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June 1992

CURRENT EXPERIMENTS IN ELEMENTARY PARTICLE PHYSICS

Particle Data Group

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Abstract – This report contains summaries of 584 current and recent experiments in elementary particle physics. Experiments that finished taking data before 1986 are excluded. Included are experiments at Brookhaven, CERN, CESR, DESY, Fermilab, Tokyo Institute of Nuclear Studies, Moscow Institute of Theoretical and Experimental Physics, KEK, LAMPF, Novosibirsk, Paul Scherrer Institut (PSI), Saclay, Serpukhov, SLAC, SSCL, and TRIUMF, and also several underground and underwater experiments. Instructions are given for remote searching of the computer database (maintained under the SLAC/SPIRES system) that contains the summaries.

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INTRODUCTION

This report contains summaries of 584 approved current and recent experiments in elementary particle physics. A glance at the summaries in the body of the report will show the kind of information given. Experiments at the following laboratories are included:

Brookhaven (BNL)
CERN
CESR
DESY
Fermilab (FNAL)
Institute for Nuclear Studies, Tokyo (INS)
Institute for Theoretical and Experimental Physics, Moscow (ITEP)
KEK
Los Alamos (LAMPF)
Novosibirsk
Paul Scherrer Institute (PSI) — formerly SIN
Saclay
Serpukhov
SLAC
SSCL
TRIUMF
Underground experiments
Underwater experiments

We exclude experiments for which the data collection was finished before 1986. The rationale for thus *in*cluding many rather old experiments is that many of them are still producing papers; note that a summary includes a list of journal papers resulting from the experiment.

We also exclude experiments mostly of interest to nuclear physicists, dealing with nuclear levels or other nuclear-structure measurements. There are of course experiments at the fuzzy borderline between particle and nuclear physics, and we have tried to make sensible choices about what experiments to include here.

Sources of information — Our first information about an experiment usually comes from the proposal for the experiment. Then we follow the progress of the experiment as best we can in laboratory reports such as "Experiments at CERN." Finally, a few months before an edition of this report is to appear, we send copies of the summaries of the experiments to the spokespersons for checking and updating. If a reply is received — as was the case for almost 80% of the experiments — there is a "✓" next to the spokesperson on the summary. Since current experiments are often in flux, we rely heavily on these replies to be up to date: no ✓ by the spokesperson means the summary may be inaccurate or incomplete. (For a handful of experiments, we verified our information with a local member of the experiment, not the spokesperson, but for simplicity put a ✓ by the spokesperson. For experiments with more than one spokesperson, all the spokespersons are checked even if only one of them replied.)

Computer database — This report is produced from a computer database maintained at SLAC under the SPIRES database management system. The database, named EXPERIMENTS, also contains information from earlier editions of this report about many experiments completed before 1986 (going back to about 1975, and including experiments at Argonne and Rutherford). See page 3 for a guide to using the EXPERIMENTS database via the remote server QSPIRES.

Summaries — Each summary lists several dates related to the experiment: the date of the proposal (in parentheses), the approval date, and when the data-taking began and was completed. The title of the proposal and the most recent list of participants are given. The detector used in the experiment is identified either by a generic name (*e.g.*, counter) or by a widely known acronym (*e.g.*, SLD). The most important reactions and particles studied and the beam energy or momentum are listed where known. A brief comment describing the apparatus and the main goals of the experiment may follow. At the end is a list of any journal articles on results or instrumentation of the experiment.

Abbreviations — To keep the summaries brief, abbreviations are used to indicate journals, kinematic variables, accelerators, and detectors. The abbreviations are usually obvious but are defined near the beginning of the report. The abbreviated forms are needed for searching the EXPERIMENTS database online.

Acknowledgments — G. Harigel and M. Varela Diaz (CERN), A. Stevens (BNL), and J. Parker (Fermilab) kindly provided computer files with data on experiments from their respective institutions, and L. Addis (SLAC) helped with the SPIRES database system. We also thank the hundreds of spokespersons who took the time to reply to our inquiries.

Comments and requests — We invite comments pointing out omissions, obscurities, out-of-date information, and errors. We also encourage spokespersons to send us proposals and letters of intent of their future experiments. Comments and other material should be sent to:

EXPERIMENTS
SLAC Library, Mail-Stop 82
SLAC, P.O. Box 4349
Stanford, CA 94309, USA
e-mail: EXPBASE@SLACVM.BITNET

Requests for additional copies of this report from the Americas, Australasia, and the Far East should go to:

EXPERIMENTS
Particle Data Group
MS 50-308
Lawrence Berkeley Laboratory
Berkeley, CA 94720, USA

Requests from other areas should go to:

CERN
Scientific Information Service
CH-1211 Geneva 23
Switzerland

SEARCHING THE "EXPERIMENTS" COMPUTER DATABASE VIA QSPIRES SERVER

General information — As mentioned in the Introduction, the summaries in this report and summaries of many earlier experiments are contained in a computer database named EXPERIMENTS maintained at SLAC under the SPIRES database management system. Anyone with an account on the SLAC's SLACVM computer may access this database by typing **SPIRES**, and then **SELECT EXPERIMENTS**. If you have a SLACVM account but are unfamiliar with SPIRES, a *Guide to VM SPIRES* is available from the SLAC Library, Mail-Stop 82, SLAC, P.O. Box 4349, Stanford, CA 94309, USA (phone: 415/926 2411). The SPIRES search procedure in the EXPERIMENTS database is thoroughly described in the previous (1989) edition of this report.

The EXPERIMENTS database is also available under different systems in Europe. The Rutherford Appleton Laboratory, and CERN, have EXPERIMENTS implemented under the HEPDATA system on their central IBM/VM and VAX/VMS computers. A guest VAX/VMS account which enables the access to HEPDATA is available on the INTERNET node 129.234.8.100 (which is also a DECNET host 19788, or DURPDG): username PDG, password HEPDATA. Contact M. Whalley, Dept. of Physics, Univ. of Durham, South Road, Durham DH1 3LE, United Kingdom, (MRW@UKACRL.BITNET) for more information. In Russia, the EXPERIMENTS is available at IHEP, Serpukhov, and JINR, Dubna. This and other IHEP high energy physics databases are managed by the BDMS/4 system and maintained by the Serpukhov COMPAS group. IHEP databases are also available on the CERN's VXCERN computer. Contact V.V. Ezhela, Inst. for High Energy Physics, 142284 Serpukhov, Moscow Region, Russia, (EZHELA@M9.IHEP.SU) for more information.

This section describes searching in the EXPERIMENTS database via the remote server QSPIRES at SLACVM. You do not need to have a SLACVM computer account to use QSPIRES. The server can be reached through e-mail from almost every international computer network, and also interactively from many BITNET sites. QSPIRES searching is free, and the only requirement is that your computer node is registered with SLAC. For more information on the registration, please contact QSPI@SLACVM.BITNET or QSPI@SLACVM.SLAC.STANFORD.EDU . Many SPIRES databases, including EXPERIMENTS, are accessible via QSPIRES. The QSPIRES search commands are similar to those used in a direct SPIRES search. An extensive *Guide to QSPIRES* is available from the SLAC Library (see the address above).

QSPIRES search commands — In the following text the **BOLDFACE UPPER CASE** letters denote the minimum part of a command. Note, however, that SPIRES and QSPIRES are case insensitive, and in an actual search you may use both lower and upper case characters and may enter either the minimum or full commands.

- Note that whenever a search value contains special characters, '(' , '>' , '<' , or '(' , the entire search value must be enclosed in double quotes.

The three most useful command verbs are **SHO**w, **BRO**wse and **FIN**d. You can formulate a variety of search commands by using these three verbs. Some examples are:

SHOw **IND**exes
(*Shows available search terms. Use these terms with* **BRO***wse and* **FIN***d.)*

BROwse **A**uthor **TRILLING**
(*Displays values in the author-name index surrounding the stated value.)*

BROwse **EXP**eriment-num
(*Gives several random values of experiment code-names.)*

BROwse **EXP**eriment-num **DESY**
(*Displays values in the code-name index alphabetically surrounding the specified value. Useful if you do not know the exact form or spelling of a search value.)*

FINd **A**uthor **RUBBIA, C** *or*
FINd **A**uthor **C RUBBIA**
(*Finds experiments in which the stated author has participated.)*

FINd **EXP**eriment-num **DESY-HERA-H1**
(*Finds the record corresponding to the specified value.)*

FINd **PAPER "PR D37 (1988) 1131"**

(Finds the experiment reported in the stated reference. Note that the reference has spaces but no commas between the elements.)

FINd **RE**action **"E+ E− −−> MU+ MU− X"**

(The "arrow" is composed of two minus signs and a 'greater-than' sign.)

FINd **AC**celerator **KEK-TRISTAN**

(Finds experiments using the stated accelerator.)

FINd **DE**tector **MARK-II**

(Finds experiments using the stated detector.)

FINd Title **CP PHASE DIFFERENCE**

(Finds experiments with the words CP, PHASE, and DIFFERENCE in the title. The order of words in the search command is unimportant.)

FINd **AF**filiation **RUTGERS U** *or*

FINd **AF**filiation **RUTGERS#**

(Finds experiments with the stated affiliation. '#' represents any remaining characters.)

FINd Particle **HIGGS**

(Finds experiments studying the specified particle.)

The following search commands are also allowed:

FINd Author **PRE**fix **PATTERS** *or*

FINd Author **PATTERS#**

(Finds authors whose last names begin with the string PATTERS, e.g., Patterson.)

FINd **EXP**eriment-num **PRE**fix **SLAC-SLC**

FINd **AF**filiation **PRE**fix **NORTHWEST**

Compound searching is also possible:

FINd Author **PERROT AND EXP**eriment-num **PRE**fix **SACLAY**

FINd **AF**filiation **BOLOGNA U AND NOT AC**celerator **CERN-SPS**

FINd Particle **J/PSI OR "PSI(2S)"**

Search commands are not the only elements in a QSPIRES search request. Often a search command has to be supplemented with additional instructions. For example, '**(IN EXPERIMENTS**', following a search command, is required to direct QSPIRES to the EXPERIMENTS database rather than the default HEP database. Such additional instructions are discussed below.

Interactive QSPIRES searching — From many BITNET nodes QSPIRES may be reached interactively. (Interactive communication is **not** possible from non-BITNET nodes!) A typical interactive search request contains one-line text beginning with the address of QSPIRES. The address is followed by a search command, and a field indicating the desired database and other instructions:

TELL QSPIRES AT SLACVM <search-command> **(IN EXPERIMENTS RES**ult

'**TELL**' is an executive command for sending interactive messages from an IBM machine running the VM operative system. The corresponding phrase on a VAX system may be '**SEND QSPIRES@SLACVM**'. For other systems, ask your local system manager for instructions. The phrase '**(IN EXPERIMENTS**', following your search command, is a mandatory part of any search request in the EXPERIMENTS database. The optional '**RES**ult' tells QSPIRES what to do with the found data: if the **RES**ult is used with **SHO**w or **BRO**wse, QSPIRES will interactively send you the complete result; if the **RES**ult is used in a search command beginning with **FIN**d, QSPIRES will interactively notify you on the number of retrieved experiments, but the actual data will not be sent:

TELL QSPIRES AT SLACVM FIN AC CESR# (IN EXPERIMENTS RES
FROM SLACVM(QSPIRES): * Result 3 Experiments

If you now want to get the retrieved records, your next message should be

TELL QSPIRES AT SLACVM OUTput

No database selection is needed with the **OUT**put command. If the search result contains too many records, try to formulate a compound search request with more criteria. An example of a possible interactive session follows:

TELL QSPIRES AT SLACVM SHO IND (IN EXPERIMENTS RES

(QSPIRES responds)

TELL QSPIRES AT SLACVM BRO DE CRYSTAL (IN EXPERIMENTS RES

(QSPIRES responds)

TELL QSPIRES AT SLACVM FIN DE CRYSTAL-BALL & AC PRE SLAC (IN EXPERIMENTS RES

(QSPIRES responds)

TELL QSPIRES AT SLACVM OUT

(QSPIRES sends the result of the search)

E-mail QSPIRES searching — People who cannot or do not want to use the interactive procedure, may reach QSPIRES through e-mail. Send your search commands to QSPIRES@SLACVM.BITNET, or QSPIRES@SLACVM.SLAC.STANFORD.EDU . Leave the *subject* line in the header of your letter empty, and send only one search command per letter, *e.g.*,

BRO PARTICLE XI (IN EXPERIMENTS RESULT

or

FIN TITLE LARGE DETECTOR (IN EXPERIMENTS RES

QSPIRES will answer through e-mail, and if you are satisfied with the number of retrieved documents, react immediately by sending the command '**OUT**put'. If the search result contains too many records, try to reformulate your request by adding more criteria.

QSPIRES waits about 30 to 40 minutes for your follow-up command (*e.g.*, '**OUT**put'). If it takes more than 20 minutes for a message to reach QSPIRES from your node, you cannot rely on follow-up search requests, and you should merge the search and output commands in a single request. You can do that by replacing '**RES**ult' in the option field with the '**FIL**e' option. For example, send the command

FIN TITLE LARGE DETECTOR AND DATE > 1984 (IN EXPERIMENTS FILE

The intermediate step in which QSPIRES reports the number of records found will be bypassed, and the retrieved records are sent immediately. Warning: if you are using this method, be sure that your search request is as restrictive as possible, by using several search criteria. Otherwise, you might be sent a file with a large number of records, and such long files travel very slowly or may even be deleted by some gateways.

Searching Problems: *There are several common reasons why a search may fail:*
(1) Any search value containing any of the special characters) > < (must be enclosed in double quotes; see the examples above for PAPER, REACTION, and PARTICLE searches.
(2) You may have used an incorrect form of the value for which you were searching, e.g., an incorrect particle or experiment code-name. To find the correct form, use the BROWSE command for the index you are searching (see above), or look in the lists of names and abbreviations beginning on page 21. Note, in particular, that in reaction and particle searches an antiparticle name is formed by following the corresponding particle name with BAR (thus the antiproton is written as PBAR); in title searches, particle names are somewhat variable in their spelling, and several forms may be used.
(3) You may have forgotten to select the EXPERIMENTS database. Always append the selection '(IN EXPERIMENTS' to your QSPIRES search request.
(4) To be able to search via QSPIRES, you must be a registered user. If you are not, please contact QSPI@SLACVM.BITNET or QSPI@SLACVM.SLAC.STANFORD.EDU .
(5) Try using 'SEND' or 'BSEND' instead of 'TELL' in interactive QSPIRES commands. Be sure BITNET is licensed on your computer.

OTHER DATABASES ACCESSIBLE WITH QSPIRES

Other SLAC public databases are available via QSPIRES. Besides EXPERIMENTS, they are are HEP, PARTICLES, CONF, HEPNAMES, INST, DATAGUIDE, and REACTION. (Refer to the *Review of Particle Properties*, Phys. Rev. **D45**, S1 (June 1992) for details on databases at other institutions.) Following is a list and brief description of these SLAC public databases:

(1) PARTICLES contains the Full Listings from this *Review of Particle Properties*, indexed by particle and particle property.
(2) HEP is a guide to particle physics preprints, journal articles, reports, theses, conference papers, etc., indexed by standard bibliographic entities as well as by citations and topics. HEP is a joint project of the SLAC and DESY libraries and, as of June 1992, contained almost 250,000 records dating from late 1974. It is updated daily with nearly 20,000 new records added each year.
(3) CONF lists past and future conferences of interest to particle physicists.
(4) HEPNAMES lists e-mail addresses of many people working in high-energy physics. As of June 1992, more than 20,000 e-mail addresses were available. Additions and corrections may be sent to:
HEPNAMES@SLACVM.BITNET.
(5) INST lists nearly 3,000 addresses (often with phone and fax numbers) of high-energy physics related institutions.
(6) DATAGUIDE, an adjunct to HEP, indexes papers containing experimental data by accelerator, detector, beam momentum, reactions, and particles studied. (Not current; see DOCUMENT under the Serpukhov databases below.)
(7) REACTIONS gives numerical data (*e.g.*, cross sections, polarizations, etc.) on reactions.
(8) EXPERIMENTS is a guide to current and past particle physics experiments, indexed similarly to HEP and DATAGUIDE.

BEAM/TARGET/MOMENTUM INDEX

Beam-target	Lab momentum (GeV/c)	Experiment
$\gamma\ e^-$	0.12–0.40	INS-ES-111
$\gamma\ p$	<1500	SERPUKHOV-UNK-003
$\gamma\ p$	50–200	CERN-NA-014/2
$\gamma\ p$	65–180	CERN-WA-069
$\gamma\ p$	100–260	FNAL-691
$\gamma\ p$	200–400	FNAL-683
γ deut	0.35–1.1	INS-ES-113
γ deut	0.4–0.8	INS-ES-112
γ deut	0.8–1.8	SLAC-NE-08
γ deut	1–3	SLAC-NE-17
γ He	0.13–0.45	INS-ES-120
γ He	0.17–0.27	INS-ES-116
$\gamma\ ^3$He	0.13–0.45	INS-ES-123
$\gamma\ ^3$He	0.38–0.70	INS-ES-124
$\gamma\ ^6$Li	0.15–0.45	INS-ES-127
$\gamma\ ^{12}$C	0.78–1.1	INS-ES-125
γ nucleus	<1	INS-ES-121
γ nucleus	<1	INS-ES-126
γ nucleus	0.25–1.05	INS-ES-118
γ nucleus	5–25	SERPUKHOV-170
γ nucleus	70–200	CERN-EMU-006
γ nucleus	200–500	FNAL-687
γ crystal	15–150	CERN-WA-081
γ crystal	?	CERN-NA-046
MOMENTUM RANGES FOR NEUTRINO BEAMS ARE NOT DEFINED VERY SYSTEMATICALLY		
$\nu\ e^-$	?	UNDERGROUND-KAMIOKANDE-II/III
$\nu\ e^-$	?	UNDERGROUND-LVD
$\nu\ e^-$	?	UNDERGROUND-SUDBURY
ν C	<0.2	LAMPF-1173
$\nu_e\ e^-$	<70	SERPUKHOV-152
$\nu_e\ e^-$	0.020–0.053	LAMPF-225
ν_e nucleon	<70	SERPUKHOV-152
ν_e nucleon	5–30	SERPUKHOV-136
ν_e deut	?	UNDERGROUND-SUDBURY
ν_e C	<0.2	LAMPF-1173
ν_e C	?	UNDERGROUND-LVD
$\nu_e\ ^{12}$C	0.020–0.053	LAMPF-225
$\nu_e\ ^{37}$Cl	?	LAMPF-1213
$\nu_e\ ^{37}$Cl	?	UNDERGROUND-HOMESTAKE
$\nu_e\ ^{71}$Ga	?	UNDERGROUND-GALLEX
$\nu_e\ ^{71}$Ga	?	UNDERGROUND-SAGE
$\nu_e\ ^{127}$I	?	LAMPF-1213
ν_e nucleus	3–30	SERPUKHOV-107
$\bar{\nu}_e\ p$	?	UNDERGROUND-KAMIOKANDE-II/III
$\bar{\nu}_e\ p$	?	UNDERGROUND-LVD
$\bar{\nu}_e\ p$	?	UNDERGROUND-SUDBURY
$\bar{\nu}_e$ nucleon	5–30	SERPUKHOV-136
$\bar{\nu}_e$ deut	?	UNDERGROUND-SUDBURY
$\bar{\nu}_e$ C	?	UNDERGROUND-LVD
$\nu_\mu\ e^-$	<12	BNL-734
$\nu_\mu\ e^-$	<70	SERPUKHOV-152
$\nu_\mu\ e^-$	5–100	CERN-WA-079
$\nu_\mu\ p$	<0.2	LAMPF-1173
$\nu_\mu\ p$	<12	BNL-734
$\nu_\mu\ p$	3–30	SERPUKHOV-107
$\nu_\mu\ p$	5–20	SERPUKHOV-145
$\nu_\mu\ n$	<12	BNL-734
$\nu_\mu\ n$	3–30	SERPUKHOV-107
$\nu_\mu\ n$	5–20	SERPUKHOV-145
ν_μ nucleon	<70	SERPUKHOV-152
ν_μ nucleon	3–30	SERPUKHOV-128
ν_μ nucleon	5–30	SERPUKHOV-136
ν_μ C	<0.2	LAMPF-1173
ν_μ nucleus	<500	FNAL-733
ν_μ nucleus	<400	FNAL-744
ν_μ nucleus	<500	FNAL-745
ν_μ nucleus	<600	FNAL-770
ν_μ nucleus	3–30	SERPUKHOV-107
ν_μ nucleus	10–400	FNAL-632
$\bar{\nu}_\mu\ e^-$	<12	BNL-734
$\bar{\nu}_\mu\ e^-$	5–100	CERN-WA-079
$\bar{\nu}_\mu\ p$	<12	BNL-734
$\bar{\nu}_\mu\ p$	3–30	SERPUKHOV-107
$\bar{\nu}_\mu\ n$	<12	BNL-734
$\bar{\nu}_\mu$ nucleon	5–30	SERPUKHOV-136
$\bar{\nu}_\mu$ nucleus	<500	FNAL-733
$\bar{\nu}_\mu$ nucleus	<400	FNAL-744
$\bar{\nu}_\mu$ nucleus	<600	FNAL-770
$\bar{\nu}_\mu$ nucleus	3–30	SERPUKHOV-107
$\bar{\nu}_\mu$ nucleus	10–400	FNAL-632
ν_τ nucleon	?	CERN-WA-095
e^+ crystal	>30	CERN-NA-043
e^+ crystal	50–300	CERN-NA-043/2
$e^-\ p$	0.73–1.28	SLAC-NE-04
$e^-\ p$	1.5–10	SLAC-NE-11
$e^-\ p$	3–10	SLAC-E-140X
$e^-\ p$	3–21	SLAC-E-140
$e^-\ p$	22.7	SLAC-E-143
e^- nucleon	1.90–5.10	SLAC-NE-18
e^- deut	0.575	SLAC-NE-01
e^- deut	0.65	SLAC-NE-01
e^- deut	0.73–1.28	SLAC-NE-04
e^- deut	1	SLAC-NE-01
e^- deut	1.5–10	SLAC-NE-11
e^- deut	2	SLAC-NE-01
e^- deut	3–10	SLAC-E-140X
e^- deut	3–21	SLAC-E-140
e^- deut	22.7	SLAC-E-143
e^- deut	?	PSI-Z-89/02
e^- He	0.9–4.3	SLAC-NE-09
e^- He	1	SLAC-NE-05
e^- He	1.5	SLAC-NE-05
e^- He	3.6	SLAC-NE-03
e^- He	9	SLAC-NE-03
$e^-\ ^3$He	0.9–4.3	SLAC-NE-09
$e^-\ ^3$He	22.7	SLAC-E-142
$e^-\ ^{12}$C	0.575	SLAC-NE-01
$e^-\ ^{12}$C	0.65	SLAC-NE-01
$e^-\ ^{12}$C	1	SLAC-NE-01
$e^-\ ^{12}$C	1	SLAC-NE-05
$e^-\ ^{12}$C	1.5	SLAC-NE-05
$e^-\ ^{12}$C	2	SLAC-NE-01
$e^-\ ^{12}$C	3.6	SLAC-NE-03
$e^-\ ^{12}$C	9	SLAC-NE-03
e^- Al	1.5–10	SLAC-NE-11
$e^-\ ^{27}$Al	0.9–4.3	SLAC-NE-09
$e^-\ ^{27}$Al	1	SLAC-NE-05
$e^-\ ^{27}$Al	1.5	SLAC-NE-05
$e^-\ ^{27}$Al	3.6	SLAC-NE-03
$e^-\ ^{27}$Al	9	SLAC-NE-03
e^- Si	1.2	INS-ES-122
e^- Si	1.2	INS-ES-128
e^- Fe	3–21	SLAC-E-140
$e^-\ ^{56}$Fe	0.575	SLAC-NE-01
$e^-\ ^{56}$Fe	0.65	SLAC-NE-01
$e^-\ ^{56}$Fe	0.9–4.3	SLAC-NE-09
$e^-\ ^{56}$Fe	1	SLAC-NE-01
$e^-\ ^{56}$Fe	1	SLAC-NE-05
$e^-\ ^{56}$Fe	1.5	SLAC-NE-05
$e^-\ ^{56}$Fe	2	SLAC-NE-01

BEAM/TARGET/MOMENTUM INDEX

Beam-target	Lab momentum (GeV/c)	Experiment
e^- ^{56}Fe	3.6	SLAC-NE-03
e^- ^{56}Fe	9	SLAC-NE-03
e^- ^{120}Sn	1	SLAC-NE-05
e^- ^{120}Sn	1.5	SLAC-NE-05
e^- Wt	2.5	KEK-PF-000
e^- Au	3–21	SLAC-E-140
e^- ^{197}Au	1	SLAC-NE-05
e^- ^{197}Au	1.5	SLAC-NE-05
e^- ^{197}Au	3.6	SLAC-NE-03
e^- ^{197}Au	9	SLAC-NE-03
e^- nucleus	30	SERPUKHOV-170
e^- nucleus	350	FNAL-774
e^- crystal	1.2	INS-ES-117
e^- crystal	1.2	INS-ES-119
e^- crystal	>30	CERN-NA-043
e^- crystal	50–300	CERN-NA-043–2
$e^\pm$ crystal	20–200	CERN-NA-042

Beam-target	C.m. energy (GeV)	Experiment
e^+ e^-	<1.40	NOVOSIBIRSK-ND
e^+ e^-	<1.40	NOVOSIBIRSK-SND
e^+ e^-	<70	KEK-TE-001
e^+ e^-	<70	KEK-TE-002
e^+ e^-	<70	KEK-TE-003
e^+ e^-	<100	CERN-LEP-L3
e^+ e^-	<100	SLAC-SLC-SLD
e^+ e^-	<100	SLAC-SLC-6
e^+ e^-	<120	CERN-LEP-ALEPH
e^+ e^-	<120	CERN-LEP-OPAL
e^+ e^-	<200	CERN-LEP-DELPHI
e^+ e^-	0.36–1.40	NOVOSIBIRSK-CMD-2
e^+ e^-	3.1	SLAC-SP-032
e^+ e^-	3.69	SLAC-SP-032
e^+ e^-	3.77	SLAC-SP-032
e^+ e^-	4.14	SLAC-SP-032
e^+ e^-	4.40–11.2	DESY-DORIS-CRYSTAL-BALL
e^+ e^-	9–12	CESR-CLEO
e^+ e^-	9.3–10.6	DESY-DORIS-ARGUS
e^+ e^-	9.4–11.6	CESR-CUSB-II
e^+ e^-	10–44	DESY-PETRA-JADE
e^+ e^-	12–47	DESY-PETRA-MARK-J
e^+ e^-	12–47	DESY-PETRA-TASSO
e^+ e^-	14.0–47.3	DESY-PETRA-CELLO
e^+ e^-	29	SLAC-PEP-04/09
e^+ e^-	29	SLAC-PEP-06
e^+ e^-	29	SLAC-PEP-12
e^+ e^-	29	SLAC-PEP-21
e^+ e^-	50.0–60.8	KEK-TE-004

Beam-target	Lab momentum (GeV/c)	Experiment
μ^+ e^-	0.005	LAMPF-869
μ^+ e^-	0.020	PSI-R-89–06
μ^+ e^-	0.020–0.029	TRIUMF-304
μ^+ C	0.0006–0.0030	PSI-R-91–08
μ^- p	0	TRIUMF-452
μ^- deut	0	TRIUMF-297
μ^- He	0	BNL-745
μ^- C	0.0006–0.0030	PSI-R-91–08
μ^- ^{23}Na	0	TRIUMF-612
μ^- ^{27}Al	0	TRIUMF-612
μ^- ^{35}Cl	0	TRIUMF-612
μ^- nucleus	0	SIN-R-81–02
μ^- nucleus	0.09	PSI-R-87–03

Beam-target	Lab momentum (GeV/c)	Experiment
muon p	<750	FNAL-665
muon p	90	CERN-NA-037
muon p	100–200	CERN-NA-047
muon p	120	CERN-NA-037
muon p	280	CERN-NA-037
muon deut	<750	FNAL-665
muon deut	90	CERN-NA-037
muon deut	100–200	CERN-NA-047
muon deut	120	CERN-NA-037
muon deut	280	CERN-NA-037
muon nucleus	<750	FNAL-665
muon nucleus	50.1	FNAL-843
muon nucleus	90	CERN-NA-037
muon nucleus	100	FNAL-843
muon nucleus	120	CERN-NA-037
muon nucleus	200	CERN-NA-037
muon nucleus	280	CERN-NA-037
muon nucleus	300	FNAL-782
muon nucleus	420	FNAL-802
muon nucleus	490	FNAL-843
pion deut	0.234	TRIUMF-375
pion deut	0.286	TRIUMF-375
pion deut	0.339	TRIUMF-375
pion nucleus	>9.64	FNAL-667
pion nucleus	40	FNAL-770
pion nucleus	70	FNAL-770
pion nucleus	100	FNAL-770
pion nucleus	250	FNAL-769
π^+ p	0.077–0.150	TRIUMF-394
π^+ p	0.096–0.195	PSI-R-85–13–3
π^+ p	0.121	LAMPF-1256
π^+ p	0.128–0.364	LAMPF-1190
π^+ p	0.131	TRIUMF-530
π^+ p	0.146	TRIUMF-530
π^+ p	0.152	TRIUMF-530
π^+ p	0.152	TRIUMF-399
π^+ p	0.152	LAMPF-1256
π^+ p	0.158	TRIUMF-530
π^+ p	0.182	TRIUMF-441
π^+ p	0.184	TRIUMF-530
π^+ p	0.219	TRIUMF-441
π^+ p	0.221	TRIUMF-530
π^+ p	0.225–0.310	TRIUMF-598
π^+ p	0.226	TRIUMF-530
π^+ p	0.247–0.378	TRIUMF-645
π^+ p	0.254	TRIUMF-441
π^+ p	0.265–0.375	LAMPF-1179
π^+ p	0.279	TRIUMF-561
π^+ p	0.288	TRIUMF-441
π^+ p	0.292	TRIUMF-561
π^+ p	0.299	TRIUMF-561
π^+ p	0.313	TRIUMF-561
π^+ p	0.321	TRIUMF-441
π^+ p	0.342–0.469	TRIUMF-624
π^+ p	0.353	TRIUMF-441
π^+ p	0.380	TRIUMF-446
π^+ p	0.385	TRIUMF-441
π^+ p	0.471–0.625	LAMPF-806
π^+ p	0.471–0.687	LAMPF-849
π^+ p	4	ITEP-843
π^+ p	6	BNL-838
π^+ p	6	KEK-179
π^+ p	60–70	SERPUKHOV-161
π^+ p	80	CERN-WA-069
π^+ p	85	CERN-WA-076
π^+ p	140	CERN-WA-069
π^+ p	280	CERN-WA-070
π^+ n	2	ITEP-875

BEAM/TARGET/MOMENTUM INDEX

Beam-target	Lab momentum (GeV/c)	Experiment
π^+ nucleon	530	FNAL-706
π^+ deut	0.032	LAMPF-1085
π^+ deut	0.038	LAMPF-828
π^+ deut	0.038	LAMPF-1085
π^+ deut	0.053	LAMPF-1085
π^+ deut	0.054	LAMPF-828
π^+ deut	0.066	LAMPF-828
π^+ deut	0.067	LAMPF-1085
π^+ deut	0.078	LAMPF-1085
π^+ deut	0.087	TRIUMF-506
π^+ deut	0.096	TRIUMF-399
π^+ deut	0.096 0.169	LAMPF-767
π^+ deut	0.121	TRIUMF-506
π^+ deut	0.128	TRIUMF-399
π^+ deut	0.128	TRIUMF-502
π^+ deut	0.150	TRIUMF-506
π^+ deut	0.150	TRIUMF-399
π^+ deut	0.195 0.410	TRIUMF-337
π^+ deut	0.246 0.370	TRIUMF-377
π^+ deut	0.265	TRIUMF-360
π^+ deut	0.310 0.417	LAMPF-979
π^+ deut	0.331 0.417	LAMPF-1096
π^+ deut	0.353	TRIUMF-508
π^+ deut	0.364	TRIUMF-443
π^+ deut	0.370	TRIUMF-503
π^+ deut	0.396	TRIUMF-443
π^+ trit	0.128 0.331	SIN-R-85 11
π^+ He	0.128 0.331	SIN-R-85 11
π^+ He	0.242	LAMPF-898
π^+ He	0.288	LAMPF-998
π^+ He	0.374	LAMPF-898
π^+ He	0.396	TRIUMF-556
π^+ He	1	KEK-217
π^+ ^{3}He	0.195	TRIUMF-557
π^+ ^{7}Li	300	FNAL-705
π^+ C	3	ITEP-841
π^+ ^{12}C	1	KEK-217
π^+ ^{12}C	1.05	KEK-160
π^+ ^{12}C	4	KEK-132
π^+ Ti	1.4	ITEP-853
π^+ Fe	1.4	ITEP-853
π^+ Pb	3	ITEP-841
π^+ nucleus	0.5 1.5	KEK-157
π^+ nucleus	0.8	BNL-828
π^+ nucleus	1 1.2	KEK-150
π^+ nucleus	1 9	ITEP-77[illegible]
π^+ nucleus	1.05	BNL-798
π^- p	0	PSI-R-86 05
π^- p	0	SIN-R-85 10
π^- p	0	SIN-R-85 14
π^- p	0.054 0.077	TRIUMF-643
π^- p	0.077 0.150	TRIUMF-394
π^- p	0.096 0.195	PSI-R-85 13 3
π^- p	0.100 0.150	LAMPF-808
π^- p	0.121	LAMPF-1256
π^- p	0.121 0.195	LAMPF-1178
π^- p	0.130	TRIUMF-560
π^- p	0.152	LAMPF-1256
π^- p	0.182	TRIUMF-441
π^- p	0.195 0.364	TRIUMF-537
π^- p	0.219	TRIUMF-441
π^- p	0.225 0.310	TRIUMF-598
π^- p	0.247 0.378	TRIUMF-645
π^- p	0.254	TRIUMF-441
π^- p	0.279	TRIUMF-561
π^- p	0.288	TRIUMF-441
π^- p	0.292	TRIUMF-561
π^- p	0.299	TRIUMF-561
π^- p	0.3 0.5	BNL-857
π^- p	0.313	TRIUMF-561
π^- p	0.321	TRIUMF-441
π^- p	0.342 0.469	TRIUMF-624
π^- p	0.35 0.45	SIN-R-86 02
π^- p	0.353	TRIUMF-441
π^- p	0.385	TRIUMF-441
π^- p	0.471 0.625	LAMPF-806
π^- p	0.471 0.687	LAMPF-849
π^- p	0.9 2	ITEP-864
π^- p	4.35	ITEP-829
π^- p	4.5	ITEP-827
π^- p	4.5	ITEP-828
π^- p	4.85	ITEP-829
π^- p	6	BNL-838
π^- p	6	KEK-179
π^- p	8	BNL-771
π^- p	8	BNL-881
π^- p	8.95	KEK-135
π^- p	12	BNL-818
π^- p	18	BNL-852
π^- p	22	BNL-747
π^- p	32	SERPUKHOV-169
π^- p	32	SERPUKHOV-172
π^- p	37	SERPUKHOV-164
π^- p	38	SERPUKHOV-140
π^- p	40	SERPUKHOV-112
π^- p	40	SERPUKHOV-147
π^- p	40	SERPUKHOV-149
π^- p	40	SERPUKHOV-155
π^- p	40	SERPUKHOV-173
π^- p	40 50	SERPUKHOV-148
π^- p	60 70	SERPUKHOV-161
π^- p	80	CERN-WA-069
π^- p	140	CERN-WA-069
π^- p	200 2400	SERPUKHOV-UNK-002
π^- p	280	CERN-WA-070
π^- p	280	CERN-WA-083
π^- p	300	CERN-NA-012 2
π^- n	300	CERN-NA-012 2
π^- nucleon	40	SERPUKHOV-163
π^- nucleon	500 2500	SERPUKHOV-UNK-002
π^- nucleon	530	FNAL-706
π^- deut	0	PSI-R-86 05
π^- deut	0.096	TRIUMF-399
π^- deut	0.096 0.169	LAMPF-767
π^- deut	>0.075	LAMPF-1182
π^- deut	0.128	TRIUMF-399
π^- deut	0.128	TRIUMF-502
π^- deut	0.150	TRIUMF-399
π^- deut	0.246 0.370	TRIUMF-377
π^- deut	0.331 0.417	LAMPF-1096
π^- deut	0.370	TRIUMF-503
π^- deut	0.408	LAMPF-981
π^- deut	0.9 2	ITEP-863
π^- deut	0.9 3	ITEP-762
π^- deut	40	SERPUKHOV-149
π^- deut	0	PSI-R-86 05
π^- trit	0.128 0.331	SIN-R-85 11
π^- He	0.128 0.331	SIN-R-85 11
π^- He	0.242	LAMPF-898
π^- He	0.288	LAMPF-998
π^- He	0.374	LAMPF-898
π^- ^{6}Li	4	KEK-187
π^- ^{7}Li	300	FNAL-705
π^- Be	150	CERN-WA-077
π^- Be	300	CERN-WA-077
π^- C	1.2	ITEP-841
π^- C	1.5 3	ITEP-826
π^- C	3	ITEP-841
π^- C	5	ITEP-841

BEAM/TARGET/MOMENTUM INDEX

Beam-target	Lab momentum (GeV/c)	Experiment
π^- C	5	ITEP-826
π^- ^{12}C	4	KEK-132
π^- Al	1.2	ITEP-841
π^- Al	3	ITEP-841
π^- Al	5	ITEP-841
π^- Si	40	SERPUKHOV-157
π^- Si	200	CERN-NA-032
π^- Ti	1.4	ITEP-853
π^- Fe	1.4	ITEP-853
π^- Cu	1.2	ITEP-841
π^- Cu	3	ITEP-841
π^- Cu	5	ITEP-841
π^- Cu	230	CERN-NA-032
π^- Cd	1.2	ITEP-841
π^- Cd	3	ITEP-841
π^- Cd	5	ITEP-841
π^- Xe	0	ITEP-851
π^- Xe	0.4	ITEP-851
π^- Xe	1	ITEP-851
π^- Pb	1.2	ITEP-841
π^- Pb	1.5 3	ITEP-826
π^- Pb	3	ITEP-841
π^- Pb	5	ITEP-841
π^- Pb	5	ITEP-826
π^- nucleus	0.7 1.3	ITEP-901
π^- nucleus	1 9	ITEP-771
π^- nucleus	2.5	ITEP-813
π^- nucleus	3	ITEP-813
π^- nucleus	5	ITEP-872
π^- nucleus	5	ITEP-813
π^- nucleus	6 15	BNL-850
π^- nucleus	40	SERPUKHOV-112
π^- nucleus	40	SERPUKHOV-148
π^- nucleus	40	SERPUKHOV-155
π^- nucleus	40 50	SERPUKHOV-148
π^- nucleus	340	CERN-WA-082
π^- nucleus	350	CERN-WA-084
π^- nucleus	500	FNAL-791
π^- nucleus	500	FNAL-672A
π^- nucleus	600	FNAL-653
kaon nucleus	40	FNAL-770
kaon nucleus	70	FNAL-770
kaon nucleus	100	FNAL-770
kaon nucleus	250	FNAL-769
K^+ p	6	BNL-838
K^+ p	80	CERN-WA-069
K^+ p	140	CERN-WA-069
K^+ deut	0.45 0.80	BNL-835
K^+ nucleon	200 2000	SERPUKHOV-UNK-002
K^+ Xe	<0.80	ITEP-871
K^+ Xe	0.56 0.81	ITEP-814
K^+ Xe	0.79	ITEP-802
K^+ nucleus	0.45 0.80	BNL-835
K^+ nucleus	0.60 0.72	BNL-874
K^- p	0	BNL-811
K^- p	1.8	BNL-813
K^- p	1.8	BNL-885
K^- p	2	BNL-886
K^- p	6	BNL-771
K^- p	6	BNL-838
K^- p	8	BNL-881
K^- p	22	BNL-747
K^- p	32	SERPUKHOV-172
K^- p	40	SERPUKHOV-112
K^- p	40	SERPUKHOV-147
K^- p	40	SERPUKHOV-149
K^- p	40	SERPUKHOV-173
K^- p	40 50	SERPUKHOV-148
K^- p	80	CERN-WA-069
K^- p	140	CERN-WA-069
K^- p	200 2400	SERPUKHOV-UNK-002
K^- deut	0	BNL-811
K^- deut	0.87	BNL-773
K^- deut	40	SERPUKHOV-149
K^- He	0.6	BNL-774
K^- He	0.75	BNL-788
K^- ^{3}He	0.715	BNL-829
K^- ^{3}He	0.87	BNL-820
K^- ^{3}He	1.8	BNL-836
K^- ^{6}Li	0.75	BNL-788
K^- ^{12}C	1.8	BNL-885
K^- Si	40	SERPUKHOV-157
K^- Si	200	CERN-NA-032
K^- Xe	<0.8	ITEP-871
K^- nucleus	0.60	BNL-887
K^- nucleus	0.60 0.72	BNL-874
K^- nucleus	0.65	KEK-166
K^- nucleus	0.65	KEK-175
K^- nucleus	0.80	BNL-781
K^- nucleus	1.65	KEK-176
K^- nucleus	1.65	KEK-224
K^- nucleus	40	SERPUKHOV-112
K^- nucleus	40	SERPUKHOV-148
K^- nucleus	40 50	SERPUKHOV-148
K^- nucleus	?	KEK-167B

pp COLLIDING BEAM EXPERIMENTS ARE MERGED IN WITH FIXED-TARGET EXPERIMENTS BY GIVING THE EQUIVALENT LAB MOMENTUM FOR SCATTERING ON A STATIONARY PROTON

p p	0.221	PSI-Z-84 02
p p	0.272	PSI-Z-84 02
p p	0.346 3.37	KEK-174
p p	0.511 0.745	SACLAY-173
p p	0.683	TRIUMF-497/287
p p	0.777 1.09	TRIUMF-301
p p	0.794	TRIUMF-552
p p	0.8	TRIUMF-552
p p	0.826 1.81	SACLAY-144
p p	0.846 1.70	SACLAY-209
p p	0.862	SACLAY-123
p p	0.874	SACLAY-123
p p	0.883	SACLAY-123
p p	0.94 2.44	SACLAY-052 2
p p	0.982 1.09	TRIUMF-633
p p	1 2	SACLAY-106
p p	1.04	TRIUMF-544
p p	1.06 1.17	SACLAY-129
p p	1.09 1.46	LAMPF-1072
p p	1.1	TRIUMF-496
p p	1.1 1.5	LAMPF-1027
p p	1.1	TRIUMF-300
p p	1.2 3.8	SACLAY-104
p p	1.28	LAMPF-583
p p	1.28	LAMPF-709
p p	1.28	LAMPF-790
p p	1.38	LAMPF-1035
p p	1.46	SACLAY-132
p p	1.46	LAMPF-583
p p	1.46	LAMPF-709
p p	1.46	LAMPF-790
p p	1.6	ITEP-893
p p	1.81 3.52	SACLAY-225
p p	1.92 3.72	SACLAY-177
p p	1.98	SACLAY-174
p p	1.99	SACLAY-174
p p	1.99	SACLAY-174
p p	1.99	SACLAY-174
p p	2.03	SACLAY-174
p p	2.09	SACLAY-174
p p	2.2	SACLAY-174

BEAM/TARGET/MOMENTUM INDEX

Beam-target	Lab momentum (GeV/c)	Experiment
p p	2.25	SACLAY-212
p p	2.31	SACLAY-174
p p	2.57	SACLAY-212
p p	2.89	SACLAY-212
p p	3.23	SACLAY-174
p p	3.31	SACLAY-132
p p	3.52	SACLAY-244
p p	3.8	SACLAY-213
p p	6	BNL-834
p p	6	BNL-838
p p	6–20	BNL-850
p p	10	BNL-834
p p	12	KEK-248
p p	12	BNL-834
p p	13–26	BNL-782
p p	13.5	BNL-785
p p	18.5	BNL-785
p p	24	BNL-794
p p	28	BNL-794
p p	60–70	SERPUKHOV-161
p p	70	SERPUKHOV-149
p p	70	SERPUKHOV-155
p p	85	CERN-WA-076
p p	200	FNAL-581/704
p p	280	CERN-WA-070
p p	300	CERN-WA-076
p p	314	CERN-UA-006
p p	400–3000	SERPUKHOV-UNK-001
p p	450	CERN-NA-012–2
p p	450	CERN-WA-091
p p	800	FNAL-743
p p	2190	SERPUKHOV-UNK-008
p p	3000	SERPUKHOV-UNK-003
p p	6000	SERPUKHOV-UNK-004
p p	6300	SERPUKHOV-UNK-005
p p	?	SACLAY-113
p p	?	SACLAY-121
p p	?	SACLAY-237
p n	<70	SERPUKHOV-119
p n	<70	SERPUKHOV-174
p n	0.346–3.37	KEK-174
p n	0.375	PSI-Z-91–02
p n	0.876–1.08	TRIUMF-460
p n	1.6	ITEP-893
p n	1.81–3.52	SACLAY-225
p nucleon	70	SERPUKHOV-169
p nucleon	70	SERPUKHOV-136
p nucleon	500–3000	SERPUKHOV-UNK-002
p nucleon	530	FNAL-706
p nucleon	800	FNAL-706
p nucleon	1000–3000	SERPUKHOV-UNK-002
p deut	0.3	PSI-Z-85–06
p deut	>0.414	SACLAY-198
p deut	0.644	TRIUMF-482
p deut	0.679	TRIUMF-332
p deut	0.793	TRIUMF-482
p deut	0.846	TRIUMF-332
p deut	0.954	TRIUMF-482
p deut	0.989	TRIUMF-332
p deut	1.08	TRIUMF-332
p deut	1.09	LAMPF-853
p deut	1.28	LAMPF-853
p deut	1.28	LAMPF-1119
p deut	1.46	LAMPF-853
p deut	1.46	LAMPF-1119
p deut	1.46	LAMPF-795
p deut	1.46	LAMPF-818
p deut	1.59	SACLAY-174
p deut	1.59	SACLAY-174
p deut	3.37	KEK-159
p deut	70	SERPUKHOV-149
p deut	800	FNAL-772
p deut	?	SACLAY-113
p deut	?	SACLAY-197
p deut	?	SACLAY-222
p deut	?	SACLAY-237
p trit	1.41	LAMPF-1135
p trit	1.44	LAMPF-1135
p trit	1.46	LAMPF-1135
p He	0.912	LAMPF-973
p He	1.26	LAMPF-973
p He	1.38	LAMPF-973
p He	1.46	LAMPF-973
p ^{3}He	0.793	TRIUMF-541
p ^{3}He	0.912	LAMPF-973
p ^{3}He	1.26	LAMPF-973
p ^{3}He	1.38	LAMPF-973
p ^{3}He	1.46	LAMPF-973
p ^{6}Li	2	ITEP-874
p ^{7}Li	2	ITEP-874
p ^{7}Li	300	FNAL-705
p Be	2	ITEP-874
p Be	22	BNL-817
p Be	450	CERN-NA-034
p Be	451	CERN-NA-044
p Be	800	FNAL-756
p Be	800	FNAL-800
p Be	900	FNAL-711
p C	3	ITEP-841
p C	3.37	KEK-159
p C	4.5	ITEP-826
p C	7.5	ITEP-841
p C	7.5	ITEP-826
p C	70	SERPUKHOV-168
p ^{12}C	0.07	PSI-Z-90–07
p ^{12}C	1.99	SACLAY-174
p ^{12}C	2.2	SACLAY-174
p ^{12}C	2.31	SACLAY-174
p ^{12}C	4	KEK-132
p Mg	70	SERPUKHOV-168
p Al	7.5	ITEP-895
p Si	200	CERN-NA-032
p Si	800–925	FNAL-771
p Su	451	CERN-NA-044
p Cu	0.87–0.92	TRIUMF-298
p Cu	3.37	KEK-159
p Cu	30	FNAL-776
p Cu	70	SERPUKHOV-168
p Cu	150	FNAL-776
p Cu	400	FNAL-776
p Cu	800	FNAL-776
p Wt	1000	FNAL-793
p Pb	3	ITEP-841
p Pb	4.5	ITEP-826
p Pb	7.5	ITEP-841
p Pb	7.5	ITEP-826
p Pb	7.5	ITEP-895
p Pb	451	CERN-NA-044
p ^{197}Au	800	FNAL-792
p ^{238}U	202	CERN-NA-038
p nucleus	0.808–0.982	SACLAY-155
p nucleus	1–9	ITEP-771
p nucleus	1–10	ITEP-873
p nucleus	1.46	SACLAY-192
p nucleus	1.46–1.92	SERPUKHOV-171
p nucleus	1.5	KEK-173
p nucleus	2.2	ITEP-894
p nucleus	2.36	SACLAY-192
p nucleus	2.89	SACLAY-133
p nucleus	3	ITEP-813
p nucleus	3.50–5	KEK-257
p nucleus	3.52	SACLAY-133
p nucleus	4.54–10.1	ITEP-831
p nucleus	5	ITEP-813
p nucleus	6	BNL-834
p nucleus	6–20	BNL-850

BEAM/TARGET/MOMENTUM INDEX

Beam-target	Lab momentum (GeV/c)	Experiment
p nucleus	7.5	ITEP-894
p nucleus	7.5	ITEP-813
p nucleus	9.96	ITEP-842
p nucleus	10	BNL-834
p nucleus	10	BNL-855
p nucleus	10.9	ITEP-831
p nucleus	12	KEK-136
p nucleus	12	BNL-834
p nucleus	14.6	BNL-802
p nucleus	15–65	SERPUKHOV-153
p nucleus	15.5	BNL-878
p nucleus	16	BNL-810
p nucleus	16	BNL-814
p nucleus	18	BNL-855
p nucleus	60.5	CERN-NA-045
p nucleus	60.9	CERN-NA-035
p nucleus	70	SERPUKHOV-120
p nucleus	70	SERPUKHOV-155
p nucleus	201	CERN-NA-035
p nucleus	202	CERN-NA-045
p nucleus	203	CERN-WA-080
p nucleus	250	FNAL-769
p nucleus	370	CERN-WA-082
p nucleus	400	FNAL-605
p nucleus	400–3000	SERPUKHOV-UNK-001
p nucleus	450	CERN-NA-034–2
p nucleus	500	FNAL-672A
p nucleus	800	FNAL-605
p nucleus	800	FNAL-672A
p nucleus	800	FNAL-653
p nucleus	800	FNAL-761
p nucleus	800	FNAL-772
p nucleus	?	BNL-888
p nucleus	?	FNAL-766
p nucleus	?	SACLAY-237
$\bar{p}$ p	0	CERN-PS-170
$\bar{p}$ p	0	CERN-PS-171
$\bar{p}$ p	0	CERN-PS-174
$\bar{p}$ p	0	CERN-PS-175
$\bar{p}$ p	0	CERN-PS-182
$\bar{p}$ p	0	CERN-PS-183
$\bar{p}$ p	0	CERN-PS-195
$\bar{p}$ p	<0.2	CERN-PS-179
$\bar{p}$ p	<0.3	CERN-PS-183
$\bar{p}$ p	<1.8	CERN-PS-201
$\bar{p}$ p	<2	CERN-PS-197
$\bar{p}$ p	<2	CERN-PS-170
$\bar{p}$ p	0.1–0.6	CERN-PS-178
$\bar{p}$ p	0.15–0.60	CERN-PS-173
$\bar{p}$ p	0.22–0.80	CERN-PS-172
$\bar{p}$ p	0.3–0.7	CERN-PS-198
$\bar{p}$ p	0.30–1.55	CERN-PS-172
$\bar{p}$ p	0.36–0.76	KEK-131
$\bar{p}$ p	0.5–1.3	CERN-PS-199
$\bar{p}$ p	0.6–1.9	CERN-PS-202
$\bar{p}$ p	1.2–2	CERN-PS-185
$\bar{p}$ p	3–7	FNAL-760
$\bar{p}$ p	5	BNL-771
$\bar{p}$ p	6	BNL-838
$\bar{p}$ p	8	BNL-881
$\bar{p}$ p	40–50	SERPUKHOV-148
$\bar{p}$ p	200	FNAL-581/704
$\bar{p}$ p	200-2400	SERPUKHOV-UNK-002

HERE, FOR THE REST OF $\bar{p}p$, WE SWITCH FROM LAB MOMENTUM TO C.M. ENERGY

Beam-target	C.m. energy (GeV)	Experiment
$\bar{p}$ p	24.3	CERN-UA-006
$\bar{p}$ p	300	FNAL-710
$\bar{p}$ p	300–2000	FNAL-713
$\bar{p}$ p	500–2000	FNAL-741
$\bar{p}$ p	500–2000	FNAL-775
$\bar{p}$ p	540	CERN-UA-001
$\bar{p}$ p	546	FNAL-710
$\bar{p}$ p	630	CERN-UA-001
$\bar{p}$ p	630	CERN-UA-002
$\bar{p}$ p	630	CERN-UA-004–2
$\bar{p}$ p	630	CERN-UA-007
$\bar{p}$ p	630	CERN-UA-008
$\bar{p}$ p	1000	FNAL-710
$\bar{p}$ p	1800	FNAL-710
$\bar{p}$ p	2000	FNAL-735
$\bar{p}$ p	2000	FNAL-740
$\bar{p}$ p	6000	SERPUKHOV-UNK-004
$\bar{p}$ p	6000	SERPUKHOV-UNK-005

Beam-target	Lab momentum (GeV/c)	Experiment
$\bar{p}$ deut	0	CERN-PS-174
$\bar{p}$ deut	0	CERN-PS-175
$\bar{p}$ deut	<0.2	CERN-PS-179
$\bar{p}$ deut	<1.8	CERN-PS-201
$\bar{p}$ deut	0.3–0.7	CERN-PS-198
$\bar{p}$ He	0	CERN-PS-175
$\bar{p}$ He	<0.6	CERN-PS-179
$\bar{p}$ He	0.10E-04–0.0001	CERN-PS-194–3
$\bar{p}$ He	0.01	CERN-PS-194–2
$\bar{p}$ He	0.031–0.087	CERN-PS-194
$\bar{p}$ He	0.2	CERN-PS-194–2
$\bar{p}$ He	0.519	KEK-215
$\bar{p}$ He	?	CERN-PS-205
$\bar{p}$ ^{3}He	0	CERN-PS-175
$\bar{p}$ ^{3}He	<0.2	CERN-PS-179
$\bar{p}$ ^{7}Li	300	FNAL-705
$\bar{p}$ Be	1.26	ITEP-865
$\bar{p}$ Be	1.53	ITEP-865
$\bar{p}$ Be	1.76	ITEP-865
$\bar{p}$ C	0.1	CERN-PS-204
$\bar{p}$ C	1.26	ITEP-865
$\bar{p}$ C	1.53	ITEP-865
$\bar{p}$ C	1.76	ITEP-865
$\bar{p}$ Ne	<0.6	CERN-PS-179
$\bar{p}$ Al	1.26	ITEP-865
$\bar{p}$ Al	1.53	ITEP-865
$\bar{p}$ Al	1.76	ITEP-865
$\bar{p}$ Fe	1.26	ITEP-865
$\bar{p}$ Fe	1.53	ITEP-865
$\bar{p}$ Fe	1.76	ITEP-865
$\bar{p}$ Cu	1.26	ITEP-865
$\bar{p}$ Cu	1.53	ITEP-865
$\bar{p}$ Cu	1.76	ITEP-865
$\bar{p}$ Pb	1.26	ITEP-865
$\bar{p}$ Pb	1.53	ITEP-865
$\bar{p}$ Pb	1.76	ITEP-865
$\bar{p}$ nucleus	0	CERN-PS-177
$\bar{p}$ nucleus	0	CERN-PS-186
$\bar{p}$ nucleus	0	CERN-PS-203
$\bar{p}$ nucleus	<1.8	CERN-PS-201
$\bar{p}$ nucleus	0.0002–0.004	CERN-PS-194–3
$\bar{p}$ nucleus	5	BNL-854
$\bar{p}$ nucleus	7	BNL-854
$\bar{p}$ nucleus	9	BNL-854
$\bar{p}$ nucleus	40	SERPUKHOV-148
$\bar{p}$ nucleus	40–50	SERPUKHOV-148
$\bar{p}$ crystal	0.03	CERN-PS-194–2
$\bar{p}$ crystal	0.2	CERN-PS-194–2
n p	0.311–0.955	LAMPF-1208
n p	0.341	PSI-Z-89–06
n p	0.342–2.85	KEK-235
n p	0.364	SIN-R-89–07
n p	0.50–1.20	PSI-R-87–12
n p	0.55–1.20	PSI-R-86–14
n p	0.60–1.20	SIN-R-72–02
n p	0.609	TRIUMF-498

BEAM/TARGET/MOMENTUM INDEX

Beam-target	Lab momentum (GeV/c)	Experiment
n p	0.680	TRIUMF-182
n p	0.771	TRIUMF-466
n p	0.773	TRIUMF-466
n p	0.776	TRIUMF-466
n p	0.782	TRIUMF-466
n p	0.795	TRIUMF-466
n p	0.808–1.46	LAMPF-960
n p	0.827–1.81	SACLAY-144
n p	0.846	TRIUMF-182
n p	0.883	TRIUMF-369
n p	0.99	TRIUMF-182
n p	1–2	SACLAY-106
n p	1.02	TRIUMF-372
n p	1.09	LAMPF-1234
n p	1.09	LAMPF-665
n p	1.09–1.28	LAMPF-770
n p	1.09–1.46	LAMPF-770
n p	1.19	LAMPF-1234
n p	1.28	LAMPF-876
n p	1.28	LAMPF-1234
n p	1.28	LAMPF-665
n p	1.28–1.70	SACLAY-140
n p	1.38	LAMPF-1234
n p	1.45	LAMPF-961
n p	1.46	LAMPF-665
n p	1.46	LAMPF-876
n p	1.46	LAMPF-589
n p	10–28	BNL-766
n p	231	TRIUMF-498
n Pb	2–10	ITEP-862
$\bar{n}$ p	<0.3	CERN-PS-201
$\bar{n}$ C	0.1–0.6	CERN-PS-178
$\bar{n}$ Al	0.1–0.6	CERN-PS-178
$\bar{n}$ Fe	0.1–0.6	CERN-PS-178
$\bar{n}$ Cu	0.1–0.6	CERN-PS-178
$\bar{n}$ Pb	0.1–0.6	CERN-PS-178
$\bar{n}$ nucleus	<0.3	CERN-PS-201
Λ p	30–60	SERPUKHOV-120
Λ deut	30–60	SERPUKHOV-120
Λ Cu	300–500	FNAL-800
Λ Cu	300–800	FNAL-756
Σ^+ p	0.2–0.6	KEK-251
Σ^+ p	30–60	SERPUKHOV-120
Σ^+ deut	30–60	SERPUKHOV-120
Σ^- p	30–60	SERPUKHOV-120
Σ^- deut	30–60	SERPUKHOV-120
Σ^- Be	360	CERN-WA-089
Σ^- Cu	360	CERN-WA-089
Ξ^- p	30–60	SERPUKHOV-120
Ξ^- deut	0	BNL-813
Ξ^- deut	30–60	SERPUKHOV-120
Ξ^- ^{6}Li	0	BNL-885
Ξ^- Be	270	CERN-WA-089
Ξ^- Cu	270	CERN-WA-089
Ξ^0 p	30–60	SERPUKHOV-120
Ξ^0 deut	30–60	SERPUKHOV-120
Ξ^0 Cu	300–500	FNAL-800
Ξ^0 Cu	300–800	FNAL-756
Ω^- p	30–60	SERPUKHOV-120
Ω^- deut	30–60	SERPUKHOV-120
Ω^- Be	270	CERN-WA-089
Ω^- Cu	270	CERN-WA-089
deut p	0.621–1.02	SACLAY-137
deut p	0.65	SACLAY-157
deut p	0.889	SACLAY-166
deut p	0.889–1.29	SACLAY-235
deut p	1.20	SACLAY-166
deut p	1.29	SACLAY-246
deut p	1.30	SACLAY-157
deut p	1.46	LAMPF-685
deut p	1.46–3.62	SACLAY-117
deut p	1.6	SACLAY-157
deut p	1.6–3.6	SACLAY-115
deut p	1.62	SACLAY-138
deut p	2.05	SACLAY-138
deut p	2.10	SACLAY-157
deut p	2.31	SACLAY-138
deut p	2.40	SACLAY-157
deut p	2.93	SACLAY-038–2
deut p	2.93	SACLAY-216
deut p	2.93	SACLAY-217
deut p	3.20	SACLAY-157
deut p	3.39	SACLAY-145
deut p	?	SACLAY-190
deut deut	1.5–4.0	KEK-125
deut deut	1.91–2.62	SACLAY-105
deut C	1.5–4.0	KEK-125
deut Al	1.5–4.0	KEK-125
deut nucleus	1.6–3.6	SACLAY-115
deut nucleus	3.5–5.0	KEK-257
deut nucleus	3.51	SACLAY-202
deut nucleus	3.72	SACLAY-134
deut nucleus	?	BNL-859
He p	3	ITEP-892
He p	5	ITEP-892
^{6}Li p	7.73–8.40	SACLAY-206
^{12}C p	3.38	TRIUMF-478
^{12}C nucleus	191	BNL-826
^{13}C p	3.52	TRIUMF-478
Ne Br	80.6	ITEP-852
Ne Ag	80.6	ITEP-852
Mg Ar	97.1	ITEP-852
Mg Br	97.1	ITEP-852
O Hg	232	BNL-801
^{16}O C	96.1	BNL-831
^{16}O C	224	BNL-831
^{16}O Au	232	BNL-844
^{16}O ^{197}Au	975	CERN-NA-041
^{16}O ^{197}Au	3633	CERN-NA-041
^{16}O Hg	975	CERN-NA-039
^{16}O Hg	3217	CERN-NA-039
^{16}O Pb	3217	CERN-EMU-002
^{16}O ^{238}U	3202	CERN-NA-038
^{16}O nucleus	96.1	BNL-831
^{16}O nucleus	223–3217	CERN-EMU-001
^{16}O nucleus	224	BNL-831
^{16}O nucleus	232	BNL-802
^{16}O nucleus	239	BNL-847
^{16}O nucleus	247	BNL-806
^{16}O nucleus	255	BNL-808
^{16}O nucleus	255	BNL-810
^{16}O nucleus	255	BNL-814
^{16}O nucleus	255	BNL-815
^{16}O nucleus	255	BNL-825
^{16}O nucleus	255	CERN-EMU-005
^{16}O nucleus	815	CERN-EMU-005
^{16}O nucleus	815	CERN-WA-086
^{16}O nucleus	961	CERN-NA-040
^{16}O nucleus	975	CERN-EMU-003

BEAM/TARGET/MOMENTUM INDEX

Beam-target	Lab momentum (GeV/c)	Experiment
^{16}O nucleus	975	CERN-EMU-004
^{16}O nucleus	975	CERN-EMU-007
^{16}O nucleus	975	CERN-EMU-008
^{16}O nucleus	975	CERN-NA-035
^{16}O nucleus	975	CERN-WA-080
^{16}O nucleus	975	CERN-WA-087
^{16}O nucleus	3202	CERN-NA-040
^{16}O nucleus	3202	CERN-NA-034 2
^{16}O nucleus	3202	CERN-NA-036
^{16}O nucleus	3217	CERN-EMU-005
^{16}O nucleus	3217	CERN-WA-086
^{16}O nucleus	3217	CERN-EMU-003
^{16}O nucleus	3217	CERN-EMU-004
^{16}O nucleus	3217	CERN-EMU-007
^{16}O nucleus	3217	CERN-EMU-008
^{16}O nucleus	3217	CERN-NA-035
^{16}O nucleus	3217	CERN-WA-080
^{16}O nucleus	3217	CERN-WA-087
Si Cu	421	BNL-793
Si Pb	421	BNL-793
^{28}Si Pb	434	BNL-882
^{28}Si nucleus	406	BNL-802
^{28}Si nucleus	418	BNL-847
^{28}Si nucleus	432	BNL-806
^{28}Si nucleus	432	BNL-878
^{28}Si nucleus	446	BNL-810
^{28}Si nucleus	446	BNL-815
^{28}Si nucleus	446	BNL-825
^{28}Si nucleus	446	BNL-858
^{28}Si nucleus	446	BNL-886
^{28}Si nucleus	?	BNL-859
Su Su	6445	CERN-NA-044
Su Su	6445	CERN-WA-094
Su Wt	6415	CERN-NA-034 3
Su Ag	6445	CERN-NA-044
Su Hg	464	BNL-801
Su Hg	6445	CERN-NA-039
Su Pb	6445	CERN-NA-044
Su nucleus	494	BNL-875
Su nucleus	6445	CERN-WA-093
^{32}S C	192	BNL-831
^{32}S C	448	BNL-831
^{32}S Al	6433	CERN-EMU-002
^{32}S Cu	6433	CERN-EMU-002
^{32}S Wt	6433	CERN-WA-085
^{32}S Au	7266	CERN-NA-041
^{32}S Pb	6433	CERN-EMU-002
^{32}S ^{238}U	6403	CERN-NA-038
^{32}S nucleus	192	BNL-831
^{32}S nucleus	448	BNL-831
^{32}S nucleus	477	BNL-847
^{32}S nucleus	509	BNL-808
^{32}S nucleus	509	BNL-814
^{32}S nucleus	509	BNL-826
^{32}S nucleus	1630	CERN-WA-086
^{32}S nucleus	1921	CERN-NA-045
^{32}S nucleus	1951	CERN-EMU-003
^{32}S nucleus	1951	CERN-EMU-004
^{32}S nucleus	1951	CERN-EMU-007
^{32}S nucleus	1951	CERN-NA-035
^{32}S nucleus	6403	CERN-NA-045
^{32}S nucleus	6403	CERN-NA-034 2
^{32}S nucleus	6403	CERN-NA-036
^{32}S nucleus	6403	CERN-NA-040
^{32}S nucleus	6433	CERN-WA-086
^{32}S nucleus	6433	CERN-EMU-003
^{32}S nucleus	6433	CERN-EMU-004
^{32}S nucleus	6433	CERN-EMU-007
^{32}S nucleus	6433	CERN-NA-035
^{32}S nucleus	6433	CERN-EMU-001
^{32}S nucleus	6433	CERN-EMU-008
^{32}S nucleus	6433	CERN-EMU-009
^{32}S nucleus	6433	CERN-EMU-010
^{32}S nucleus	6433	CERN-WA-080
^{32}S nucleus	6433	CERN-WA-087
^{32}S nucleus	6433	CERN-WA-090
Au nucleus	3035	BNL-875
Au nucleus	?	BNL-888
^{197}Au Pb	3056	BNL-882
^{197}Au nucleus	2286	BNL-866
^{197}Au nucleus	2308	BNL-864
^{197}Au nucleus	3036	BNL-878
^{197}Au nucleus	3135	BNL-808
^{197}Au nucleus	3135	BNL-886
^{197}Au nucleus	0.396E5	CERN-EMU-011
Pb Pb	0.416E5	CERN-NA-044
Pb Pb	0.540E5	CERN-WA-097
Pb nucleus	?	CERN-NA-049
Pb nucleus	?	CERN-NA-050
^{207}Pb nucleus	0.126E5	CERN-EMU-011
^{207}Pb nucleus	0.126E5 0.333E5	CERN-EMU-012
^{207}Pb nucleus	0.374E5	CERN-EMU-013
^{207}Pb nucleus	0.416E5	CERN-EMU-011
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ABBREVIATIONS USED IN THE SUMMARIES

JOURNALS

Following are abbreviations for journals listed in the summaries:

AIPCP	American Institute of Physics Conference Proceedings
APL	Applied Physics Letters
APP	Acta Physica Polonica
AOPT	Applied Optics
ASTJ	Astrophysical Journal
BJP	Bulgarian Journal of Physics
CAMP	Comments on Atomic and Molecular Physics
CJP	Canadian Journal of Physics
CNPP	Comments on Nuclear and Particle Physics
CPC	Computer Physics Communications
CZJP	Czechoslovakian Journal of Physics
DANS	Doklady Akademii Nauk SSSR (in Russian)
ECHAYA	Fizika Elementarnykh Chastits i Atomnogo Yadra (in Russian)
EPL	Europhysics Letters
FORT	Fortschritte der Physik
HEPNP	High Energy Physics and Nuclear Physics (in Chinese)
HFI	Hyperfine Interactions
HPA	Helvetica Physica Acta
IEEE MAG	Institute of Electrical and Electronics Engineers Transactions on Magnetics
IEEE TNS	Institute of Electrical and Electronics Engineers Transactions on Nuclear Science
IJMP	International Journal of Modern Physics
JETP	Journal of Experimental and Theoretical Physics (translation of ZETF)
JETPL	Journal of Experimental and Theoretical Physics Letters (translation of ZETFP)
JJAP	Japanese Journal of Applied Physics
JdeP	Journale de Physique
JOSA	Journal of the Optical Society of America
JPHY	Journal of Physics
JPSJ	Journal of the Physical Society of Japan
LNC	Lettere al Nuovo Cimento
MPL	Modern Physics Letters
NC	Nuovo Cimento
NIM	Nuclear Instruments and Methods
NP	Nuclear Physics
PL	Physics Letters
PR	Physical Review
PRPL	Physics Reports (Physics Letters C)
PRL	Physical Review Letters
PS	Physica Scripta
PTE	Pribory i Tekhnika Eksperimenta (in Russian)
PTP	Progress of Theoretical Physics
PW	Particle World
RCHA	Radiochimica Acta
RMP	Reviews of Modern Physics
RNC	Rivista del Nuovo Cimento
RPP	Reports on Progress in Physics
RSI	Review of Scientific Instruments
SHEP	Surveys in High Energy Physics
SJNP	Soviet Journal of Nuclear Physics (translation of YF)
YF	Yadernaya Fizika (translated as SJNP)
ZETF	Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki (translated as JETF)
ZETFP	Pis'ma v Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki (translated as JETPL)
ZPHY	Zeitschrift für Physik

KINEMATIC VARIABLES

Following are abbreviations used with reactions to indicate the momenta or energies at which they are studied:

PLAB	beam momentum in the lab frame
TLAB	beam kinetic energy in the lab frame
ELAB	beam total energy in the lab frame
PLAB/N	beam momentum per nucleon in the lab frame
TLAB/N	beam kinetic energy per nucleon in the lab frame
ELAB/N	beam total energy per nucleon in the lab frame
ECM	total energy in the c.m. frame

ACCELERATORS

BNL	Brookhaven AGS proton synchrotron (31 GeV/c Plab)
BNL-ION	Brookhaven heavy ion accelerator
BNL-RHIC	Brookhaven relativistic heavy ion collider (100 GeV/n per beam)
CERN	CERN proton synchrotron (28 GeV/c Plab)
CERN-ISR	CERN proton-proton Intersecting Storage Rings (62 GeV Ecm)
CERN-LEAR	CERN Low-Energy Antiproton Ring
CERN-LEP	CERN Large Electron-Positron collider (100 GeV Ecm)
CERN-PBAR/P	CERN $\bar{p}p$ collider (900 GeV Ecm)
CERN-SC	CERN cyclotron (600 MeV/c Plab)
CERN-SPS	CERN Super Proton Synchroton (450 GeV/c Plab)
CESR	Cornell Electron-positron Storage Ring (16 GeV Ecm)
DESY	Hamburg Deutches Electron SYnchrotron (7.5 GeV/c Plab)
DESY-DORIS	DESY DORIS electron-positron double ring (11.6 GeV Ecm)
DESY-DORIS-II	DESY DORIS single-ring 1982 upgrade
DESY-DORIS-III	DESY DORIS 1991 upgrade
DESY-HERA	DESY HERA electron (26 GeV) proton (820 GeV) collider
DESY-PETRA	DESY PETRA electron-positron storage ring (40 GeV Ecm)
FNAL	FNAL proton synchrotron (500 GeV/c Plab)
FNAL-COLLIDER	FNAL $\bar{p}p$ collider (2000 GeV Ecm)
FNAL-TEV	FNAL fix target Tevatron (1000 GeV)
ITEP	ITEP Moscow proton synchrotron (7 GeV/c Plab)
JINR	JINR (Dubna) proton synchrotron (10 GeV/c Plab)
KEK-PS	KEK proton synchrotron (12 GeV/c Plab)
KEK-PF-LINAC	KEK electron linac (2.5 GeV) for photon factory and TRISTAN
KEK-TRISTAN	KEK electron-positron storage ring (60 GeV Ecm)
LAMPF	Los Alamos Meson/Proton Factory (1460 MeV/c Plab)
NONE	no accelerator used
NOVO-VEPP-2M	Novosibirsk VEPP-2M electron-positron storage ring (1.4 GeV Ecm)
NOVO-VEPP-4	Novosibirsk VEPP-4 electron-positron storage ring (10.4 GeV Ecm)
PSI	Paul Scherrer Institute, formerly SIN (590 MeV Tlab)
SATURNE-II	Saclay Saturne-II p, d, and He synchrotron
SERPUKHOV	Serpukhov proton synchrotron (76 GeV/c Plab)
SERPUKHOV-UNK	Serpukhov multi-TeV proton machine
SIN	Schweizerische Inst. für Nuklearforschung (590 MeV Tlab)
SLAC	Stanford electron linear accelerator (40 GeV/c Plab)
SLAC-PEP	SLAC Positron-Electron Project (36 GeV Ecm)
SLAC-SLC	SLAC Linear e^+e^- Collider (100 GeV Ecm)
SLAC-SPEAR	SLAC SPEAR electron-positron ring (8.4 GeV Ecm)
SSC	Texas pp Superconducting Super Collider (40 TeV Ecm)
TOKYO	Inst. for Nucl. Studies (Tokyo) electron synchrotron (1.3 GeV/c Plab)
TRIUMF	Canadian TRIangle University Meson Facility (520 MeV Tlab)

DETECTORS

For bubble chambers, we use a construction such as:

DBC-2M, or **HBC-15FT-HYB**, or **HLBC-BEBC-TST**.

The first element, one of

HBC, **DBC**, **HEBC**, or **HLBC**,

tells whether the chamber fill is hydrogen, deuterium, helium, or heavy liquid. The second element gives the size or name of the chamber. Where appropriate, a third element, one of

HYB, **RAP**, or **TST**,

indicates that the chamber is part of a hybrid system, or that it is rapid cycling, or that it contains a track-sensitive target.

In searching the SLAC/SPIRES database from which this report is taken, use the following abbreviations for general kinds of detectors (in this report, the words are spelled out):

CALO	calorimeter
CNTR	counter(s)
COMB	combination of various elements
DAS	double-arm spectrometer
DRIFT	drift chamber
EMUL	emulsion
IONIZATION	detector looking for ionization
MICROSTRIP	microstrip detector
NEUTRONSPEC	neutron spectrometer
OSPK	optical spark chamber
OTHER	rare, nonelectronic detector (e.g., moon, ocean floor)
PHOTON	photon spectrometer such as NaI or Ge detectors
PLASTIC	Lexan, etc., used like emulsion
SAS	single-arm spectrometer
SCINT	scintillator
SPEC	spectrometer system
STRC	streamer chamber
TPC	time projection chamber
TRAD	transition radiation detector
WAS	wide-angle spectrometer
WIRE	wire chamber
X-RAY	detector x-ray spectrometer

Acronyms for specific detectors:

ALEPH	CERN-LEP detector
AMY	KEK-TRISTAN high-resolution lepton detector
ARGUS	DESY-DORIS-II detector
BCD	FNAL Bottom Collider Detector
BENKEI	KEK-PS detector
BIS-2	Serpukhov upgrade of BIS spectrometer
CCM	FNAL, FNAL-TEV Chicago Cyclotron Magnet spectrometer
CDF	Collider Detector at Fermilab
CELLO	DESY-PETRA spectrometer system
CHAOS	TRIUMF detector
CHARM	CERN-PS, CERN-SPS CERN-Hamburg-Amsterdam-Rome-Moscow neutrino detector
CHARM-II	CERN-SPS upgrade of CHARM detector
CLEO	CESR spectrometer system
CMD	Novosibirsk detector
CMD-2	Novosibirsk upgrade of CMD
CRYSTAL-BALL	SLAC-PEP, DESY-DORIS, DESY-DORIS-II Crystal Ball large-solid-angle neutral detector
CRYSTAL-BARREL	CERN-LEAR Crystal Barrel large-solid-angle detector
CRYSTAL-BOX	LAMPF Crystal Box crystal array detector
CUSB	CESR Columbia-Stony Brook high-resolution calorimeter
CUSB-II	CESR upgrade of CUSB
DELPHI	CERN-LEP detector
DIOGENE	Saclay SATURNE-II pictorial drift chamber

DETECTORS

D0	FNAL-COLLIDER detector
EMC	CERN-SPS European Muon Collaboration detector
EMRIC	Saclay detector
EPICS	LAMPF Energetic PIon Channel and Spectrometer
EVA	BNL Exclusive Variable Apparatus
EXCHARM	Serpukhov detector, upgrade of BIS-2M
FANCY	KEK-PS, KEK-TRISTAN Forward ANd CYlindrical detector system
FHS-1	ITEP Focusing Hadron Spectrometer
FHS-2	ITEP upgrade of FHS-1
FMPS	FNAL, FNAL-TEV Fermilab Multiparticle Spectrometer
FODS	Serpukhov double-arm spectrometer
FOCUS	ITEP modified NHS spectrometer
GAMS-2000	Serpukhov hodoscope gamma spectrometer
GAMS-4PI	Serpukhov gamma spectrometer
GAMS-4000	CERN-SPS 64×64 cell Pb-glass array
GEM	SSCL Gamma, Electron and Muon detector
GGNT	Baksan Gallium-Germanium Neutrino Telescope
GLUON	Serpukhov-UNK detector
HELIOS	CERN-SPS detector
HRS	SLAC-PEP High-Resolution Spectrometer
HYPERON-II	Serpukhov single arm magnetic spectrometer
HYPERSPEC	BNL hypernuclear spectrometer
H1	DESY-HERA detector
ISTRA-M	Serpukhov detector
JADE	DESY-PETRA detector
JANUS	LAMPF proton polarimeter
JETSET	CERN-LEAR compact general purpose detector
KASKAD	Serpukhov cascade magnetic spectrometer
KURAMA	KEK wide angle spectrometer
LAB-E	FNAL, FNAL-TEV target-calorimeter muon-spectrometer detector for neutrino physics
LAHRS	LAMPF Los Alamos High-Resolution proton Spectrometer
LAMBDAMETER	ITEP detector
L3	CERN-LEP detector
MAC	SLAC-PEP MAgnetic Calorimeter
MARK-II	SLAC-SPEAR, SLAC-PEP, SLAC-SLC detector
MARK-III	SLAC-SPEAR detector
MARK-J	DESY-PETRA detector
MEGA	LAMPF array of electron and photon spectrometers
MIS	Serpukhov multiparticle spectrometer
MIS-2	Serpukhov upgrade of MIS
MMS-UNK	Serpukhov-UNK multimuon spectrometer
MPS	BNL MultiParticle Spectrometer
MPS-II	BNL upgrade of MPS
MTS	ITEP detector
NEPTUN	Serpukhov-UNK jet target detector
NEUTRONSPEC	FNAL detector
NEUTSPEC	Novosibirsk neutral-particle energy and angle measuring detector
NHS	ITEP non-magnetic hadron spectrometer
OMEGA	CERN, CERN-SPS spectrometer system
OMEGAPRIME	CERN-SPS spectrometer system
OPAL	CERN-LEP detector
PHENIX	BNL-RHIC photon, electron, and hadron detector
PINOT	Saclay high resolution pi0 and eta detector
PLASTIC-BALL	CERN-SPS plastic ball detector
POLDER	Saclay polarimeter
POMME	Saclay medium energy deuteron polarimeter
PROZA	Serpukhov polarized proton target with frozen polarization, gamma spectrometer, neutron detector
PROZA-M	Serpukhov polarized target detector
QUARTZ	Serpukhov crystal-diffraction spectrometer
SDC	SSCL solenoidal detector
SFINKS	Serpukhov detector
SHIP	KEK-TRISTAN detector for Search for Highly Ionizing Particles
SIGMA	Serpukhov CERN-IHEP magnetic spectrometer
SIGMA-AYAKS	Serpukhov upgrade of SIGMA

DETECTORS

SINDRUM	SIN large-solid-angle magnetic detector
SINDRUM-II	SIN upgraded large-angle solenoid detector
SLD	SLAC-SLC detector
SND	Novosibirsk Spherical Neutral Detector
SPES-I	Saclay high-resolution spectrometer
SPES-II	CERN, CERN-LEAR high-resolution spectrometer
SPES-III	Saclay high-resolution spectrometer
SPES-IV	Saclay high-resolution spectrometer
SPES-0	Saclay modular lead-glass Cerenkov detector
STAR	BNL-RHIC solenoidal detector
SUPERBENKEI	KEK window-frame type superconducting magnetic spectrometer
TAGX	TOKYO large-aperture spectrometer system
TASSO	DESY-PETRA detector
TOKIWA	KEK-PS spectrometer
TOPAZ	KEK-TRISTAN solenoidal spectrometer with TPC
TPS	FNAL Tagged Photon Spectrometer
TSD	Serpukhov-UNK streamer detector
2-GAMMA	SLAC-PEP system of forward detectors for 2-gamma process
UA1	CERN-PBAR/P UA1 experiment detector
UA2	CERN-PBAR/P UA2 experiment detector
UKD	Serpukhov-UNK Universal Calorimetrical Detector
VENUS	KEK-TRISTAN Versatile Economical and Novel Universal Spectrometer
ZEUS	DESY-HERA detector

PARTICLES

The first column gives the name as printed in this report, the second gives the name to use in searching the SLAC/SPIRES EXPERIMENTS database from which this report is taken (see p. 3).

As printed herein	For searching EXPERIMENTS database	Definition or comment
(chargeds)	(CHARGEDS)	zero or more charged particles plus possible neutrals
(γ)	(GAMMA)	zero or one γ
(γ's)	(GAMMAS)	zero or more γ's
(hadrons)	(HADRONS)	zero or more hadrons
(jets)	(JETS)	zero or more jets
(neutrals)	(NEUTRALS)	zero or more neutral particles
(pions)	(PIONS)	zero or more pions
(π^0)	(PI0)	zero or one π^0
(π^0's)	(PI0S)	zero or more π^0's
(vees)	(VEES)	zero or more unspecified neutral strange particle decays
Ag	AG	silver nucleus
Al	AL	aluminum nucleus
^{27}Al	AL27	aluminum-27 nucleus
$\overline{\text{muonium}}$	AMUONIUM	anti-muonium
annihil	ANNIHIL	pure annihilation final state in nucleon-antinucleon scattering
Ar	AR	argon nucleus
^{37}Ar	AR37	argon-37 nucleus
Au	AU	gold nucleus
^{197}Au	AU197	gold-197 nucleus
axion	AXION	hypothesized light Higgs scalar boson
$a_0(980)^+$	A0(980)+	was $\delta(980)$
$a_0(980)^-$	A0(980)–	was $\delta(980)$
$a_0(980)^0$	A0(980)0	was $\delta(980)$
$a_1(1260)^+$	A1(1260)+	
$a_1(1260)^-$	A1(1260)–	
$a_1(1260)^0$	A1(1260)0	
$a_2(1320)$	A2(1320)	
$a_2(1320)^+$	A2(1320)+	
$a_2(1320)^-$	A2(1320)–	
$a_2(1320)^0$	A2(1320)0	
B	B	$B(5270)$ bottom meson
B^+	B+	$B(5270)^+$ bottom meson
B^*	B*	excited bottom meson
B^-	B–	$B(5270)^-$ bottom meson
B_s	B/S	B_s bottom-antistrange meson
$\overline{B}_s$	B/SBAR	antibottom-strange meson
baryon	BARYON	unspecified baryon
$\overline{\text{baryon}}$	BARYONBAR	unspecified antibaryon
baryonium	BARYONIUM	meson that couples predominantly to baryon-antibaryon
^{134}Ba	BA134	barium-134 nucleus
^{136}Ba	BA136	barium-136 nucleus
$\overline{B}$	BBAR	$\overline{B}(5270)$ antibottom meson
$\overline{B}^0$	BBAR0	$\overline{B}(5270)^0$ antibottom meson
Be	BE	beryllium nucleus
^{7}Be	BE7	beryllium-7 nucleus
Bi	BI	bismuth nucleus
Bor	BOR	boron nucleus — note name is not same as chemical symbol
^{8}Bor	BOR8	boron-8 nucleus — note name is not same as chemical symbol
^{10}Bor	BOR10	boron-10 nucleus — note name is not same as chemical symbol
^{11}B	BOR11	boron-11 nucleus — note name is not same as chemical symbol
^{12}Bor	BOR12	boron-12 nucleus — note name is not same as chemical symbol
bottom	BOTTOM	unspecified particle with naked bottom

PARTICLES

$\overline{\text{bottom}}$	BOTTOMBAR	unspecified particle with naked antibottom
Br	BR	bromine nucleus
^{81}Br	BR81	bromine-81 nucleus
B^0	B0	$B(5270)^0$ bottom meson
$b_1(1235)^+$	B1(1235)+	
$b_1(1235)^-$	B1(1235)−	
$b_1(1235)^0$	B1(1235)0	
C	C	carbon nucleus
^{12}C	C12	carbon-12 nucleus
^{13}C	C13	carbon-13 nucleus
$C(1480)$	C(1480)	meson decaying into $\phi\pi$
$C(1480)^+$	C(1480)+	meson decaying into $\phi\pi^+$
$C(1480)^-$	C(1480)−	meson decaying into $\phi\pi^-$
$C(1480)^0$	C(1480)0	meson decaying into $\phi\pi^0$
C*	C*	excited state of carbon nucleus
C*(4.44)	C*(4.44)	4.44 keV excited state of carbon nucleus
Cd	CD	cadmium nucleus
^{116}Cd	CD116	cadmium-116 nucleus
centauro	CENTAURO	new type of final state with 50 or more charged particles, no π^0's
charged	CHARGED	unspecified charged particle
charged(s)	CHARGED(S)	one or more unspecified charged particles
charged$^+$	CHARGED+	unspecified positive particle
charged$^-$	CHARGED−	unspecified negative particle
chargeds	CHARGEDS	two or more unspecified charged particles
charm	CHARM	unspecified charmed particle
$\overline{\text{charm}}$	CHARMBAR	unspecified anticharmed particle
charmed-baryon	CHARMED-BARYON	unspecified charmed baryon
charmed-meson	CHARMED-MESON	unspecified charmed meson
charmonium	CHARMONIUM	unspecified charm-anticharm state
chgd-hadron(s)	CHGD-HADRON(S)	one or more unspecified charged hadrons
χ_b(unspec)	CHI/B(UNSPEC)	unspecified radiative decay product of higher mass Υ's
$\chi_{b0}(1P)$	CHI/B0(1P)	bottomonium meson
$\chi_{b0}(2P)$	CHI/B0(2P)	bottomonium meson
$\chi_{b1}(1P)$	CHI/B1(1P)	bottomonium meson
$\chi_{b1}(2P)$	CHI/B1(2P)	bottomonium meson
$\chi_{b2}(1P)$	CHI/B2(1P)	bottomonium meson
$\chi_{b2}(2P)$	CHI/B2(2P)	bottomonium meson
χ_c(unspec)	CHI/C(UNSPEC)	unspecified radiative decay product of any ψ meson
$\chi_{c1}(1P)$	CHI/C1(1P)	charmonium meson
$\chi_{c2}(1P)$	CHI/C2(1P)	charmonium meson
Cl	CL	chlorine nucleus
^{35}Cl	CL35	chlorine-35 nucleus
^{37}Cl	CL37	chlorine-37 nucleus
Cr	CR	chromium nucleus
crystal	CRYSTAL	general target for channeling expts – target is not individual particles
Cu	CU	copper nucleus
D(unspec)	D(UNSPEC)	unspecified charmed nonstrange meson
D^+	D+	$D(1869)^+$ charmed nonstrange meson
$D^*(2010)$	D*(2010)	excited charmed nonstrange meson
$D^*(2010)^+$	D*(2010)+	excited charmed nonstrange meson
$D^*(2010)^-$	D*(2010)−	excited charmed nonstrange meson
D^-	D−	$D(1869)^-$ charmed nonstrange meson
D_s^+	D/S+	$D_s(1971)^+$ charmed strange meson, was F
$D_s^\pm$	D/S+−	$D_s(1971)^+$ or $D_s(1971)^-$ charmed strange meson, was F
D_s^-	D/S−	$D_s(1971)^-$ charmed strange meson, was F
$\overline{D}^0$	DBAR	D^- or $\overline{D}^0$ charmed meson
$\overline{D}^0$	DBAR0	$\overline{D}(1865)^0$ anticharmed nonstrange meson
Δ(unspec)	DELTA(UNSPEC)	unspecified $I = 3/2$, $S = 0$ baryon

PARTICLES

$\Delta(\text{unspec})^{++}$	DELTA(UNSPEC)++	unspecified $I = 3/2$, $S = 0$ baryon
$\Delta(\text{unspec})^{0}$	DELTA(UNSPEC)0	unspecified $I = 3/2$, $S = 0$ baryon
$\Delta(1232\,P_{33})$	DELTA(1232P33)	
$\Delta(1232\,P_{33})^{+}$	DELTA(1232P33)+	
$\Delta(1232\,P_{33})^{++}$	DELTA(1232P33)++	
$\Delta(1232\,P_{33})^{-}$	DELTA(1232P33)−	
$\Delta(1232\,P_{33})^{0}$	DELTA(1232P33)0	
$\overline{\Delta}(1232\,P_{33})^{0}$	DELTABAR(1232P33)0	
deut	DEUT	deuteron
$\overline{\text{deut}}$	DEUTBAR	antideuteron
dibaryon	DIBARYON	unspecified nonstrange dibaryon resonance
dibaryon($S = -1$)	DIBARYON(S=−1)	unspecified $S = -1$ dibaryon resonance
dibaryon($S = -2$)	DIBARYON(S=−2)	unspecified $S = -2$ dibaryon resonance
D^0	D0	$D(1865)^0$ charmed nonstrange meson
e^+	E+	positron
e^+(s)	E+(S)	one or more positrons
$e^\pm$	E+−	electron or positron
$e^\pm$(s)	E+−(S)	one or more electrons or positrons
$e^{*\pm}$	E*+−	excited positron or electron
e^-	E−	electron
e^-(s)	E−(S)	one or more electrons
η	ETA	$\eta(549)$ meson
η(s)	ETA(S)	one or more $\eta(549)$ mesons
$\eta(1080)$	ETA(1080)	
$\eta(1440)$	ETA(1440)	was $\iota(1440)$ – glueball candidate
η_b	ETA/B	lowest mass $J^P = 0^-$ $b\bar{b}$ state
$\eta_c(1S)$	ETA/C(1S)	charmonium meson
$\eta_c(2S)$	ETA/C(2S)	charmonium meson
η'	ETAPRIME	$\eta'(958)$ meson
exotic	EXOTIC	unspecified particle which cannot be fit into $q\bar{q}$ or qqq model
exotic-meson	EXOTIC-MESON	cannot be formed of $q\bar{q}$
exotic-nucleon	EXOTIC-NUCLEON	cannot be formed of qqq
Fe	FE	iron nucleus
^{56}Fe	FE56	iron-56 nucleus
frag	FRAG	nuclear fragment
$f_0(700)$	F0(700)	was $\epsilon(700)$ – $\pi\pi$ S-wave (near 700 MeV)
$f_0(975)$	F0(975)	was $S(975)$
$f_0(1300)$	F0(1300)	was $\epsilon(1300)$ – $\pi\pi$ S-wave (near 1300 MeV)
$f_0(1590)$	F0(1590)	
$f_1(1285)$	F1(1285)	was $D(1285)$
$f_1(1420)$	F1(1420)	was $E(1420)$
$f_2(1270)$	F2(1270)	
$f_2(1720)$	F2(1720)	was $\theta(1690)$ – glueball candidate
$f_2(1810)$	F2(1810)	
$f_2(2010)$	F2(2010)	glueball candidate
$f'_2(1525)$	F2PRIME(1525)	
$f_4(2050)$	F4(2050)	was $h(2030)$ – $I = 0$, $J^P = 4^+$ meson resonance
$f_4(2220)$	F4(2220)	was $\xi(2220)$ – meson seen in J/ψ decays
Ga	GA	gallium nucleus
^{71}Ga	GA71	gallium-71 nucleus
γ	GAMMA	photon
γ(s)	GAMMA(S)	one or more γ's
γ's	GAMMAS	two or more γ's
^{71}Ge	GE71	germanium-71 nucleus
^{76}Ge	GE76	germanium-76 nucleus
glueball	GLUEBALL	unspecified glueball
gluino	GLUINO	spin 1/2 SUSY partner of the gluon
gluon	GLUON	

PARTICLES

$h(990)$	H(990)	
hadron	HADRON	unspecified hadron
hadron(s)	HADRON(S)	one or more unspecified hadrons
hadron$^+$	HADRON+	unspecified positive hadron
hadron$^-$	HADRON−	unspecified negative hadron
hadrons	HADRONS	two or more unspecified hadrons
He	HE	helium nucleus
^{2}He	HE2	helium-2 nucleus
^{3}He	HE3	helium-3 nucleus
^{6}He	HE6	helium-6 nucleus
Hg	HG	mercury nucleus
higgs	HIGGS	Higgs boson
higgs$^\pm$	HIGGS+−	charged Higgs of unspecified sign
higgsino	HIGGSINO	spin 1/2 SUSY partner of any Higgs boson
hvy-flavor	HVY-FLAVOR	any unspecified particle carrying a flavor heavier than strange
hvy-lepton	HVY-LEPTON	unspecified heavy lepton
hvy-lepton^0	HVY-LEPTON0	unspecified neutral heavy lepton
hvy-ν	HVY-NU	unspecified heavy neutrino
hvy-ν_e	HVY-NUE	unspecified heavy electron neutrino
hvy-ν_μ	HVY-NUMU	unspecified heavy muon neutrino
hypernuc	HYPERNUC	unspecified hypernucleus, generally containing more than two baryons
hyperon	HYPERON	unspecified hyperon
In	IN	indium nucleus
inelastic	INELASTIC	same as anything, except elastic excluded
Ir	IR	iridium nucleus
^{124}I	I124	iodine-124 nucleus
^{127}I	I127	iodine-127 nucleus
$J/\psi(1S)$	J/PSI(1S)	$J/\psi(3097)$
jet	JET	
jet(s)	JET(S)	one or more jets
jets	JETS	two or more jets
K^+	K+	ordinary K^+ meson
$K^\pm$	K+−	ordinary K^+ or K^- meson
K^*(unspec)	K*(UNSPEC)	unspecified K^*
K^*(unspec)$^+$	K*(UNSPEC)+	unspecified K^{*+}
K^*(unspec)$^-$	K*(UNSPEC)−	unspecified K^{*-}
K^*(unspec)^0	K*(UNSPEC)0	unspecified K^{*0}
$K^*(892)$	K*(892)	
$K^*(892)^+$	K*(892)+	
$K^*(892)^-$	K*(892)−	
$K^*(892)^0$	K*(892)0	
$\overline{K}^*$(unspec)	K*BAR(UNSPEC)	unspecified $\overline{K}^*$
$\overline{K}^*$(unspec)^0	K*BAR(UNSPEC)0	unspecified $\overline{K}^{*0}$
$\overline{K}^*(892)^0$	K*BAR(892)0	
K^-	K−	ordinary K^- meson
kaon	KAON	kaon or antikaon of unspecified charge
$\overline{K}^0$	KBAR0	ordinary $\overline{K}^0$ meson
K_L	KL	$K_{\rm long}$, neutral K meson
K_S	KS	$K_{\rm short}$, neutral K meson
K^0	K0	ordinary K^0 meson
Λ	LAMBDA	ordinary Λ hyperon
Λ(s)	LAMBDA(S)	one or more Λ's
Λ(unspec)	LAMBDA(UNSPEC)	unspecified $I = 0$, $S = -1$ baryon
$\Lambda(1520\,D_{03})$	LAMBDA(1520D03)	
$\Lambda N(2130)^+$	LAMBDA-N(2130)+	$S = -1$ dibaryon resonance
Λ_c^+	LAMBDA/C+	$\Lambda_c(2281)^+$ $I = 0$ charmed baryon
$\overline{\Lambda}$	LAMBDABAR	ordinary $\overline{\Lambda}$ antihyperon
^{139}La	LA139	lanthanum-139 nucleus

PARTICLES

lepton – quark	LEPTO-QUARK	lepton-quark
lepton	LEPTON	unspecified lepton
lepton$^+$	LEPTON+	unspecified positive lepton
lepton$^-$	LEPTON–	unspecified negative lepton
leptons	LEPTONS	two or more unspecified leptons
Li	LI	lithium nucleus
^{6}Li	LI6	lithium-6 nucleus
^{7}Li	LI7	lithium-7 nucleus
longlived	LONGLIVED	unspecified particle stable under strong and electromagnetic decay
majoron	MAJORON	neutral, spinless hypothetical light or massless particle
meson	MESON	unspecified meson
meson(2950)	MESON(2950)	bump seen in $p\bar{p}\pi$
meson$^+$	MESON+	unspecified positive meson
meson$^-$	MESON–	unspecified negative meson
mesons	MESONS	two or more unspecified mesons
meson^0	MESON0	unspecified neutral meson
Mg	MG	magnesium nucleus
^{27}Mg	MG27	magnesium-27 nucleus
monopole	MONOPOLE	magnetic monopole
^{94}Mo	MO94	molybdenum-94 nucleus
^{96}Mo	MO96	molybdenum-96 nucleus
^{100}Mo	MO100	molybdenum-100 nucleus
μ^+	MU+	ordinary μ^+ lepton
μ^-	MU–	ordinary μ^- lepton
mult[charged]	MULT(CHARGED)	multiplicity distribution for unspecified charged particle
muon	MUON	ordinary muon of unspecified charge
muon(s)	MUON(S)	one or more muons
muonium	MUONIUM	μ^+e^- atom
$\overline{\text{muonium}}$	MUONIUMBAR	μ^-e^+ atom
muons	MUONS	two or more muons
n	N	neutron
N(unspec)$^+$	N(UNSPEC)+	unspecified $I = 1/2$, $S = 0$ baryon
N(unspec)^0	N(UNSPEC)0	unspecified $I = 1/2$, $S = 0$ baryon
$N(1440\,P_{11})^+$	N(1440P11)+	
$N(1520\,D_{13})^+$	N(1520D13)+	
$N(1520\,D_{13})^0$	N(1520D13)0	
$N(1675\,D_{15})^+$	N(1675D15)+	
$N(1680\,F_{15})^0$	N(1680F15)0	
N^*(unspec)	N*(UNSPEC)	I =unspecified, $S = 0$ baryon of unspecified mass
N^*(unspec)$^+$	N*(UNSPEC)+	I =unspecified, $S = 0$ baryon of unspecified mass
N^*(unspec)^0	N*(UNSPEC)0	I =unspecified, $S = 0$ baryon of unspecified mass
$N^*_{5/2}$(unspec)	N*5/2(UNSPEC)	unspecified $I = 5/2$, $S = 0$ baryon
$N^*_{5/2}$(unspec)$^{+++}$	N*5/2(UNSPEC)+++	unspecified $I = 5/2$, $S = 0$ baryon
^{23}Na	NA23	sodium-23 nucleus
^{24}Na	NA24	sodium-24 nucleus
$\bar{n}$	NBAR	antineutron
Ne	NE	neon nucleus
neutral	NEUTRAL	unspecified neutral particle
neutral(s)	NEUTRAL(S)	one or more unspecified neutral particles
neutrals	NEUTRALS	two or more unspecified neutral particles
^{23}Ne	NE23	neon-23 nucleus
^{12}N	NIT12	nitrogen-12 nucleus note name is not same as chemical symbol
Nit	NIT	nitrogen-14 nucleus note name is not same as chemical symbol
$N\phi(1950)$	NPHI(1950)0	reported baryon with $s\bar{s}$ plus 3 other quarks
ν	NU	unspecified neutrino
$\nu(s)$	NU(S)	one or more unspecified neutrinos
$\bar{\nu}$	NUBAR	unspecified antineutrino
nucleon	NUCLEON	unspecified nucleon

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$\overline{\text{nucleon}}$	NUCLEONBAR	unspecified antinucleon
nucleus	NUCLEUS	unspecified nucleus
ν_e	NUE	electron neutrino
$\overline{\nu}_e$	NUEBAR	anti-electron neutrino
nuino	NUINO	any light supersymmetric particle
ν_μ	NUMU	muon neutrino
$\overline{\nu}_\mu$	NUMUBAR	anti-muon neutrino
ν_τ	NUTAU	τ neutrino
$\overline{\nu}_\tau$	NUTAUBAR	anti-τ neutrino
O	O	oxygen nucleus
^{16}O	O16	oxygen-16 nucleus
ω	OMEGA	$\omega(783)$ meson
Ω^*(unspec)	OMEGA*(UNSPEC)	$S = -3$ baryon of unspecified mass
Ω^*(unspec)$^-$	OMEGA*(UNSPEC)−	$S = -3$ baryon of unspecified mass
Ω^-	OMEGA−	ordinary Ω^- hyperon
Ω_b^-	OMEGA/B−	Ω_b^- doubly strange baryon with bottom quark
Ω_{bb}^-	OMEGA/BB−	Ω_{bb}^- strange baryon with two bottom quarks
Ω_{cb}^0	OMEGA/CB0	Ω_{cb}^0 strange baryon with bottom and charm quarks
Ω_c^0	OMEGA/C0	$\Omega_c(2740)^0$ $I = 0$ charmed doubly strange baryon
$\overline{\Omega}^+$	OMEGABAR+	ordinary $\overline{\Omega}^+$ antihyperon
p	P	proton
Pb	PB	lead nucleus
^{207}Pb	PB207	lead-207 nucleus
$\overline{p}$	PBAR	antiproton
ϕ	PHI	$\phi(1020)$ meson
$\phi(1680)$	PHI(1680)	
$\phi_3(1850)$	PHI3(1850)	bump in K^+K^- mass
photino	PHOTINO	spin 1/2 SUSY partner of the photon
π^+	PI+	ordinary π^+ meson
$\pi^\pm$	PI+−	ordinary π^+ or π^- meson
π^-	PI−	ordinary π^- meson
pion	PION	pion of unspecified charge
pion(s)	PION(S)	one or more pions
pions	PIONS	two or more pions
π^0	PI0	ordinary π^0 meson
π^0(s)	PI0(S)	one or more π^0's
π^0's	PI0S	two or more π^0's
$\pi_2(1670)^-$	PI2(1670)−	was $A(1680)$
pomeron	POMERON	
positronium	POSITRONIUM	
ψ(unspec)	PSI(UNSPEC)	unspecified ψ meson
$\psi(2S)$	PSI(2S)	
$\psi(3770)$	PSI(3770)	
$\psi(4415)$	PSI(4415)	
Pt	PT	platinum nucleus
quark	QUARK	quark of unspecified charge
quark(1/3)	QUARK(1/3)	quark of charge 1/3
quark(2/3)	QUARK(2/3)	quark of charge 2/3
q^*	QUARK*	excited quark
$\overline{q}^*$	QUARK*BAR	excited antiquark
$\overline{\text{quark}}$	QUARKBAR	antiquark of unspecified charge
$\overline{\text{quark}}$(1/3)	QUARKBAR(1/3)	antiquark of charge 1/3
$\overline{\text{quark}}$(2/3)	QUARKBAR(2/3)	antiquark of charge 2/3
ρ	RHO	$\rho(770)$ meson
$\rho(1250)^0$	RHO(1250)0	
$\rho(1700)^0$	RHO(1700)0	
ρ^+	RHO+	$\rho(770)^+$ meson
ρ^-	RHO−	$\rho(770)^-$ meson

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ρ^0	RHO0	$\rho(770)^0$ meson
$\rho_3(1690)^+$	RHO3(1690)+	was $g(1690)$
$\rho_3(1690)^-$	RHO3(1690)-	was $g(1690)$
$\rho_3(1690)^0$	RHO3(1690)0	was $g(1690)$
^{100}Ru	RU100	ruthenium-100 nucleus
s-electron	SELECTRON	spin-0 SUSY partner of the electron or positron
^{76}Se	SE76	selenium-76 nucleus
shower	SHOWER	shower track
Si	SI	silicon nucleus
^{28}Si	SI28	silicon-28 nucleus
Σ	SIGMA	ordinary Σ hyperon
$\Sigma(\text{unspec})^+$	SIGMA(UNSPEC)+	unspecified $I = 1$, $S = -1$ baryon
$\Sigma(\text{unspec})^-$	SIGMA(UNSPEC)-	unspecified $I = 1$, $S = -1$ baryon
$\Sigma(\text{unspec})^0$	SIGMA(UNSPEC)0	unspecified $I = 1$, $S = -1$ baryon
$\Sigma(1385\,P_{13})^+$	SIGMA(1385P13)+	
$\Sigma(1385\,P_{13})^-$	SIGMA(1385P13)-	
Σ^+	SIGMA+	ordinary Σ^+ hyperon
Σ^-	SIGMA-	ordinary Σ^- hyperon
$\Sigma_c(2455)$	SIGMA/C(2455)	$I = 1$ charmed baryon
$\Sigma_c(2455)^+$	SIGMA/C(2455)+	$I = 1$ charmed baryon
$\Sigma_c(2455)^{++}$	SIGMA/C(2455)++	$I = 1$ charmed baryon
$\Sigma_c(2455)^0$	SIGMA/C(2455)0	$I = 1$ charmed baryon
$\overline{\Sigma}^+$	SIGMABAR+	ordinary $\overline{\Sigma}^+$ antihyperon
$\overline{\Sigma}^-$	SIGMABAR-	ordinary $\overline{\Sigma}^-$ antihyperon
$\overline{\Sigma}^0$	SIGMABAR0	ordinary $\overline{\Sigma}^0$ antihyperon
Σ^0	SIGMA0	ordinary Σ^0 hyperon
s-lepton	SLEPTON	spin 0 SUSY lepton partner
Sn	SN	tin nucleus
^{116}Sn	SN116	tin-116 nucleus
^{120}Sn	SN120	tin-120 nucleus
s-particle	SPARTICLE	supersymmetric partner of any ordinary particle
s-quark	SQUARK	spin 0 SUSY quark partner
strange	STRANGE	unspecified strange particle
strange(s)	STRANGE(S)	one or more unspecified strange particles
$\overline{\text{strange}}$	STRANGEBAR	unspecified strangeness +1 particle
strangeonium	STRANGEONIUM	unspecified meson whose quark content is dominantly $s\bar{s}$, such as the ϕ
Su	SU	sulfur nucleus note name is not same as chemical symbol
^{32}S	SU32	sulfur-32 nucleus note name is not same as chemical symbol
^{35}S	SU35	sulfur-35 nucleus note name is not same as chemical symbol
Ta	TA	tantalum nucleus
tachyon	TACHYON	
τ	TAU	ordinary τ lepton of unspecified charge
τ^+	TAU+	ordinary τ^+ lepton
τ^-	TAU-	ordinary τ^- lepton
^{124}Te	TE124	tellurium-124 nucleus
Th	TH	thorium nucleus
Ti	TI	titanium nucleus
Tl	TL	thallium nucleus
top	TOP	unspecified particle with naked top
$\overline{\text{top}}$	TOPBAR	unspecified particle with naked antitop
trit	TRIT	tritium nucleus
U	U	uranium nucleus
^{238}U	U238	uranium-238 nucleus
$U(3100)$	U(3100)	exotic meson possibly seen in lambda-pbar plus pions
unspec	UNSPEC	particle of unspecified type
$\Upsilon(\text{unspec})$	UPSI(UNSPEC)	unspecified Υ particle
$\Upsilon(1S)$	UPSI(1S)	
$\Upsilon(10860)$	UPSI(10860)	

$\Upsilon(11020)$	UPSI(11020)	
$\Upsilon(2S)$	UPSI(2S)	
$\Upsilon(3S)$	UPSI(3S)	
$\Upsilon(4S)$	UPSI(4S)	
vee	VEE	unspecified neutral-strange-particle decay
vee(s)	VEE(S)	one or more unspecified neutral-strange-particle decays
vmeson	VMESON	vector meson of unspecified mass
vmeson^0	VMESON0	neutral vector meson of unspecified mass
W	W	weak gauge boson
W^+	W+	positive weak gauge boson
$W^\pm$	W+-	positive or negative weak gauge boson
W^-	W-	negative weak gauge boson
$W'^\pm$	WPRIME+-	additional charged W boson
Wt	WT	tungsten nucleus note name is not same as chemical symbol
W^0	W0	neutral weak gauge boson
X	X	for use in inclusive reactions, also for total cross-section data, as in $K^- p \to$ X
$X(1700)$	X(1700)	
$X(1935)$	X(1935)	was $S(1935)$
$X(1935)^-$	X(1935)-	was $S(1935)$
$X(1935)^0$	X(1935)0	was $S(1935)$
$X(3100)$	X(3100)	
$X(3100)^+$	X(3100)+	exotic meson possibly seen in lambda pbar plus pions
$X(3100)^-$	X(3100)-	exotic meson possibly seen in lambda pbar plus pions
$X(3100)^0$	X(3100)0	exotic meson possibly seen in lambda pbar plus pions
$X(3250)$	X(3250)	
X-ray	X-RAY	x-ray frequency gamma ray
Xe	XE	xenon nucleus
^{124}Xe	XE124	xenon-124 nucleus
^{127}Xe	XE127	xenon-127 nucleus
^{134}Xe	XE134	xenon-134 nucleus
^{136}Xe	XE136	xenon-136 nucleus
Ξ	XI	ordinary Ξ hyperon
Ξ(unspec)	XI(UNSPEC)	unspecified $I = 1/2$, $S = -2$ baryon
$\Xi(\text{unspec})^-$	XI(UNSPEC)-	unspecified $I = 1/2$, $S = -2$ baryon
$\Xi(\text{unspec})^0$	XI(UNSPEC)0	unspecified $I = 1/2$, $S = -2$ baryon
$\Xi(1530\,P_{13})^-$	XI(1530P13)-	
$\Xi(1530\,P_{13})^0$	XI(1530P13)0	
$\Xi(1620)^-$	XI(1620)-	
$\Xi(1620)^0$	XI(1620)0	
$\Xi(1820\,D_{13})^-$	XI(1820D13)-	
$\Xi(1820\,D_{13})^0$	XI(1820D13)0	
$\Xi(1950)^-$	XI(1950)-	
$\Xi(1950)^0$	XI(1950)0	
$\Xi(2030)^-$	XI(2030)-	
$\Xi(2030)^0$	XI(2030)0	
$\Xi(2250)^-$	XI(2250)-	
$\Xi(2250)^0$	XI(2250)0	
$\Xi(2500)^-$	XI(2500)-	
$\Xi(2500)^0$	XI(2500)0	
Ξ^*(unspec)	XI*(UNSPEC)	I =unspecified, $S = -2$ baryon of unspecified mass
$\Xi^*(\text{unspec})^-$	XI*(UNSPEC)-	I =unspecified, $S = -2$ baryon of unspecified mass
$\Xi^*(\text{unspec})^0$	XI*(UNSPEC)0	I =unspecified, $S = -2$ baryon of unspecified mass
Ξ^-	XI-	ordinary Ξ^- hyperon
Ξ_b^-	XI/B-	Ξ_b^- strange baryon with bottom quark
Ξ_b^0	XI/B0	Ξ_b^0 strange baryon with bottom quark
Ξ_c^+	XI/C+	$\Xi_c(2460)^+$ $I = 1/2$ charmed strange baryon
$\overline{\Xi}_c^-$	XI/CBAR-	$\overline{\Xi}_c(2460)^-$ $I = 1/2$ charmed strange antibaryon
$\overline{\Xi}_c^0$	XI/CBAR0	$\overline{\Xi}_c(2460)^0$ $I = 1/2$ charmed strange antibaryon

Ξ_c^0	XI/C0	$\Xi_c(2460)^0$ $I = 1/2$ charmed strange baryon
$\bar{\Xi}^+$	XIBAR+	ordinary $\bar{\Xi}^+$ antihyperon
$\bar{\Xi}^0$	XIBAR0	ordinary $\bar{\Xi}^0$ antihyperon
Ξ^0	XI0	ordinary Ξ^0 hyperon
Y^*(unspec)	Y*(UNSPEC)	I = unspecified, $S = -1$ baryon of unspecified mass
$Y^*(\text{unspec})^+$	Y*(UNSPEC)+	I = unspecified, $S = -1$ baryon of unspecified mass
$Y^*(\text{unspec})^-$	Y*(UNSPEC)-	I = unspecified, $S = -1$ baryon of unspecified mass
$Y^*(\text{unspec})^0$	Y*(UNSPEC)0	I = unspecified, $S = -1$ baryon of unspecified mass
Y^0	Y0	represents a Λ or Σ^0 or low-mass neutral Y*
Z	Z	neutral weak gauge boson
$Z^*(\text{unspec})^0$	Z*(UNSPEC)0	exotic I =unspecified, $S = +1$ baryon of unspecified mass
$\zeta(8300)$	ZETA(8300)	reported $\zeta(8300)$
Zn	ZN	zinc nucleus
Z'	ZPRIME	additional Z boson
^{94}Zr	ZR94	zirconium-94 nucleus
^{96}Zr	ZR96	zirconium-96 nucleus
Z^0	Z0	neutral weak gauge boson

BNL Experiments

BNL-734 (Aug 1978) Approved Feb 1979, Feb 1984; Started Jan 1981; Completed May 1986.

A MEASUREMENT OF THE ELASTIC SCATTERING OF NEUTRINOS FROM ELECTRONS AND PROTONS

BROOKHAVEN – L A Ahrens, S H Aronson, B G Gibbard, M J Murtagh (✓ Spokesperson), S J Murtagh, P J Wanderer, D H White
BROWN U – J Callas, D Cutts, J Hoftun, R E Lanou
KEK – K Abe, K Amako, S Kabe, T Shinkawa, A Sterad
OSAKA U – Y Nagashima, Y Suzuki
PENN U – E W Beier, L S Durkin, S M Heagy, M Hurley, A K Mann, H H Williams, T York
SUNY, STONY BROOK – D Hedin, M D Marx, E Stern

Accelerator BNL *Detector* Calorimeter

Reactions

$\nu_\mu\ e^- \to \nu_\mu\ e^-$	0 12 GeV/c
$\nu_\mu\ p \to \nu_\mu\ p$	"
$\nu_\mu\ p \to \nu_\mu\ p\ \pi^0$	"
$\nu_\mu\ p \to \nu_\mu\ n\ \pi^+$	"
$\nu_\mu\ n \to \mu^-\ p$	"
$\nu_\mu\ n \to \nu_\mu\ p\ \pi^-$	"
$\nu_\mu\ n \to \nu_\mu\ n\ \pi^0$	"
$\bar{\nu}_\mu\ e^- \to \bar{\nu}_\mu\ e^-$	"
$\bar{\nu}_\mu\ p \to \bar{\nu}_\mu\ p$	"
$\bar{\nu}_\mu\ p \to \bar{\nu}_\mu\ p\ \pi^0$	"
$\bar{\nu}_\mu\ p \to \bar{\nu}_\mu\ n\ \pi^+$	"
$\bar{\nu}_\mu\ n \to \bar{\nu}_\mu\ p\ \pi^-$	"
$\bar{\nu}_\mu\ n \to \bar{\nu}_\mu\ n\ \pi^0$	"

Comments Ran for 4630 hours.

Papers PRL 51 (1983) 1514, IEEE TNS 30 (1983) 3782, PRL 54 (1985) 18, PR D31 (1985) 2732, PRL 56 (1986) 1107, PR D34 (1986) 75, PRL 58 (1987) 636, NIM A254 (1987) 515, PR D35 (1987) 785, PL B194 (1987) 420, PL B194 (1987) 586, PL B202 (1988) 284, PRL 62 (1989) 1709, and PR D41 (1990) 3297.

BNL-745 (Apr 1979) Approved Sep 1979, Feb 1984; Started Feb 1983; Completed May 1986.

AN IMPROVED TEST OF QED — AN EXPERIMENT TO MEASURE VACUUM POLARIZATION IN THE 3D-3P TRANSITIONS IN MUONIC HELIUM

CERN & COLUMBIA U – E Zavattini
BROOKHAVEN – M May
COLUMBIA U – A Blaer, J French, A M Sachs (✓ Spokesperson)

Accelerator BNL *Detector* Counter

Reactions

μ^- He $\to \mu^-$ He γ	0 GeV/c

Comments The transitions are stimulated by infrared radiation from an isotopic-gas CO_2 laser. Ran for 2142 hours.

Papers PR A40 (1989) 158.

BNL-747 (Aug 1979) Approved Oct 1980, Feb 1984; Started Jun 1982; Completed 1988.

A HIGH STATISTICS STUDY OF ϕ AND $\phi\phi$ PRODUCTION FROM $\pi^- p$ AND $K^- p$ INTERACTIONS AT 22 GeV/c — A SEARCH FOR GLUEBALLS

BROOKHAVEN – A Etkin, K J Foley, R W Hackenburg, R S Longacre, W A Love, T W Morris, E D Platner, A C Saulys
BROOKHAVEN & CITY COLL, N Y – S J Lindenbaum (✓ Spokesperson)
CITY COLL, N Y – C S Chan, M A Kramer

Accelerator BNL *Detector* MPS-II

Reactions

$\pi^- p \to \phi\ \phi\ n$	22 GeV/c
$\pi^- p \to \phi\ K^+\ K^-\ n$	"
$K^- p \to \phi\ Y^0$	"
$K^- p \to \phi\ \phi\ Y^0$	"
$K^- p \to \phi\ K^+\ K^-\ Y^0$	"

Particles studied glueball

Comments Of particular interest is the role of glueballs in the breaking of the OZI rule in $\pi^- p \to \phi\phi n$. Three new $I^G J^{PC}$ 0^+2^{++} meson states, the $f_2(2010)$, $f_2(2300)$, and $f_2(2340)$, fit the glueball resonance hypothesis and no other one proposed. A second-phase experiment is planned to search for exotic-J^{PC} glueballs in $\pi^- p \to \phi\phi n$ and other reactions.

Papers PRL 49 (1982) 1620, SHEP 4 (1983) 69, PL B131 (1983) 221, CNPP 13 (1984) 285, PL B149 (1984) 407, PL B165 (1985) 202, PL B165 (1985) 217, and PL B201 (1988) 568.

BNL-766 (Sep 1980, Dec 1980) Approved Feb 1981; Started Jun 1982; Completed Jul 1986.

STUDY OF Ω^- PRODUCTION AND DEVELOPMENT OF ON-LINE HARDWARE PROCESSING

NEVIS LABS, COLUMBIA U – M Church, E Gottschalk, R Hylton, B Knapp (✓ Spokesperson), B Stern, L Wiencke
MASSACHUSETTS U, AMHERST – E Hartouni, D Jensen, M Kreisler (✓ Spokesperson), M Rabin, J Uribe
MEXICO U – C Avilez (✓ Spokesperson), W Correa, J Escalona
FERMILAB – D Christian, G Guitierrez, S Holmes, J Strait, A Wehman

Accelerator BNL *Detector* Spectrometer

Reactions

$n\ p \to \Omega^-\ X$	10 28 GeV/c
$n\ p \to p\ \Omega^-\ 3K^+\ 2\pi^-$	"
$n\ p \to p\ \Omega^-\ K^0\ 2K^+\ \pi^-$	"
$n\ p \to \Lambda\ X$	"
$n\ p \to \Lambda\ K^0\ p$	"
$n\ p \to \Lambda\ K^+\ p\ \pi^+\ 2\pi^-$	"
$n\ p \to \Xi^-\ X$	"
$n\ p \to 2\Lambda\ X$	"
$n\ p \to \phi\ \pi^+\ \pi^-\ X$	"

Particles studied Ω^-

Comments Only a sampling of the reactions to be studied is listed above. Also studied pp interactions. The spectrometer is designed to measure exclusive topologies with high sensitivity. Ran for 1194 hours.

Papers AIPCP 132 (1985) 425, AIPCP 185 (1988) 408, and IEEE TNS 36 (1989) 1480.

BNL-771 (Jan 1981) Approved Mar 1981, Oct 1983; Started Apr 1983; Completed 1987.

STUDY OF E-MESON CHARACTERISTICS IN $\pi^- p$, $K^- p$, AND $\bar{p}p$ INTERACTIONS

BROOKHAVEN – S U Chung (✓ Spokesperson), R C Fernow, H Kirk, S D Protopopescu, D Weygand, H J Willutzki
FLORIDA STATE U – A Boehnlein, D Boehnlein, J H Goldman, V Hagopian, D Reeves
SOUTHEASTERN MASS U – Z Bar-Yam, J Dowd, W Kern, E King, H Rudnicka
INDIANA U – R Crittenden, A Dzierba, T Marshall, S Teague, D Zieminska

Accelerator BNL *Detector* MPS-II

Reactions

$\pi^- p \to K^+\ K_S\ \pi^-\ X$	8 GeV/c
$\pi^- p \to f_1(1420)\ n$	"
$\pi^- p \to \eta(1440)\ n$	"
$\pi^- p \to \Xi^-\ \pi^+\ \pi^-\ X$	"
$\pi^- p \to \Xi^*(\text{unspec})^-\ X$	"

$K^- p \to K^+ K_S \pi^- X$	6 GeV/c
$K^- p \to f_1(1420) \Lambda$	"
$K^- p \to \eta(1440) \Lambda$	"
$K^- p \to \Lambda K^- \pi^+ K^0$	"
$K^- p \to \Xi^*(\text{unspec})^0 K^0$	"
$K^- p \to \Lambda K_S \pi^- K^+$	"
$K^- p \to \Xi^*(\text{unspec})^- K^+$	"
$\bar{p} p \to K^+ K_S \pi^- X$	5 GeV/c
$\bar{p} p \to f_1(1420) \pi^0$	"
$\bar{p} p \to f_1(1420) \rho^0$	"
$\bar{p} p \to \eta(1440) \pi^0$	"
$\bar{p} p \to \eta(1440) \rho^0$	"
$\bar{p} p \to \bar{p} p \pi^0$	"

Particles studied $f_1(1420)$, glueball, Ξ^*(unspec), baryonium, strangeonium

Comments An attempt to study $f_1(1420)$ and $\eta(1440)$.

Papers PR D30 (1984) 1409, PRL 55 (1985) 779, PR D34 (1986) 1960, and PRL 61 (1988) 1557.

BNL-773 (Aug 1981) Approved Feb 1983; Started Apr 1984; Completed Jul 1986.

SEARCH FOR $S = -1$ DIBARYON STATES IN THE Λp MISSING MASS SPECTRUM NEAR THE ΣN THRESHOLD IN THE REACTION $d(K^-, \pi^-)X$ AT 870 MeV/c

BRANDEIS U - J R Bensinger, H Piekarz (✓ Spokesperson), S Tarem
BROOKHAVEN - S Bart, R E Chrien, A Moalem, P Pile, R J Sutter, T Ward
HOUSTON U - E V Hungerford, T Kishimoto, B Mayes, L Pinsky
MIT - M Deutsch, J Piekarz
OSAKA U - T Fukuda, T Shibata
TEXAS U - M Barlett, G W Hoffman
VASSAR COLL - R L Stearns

Accelerator BNL *Detector* Spectrometer

Reactions

K^- deut $\to \pi^-$ X	870 MeV/c

Particles studied dibaryon($S = -1$)

Comments The reaction was studied using a double-arm magnetic spectrometer. The scattering angles were 6, 10, 14, 18, 22, and 26°, allowing for both s-wave and p-wave resonance production. The 3-layer scintillation range hodoscope closely surrounding a liquid deuterium target and arranged into 12 polar angles was used to detect charged particles from Λp final-state resonance decays as well as to suppress the quasi-elastic Λp and $\Sigma^0 p$ backgrounds. X denotes a dibaryon state with $S = -1$ and $Q = +1$.

Papers NP A463 (1987) 205c.

BNL-774 (Aug 1981, Apr 1982) Approved May 1982; Started Apr 1985; Completed 1991.

SEARCH FOR Σ HYPERNUCLEAR LEVELS IN ^{4}He

HOUSTON U - E V Hungerford (✓ Spokesperson), B W Mayes, H Piekarz, L S Pinsky
BROOKHAVEN - S Bart, R Chrien, P Pile
NEW MEXICO U - B Bassalleck
VASSAR COLL - R Stearns

Accelerator BNL *Detector* Spectrometer

Reactions

K^- He $\to \pi^+$ hypernuc	600 MeV/c

Particles studied hypernuc

Comments A continuation of BNL-752. Ran for 650 hours. Data under analysis.

Papers PR C35 (1987) 1589.

BNL-776 (Sep 1981) Approved Feb 1982; Started Dec 1983; Completed May 1986.

NEUTRINO OSCILLATION EXPERIMENT

COLUMBIA U - L Borodovsky, C Y Chi, Y Ho, N Kondakis, W Lee (✓ Spokesperson), J Mechalakos, B Rubin, R Seto, C Stoughton, G Tzanakos
ILLINOIS U, URBANA - W P Hogan, E O'Brien, T O'Halloran, K Reardon, S Salman, P D Sheldon, G W Sullivan
JOHNS HOPKINS U - B Blumenfeld, L Chichura, C Chien, J Krizmanic, E Lincke, L Lueking, W Lyle, L Madansky, A Pevsner

Accelerator BNL *Detector* Combination

Reactions

$\nu_\mu \to$ X	0 10 GeV/c
$\nu_\mu \to \nu_e$	"
$\bar{\nu}_\mu \to$ X	"
$\bar{\nu}_\mu \to \bar{\nu}_e$	"

Particles studied ν_μ, ν_e, $\bar{\nu}_\mu$, $\bar{\nu}_e$

Comments Studies (1) ν_μ disappearance and $\nu_\mu \to \nu_e$ oscillations using a *narrow band* beam, and (2) ν_μ ($\bar{\nu}_\mu$) disappearance and $\nu_\mu \to \nu_e$, $\bar{\nu}_\mu \to \nu_e$ oscillations using a *wide band* beam. Ran for 2715 hours.

Papers PRL 62 (1989) 2237, NIM A281 (1989) 448, and PRL 68 (1992) 274.

BNL-777 (Jan 1982) Approved May 1982; Started Feb 1985; Completed May 1988.

SEARCH FOR THE RARE DECAY MODE $K^+ \to \pi^+ \mu^+ e^-$

BROOKHAVEN - H A Gordon, D M Lazarus, P Rehak
YALE U - C Alliegro, C Campagnari, P S Cooper, N Hadley, A Lee, M E Zeller (✓ Spokesperson)
WASHINGTON U, SEATTLE - V Chaloupka, E Jagel, H J Lubatti
PSI, VILLIGEN - J Egger, W D Herold, H Kasper

Accelerator BNL *Detector* Spectrometer

Reactions

$K^+ \to \pi^+ \mu^+ e^-$	5.8 GeV/c
$K^+ \to \pi^+ e^+ e^-$	"

Particles studied K^+

Papers PRL 59 (1987) 2832, PRL 61 (1988) 2062, and PRL 64 (1990) 165.

BNL-780 (Sep 1982) Approved Feb 1983; Started May 1985; Completed 1988.

A SEARCH FOR THE FLAVOR CHANGING NEUTRAL CURRENTS $K_L \to \mu e$ AND $K_L \to e^+ e^-$

BROOKHAVEN - E Jastrzembski, R C Larsen, L B Leipuner, W M Morse (✓ Spokesperson)
YALE U - R K Adair, H B Greenlee, H Kasha, E B Mannelli, M Mannelli, K E Ohl, S F Schaffner, M P Schmidt (✓ Spokesperson), C B Schwarz

Accelerator BNL *Detector* Spectrometer

Reactions

$K_L \to \mu^+ e^-$	4 12 GeV/c
$K_L \to \mu^- e^+$	"
$K_L \to e^+ e^-$	"
$K_L \to \mu^+ \mu^-$	"
$K_L \to \pi^0 e^+ e^-$	"

Particles studied K_L

Comments A sensitivity to branching fractions of 10^{-9} was achieved.

Papers PRL 60 (1988) 893, PRL 61 (1988) 2300, and PR D39 (1989) 990. No other papers expected.

BNL-781 (Sep 1982) Approved Feb 1983; Started Jan 1984.

SPIN DEPENDENCE OF THE Λ NUCLEUS INTERACTION DETERMINED BY OBSERVATION OF HYPERNUCLEAR γ RAYS

BROOKHAVEN S Bart, R E Chrien, M May (√ Spokesperson), P Pile
MIT M Deutsch (√ Spokesperson)
HOUSTON U E V Hungerford, B Mayes, L Pinsky
CARNEGIE MELLON U P Barnes
VASSAR COLL R L Stearns
NEW YORK U B Budick

Accelerator BNL *Detector* Spectrometer

Reactions

K^- nucleus $\rightarrow \pi^-$ hypernuc $\gamma(s)$ 800 MeV/c

Particles studied hypernuc

Comments A continuation of BNL-760. Approved for 1028 hours.

BNL-782 (Sep 1982) Approved Feb 1983; Started Jul 1984; Completed 1988.

SPIN-SPIN EFFECTS IN MEDIUM AND HIGH MOMENTUM TRANSFER ELASTIC *pp* SCATTERING

MICHIGAN U R J Bruni, G R Court, D G Crabb, R L Cummings, I Gialas, F Z Khiari, A D Krisch (√ Spokesperson), A M T Lin, R A Phelps, R R Raylman, R S Raymond, T Roser, J A Stewart, K M Terwilliger
BROOKHAVEN K A Brown, G T Danby, Y Y Lee, L G Ratner
MARYLAND U & MICHIGAN U D C Peaslee
MIT P R Cameron
NOTRE DAME U J R O'Fallon
RICE U J B Roberts
TEXAS A AND M T S Bhatia, G Glass, L C Northcliffe
ZURICH, ETH M Simonius

Accelerator BNL *Detector* Counter

Reactions Polarized beam and target

$p\,p \rightarrow p\,p$ 13 26 GeV/c

Comments Continues to higher energies studies at Argonne of spin-spin effects.

Papers PR D31 (1985) 3017, PRL 57 (1986) 507, PRL 60 (1988) 2351, and PR D39 (1989) 45.

BNL-785 (Jan 1983) Approved Feb 1983; Started Jul 1984; Completed Feb 1986.

SINGLE SPIN ASYMMETRY MEASUREMENT IN INCLUSIVE $\bar{p}p$ REACTIONS AT 24 GeV/c AND HIGH TRANSVERSE MOMENTUM

BROOKHAVEN D S Barton, G Bunce, A S Carroll, Y I Makdisi (√ Spokesperson)
MINNESOTA U H Courant, K Heller, S Heppelman, M Marshak, S Z Saroff, M Shupe (√ Spokesperson)
SOUTHEASTERN MASS U J J Russell

Accelerator BNL *Detector* Single-arm spectrometer

Reactions Polarized beam

$p\,p \rightarrow \pi^+$ X	13.5, 18.5 GeV/c
$p\,p \rightarrow \pi^-$ X	"
$p\,p \rightarrow K^+$ X	"
$p\,p \rightarrow K^-$ X	"
$p\,p \rightarrow p$ X	"

Comments Ran for 624 hours.

Papers PRL 64 (1990) 995. No other papers expected.

BNL-787 (Sep 1983) Approved Oct 1983; Started Jun 1984.

A STUDY OF THE DECAY $K^+ \rightarrow \pi^+\nu\bar{\nu}$

BROOKHAVEN S Adler, M S Atiya, I Chiang, J S Frank, J S Haggerty, T F Kycia, K K Li, L S Littenberg (√ Spokesperson), A K Sambamurti, A J Stevens, R C Strand, C Witzig
PRINCETON U M Ardibili, M Convery, M M Ito, D R Marlow, R McPherson, P D Meyers, F C Shoemaker, A J S Smith (√ Spokesperson)
TRIUMF E W Blackmore, D A Bryman (√ Spokesperson), L Felawka, P Kitching, A Konaka, V Kujala, Y Kuno, J A Macdonald, T Nakano, T Numao, P Padley, J Poutissou, R Poutissou, J Roy, R Soluk, A S Turcot

Accelerator BNL *Detector* Spectrometer

Reactions

$K^+ \rightarrow \pi^+\,\nu\,\bar{\nu}$	0 MeV/c
$K^+ \rightarrow \pi^+\,\mu^+\,\mu^-$	"
$K^+ \rightarrow \mu^+\,\mu^+\,\mu^-\,\nu$	"
$K^+ \rightarrow \pi^+$ higgs	"
$K^+ \rightarrow \pi^+\,\gamma\,\gamma$	"
$K^+ \rightarrow \pi^+$ X	"
$\pi^0 \rightarrow \nu\,\bar{\nu}$	205 MeV/c
$\pi^0 \rightarrow \gamma$ X	"
$\pi^0 \rightarrow \gamma\,\nu\,\bar{\nu}$	"

Particles studied K^+, higgs, nuino, π^0

Comments A sensitivity down to a level of about 2×10^{-10} is expected for $K^+ \rightarrow \pi^+\nu\bar{\nu}$. A measurement at this level would determine $|V_{td}|$ if m_t were known. An observation significantly above this level would indicate a fourth generation of quarks and leptons, the presence of nuinos, or other new phenomena. A simultaneous measurement of $K^+ \rightarrow \pi^+ X$ to a sensitivity of about 5×10^{-11} is also expected. This probes the existence of axions, familons, hyperphotons, or other new particles. Other processes probe the existence of higgs, majorons, massive neutrinos, and other hypothetical particles. Approved for 3000 additional hours with an upgraded beam and detector. In progress (February 92).

Papers PRL 63 (1989) 2177, PRL 64 (1990) 21, PRL 65 (1990) 1188, and PRL 66 (1991) 2189.

BNL-788 (Sep 1983) Approved Oct 1983; Started May 1985; Completed May 1990.

THE FOUR-FERMION WEAK INTERACTION AND THE DECAY OF $^4_\Lambda$He AND $^5_\Lambda$He

CARNEGIE MELLON U M Athanas, G Franklin (√ Spokesperson), C Maher, B Quinn, R A Schumacher, I R Sukaton, V Zeps
ALBERTA U F M Rozon
BROOKHAVEN S Bart, R Chrien, K Johnson, P Pile, R Sawafta, R Sutter
HOUSTON U E V Hungerford, T Kishimoto, L G Tang
INDIANA U J J Szymanski
LOS ALAMOS P D Barnes (√ Spokesperson)
NEW MEXICO U B Bassalleck
VASSAR COLL R L Stearns
YALE U G Diebold

Accelerator BNL *Detector* Spectrometer

Reactions

K^- He $\rightarrow \pi^-$ hypernuc	750 MeV/c
$K^-\,{}^6$Li $\rightarrow \pi^-$ hypernuc	"

Particles studied hypernuc

Comments Tests the $\Delta I = 1/2$ rule through measurements of hypernuclear decay rates $\Gamma(\Lambda \rightarrow p\pi^-)$, $\Gamma(\Lambda \rightarrow n\pi^0)$, $\Gamma(\Lambda n \rightarrow nn)$, and $\Gamma(\Lambda p \rightarrow np)$. The hypernuclear state is isolated by momentum analysis of the (K^-, π^-) target reaction. Out-of-beam large volume scintillation detectors and tracking chambers are used to identify the hypernuclear decay products by time-of-flight, dE/dx, and range.

Papers PR C43 (1991) 849.

BNL-791 (1984) Approved Jun 1984; Started Apr 1985; Completed.

STUDY OF VERY RARE K_L DECAYS

UC, IRVINE A Heinson, J Horvath, P Knibbe, C Mathiazhagan, W R Molzon (√ Spokesperson), J Urheim
UCLA K Arisaka, R D Cousins (√ Spokesperson), T Kaarsberg, J Konigsberg, J Kubic, P Melese, P Rubin, W E Slater, D Wagner

LOS ALAMOS - G W Hart, W W Kinneson, D M Lee, R J McKee, Jr , E C Milner, G H Sanders, H J Ziock
STANFORD U - S Axelrod, K A Biery, M Diwan, G M Irwin, K Lang, J Marguiles, D A Ouimette, A Schwartz, Q H Trang, S G Wojcicki
TEMPLE U - L B Auerbach, J Belz, P Buchholz, C Guss, V L Highland, S Kettell, W K McFarlane, M Sivertz
TEXAS U - G W Hoffmann, P J Riley, J L Ritchie, A Yamashita
WILLIAM AND MARY COLL - M D Chapman, E Eckhouse, J F Ginkel, P Guss, A D Hancock, D Joyce, J R Kane, C J Kenney, Y Kuang, W F Vulcan, R E Welsch, R J Whyley, R G Winter

Accelerator BNL *Detector* Spectrometer

Reactions

$K_L \rightarrow$ muon $e^{\pm}$
$K_L \rightarrow \mu^+ \mu^-$
$K_L \rightarrow e^+ e^-$
$K_L \rightarrow e^+ e^- e^+ e^-$
$K_L \rightarrow e^+ e^- \gamma$

Particles studied K_L

Comments The first priority is a search for $K_L \rightarrow \mu e$ with a branching-ratio sensitivity of 10^{-12}. Ran for 5000 hours. See also BNL-871.

Papers NIM A256 (1987) 329, PR D38 (1988) 2914, NIM A277 (1989) 517, PRL 63 (1989) 2181, PRL 63 (1989) 2185, and PR D44 (1991) 1.

BNL-793 (Aug 1984) Approved Oct 1984; Completed 1989.

SEARCH FOR FRACTIONALLY CHARGED NUCLEI IN 15 A GeV Si Pb AND Si Cu COLLISIONS

UC, BERKELEY - Y D He, P B Price (✓ Spokesperson)

Accelerator BNL-ION *Detector* Plastic

Reactions

Si Pb → 15 GeV (E_{lab}/N)
Si Cu → "

Particles studied quark

Comments Looks for quarks bound to nuclear fragments, anomalons, and other exotic composites. Studies secondary interactions of projectile fragments. Ran in 1987, and in Summer 89.

Papers PL B252 (1990) 331, PR C43 (1991) 835, and PR C44 (1991) 1672.

BNL-794 (Aug 1984) Approved Oct 1984; Started Mar 1985; Completed 1990.

ONE-SPIN EFFECTS IN $pp \rightarrow pp$ AT HIGH $p_{\perp}^2$

MICHIGAN U - P R Cameron, G R Court, D G Crabb, I Gialas, W A Kaufman, F Z Khiari, A D Krisch (✓ Spokesperson), A M T Lin, G de Muth, R A Phelps, R R Raylman, R S Raymond, T Roser, J A Stewart, K M Terwilliger, B Vuaridel
BROOKHAVEN - K A Brown, G T Danby, L G Ratner
MARYLAND U & MICHIGAN U - D C Peaslee
NOTRE DAME U - J R O'Fallon
RICE U - J B Roberts
TEXAS A AND M - T S Bhatia, G Glass, L C Northcliffe
ZURICH, ETH - M Simonius

Accelerator BNL *Detector* Double-arm spectrometer

Reactions Polarized target

$p\,p \rightarrow p\,p$ 24, 28 GeV/c

Comments Measures elastic differential cross sections in different initial spin states in the large $P_{\perp}^2$ region from 6.6 to 8 (GeV/c)^2. Continues studies of BNL-748. Ran for 1400 hours. For a similar experiment at much higher energies, see SERPUKHOV-UNK-001.

Papers PRL 51 (1983) 2359, PR D32 (1985) 3070, and PRL 65 (1990) 3241.

BNL-798 (Sep 1984) Approved Oct 1984; Completed 1987.

STUDY OF STRANGENESS IN NUCLEI BY USE OF THE (π^+, K^+) REACTION

BROOKHAVEN - S Bart, R E Chrien, P H Pile (✓ Spokesperson), R J Sutter
CARNEGIE MELLON U - R McCrady, B Quinn, J Seydoux
FLORIDA STATE U - H Plendl
HOUSTON U - E V Hungerford, T Kishimoto, L Tang, W von Witsch, Z Xu
LOS ALAMOS - C S Mishra, J C Peng (✓ Spokesperson)
MISSISSIPPI U - A Rafatian, J Reidy
TOHOKU U - K Maeda
TRIUMF - D Gill
VASSAR COLL - J W Sleight, R L Stearns

Accelerator BNL *Detector* Spectrometer

Reactions

π^+ nucleus → K^+ hypernuc 1.05 GeV/c

Particles studied hypernuc

Comments Extends measurements of BNL-758.

Papers NP A478 (1988) 705c, JPSJ 58 (1989) Suppl. p. 394, NC 102A (1989) 413, AIPCP 224 (1990) 77, and PRL 66 (1991) 2585. No other papers expected.

BNL-801 (Sep 1984) Approved Oct 1984; Completed 1987.

A SEARCH FOR QUARKS PRODUCED IN HEAVY-ION MERCURY INTERACTIONS

SAN FRANCISCO STATE U - G P Alba, R W Bland (✓ Spokesperson), S Dickson, C L Hodges, R Johnson, M Lindgren, T L Palmer, D A Stricker
LBL - H Mattis, H Pugh
UC, IRVINE - G Shaw
LOS ALAMOS - R Slansky

Accelerator BNL-ION *Detector* Other

Reactions

Su Hg 14.5 GeV (E_{lab}/N)
O Hg "

Particles studied quark

Comments Quarks produced in collisions of oxygen and sulfur with a mercury target are stopped in the target, which then is distilled and run through an automated Millikan-type device. Quarks are also stopped in a liquid argon tank and collected electrostatically, then dissolved in mercury for the Millikan apparatus.

Papers PR D36 (1987) 3533, and NP A525 (1991) 513c.

BNL-802 (Sep 1984) Approved Oct 1984; Completed 1989.

STUDIES OF PARTICLE PRODUCTION AT EXTREME BARYON DENSITIES IN NUCLEAR COLLISIONS AT THE AGS

ARGONNE - S Kaufman
BROOKHAVEN - D Alburger, D Beavis, P D Bond, C Chasman (✓ Spokesperson), Z Chen, Y Y Chu, J B Cumming, R Debbe, J H van Dijk, S Gushue, O Hansen, S Hayashi, M J LeVine, Y Miake, B E Moskowitz, J Olness, L P Remsberg, M Tanaka, M J Tannenbaum, F Videbaek, P Vincent, H Wegner
BUENOS AIRES U - M Mariscotti
COLUMBIA U - I Juricic, K Kurita, S Nagamiya (✓ Spokesperson), P W Stankus, Y Wu, W A Zajc
HIROSHIMA U - T Sugitate
KYUSHU U - Y Ikeda, K Kimura
LIVERMORE - J Engelage
MIT - M Bloomer, B A Cole, J B Costales, L Grodzins, H Huang, R J Ledoux, R J Morse, C Parsons, M Sarabura, S G Steadman, G S F Stephans, V Vutsadakis, D S Woodruff
UC, BERKELEY - H Crawford
UC, RIVERSIDE - T Abbott, S Fung, M Vient
TOKYO U - R S Hayano, H Sakurai
TOKYO U, INS - Y Akiba, H Hamagaki, S Homma

Accelerator BNL-ION *Detector* Single-arm spectrometer

Reactions

^{28}Si nucleus → charged X	14.5 GeV/c (P_{lab}/N)
^{16}O nucleus → charged X	"
p nucleus → charged X	"

Comments Aims to establish effective temperatures in nucleus-nucleus conditions and to measure particle production cross sections. Measures inclusive spectra of $\pi^{\pm}$, $K^{\pm}$, $p^{\pm}$ under well-defined, variable trigger conditions. Ran for 2300 hours.

Papers NIM A254 (1987) 88, RSI 58 (1987) 143, RSI 58 (1987) 1761, PL B197 (1987) 285, ZPHY C38 (1988) 35, ZPHY C38 (1988) 135, NP A498 (1989) 67c, NP A498 (1989) 415c, NIM A281 (1989) 367, NIM A283 (1989) 772, PRL 64 (1990) 847, NP A525 (1991) 231c, NP A525 (1991) 455c, NP A525 (1991) 531c, NP A525 (1991) 681c, PRL 66 (1991) 1567, PR C44 (1991) 1611, and NP A527 (1991) 595c.

BNL-805 (Dec 1984) Approved Mar 1985; Started Aug 1986; Completed Jun 1989.

A SEARCH FOR GALACTIC AXIONS

ROCHESTER U – S DePanfilis, A C Melissinos (✓ Spokesperson), B Moskowitz, J Rogers, Y Semertzidis, W Wuensch
BROOKHAVEN – H Halama, A Prodell
FERMILAB – W B Fowler, F Nezrick

Accelerator NONE *Detector* Other

Particles studied axion

Comments A search for a light-mass galactic axion through its electromagnetic conversion to a photon in the presence of a strong static field. Uses a high-field large-aperture solenoid and microwave detection apparatus. Data from 1 to 6 GHz are complete.

Papers PRL 59 (1987) 839, APL 52 (1988) 2266, IEEE MTT 36 (1988) 607, NIM A264 (1988) 98, NIM A264 (1988) 445, and PR D40 (1989) 3153.

BNL-806 (Dec 1984) Approved Mar 1985; Started Nov 1986; Completed Jun 1988.

NUCLEAR FRAGMENTATION IN HEAVY ION COLLISIONS AT 15 GeV/amu

SIEGEN U – C Brechtmann, W Heinrich (✓ Spokesperson)

Accelerator BNL-ION *Detector* Plastic

Reactions

^{28}Si nucleus	14.5 GeV (T_{lab}/N)
^{16}O nucleus	"

Particles studied frag

Comments Measures the cross sections for production of beam fragments with charges greater than five. Studies nuclear fragmentation and coulomb dissociation for various targets. Searches for projectile fragments with fractional charge.

Papers PL B200 (1988) 583, PR C39 (1989) 2222, and MPL A4 (1989) 1879.

BNL-808 (Feb 1985) Approved Mar 1985; Completed 1988.

INTERACTIONS OF 14.1 GeV/amu NUCLEI FOR ^{16}O TO ^{197}Au IN LIGHT AND HEAVY TARGETS

CRACOW – R Holynski, A Jurak, A Olszewski, B Wilczynska, H Wilczynski, W Wolter
LOUISIANA STATE U – L Barbier, W V Jones, E Pruet, J P Wefel, B Wosiek
MINNESOTA U – P S Freier, C J Waddington (✓ Spokesperson)

Accelerator BNL-ION *Detector* Emulsion

Reactions

^{16}O nucleus	15 GeV (T_{lab}/N)
^{32}S nucleus	"
^{197}Au nucleus	"

Comments A search for evidence for a quark-gluon plasma. Uses emulsion chambers.

Papers PRL 60 (1988) 405, PRL 62 (1989) 733, NP A498 (1989) 535c, PR C39 (1989) 1385, PR C40 (1989) 2449, and PR C41 (1990) 1292.

BNL-810 (Jan 1985) Approved Mar 1985.

A SEARCH FOR QUARK MATTER (QGP) AND OTHER NEW PHENOMENA UTILIZING HEAVY ION COLLISIONS AT THE AGS

BROOKHAVEN – A Etkin, K J Foley, R W Hackenburg, R S Longacre, W A Love, T W Morris, E D Platner (✓ Spokesperson), A C Saulys
BROOKHAVEN & CITY COLL, N Y – S J Lindenbaum (✓ Spokesperson)
CITY COLL, N Y – C Chan, M A Kramer
JOHNS HOPKINS U – T J Halman, L Madansky
RICE U – S Ahmad, B E Bonner, J A Buchanan, C N Chiou, J M Clement, G S Mutchler

Accelerator BNL-ION *Detector* MPS

Reactions

p nucleus	15 GeV (T_{lab}/N)
^{28}Si nucleus	"
^{16}O nucleus	"

Comments Searches for anomalous behavior in rapidities, multiplicities, strangeness enhancements, transverse momenta, energy flows, etc. Targets are carbon, silicon, tin, copper, tungsten, lead, and gold. The tracking and momentum analysis of most of the charged particles emitted in individual events permit a very sensitive search for anomalous phenomena such as a quark-gluon plasma. Approved for 1650 hours. Data were taken in December 88, June 89, June 90, and February 91.

Papers NP A498 (1989) 523c, IEEE TNS 36 (1989) 58, NIM A283 (1989) 557, PL B248 (1990) 254, NP (Proc. Suppl.) B16 (1990) 405, NP A525 (1991) 601c, and PL B (accepted).

BNL-811 (Jan 1985) Approved Mar 1985, Jun 1986; Completed Apr 1989.

RADIATIVE KAON CAPTURE AND HYPERON WEAK RADIATIVE DECAY

BIRMINGHAM U – N Hessey, J Lowe
BOSTON U – E C Booth, K P Gall, C Heisey, E K McIntyre, J P Miller, B L Roberts (✓ Spokesperson), D A Whitehouse
BRITISH COLUMBIA U – M D Hasinoff, D F Measday, A J Noble
BROOKHAVEN – M Sakitt
CASE WESTERN RESERVE U – W Fickinger, K Robinson
BUDAPEST, CRIP & TRIUMF – D Horvath
TRIUMF – M Salomon

Accelerator BNL *Detector* Counter

Reactions

$K^- p \to \Lambda \gamma$	0 MeV/c
$K^- p \to \Lambda \pi^0$	"
$K^- p \to \Sigma^0 \gamma$	"
$K^- p \to \Sigma^+ \pi^-$	"
K^- deut $\to \Lambda n \gamma$	"

Particles studied Λ, Σ^+

Comments Studies weak radiative decays of the Λ and Σ^+ in the $K^- p$ reactions, and measures the $\Lambda - n$ scattering length in $K^- d$ capture. Approved for 3750 hours.

Papers NP A479 (1988) 75c, ZPHY C42 (1989) 175, NC 102A (1989) 145, PRL 63 (1989) 1352, NP (Proc. Suppl.) B13 (1990) 449, and PR C42 (1990) 475.

BNL-813 (Jan 1985) Approved Mar 1985; Started 1991.

SEARCH FOR A STRANGENESS – 2 DIBARYON

CARNEGIE MELLON U – M Athanas, G Franklin (✓ Spokesperson), R Magahiz, C Maher, F Merrill, B Quinn, R A Schumacher, I R Sukaton, V Zeps
ALBERTA U – F M Rozon

BIRMINGHAM U J Lowe, J Nelson, R Zybert
BROOKHAVEN R Chrien, P Pile, R Sawafta, R Sutter
CERN N Hamann
FREIBURG U P Birien, T Buerger, M Burger, H Fischer, J Franz, E Roessle, H Schmitt
INDIANA U J J Szymanski
KYOTO U T Iijima, K Imai, A Masaike, K Miyake
KYOTO SANGYO U K Okada, F Takeutchi
LOS ALAMOS P D Barnes (✓ Spokesperson)
MANITOBA U A Berdoz, C Davis, N E Davison, W T H van Oers, S Page, W D Ramsay, V Sum
NEW MEXICO U B Bassalleck, A Rusek, D Wolfe
TRIUMF D Gill
VASSAR COLL R L Stearns
YALE U G Diebold

Accelerator BNL *Detector* Spectrometer, Counter

Reactions

$K^- p \to K^+ \Xi^-$	1.8 GeV/c
Ξ^- deut $\to$ dibaryon($S = -2$) n	0 GeV/c

Particles studied dibaryon($S = -2$)

Comments Covers from about 100 MeV below to 20 MeV above the $\Lambda\Lambda$ mass in a triple-coincidence mode. See also BNL-836 for a search in the reaction $K^- {}^3\mathrm{He} \to K^+$ dihyperon N. Approved for 1000 hours, began taking data in 1991.

BNL-814 (Feb 1985) Approved Nov 1985; Started Dec 1988.

STUDY OF EXTREME PERIPHERAL COLLISIONS AND OF THE TRANSITION FROM PERIPHERAL TO CENTRAL COLLISIONS IN REACTIONS INDUCED BY RELATIVISTIC HEAVY IONS

BROOKHAVEN E Duek, M Fatyga, R Hogue, D Lissauer, T Ludlam, D Makowiecki, E O'Brien, V Polychronakos, H Takai, T Throwe, C Woody
CERN W J Willis
LOS ALAMOS J Boissevain, D Fox, H Van Hecke, W E Sondheim, J W Sunier
MCGILL U J Barrette, S K Mark, C Pruneau
NEW MEXICO U B Bassalleck, J Hall, D Wolfe
PITTSBURGH U W Cleland, K Jayananda, D Kraus, U Sonnadara, M Takagui
SUNY, STONY BROOK R Bellwied, P Braun-Munzinger (✓ Spokesperson), G David, N Herrmann, G Ingold, W Llope, M Muthuswami, J Stachel, L Waters
TEL AVIV U R Heifetz
TEXAS A AND M E Barasch, M Rawool, J A Shoemaker, J Simon, J Sullivan, K Wolf
YALE U V Greene, T Hemmick, R Majka, J Mitchell, F Rotondo, J Sandweiss, B Shivakumar

Accelerator BNL-ION *Detector* Spectrometer, Calorimeter

Reactions

p nucleus	15 GeV (T_{lab}/N)
^{16}O nucleus	"
^{32}S nucleus	"

Comments Combines 4π calorimetry with a high-resolution forward spectrometer, allowing a completely exclusive study of the projectile fragmentation region and a detailed study of more central collisions. Topics include a search for strange matter, and a study of rapidity distributions for baryons and mesons. Ran for 2700 hours. Final run scheduled for Spring 92.

Papers ZPHY C38 (1988) 45, NIM A284 (1989) 323, IEEE TNS 37 (1990) 82, IEEE TNS 37 (1990) 88, PR C41 (1990) 1512, PR C41 (1990) 2644, PRL 64 (1990) 1219, PL B252 (1990) 550, NP (Proc. Suppl.) B24 (1991) 265, and PR C45 (1992) 421.

BNL-815 (1985) Approved Mar 1986; Completed 1988.

PARTICLE PRODUCTION AND NUCLEAR FRAGMENTATION IN COLLISIONS OF HEAVY IONS IN EMULSION AT AGS ENERGIES

ALMA ATA, PHYS INST N P Andreeva, Z V Anson, V I Bubnov, Y I Chasnikov, G Z Eligbaeva, L E Eremenko, A S Gaitanov, G S Kalyachkina, E K Kanygina, V N Lepetan, C I Shakova
BEIJING, IHEP G F Xu, P Y Zheng
PANJAB U M M Aggarwal, R Arora, V S Bhatia, I S Mittra
HUNAN EDUCATION INST Y X Li, L Liang, Z G Liu, Z Q Weng, Y L Xia
DUBNA S A Krasnov, S Kulikova, T N Maksimkina, J J Musulmanbekov, G S Shabratova, K D Tolstov
RAJASTHAN U K B Bhalla, S K Gupta, V Kumar, P Lal, S Lokanathan, S Mookerjee, H S Palsania, R Raniwala, S Raniwala
JAMMU U S K Badyal, A Bhasin, V K Gupta, S Kachroo, S Kitroo, L Mangotra, N K Rao
KOSICE U L Just, M Karabova, M Tothova, S Vokal, J Vrlakova
SHANXI NORMAL U S B Lou, Y M Qin, D H Zhang
LUND U S Garpman, B Jakobsson, J Nystrand, I Otterlund (✓ Spokesperson), K Soderstrom, E Stenlund
MARBURG U E Ganssauge, J T Rhee
LEBEDEV INST M I Adamovich, Y A Alexandrov, M M Chernyavsky, S G Gerassimov, S P Kharlamov, V G Larionova, N V Maslennikova, G I Orlova, N G Peresadko, V M Rappoport, N A Salmanova, M I Tretyakova
WASHINGTON U, SEATTLE T H Burnett, J Grote, J J Lord, D Skelding, R J Wilkes
KHLOPIN RADIUM INST V G Bogdanov, V A Plyushchev, Z I Solovieva
TASHKENT, IFY E S Basova, H Nasrullaeva, S Z Nasyrov, N V Petrov, D A Qarshiev, T P Trofimova, U I Tuleeva
TASHKENT, FTI L P Chernova, K G Gulamov, F G Kadyrov, N S Lukicheva, V S Navotny, N Saidkhanov, L N Svechnikova, S I Zhokhova
HUA-ZHONG NORMAL U X Cai, H Huang, L S Liu, W Y Qian, H Q Wang, D C Zhou
YEREVAN PHYS INST F A Avetyan, N A Marutyan, L G Sarkisova, V R Sarkisyan

Accelerator BNL *Detector* Emulsion

Reactions

^{16}O nucleus	15 GeV (T_{lab}/N)
^{28}Si nucleus	"

Comments Uses emulsion chambers and emulsion stacks. Studies pseudo-rapidity density distributions, density fluctuations, multiplicity and angular distributions, production cross sections, etc. See also CERN-EMU-001.

Papers PR C40 (1989) 66, PL B223 (1989) 262, PRL 62 (1989) 2801, HEPNP 13 (1989) 865, PL B230 (1989) 175, PL B242 (1990) 512, MPL A5 (1990) 169, PS T32 (1990) 168, NP A525 (1991) 551c, ZPHY C49 (1991) 395, MPL A6 (1991) 469, HEPNP 15 (1991) 131, PL B262 (1991) 369, PL B263 (1991) 539, and PRL 67 (1991) 1201.

BNL-816 (May 1985) Approved Jun 1985; Completed 1986.

SEARCH FOR NEUTRINO OSCILLATIONS

BROOKHAVEN M J Murtagh, H White
CERN C Detraz, M Ferro-Luzzi, J M Perreau
PARIS, CURIE UNIV VI & PARIS, UNIV VII, LPNHE P Astier, J Chauveau, A Diaczek, J Dumarchez, F Kovacs, A Letessier, J M Levy, Y Pons, A M Touchard, F Vannucci (✓ Spokesperson)
BOSTON U G Bernardi, T Chrysicopoulou, J Stone

Accelerator BNL *Detector* Calorimeter

Reactions

$\nu_\mu \to \nu_e$	< 4 GeV/c

Comments A repeat of CERN-PS-191 with 20 times more statistics. Uses a fine-grained calorimeter.

Papers PL B220 (1989) 646, and NP B335 (1990) 517. No other papers expected.

BNL-817 (Jun 1985)

POLARIZATION TRANSFER IN HYPERON PRODUCTION

RICE U D L Adams, B E Bonner (✓ Spokesperson), J A Buchanan, J M Clement, M D Corcoran, N Krishna,

J W Kruk, H E Miettinen, G S Mutchler, F Nessi, M Nessi, J B Roberts (✓ Spokesperson), P M Stevenson
BROOKHAVEN - S U Chung, R C Fernow, H Willutski
JOHNS HOPKINS U - T Hallman, L Madansky
HOUSTON U - L S Pinsky
MINNESOTA U - K Johns
SOUTHEASTERN MASS U - Z Bar-Yam, J Dowd, W Kern, E King

Accelerator BNL *Detector* MPS

Reactions Polarized beam
p Be $\rightarrow \Lambda$ X 22 GeV/c
p Be $\rightarrow \Sigma^0$ X "

Comments Approved for 1300 hours. In progress (Dec 91).

Papers PRL 58 (1987) 447, PR D38 (1988) 729, PRL 62 (1989) 1591, and PR D41 (1990) 13.

BNL-818 (1985) Approved Mar 1986; Started 1990.

SEARCH FOR A J^{PC}-EXOTIC HYBRID MESON

BROOKHAVEN - A Birman, S U Chung (✓ Spokesperson), R C Fernow, H Kirk, S D Protopopescu
INDIANA U - R Crittenden, A Dzierba, T Marshall, D Zieminska
SOUTHEASTERN MASS U - N Bar-Yam, J Dowd, W Kern, E. King
RICE U - B E Bonner, G C Phillips, J B Roberts

Accelerator BNL *Detector* MPS

Reactions
$\pi^- p \rightarrow f_1(1285)\, \pi^- p$ 12 GeV/c

Particles studied exotic-meson

Comments Looks for a resonance in the $J^{PC} = 1^{-+}$ $f_1(1285)\pi^-$ system. Approved for 1000 hours. In progress (December 91).

BNL-820 (1985) Approved Nov 1985; Started Dec 1988; Completed May 1989.

SEARCH FOR $S = -1$ DIBARYON RESONANCES IN THE MASS REGION 2050–2130 MeV/c USING THE REACTIONS ^{3}He$(K^-, \pi^+)nX$ AND ^{3}He$(K^-, \pi^+)pX^-$ AT 870 MeV/c

BROOKHAVEN - S Bart, R E Chrien, P H Pile, R J Sutter, N Tsoupas, T Ward
FLORIDA STATE U - H Piekarz (✓ Spokesperson)
HOUSTON U - E V Hungerford, K Johnstone, B Mayes, L Pinsky, L Tang
OHIO STATE U - K Hicks
OSAKA U - T Kishimoto
TEXAS U - R Krauss
TOKYO U - T Fukuda
TRIUMF - D Gill
VASSAR COLL - R L Stearns

Accelerator BNL *Detector* Spectrometer

Reactions
$K^-\ ^3$He $\rightarrow \pi^+\ n$ dibaryon$(S = -1)$ 870 MeV/c
$K^-\ ^3$He $\rightarrow \pi^+\ p$ dibaryon$(S = -1)$ "

Particles studied dibaryon$(S = -1)$

Comments A double-arm magnetic spectrometer was used to measure the missing mass spectrum from the studied reactions. The scattering angle was 20°, in order to enhance the p-wave resonance production. A two-layer scintillation hodoscope closely surrounding a liquid ^{3}He target and arranged into twelve azimuthal and polar angles was used to detect charged particles from the Λn and $\Sigma^- n$ final state resonance decays. It was also used to suppress the K^0_S and quasi-elastic $\Sigma^- p$ backgrounds. The neutral ($Q = 0$) and charged ($Q = -1$) two-baryon states were studied in the first and second reactions, respectively.

BNL-821 (Sep 1985, Sep 1986) Approved Nov 1986.

A NEW PRECISION MEASUREMENT OF THE MUON G-2 VALUE AT THE LEVEL OF 0.35 PPM

BOSTON U - D H Brown, R M Carey, M Chertok, E Hazen, F Krienen, Z Liu, J P Miller, B L Roberts (✓ Spokesperson), L R Sulak, W Worstell, T Zwart
BROOKHAVEN - H N Brown, J R Cullen, G T Danby, C R Gardner, J W Jackson, Y Y Lee, S Mane , W Meng, W M Morse (✓ Spokesperson), K Woodle
CORNELL U - T Kinoshita, Y Orlov
HEIDELBERG U, PHYS INST - K Jungmann, G zu Putlitz
HEIDELBERG, MAX PLANCK INST - U Haeberlen
KEK - K Endo, H Hirabayashi, S Kurokawa, Y Mizumachi, T Sato, A Yamamoto
LOS ALAMOS - W P Lysenko
NOVOSIBIRSK, IYF - L M Barkov, D N Grigorev, B I Khazin, E A Kuraev, Y M Shatunov, E Solodov
WAKO, RIKEN - K Ishida
TOKYO U - K Nagamine, K Nishiyama
YALE U - P Cushman, S K Dhawan, A A Disco, F J M Farley, X Fei, S Hou, V W Hughes (✓ Spokesperson)

Accelerator BNL *Detector* Other

Reactions Polarized beam
muon $\rightarrow e^{\pm}\ \nu\ \bar{\nu}$ 3.09 GeV/c

Particles studied muon

Comments Uses a 7-m-radius muon storage ring with a 1.47-tesla vertical field. Approved for 2100 hours. Expected to run in 1992.

BNL-825 (Oct 1985) Approved Nov 1985; Completed 1988.

RADIOCHEMICAL STUDIES OF ULTRARELATIVISTIC NUCLEAR COLLISIONS

OREGON STATE U - C Casey, W Loveland (✓ Spokesperson), Z Xu
BROOKHAVEN - Y Y Chu, J B Cumming, P E Haustein, S Katcoff
PURDUE U - M Bronikowski, Y H Chung, N T Porile
STUDSVIK SCI RES LAB, NYKOPING - K Aleklett, L Sihver

Accelerator BNL *Detector* Photon spectrometer

Reactions
^{16}O nucleus 15 GeV (T_{lab}/N)
^{28}Si nucleus "

Particles studied frag

Comments Targets are copper, silver, and gold. Induced radioactivities are determined by off-line γ spectroscopy. Investigates evidence for a limiting fragmentation.

Papers PR C37 (1988) 1311, PR C42 (1990) 1753, and PR C44 (1991) 1661.

BNL-826 (Dec 1985) Approved Mar 1986; Completed 1988.

EXCLUSIVE EXPERIMENT OF HIGH ENERGY NUCLEAR REACTIONS INDUCED BY ^{32}S IONS WITH 15 GeV/N AT THE BNL AGS

SAGA U, JAPAN - H Itoh (Spokesperson)
TOHOKU U - M Chida, T Hayashino, Y Yamato
NAGOYA U - K Nakazawa
OSAKA U - R Ihara, T Nakai
SAGAMI INST TECH - H Sugimoto, K Taira
GIFU U - S Tasaka
UTSUNOMIYA U - Y Sato
KANAGAWA U - N Tateyama

Accelerator BNL-ION *Detector* Emulsion

Reactions
^{32}S nucleus 15 GeV (T_{lab}/N)
^{12}C nucleus "

Comments Uses emulsion chambers in a 2-tesla magnetic field. A search for evidence for a quark-gluon plasma, etc.

BNL-828 (Jan 1985) Approved Mar 1986; Completed 1987.

SEARCH FOR η-MESIC NUCLEUS WITH THE (π^+, p) REACTION AT 0.85 GeV/c

LOS ALAMOS - B J Dropesky, R J Estep, G C Giesler, L C Liu (✓ Spokesperson)
WILLIAM AND MARY COLL - M Finn, H Funsten (✓ Spokesperson), C F Perdrisat
BROOKHAVEN - S Bart, R E Chrien (✓ Spokesperson), P H Pile, R J Sutter, T E Ward
GEORGE MASON U - B J Lieb
RUTGERS U - R D Ransome
HOUSTON U - T Kishimoto
VASSAR COLL - R L Stearns
VIRGINIA TECH - C E Stronach

Accelerator BNL *Detector* Spectrometer

Reactions

π^+ nucleus $\rightarrow p$ X 0.80 GeV/c

Comments The targets are lithium, carbon, oxygen, and aluminum. Investigates a prediction of strongly bound systems of the η meson and nuclei. Sets an upper limit on the production cross section.

Papers PRL 60 (1988) 2595. No other papers expected.

BNL-829 (Jan 1986) Approved 1986; Completed 1989.

SEARCH FOR $S = -1$ THREE BODY BOUND SYSTEM

HOUSTON U - E V Hungerford, T Kishimoto (✓ Spokesperson), B Mayes, L Pinsky
BRANDEIS U - H Piekarz
BROOKHAVEN - S Bart, R E Chrien, P H Pile, R J Sutter, T E Ward
MIT - M Deutsch
OSAKA U - T Fukuda, T Shibata
TEXAS U - M Barlett, G W Hoffman
VASSAR COLL - R L Stearns

Accelerator BNL *Detector* HYPERSPEC

Reactions

$K^-\ ^3$He $\rightarrow \pi^-$ X 715 MeV/c

Particles studied hypernuc

Comments A search for a Λpp bound state in $K^-\ ^3\mathrm{He} \rightarrow \pi^- X$.

BNL-831 (1986) Approved 1986; Completed 1987.

SEARCH FOR HYPERNUCLEAR PROJECTILE FRAGMENTS IN THE RELATIVISTIC HEAVY-ION COLLISION USING AN EMULSION CHAMBER

TOKYO U, INS - C Nagoshi, K Omata, Y Shida (Spokesperson)
KOBE U - H Fukushima, T Hara, M Miyagaki, K Taruma, C Yokoyama
BROOKHAVEN - D Beavis

Accelerator BNL-ION *Detector* Emulsion, Counter

Reactions

^{16}O C	6, 14 GeV/c (P_{lab}/N)
^{16}O nucleus	"
^{32}S C	"
^{32}S nucleus	"

Comments Ran for 6 hours.

BNL-834 (Jan 1986) Approved Mar 1986; Completed 1987.

STUDY OF HADRONIC HARD SCATTERING WAVE FUNCTIONS USING ELASTIC SCATTERING INSIDE NUCLEI

BROOKHAVEN - D S Barton, G M Bunce, A S Carroll (✓ Spokesperson), S Gushue, Y I Makdisi
MINNESOTA U - H Courant, G Y Fang, K J Heller, M L Marshak, M A Shupe
PENN STATE U - S Heppelmann (✓ Spokesperson)
SOUTHEASTERN MASS U - J J Russell

Accelerator BNL *Detector* Spectrometer

Reactions

$p\ p \rightarrow p\ p$	6, 10, 12 GeV/c
p nucleus	"

Comments Studies elastic scattering from protons in nuclei as a function of A and energy. This provides information on the color transparency of the interacting particles. Spectral functions of nuclei at large momentum transfer are also measured.

Papers PRL 61 (1988) 1698, and PL B232 (1989) 167.

BNL-835 (Apr 1986) Approved Jun 1986, Mar 1989; Completed 1990.

KAON-NUCLEUS TOTAL CROSS SECTION MEASUREMENTS AND PARTIAL DECONFINEMENT IN NUCLEI

TEL AVIV U - J Alster, D Ashery, J Lichtenstadt, M A Moinester, I Navon, E Piasetzky (✓ Spokesperson), A Rahav, I Yavin
BROOKHAVEN - S Bart, R E Chrien (✓ Spokesperson), M May, P H Pile, R J Sutter

Accelerator BNL *Detector* Counter

Reactions

K^+ deut	450-800 MeV/c
K^+ nucleus	"

Comments Measures the ratio of K^+-nucleus to K^+d total cross sections to search for evidence for nucleon swelling in nuclei. Targets are light nuclei with $N = Z$ (^{6}Li, ^{12}C, ^{28}Si, and ^{40}Ca). The first run was completed in 1988, the last in 1990. Analysis of data is in progress.

Papers PRL 65 (1990) 2110, and PR C (to be published).

BNL-836 (May 1986) Approved Jun 1986.

SEARCH FOR A STRANGENESS -2 DIBARYON USING A ^{3}HE TARGET

CARNEGIE MELLON U - M Athanas, G Franklin (✓ Spokesperson), R Magahiz, C Maher, F Merrill, B Quinn, R A Schumacher, I R Sukaton, V Zeps
ALBERTA U - F M Rozon
BIRMINGHAM U - J Lowe, J Nelson, R Zybert
BROOKHAVEN - R Chrien, P Pile, R Sawafta, R Sutter
CERN - N Hamann
FREIBURG U - P Birien, T Buerger, M Burger, H Fischer, J Franz, E Roessle, H Schmitt
INDIANA U - J J Szymanski
KYOTO U - T Iijima, K Imai, A Masaike, K Miyake
KYOTO SANGYO U - K Okada, F Takeutchi
LOS ALAMOS - P D Barnes (✓ Spokesperson)
MANITOBA U - A Berdoz, C Davis, N E Davison, W T H van Oers, S Page, W D Ramsay, V Sum
NEW MEXICO U - B Bassalleck, A Rusek, D Wolfe
TRIUMF - D Gill
VASSAR COLL - R L Stearns
YALE U - G Diebold

Accelerator BNL *Detector* Spectrometer

Reactions

$K^-\ ^3\mathrm{He} \rightarrow K^+\ n$ dibaryon($S = -2$) 1.8 GeV/c

Particles studied dibaryon($S = -2$)

Comments See also BNL-813 for a search in the reaction $\Xi^- d \rightarrow$ dihyperon n. Approved for 700 hours. Expected to run in 1993.

BNL-838 (Oct 1986) Approved Nov 1986; Started 1988; Completed 1988.

90° EXCLUSIVES AT 6 GeV

BROOKHAVEN - D S Barton, G Bunce (✓ Spokesperson), A S Carroll, Y I Makdisi
MINNESOTA U - H Courant, K J Heller, S Heppelmann, M L Marshak, M A Shupe
SOUTHEASTERN MASS U - J J Russell (✓ Spokesperson)

Accelerator BNL *Detector* Double-arm spectrometer

Reactions

$\pi^- p \to \pi^- p$	6 GeV/c
$\pi^- p \to \rho^- p$	"
$\pi^- p \to \pi^+ \Delta(1232\, P_{33})^-$	"
$\pi^- p \to K^+ \Sigma^-$	"
$\pi^- p \to K^0 \Lambda$	"
$\pi^+ p \to \pi^+ p$	"
$\pi^+ p \to \rho^+ p$	"
$\pi^+ p \to \pi^+ \Delta(1232\, P_{33})^+$	"
$\pi^+ p \to K^+ \Sigma^+$	"
$K^+ p \to K^+ p$	"
$K^- p \to K^- p$	"
$p\, p \to p\, p$	"
$\bar{p}\, p \to \bar{p}\, p$	"

Comments Continues studies of BNL-755 to a lower momentum, where the cross sections are larger. The apparatus is a single-arm spectrometer and a nonmagnetic arm. Ran for 902 hours.

BNL-839 (1988) Completed 1989.

A SEARCH FOR MAGNETIC MONOPOLES

IBM WATSON RES CTR - S Bermon (✓ Spokesperson), P Chaudhari, C C Chi, C C Tsuei
BROOKHAVEN - A Prodell (✓ Spokesperson)

Accelerator NONE *Detector* Other

Particles studied monopole

Comments A study involving the design, construction, and operation of a prototype superconducting induction monopole detection system. The goal is to develop a large-area prototype detector which can be replicated to achieve monopole flux limits approaching the Parker limit.

BNL-840 (Jul 1987) Approved Oct 1987; Started Jul 1989; Completed Dec 1991.

SEARCH FOR THE COHERENT PRODUCTION OF LIGHT SCALAR AND PSEUDOSCALAR PARTICLES

ROCHESTER U - R Cameron, G Cantatore, A C Melissinos (✓ Spokesperson), J T Rogers, G Ruoso, Y K Semertzidis
BROOKHAVEN - H Halama, D Lazarus, A G Prodell
FERMILAB - F A Nezrick
CERN & TRIESTE U - P Micossi, C Rizzo, E Zavattini

Accelerator NONE *Detector* Other

Particles studied axion

Comments The detector used two CBA superconducting dipoles. Searched for light scalar or pseudoscalar particles that couple to the electromagnetic field. Looked for optical rotation of a polarized laser beam traversing in vacuum the 3.5-T magnetic field. The sensitivity of 10^{-10} rad corresponds to a limit on the coupling $g_{a\gamma\gamma}$ of 4×10^{-7} GeV^{-1}. Did not reach Delbruck scattering (real photons from virtual photons) below the e^+e^- threshold. Analysis of data is in progress.

Papers PRL 64 (1990) 2988, JOSA B8 (1991) 520, and PL A157 (1991) 125.

BNL-841 (1987) Approved Aug 1987.

PHYSICS CALIBRATION OF THE SOUDAN-II NUCLEON DECAY EXPERIMENT USING NEUTRINOS AT BROOKHAVEN

ARGONNE - I Ambats, D Ayres, L Balka, L Barrett, J Biggs, J Dawson, T Fields, M C Goodman, N Hill, D Jankowski, F Lopez, E May, L E Price, J Schlereth, J Thron
MINNESOTA U - H Courant, U DasGupta, K Heller, K Johns, M Marshak, E Peterson, D Rosen, K Ruddick, M Shupe, S Werkema
OXFORD U - W W M Allison, G D Barr, C B Brooks, J H Cobb, L Kirby-Gallagher, D H Perkins, P Shield, N West
RUTHERFORD - J Alner, D Cockerill, C Garcia, R Giles, P J Litchfield, G F Pearce
TUFTS U - T Kafka, W A Mann (✓ Spokesperson), R Milburn, A Napier, W Oliver, B Saitta, J Schneps, N Sundaralingam

Accelerator BNL *Detector* Calorimeter

Reactions

ν_μ	<5 GeV/c

Comments A test of modules for the Soudan-II proton decay detector, to run parasitically during neutrino runs. For neutrino energies near the nucleon mass, the flux from the AGS wide-band beam has a shape similar to the spectrum of atmospheric neutrinos. The test measures the extent to which neutrino events can mimic decaying nucleons in the detector. Approved for 350 hours.

BNL-844 (1988) Approved Mar 1988.

MEASUREMENT OF ANGULAR DISTRIBUTIONS FOR FRAGMENTS IN THE TARGET RAPIDITY REGION

BROOKHAVEN - Y Y Chu, J B Cumming (✓ Spokesperson), P E Haustein, S Katcoff, R W Stoenner
OREGON STATE U - W Loveland

Accelerator BNL-ION *Detector* Other

Reactions

^{16}O Au $\to$ ^{37}Ar X	13.6 GeV (T_{lab}/N)
^{16}O Au $\to$ ^{127}Xe X	"

Comments Investigates enhanced backward yields of fragments in the mass range A = 24-48 observed in BNL-825. Fragments are stopped in catcher foils and yields are determined off-line. Approved for 100 hours. Awaiting the availability of a high intensity ^{16}O beam.

BNL-845 (Jan 1988) Approved Mar 1988; Started Jan 1989; Completed May 1989.

A SEARCH FOR THE RARE DECAY $K^0 \to \pi^0 e^+ e^-$

BROOKHAVEN - E Jastrzembski, R C Larsen, L B Leipuner, W M Morse (✓ Spokesperson)
YALE U - R K Adair, H B Greenlee, H Kasha, E B Mannelli, K E Ohl, M P Schmidt (✓ Spokesperson), M Vagins
VASSAR COLL - C B Schwarz

Accelerator BNL *Detector* Spectrometer

Reactions

$K_L \to \pi^0\, e^+\, e^-$
$K_L \to e^+\, e^-\, \gamma$
$K_L \to e^+\, e^-\, \gamma\, \gamma$

Particles studied K_L

Comments Normalized to $K_L^0 \to \pi^+\pi^-\pi^0$ with and without π^0 Dalitz decay. Sensitive to K_L^0 decays with an e^+e^- pair: $K_L^0 \to \pi^0 e^+ e^-$, $e^+e^-\gamma$, $e^+e^-e^+e^-$, $e^+e^-\gamma\gamma$, and similar decays. Ran for 1500 hours.

Papers PRL 64 (1990) 2755, PRL 65 (1990) 1407, PR D42 (1990) 3724, NP A527 (1991) 717, and PR D45 (1992) 36.

BNL-847 (1988) Approved Oct 1988; Completed Jun 1989.

STUDY OF PARTICLE PRODUCTION IN HEAVY-ION COLLISIONS

SUNY, BUFFALO - P L Jain (✓ Spokesperson), K Sengupta, G Singh

Accelerator BNL-ION *Detector* Emulsion

Reactions

^{16}O nucleus	14 GeV (T_{lab}/N)
^{32}S nucleus	"
^{28}Si nucleus	"

Comments Emphasis is on central collisions with the aim of finding evidence for a new, collective form of quark matter. Ran for 2 hours.

Papers PR C43 (1991) 2027, PR C43 (1991) 2417, PR C44 (1991) 854, ZPHY C52 (1991) 465, MPL A7 (1992) 93, and ZPHY C (accepted).

BNL-849 (Aug 1988)

SEARCH FOR MUONIUM TO ANTIMUONIUM CONVERSION

A T AND T BELL LABS, MURRAY HILL D R Harshman (Spokesperson), A P Mills (Spokesperson)

Accelerator BNL *Detector* Counter

Reactions

muonium → $\overline{\text{muonium}}$

Comments A search for spontaneous conversion of muonium to antimuonium by looking for the spectator orbital positron remaining after the decay of the μ^-. Approved for 500 hours subject to test, with a request for a further 1550 hours deferred.

BNL-850 (1988) Approved Oct 1988.

EVA, A SOLENOIDAL DETECTOR FOR LARGE ANGLE EXCLUSIVE REACTIONS: PHASE I — DETERMINING COLOR TRANSPARENCY TO 22 GeV/c

BROOKHAVEN D S Barton, G Bunce, A S Carroll (✓ Spokesperson), S Gushue, M Kmit, D I Lowenstein, Y I Makdisi, M Tanaka
MINNESOTA U H Courant, K J Heller, K Johns, M L Marshak, C White
MOUNT HOLYOKE COLL H Nicholson
PENN STATE U S Durand, S Heppelmann (✓ Spokesperson), E D Minor, J Y Wu
SOUTHEASTERN MASS U S Baker, F J Barbosa, J J Russell
TEL AVIV U J Aclander, J Alster, I Mardor, Y Mardor, E Piasetzky

Accelerator BNL *Detector* EVA

Reactions

$p\,p \to p\,p$	6–20 GeV/c
p nucleus → $p\,p$ nucleus	"
π^- nucleus → $\pi^-\,p$ nucleus	6–15 GeV/c

Comments The detector EVA (Exclusive Variable Apparatus) is built around the CLEO I solenoid. This first experiment with EVA measures color transparency, defined as the ratio of pp elastic scattering for the target proton in a nucleus to elastic scattering on free protons. Continues studies of BNL-834. Approved for 1200 hours.

BNL-851 (Sep 1988) Approved Oct 1988; Completed 1989.

A STUDY OF THE DECAY $K^+ \to \pi^+ e^+ e^-$

BROOKHAVEN H A Gordon, D M Lazarus, P Rehak
PSI, VILLIGEN J Egger, W D Herold, H Kaspar
WASHINGTON U, SEATTLE V Chaloupka, H J Lubatti, A Shukla, T Zhao
YALE U C Alliegro, A Deshpande, N J Hadley, A M Lee, M E Zeller (✓ Spokesperson)

Accelerator BNL *Detector* Spectrometer

Reactions

$K^+ \to \pi^+\,e^+\,e^-$
$K^+ \to \pi^+$ neutral
neutral $\to e^+\,e^-$
$\pi^0 \to e^+\,e^-$

Particles studied K^+, π^0

Comments Measures the $K^+ \to \pi^+ e^+ e^-$ and $\pi^0 \to e^+ e^-$ branching fractions and searches for an e^+e^- state in the mass range 1.02 to 350 MeV. Ran for 2000 hours.

BNL-852 (Jan 1989) Approved Mar 1989.

SEARCH FOR GLUEBALLS AND J^{PC}-EXOTIC HYBRID MESONS

BROOKHAVEN S U Chung (✓ Spokesperson), S D Protopopescu, D Weygand, H J Willutzki
INDIANA U R R Crittenden, A R Dzierba (✓ Spokesperson), P T Smith, D Ziemiuska
LOUISVILLE U C Davis
SOUTHEASTERN MASS U Z Bar-Yam, J Dowd, W Kern
NOTRE DAME U J M Bishop, N M Cason, R C Ruchti, W D Shephard
MOSCOW STATE U L Bravina, A Demianov, A Ostrovidov, L Sarycheva, N Sinev
SERPUKHOV V Lipaev, A Soldatov

Accelerator BNL *Detector* MPS

Reactions

$\pi^-\,p \to n\,\eta\,\pi^0$	18 GeV/c
$\pi^-\,p \to p\,\eta\,\pi^-$	"
$\pi^-\,p \to n\,\eta\,\pi^0\,\pi^0$	"
$\pi^-\,p \to n\,\eta\,\pi^+\,\pi^-$	"
$\pi^-\,p \to n\,\eta\,\eta'$	"
$\pi^-\,p \to n\,\eta\,\eta\,\pi^0$	"
$\pi^-\,p \to n\,K^0\,\overline{K}^0\,\pi^0$	"
$\pi^-\,p \to n\,K^0\,\overline{K}^0\,\pi^0\,\pi^0$	"
$\pi^-\,p \to n\,K^0\,\overline{K}^0\,\pi^+\,\pi^-$	"

Particles studied exotic-meson, glueball, $f_0(1590)$

Comments Looks in particular for further evidence for an "$M(1405)$" observed to decay into $\eta\pi^0$ in GAMS-spectrometer experiments at Serpukhov and CERN. Expected to take data in 1993.

BNL-854 (Jan 1989) Approved Mar 1989; Started May 1991.

ANTIPROTON–NUCLEUS INTERACTIONS AT 5-10 GEV/c

RICE U D L Adams, B E Bonner (✓ Spokesperson), J A Buchanan, C Chiou, J M Clement, M D Corcoran, H E Miettinen, G S Mutchler, F Nessi-Tedaldi, M Nessi, J B Roberts
LOS ALAMOS W R Gibbs
BROOKHAVEN S E Eiseman, A Etkin, K J Foley, R W Hackenburg, R S Longacre, W A Love, T W Morris, E D Platner, A C Saulys
BROOKHAVEN & CITY COLL, N Y S J Lindenbaum
JOHNS HOPKINS U T J Hallman, L Madansky

Accelerator BNL *Detector* MPS

Reactions

$\overline{p}$ nucleus → Λ X	5, 7, 9 GeV/c
$\overline{p}$ nucleus → $\overline{\Lambda}$ X	"
$\overline{p}$ nucleus → K_S X	"

Comments Measured production cross sections and rapidity distributions of Λ's, $\overline{\Lambda}$'s, and K_S^0's for five targets from carbon to lead. A probe of the high-temperature, low-density region of the nuclear-matter phase diagram in search of evidence for the quark-gluon plasma. Ran for 400 hours, in May and June 1991. Data are being analyzed.

BNL-855 (Jan 1989) Approved Mar 1989; Completed Apr 1990.

LOW ENERGY PHOTON PRODUCTION IN PROTON NUCLEUS COLLISIONS AT THE AGS

BROOKHAVEN D Lissauer, C Woody (✓ Spokesperson)
OAK RIDGE J Gomez del Campo, A Ray, D Shapira (✓ Spokesperson), M Tincknell
CERN C Erd, J Schukraft, W Willis
VANDERBILT U R Clark

Accelerator BNL *Detector* Spectrometer

Reactions

p nucleus → γ X	10, 18 GeV/c

Comments Uses the BNL-814 spectrometer and BaF_2 photon detectors. Studies low-energy photon production in correlation with event topology. A search for new sources of soft photons (in excess of nuclear decays and hadronic bremsstrahlung). Ran for 500 hours.

BNL-857 (Jan 1989) Approved Mar 1989; Completed May 1989.

π^0 PAIR PRODUCTION NEAR THRESHOLD AND CHIRAL SYMMETRY BREAKING

BIRMINGHAM U - J Lowe (✓ Spokesperson)
OXFORD U - N W Tanner
BOSTON U - J P Miller, B L Roberts (✓ Spokesperson)
BRITISH COLUMBIA U - M D Hasinoff, A J Noble, M Sevior, C E Waltham
BROOKHAVEN - M Sakitt
CASE WESTERN RESERVE U - W J Fickinger, D K Robinson
BUDAPEST, CRIP & TRIUMF - D Horvath
NEW MEXICO U - B Bassalleck, J R Hall, K D Larson, D M Wolfe

Accelerator BNL *Detector* Counter

Reactions
$\pi^- p \rightarrow \pi^0 \pi^0 n$ 300 - 500 MeV/c

Comments Measurements made between threshold (265 MeV/c) up to 450 MeV/c, particularly in the region where the cross section varies rapidly, to provide the value of the chiral symmetry breaking parameter ξ. Also searches for the $\pi\pi$ resonance reported by the OMICRON collaboration in the neutral two π^0 channel. Analysis in progress (January 92).

Papers PR C44 (1991) 956, and PRL 67 (1991) 2622.

BNL-858 (May 1989) Approved Jun 1989; Completed Jun 1989.

MEASUREMENT OF NEGATIVE PARTICLE YIELD AT 0° FOR 15 A GeV Si + Au COLLISIONS

UC, BERKELEY, SPACE SCI DEPT - H J Crawford (✓ Spokesperson), J Engelage
BOSTON U - J Beatty, B Zhou
BROOKHAVEN - D Beavis, R Debbe
UCLA - J Carroll, G Igo
KEK - J Chiba, K Tanaka
WASEDA U - T Doke, T Kashiwagi, J Kikuchi
TOKYO U - M Aoko, R Hayano, Y Shimazu
JOHNS HOPKINS U - T Hallman
LOUISIANA STATE U - P Kirk, L Mao, Z Wang
LBL - H H Heckman, P J Lindstrom
COLUMBIA U - S Nagamiya, P Stankus

Accelerator BNL *Detector* Counter

Reactions
^{28}Si nucleus $\rightarrow$ charged X 15 GeV (T_{lab}/N)

Particles studied π^-, K^-, $\bar{p}$, $\overline{\text{deut}}$

Comments Studies the yield of antinuclei, π^-, and K^- at 0°. 100 hours of data taking.

BNL-859 Approved Jul 1989.

STUDIES OF HIGH DENSITY BARYON MATTER FROM EXTENDED MEASUREMENTS OF PARTICLE MOMENTUM DISTRIBUTIONS AND FROM HIGH-PRECISION TWO-PARTICLE CORRELATIONS

ARGONNE - S Kaufman
BROOKHAVEN - D Beavis, C Chasman, Z Chen, Y Y Chu, J B Cumming, R Debbe, J H van Dijk, S Gushue, O Hansen, S Hayashi, M J LeVine, Y Miake, B E Moskowitz, J Olness, L P Remsberg (Spokesperson), M Tanaka, M Tannenbaum, F Videback, H Wegner
COLUMBIA U - C Chi, I Juricic, K Kurita, S Nagamiya, P W Stankus, O E Vossnack, Y Wang, F Want, Y Wu, W A Zajc (Spokesperson)
HIROSHIMA U - T Sugitate
TOKYO U, INS - Y Akiba, H Hamagaki, S Hayashi, S Homma, Y Ikeda
KYUSHU U - K Kimura
LOS ALAMOS - M Sarabura
UC, BERKELEY, SPACE SCI DEPT - H J Crawford, J Engelage, H Z Huang
LIVERMORE - H C Britt, M N Namboodiri, T C Sangster, J Thomas
MIT - M A Bloomer, V Cianciola, B A Cole, J Costales, L Grodzins, W Kehoe, R J Ledoux (Spokesperson), D P Morrison, R J Morse, C G Parsons, P J Rothschild, R A Soltz, S G Steadman, G Stephans, T W Sung, V Vutsadakis, D Woodruff, D S Zachary
NEW YORK U - B Budick
TOKYO U - R S Hayano, H Sakurai
UC, RIVERSIDE - T Abbott, J W Chang, S Fung, J H Kang

Accelerator BNL *Detector* Calorimeter, Counter, Single-arm spectrometer

Reactions
^{28}Si nucleus $\rightarrow$ charged X
deut nucleus $\rightarrow$ charged X

Particles studied K^+, π^-, π^+

Comments Extends the inclusive cross section measurements of BNL-802 over a significantly larger kinematic range and performs high-precision two-particle measurements on particles produced in nucleus-nucleus collisions.

BNL-864 (May 1990) Approved Nov 1990.

PRODUCTION OF RARE COMPOSITE OBJECTS IN RELATIVISTIC HEAVY ION COLLISIONS

BROOKHAVEN - C B Dover, T G Throwe
MASSACHUSETTS U, AMHERST - M S Z Rabin
MCGILL U - C Pruneau
NEW MEXICO U - J R Hall
PENN STATE U - T A Armstrong, R A Lewis, G A Smith
YALE U - K N Barish, G E Diebold, J V Germani, S V Greene, J G Lajoie, R D Majka, J T Mitchell, F S Rotondo, J Sandweiss (✓ Spokesperson), B Shivakumar, A Slaughter, E J Wolin

Accelerator BNL *Detector* Calorimeter, Counter

Reactions
^{197}Au nucleus 11.71 GeV/c (P_{lab}/N)

Particles studied $\bar{p}$, dibaryon

Comments Analyzes particles produced in small impact parameter collisions in the central region of rapidity. Studies known objects, such as light nuclei and antinuclei, and those whose existence is uncertain, such as an H^0 dibaryon and quark matter. Approved but not running in FY 1991.

BNL-865 (May 1990) Approved Jun 1990.

IMPROVED SEARCH FOR $K^+ \rightarrow \pi^+\mu^+e^-$

BASEL U - G Backenstoss, H Weyer
BROOKHAVEN - D Lazarus, H Ma, P Pile, P Rehak
DUBNA - B Z Zalikhanov
MOSCOW, INR - G S Atoyan, S N Gninenko, V V Isakov, A A Poblaguev
NEW MEXICO U - B Bassalleck, J Lowe, D Wolfe
PSI, VILLIGEN - J Egger, W D Herold, H Kaspar, J Missimer
PITTSBURGH U - D E Krauss, J A Thompson
TBILISI STATE U - Y S Bagaturia, D Mazavia, T M Sakhelashvili
YALE U - R Appel, M E Zeller (✓ Spokesperson)
ZURICH U - P Truoel

Accelerator BNL *Detector* Spectrometer, Calorimeter

Comments Continuation of BNL-777 experiment, with a factor of approximately 70 improved sensitivity. Approved and expected to run in 1994/5.

BNL-866 (May 1990) Approved Jun 1990.

STUDIES OF PARTICLE PRODUCTION AT HIGH BARYON DENSITY USING THE Au BEAM

ARGONNE - S Kaufman
BROOKHAVEN - D Beavis, C Chasman (✓ Spokesperson), Z Chen, Y Y Chu, J B Cumming, R Debbe, J H van Dijk, M Gonin, S Gushue, O Hansen, S Hayashi, M J LeVine, Y Miake, B E Moskowitz, J Olness, L P Remsberg, D Roehrich, M Tanaka, M J Tannenbaum, F Videback, H Wegner
COLUMBIA U - K Kurita, S Nagamiya, T K Nayak, P W Stankus, O E Vossnack, Y Wu, W A Zajc
HIROSHIMA U - T Sugitate
KYUSHU U - K Kimura

LIVERMORE - H C Britt, M N Namboodiri, T C Sangster, J H Thomas
MIT - L Ahle, V Cianciolo, B A Cole, J B Costales, W L Kehoe, R J Ledoux, D P Morrison, R J Morse, P J Rothschild, R A Soltz, S G Steadman, G S F Stephans, T W Sung, D S Woodruff, D Zachary
UC, BERKELEY, SPACE SCI DEPT - H J Crawford, J Engelage
UC, RIVERSIDE - P Beery, S Fung, J H Kang, R K Seto
TOKYO U - R S Hayano, H Sakurai, K Shigaki, Y Shimizu, H Tamura
TOKYO U, INS - Y Akiba, H Hamagaki (✓ Spokesperson), S Homma, Y Tanaka

Accelerator BNL *Detector* Single-arm spectrometer

Reactions
^{197}Au nucleus → charged X 11.6 GeV/c (P_{lab}/N)

Comments Studies heavy ion reactions at AGS energies for central and peripheral collisions across a wide range of targets. Measures inclusive spectra of $\pi^{\pm}$, $K^{\pm}$, $p^{\pm}$ under well-defined, variable trigger conditions. Approved for 2600 hours, startup Spring 92.

BNL-868 (Sep 1990) Approved Nov 1990.

INTERACTIONS OF 14.1 GeV/NUCLEON NUCLEI FROM ^{16}O TO ^{197}Au IN LIGHT AND HEAVY TARGETS

CRACOW - R Holynski, A Jurak, A Olszewski, M Szarska, A Trzupek, B Wilczynska, H Wilczynski, W Wolter, B Wosiek, K Wozniak
LOUISIANA STATE U - M L Cherry, W V Jones, K Sengupta, J P Wefel
MINNESOTA U - P S Freier, J Kapusta, C J Waddington (✓ Spokesperson)
MOSCOW, ITEP - A I Dubinina, O K Egorov, E D Kolganova, E A Pozharova, T Yu Skorotko, V A Smirnitski

Accelerator BNL *Detector* Emulsion

Comments Studies the multiple fragmentation of heavy ions into lighter nuclei and searches for evidence of the formation of a quark-gluon plasma. Photographic nuclear emulsions are exposed to high energy AGS beams. Exposure to a gold beam is expected in April 92.

BNL-871 (Sep 1990) Approved Nov 1990.

A NEW SEARCH FOR VERY RARE K_L DECAYS

UC, IRVINE - R Atmur, D Connor, J Cortese, A Heinson, W R Molzon (✓ Spokesperson)
STANFORD U - M Diwan, K Ecklund, G M Irwin, D A Ouimette, S G Wojcicki (✓ Spokesperson)
TEMPLE U - J Belz, S H Kettell, W K McFarlane
TEXAS U - C C Allen, S Graessle, G W Hoffmann, K Lang, M R Marcin, J McDonough, C T Nguyen, P J Riley, J L Ritchie (✓ Spokesperson), C B Ware, S Worm
WILLIAM AND MARY COLL - M Eckhause, A D Hancock, J R Kane, Y Kuang, R D Martin, R E Welsh, R G Winter, M Witkowski

Accelerator BNL *Detector* Counter, Drift chamber, Spectrometer

Comments A search for the decays $K_L \to \mu e$, $K_L \to ee$, and $K_L \to \mu\mu$, building upon the experience and reusing some of the equipment of BNL-791. The detector consists of two dipoles, straw trackers, drift chambers, scintillation and gas Čerenkov counters, lead glass and a muon rangefinder. A novel feature of the experiment is the stopping of the neutral beam inside the spectrometer with a shielded tungsten 'beam plug.' Test data taken in 1991. 2,800 hours approved.

BNL-874 (Sep 1990) Approved Jan 1991.

KAON-NUCLEUS QUASIELASTIC AND ELASTIC SCATTERING

BROOKHAVEN - S Bart, R E Chrien (✓ Spokesperson), R Sawafta, R J Sutter
COLORADO U - C Kormanyos, R J Peterson (✓ Spokesperson), J Wise
HOUSTON U - M Barakat, E V Hungerford (✓ Spokesperson), K Johnston, B W Mayes, L S Pinsky
TRIUMF - D R Gill, L Lee, A Rahav, S Yen

Accelerator BNL *Detector* Spectrometer, Drift chamber

Reactions
K^+ nucleus 600 720 MeV/c (P_{lab})
K^- nucleus "

Particles studied K^+, K^-

Comments Studies kaon scattering from light nuclear systems (C, Li, and H_2O). Uses the kaon spectrometer, Moby Dick, with its associated detection apparatus. Expected to run May 92.

BNL-875 (Jan 1991) Approved Mar 1991.

STUDY OF PARTICLE PRODUCTION AND NUCLEAR FRAGMENTATION IN RELATIVISTIC HEAVY-ION COLLISIONS IN NUCLEAR EMULSIONS

SUNY, BUFFALO - P L Jain (✓ Spokesperson), A Mukhopadhyay, G Singh
AMHERST COLL - A Z M Ismail

Accelerator BNL *Detector* Emulsion

Reactions
Su nucleus 14.5 GeV (T_{lab}/N)
Au nucleus "

Comments Emphasis is on events produced in central collisions with low-energy fragments emitted from the target excitation. This may provide evidence for a new form of matter quark matter. In preparation (April 92).

BNL-876 (Jan 1991) Approved Mar 1991.

μ^+ SURFACE BEAM CHARACTERIZATION

COLUMBIA U - G Luke, B Sternlieb, Y J Uemura
GEORGE MASON U - W F Lankford
VIRGINIA STATE COLL - M R Davis, C E Stronach
WILLIAM AND MARY COLL - A Greer, W J Kossler (Spokesperson), H E Schone

Accelerator BNL *Detector* Counter

Particles studied μ^+

Comments Studies surface muons produced at the AGS. Surface muons are muons that result from the decay of pions that have come to rest near the surface of the primary production target. Approved but not running in FY 1991.

BNL-877 (Jan 1991) Approved Mar 1991.

STUDY OF RELATIVISTIC NUCLEAR COLLISIONS WITH HEAVY BEAMS USING THE BNL-814 4π CALORIMETRY AND MODIFIED FORWARD SPECTROMETER

BROOKHAVEN - D Lissauer, T Ludlam, S McCorkle, E O'Brien, V A Polychronakos, H Takai, T G Throwe, C L Woody
DARMSTADT, GSI - N W Herrmann
MCGILL U - J Barrette, S Gilbert, R Lacasse, S Mark, C Pruneau
NEW MEXICO U - B Bassalleck, J Hall, J Lowe, D Wolfe
PITTSBURGH U - W Cleland
SAO PAULO U - O Dietzsch
SUNY, STONY BROOK - P Braun-Munzinger (✓ Spokesperson), G David, J Dee, T K Hemmick, B Hong, W Llope, M Muthuswami, J Stachel, N Xu, Y Zhang, Z Zou
WAYNE STATE U - R Bellwied, T M Cormier, Q Li

Accelerator BNL *Detector* Calorimeter, Spectrometer

Particles studied K^-, K^+, π^-, π^+, nucleon

Comments Studies invariant cross sections for identified particles (N, K, π) with rapidities $y > 1.5$ and transverse momentum $p_T > 0.5$ GeV/c. Measures and identifies particles produced at large angles. Analyzes the transverse energy and multiplicity production for very heavy systems. Approved but not running in FY 1991.

BNL-878 (Jan 1991) Approved Mar 1991.

INVESTIGATION OF ANTINUCLEUS PRODUCTION AND SEARCH FOR NEW PARTICLES IN NUCLEUS-NUCLEUS COLLISIONS AT THE AGS

BROOKHAVEN - D Beavis, R Debbe
COLUMBIA U - S Nagamiya, P W Stankus
JOHNS HOPKINS U - T J Hallman
KEK - J Chiba, K H Tanaka
UC, BERKELEY, SPACE SCI DEPT - H J Crawford (√ Spokesperson), J Engelage, L C Greiner
LBL - I Flores, H H Heckman, P J Lindstrom, R Wright
TOKYO U - R S Hayano, Y Shimizu
UCLA - J B Carroll, G Igo
UNIVERSITIES SPACE RESEARCH ASSOC - J Mitchell
WASEDA U - T Doke, T Kashiwagi, J H Kikuchi

Accelerator BNL *Detector* Counter, Spectrometer, Drift chamber

Reactions

p nucleus → charged X	14.5 GeV (T_{lab}/N)
^{28}Si nucleus → charged X	"
^{197}Au nucleus → charged X	"

Particles studied π^-, K^-, $\bar{p}$

Comments Investigates the π^-, K^-, and $\bar{p}$ spectrum at 0°. Studies antideuteron and rare particle production in heavy ion collisions. The proton program is designed to provide a check of the spectrometer. Scheduled to run March 92.

BNL-880 (Jun 1991) Approved Aug 1991.

THE EFFECTS OF A PARTIAL SIBERIAN SNAKE ON POLARIZATION AT THE AGS

INDIANA U - D Caussyn, T Ellison, B Jones, S Y Lee (√ Spokesperson), P Schwandt
BROOKHAVEN - L Ahrens, J Alessi, W van Asselt, E J Blesser, G Bunce, P Cameron, E D Courant, H W J Foelsche, C J Gardner, J Geller, Y Y Lee, Y I Makdisi, S R Mane, L Ratner (√ Spokesperson), K Reece, T Roser, J F Skelly, A Soukas, S Tepikian, R E Thern
ARGONNE - H Spinka, L Teng, D G Underwood, A Yokosawa
KEK - S Hiramatsu, Y Mori, H Sato, K Yokoya
TRIUMF - U Wienands
FERMILAB - V Bharadwaj, S Hsueh

Accelerator BNL *Detector* Spectrometer

Comments The 5% spin rotator (AGS "partial snake") for overcoming the imperfection-type spin depolarizing resonances is studied, and the impact of the partial snake solenoid on the beam dynamics in the AGS ring is analyzed. A magnetic spectrometer with scintillation counter hodoscopes is used to detect the polarization in pp elastic scattering at $-t = 0.15$ $(\mathrm{GeV}/c)^2$ from an internal target in the AGS. 320 hours of beam time requested. In preparation (February 92).

BNL-881 (Jul 1991) Approved Aug 1991.

UTILIZING $\phi\phi$ SPECTROSCOPY TO SEARCH FOR EXOTIC GLUEBALLS, EXOTIC HYBRID, OR EXOTIC MULTIQUARK STATES

BROOKHAVEN & CITY COLL, N Y - S J Lindenbaum (√ Spokesperson)
BROOKHAVEN - R W Hackenburg, R S Longacre
CITY COLL, N Y - C S Chan, M A Kramer, K Zhao, Y Zhu
RENSSELAER POLY - G Adams, K Vaziri

Accelerator BNL *Detector* MPS-II

Reactions

$\pi^- p \to \phi\,\phi\, n$	8 GeV/c (P_{lab})
$\pi^- p \to \phi\, K^+ K^- n$	"
$\pi^- p \to K^+ K^- K^+ K^- n$	"
$K^- p \to \phi\,\phi\,\Lambda$	"
$K^- p \to \phi\,\phi\,\Sigma$	"
$K^- p \to \phi\, K^+ K^- \Lambda$	"
$K^- p \to \phi\, K^+ K^- \Sigma$	"
$K^- p \to K^+ K^- K^+ K^- \Lambda$	"
$K^- p \to K^+ K^- K^+ K^- \Sigma$	"
$\bar{p}\, p \to \phi\,\phi\,\pi^0$	"
$\bar{p}\, p \to \phi\, K^+ K^- \pi^0$	"
$\bar{p}\, p \to K^+ K^- K^+ K^- \pi^0$	"

Particles studied glueball

Comments A search for exotic glueballs and exotic hybrids. Uses the MPS facility and the MESB beam at 8 GeV/c, tuned to contain π^-, K^-, and $\bar{p}$. Lowering the energy to 8 GeV/c increases the rate of exchanges required to make exotics.

BNL-882 (Jul 1991) Approved Aug 1991.

SEARCH FOR PARTICLES WITH $|Z| > 3$ AND NEGATIVE CHARGE OR LARGE A/Z PRODUCED IN CENTRAL NUCLEUS-NUCLEUS COLLISIONS

UC, BERKELEY - Y D He, D M Lowder, P B Price (√ Spokesperson)

Accelerator BNL *Detector* Plastic

Reactions

^{28}Si Pb → charged X	14.6 GeV (T_{lab}/N)
^{197}Au Pb → charged X	"

Comments In a ^{28}Si run, uses CR-39 plastic track detectors to study production of multiply charged composites in central collisions. In particular, searches for charged, mid-rapidity particles with $|Z| > 3$ and anomalously large A/Z, which would be a signature of strange matter. In a ^{197}Au run, uses PB-1 glass detectors. Studies projectile fragmentation, the nuclear charge pickup process, possible production of fractional charges and $Z > 79$ exotic composites, and dependence of the detector response on velocity. Scheduled to run March 92.

BNL-885 (Jan 1992) Approved Feb 1992.

EXPERIMENT TO DETECT $\Lambda\Lambda$ HYPERNUCLEI

BROOKHAVEN - S Bart, R E Chrien, M May (Spokesperson), P H Pile, R Sawafta, R Sutter
CARNEGIE MELLON U - G Franklin (Spokesperson), R Magahiz, F Merrill, B Quinn, R Schumacher, V Zeps
KYOTO U - T Iijima
KYOTO SANGYO U - F Takeutchi
MANITOBA U - C Davis, W van Oers, S Page, D Ramsay
NEW MEXICO U - B Bassalleck, J Lowe, A Rusek, D Wolfe
TRIUMF - D Gill
VASSAR COLL - R Stearns

Accelerator BNL *Detector* Spectrometer

Reactions

$K^- p \to \Xi^- K^+$	1.8 GeV/c (P_{lab})
$K^-\ ^{12}$C	"
$\Xi^-\ ^{6}$Li	0 GeV/c (P_{lab})

Comments Studies the properties of $\Lambda\Lambda$ hypernuclei. The K^- beam is incident on a polyethylene (CH_2) target where Ξ^- is produced. The Ξ^- is then stopped in a ^{6}Li target producing $\Lambda\Lambda$ hypernuclei. The K^- also interacts with the carbon nuclei in the target, producing other $\Lambda\Lambda$ hypernuclear final states. Uses the spectrometer of the BNL-813, and a neutron TOF array. In preparation (April 1992).

BNL-886 (Jan 1992) Approved Feb 1992.

SEARCH FOR NEW PARTICLES IN NUCLEUS-NUCLEUS COLLISIONS

KYOTO U - H Enyo, T Iijima, K Imai (Spokesperson), A Masaike
KYOTO SANGYO U - K Okada, F Takeutchi
BIRMINGHAM U - N Nelson, R Zybert

BROOKHAVEN – D Beavis, R E Chrien, P Pile (Spokesperson), R Sawafta, R Sutter
CARNEGIE MELLON U – G Franklin, R Magahiz, F Merrill, B Quinn, R Schumacher, R Sukaton, V Zeps
YALE U – G Diebold
LOS ALAMOS – P Barnes
NEW MEXICO U – B Bassalleck, J Hall, A Rusek, D M Wolf
NEW MEXICO U & BIRMINGHAM U – J Lowe
FREIBURG U – M Burger, J Franz, E Roessle, H Schmitt

Accelerator BNL *Detector* Spectrometer, Counter

Reactions

^{28}Si nucleus	15 GeV (T_{lab}/N)
^{197}Au nucleus	"
$K^- p \rightarrow K^+ \Xi^-$	2 GeV/c (P_{lab})

Comments The goal is to search for new particles, such as strange matter (strangelets), in nucleus-nucleus collisions. Uses the 2 GeV/c K-beam line as a mass spectrometer. By placing two electro-static separators in the beam line spectrometer, specific M/Z ratios may be selected and background particles deflected out. Uses also a scintillating fiber track detector, TOF and dE/dx detectors. In preparation (April 1992).

BNL-887 (Jan 1992) Approved Feb 1992.

DO NARROW Σ HYPERNUCLEAR STATES EXIST?

BROOKHAVEN – S Bart, R E Chrien, R Sawafta (Spokesperson), R Sutter
HAMPTON U & CEBAF – K Baker, L Tang
HOUSTON U – M Barakat, E V Hungerford
INDIANA U – S M Bowyer, S Wells, S W Wissink
TOKYO U, INS – H Outa
OHIO U – K Hicks (Spokesperson), B Larson, R Michael
TOKYO U – R S Hayano, Y Shimizu, H Tamura

Accelerator BNL *Detector* Spectrometer

Reactions

K^- nucleus $\rightarrow \pi^\pm$ X	600 MeV/c (P_{lab})

Comments Measures hypernuclear mass spectra for in-flight ($K^-, \pi^\pm$) reactions with ^{7}Li, ^{9}Be, ^{12}C, and ^{16}O targets. The aim is to provide data with sufficient energy resolution and statistics, in order to investigate systematically whether narrow Σ hypernuclear states exist below or above threshold in light hypernuclei. Uses the Moby-Dick spectrometer. In preparation (April 1992).

BNL-888 (Jan 1992) Approved Feb 1992.

SEARCH FOR THE *H* DIBARYON

BROOKHAVEN – M May, S White
UC, IRVINE – D Connor, J Cortese, W R Molzon
UCLA – R D Cousins (Spokesperson)
PRINCETON U – V L Fitch, J Klein, A J Schwartz (Spokesperson)
STANFORD U – M V Diwan, K Ecklund, G M Irwin, D A Ouimette, S G Wojcicki
TEMPLE U – J Belz, V L Highland, S H Kettell
TEXAS U – C A Allen, G W Hoffmann, K Lang, M R Marcin, J McDonough, C T Nguyen, P T Riley, J L Ritchie, B Ware, S Worm
WILLIAM AND MARY COLL – M Eckhause, A D Hancock, J R Kane, Y Kuang, W F Vulcan, R E Welsh, R G Winter, M Witkowski

Accelerator BNL *Detector* Drift chamber, Counter

Reactions

p nucleus	—
Au nucleus	—

Particles studied dibaryon

Comments A proposal to search for the H dibaryon (six-quark $uuddss$ state) using the BNL-791 beamline and spectrometer, modified for two H detection techniques. In the first technique, a search is made for the decay sequence $H \rightarrow \Lambda X \rightarrow p\pi^- X$ in the decay volume. In the second, a diffractive dissociation of long-lived H's is studied: $H + A \rightarrow \Lambda\Lambda A \rightarrow 2p2\pi^- A$. Expected to run Spring 92.

BNL-RHIC-PHENIX (1989)

PHOTON ELECTRON NEW HEAVY ION EXPERIMENT

Accelerator BNL-RHIC *Detector* PHENIX

Comments Studies thermodynamic conditions and particle states characterizing the high density matter created in ion collisions. Focuses specifically on the measurement of leptons and photons and should be capable of exploiting the highest luminosities envisioned for RHIC. The PHENIX detector system is based on an axial field magnet in which the central rapidity interval is covered by two detector arms, each subtending 90° in azimuth. The aperture is instrumented to detect electrons, photons, and hadrons. The muon arm, covering polar angles forward of 30° has a good acceptance for muon pairs, and allows electron-muon coincidence measurements. In the planning phase (April 92). For further details, please contact the spokesperson, Dr. Shoji Nagamiya, Columbia University.

BNL-RHIC-STAR (1989) Approved Aug 1991.

SOLENOIDAL TRACKING AT RHIC

Accelerator BNL-RHIC *Detector* STAR

Comments Aims to measure thousands of charged particle trajectories per event in collisions of relativistic ions at RHIC. With the capability to reconstruct a large sample of hadrons emitted in each event, the experiment serves as a global survey instrument to guide the early research at the new collider. The core of the STAR detector is a time projection chamber (TPC) covering about three units of central rapidity in a solenoidal magnetic field, with its data acquisition and triggering systems. The cylindrical TPC is four meters in diameter. Ionization charges produced along particle trajectories are drifted to the two end plates, where induced signals and arrival times are read out on 150,000 cathode pads. The central TPC is immersed in a 0.5 T solenoidal magnetic field, and is surrounded by an array of TOF counters and electromagnetic shower detectors. The vertex detector uses position sensitive silicon devices with a drift-time measurement technique. External TPCs extend the particle tracking coverage to very small angles. In preparation (April 92). For further details, please contact the spokesperson, Dr. John Harris, LBL, Berkeley.

CERN Experiments

CERN-EMU-001 (Apr 1984) Approved Nov 1984; Completed Aug 1990.

STUDY OF PARTICLE PRODUCTION AND NUCLEAR FRAGMENTATION IN COLLISIONS OF ^{16}O BEAMS WITH EMULSION NUCLEI AT 13–200 A GeV

ALMA ATA, PHYS INST – N P Andreeva, Z V Anson, V I Bubnov, Y I Chasnikov, G Z Eligbaeva, L E Eremenko, A S Gaitanov, G S Kalyachkina, E K Kanygina, V N Lepetan, C I Shakova
BEIJING, IHEP – G F Xu, P Y Zheng
PANJAB U – M M Aggarwal, R Arora, V S Bhatia, I S Mittra
HUNAN EDUCATION INST – Y X Li, L Liang, Z G Liu, Z Q Weng, Y L Xia
DUBNA – S A Krasnov, S Kulikova, T N Maksimkina, J J Musulmanbekov, G S Shabratova, K D Tolstov
RAJASTHAN U – K B Bhalla, S K Gupta, V Kumar, P Lal, S Lokanathan, S Mookerjee, H S Palsania, R Raniwala, S Raniwala
JAMMU U – S K Badyal, A Bhasin, V K Gupta, S Kachroo, S Kitroo, L Mangotra, N K Rao
KOSICE U – L Just, M Karabova, M Tothova, S Vokal, J Vrlakova
SHANXI NORMAL U – S B Lou, Y M Qin, D H Zhang
LUND U – S Garpman, B Jakobsson, J Nystrand, I Otterlund (✓ Spokesperson), K Soderstrom, E Stenlund
MARBURG U – E Ganssauge, J T Rhee
LEBEDEV INST – M I Adamovich, Y A Alexandrov, M M Chernyavsky, S G Gerassimov, S P Kharlamov, V G Larionova, N V Maslennikova, G I Orlova, N G Peresadko, V M Rappoport, N A Salmanova, M I Tretyakova
WASHINGTON U, SEATTLE – T H Burnett, J Grote, J J Lord, D Skelding, R J Wilkes
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TASHKENT, IFY – E S Basova, H Nasrullaeva, S Z Nasyrov, N V Petrov, D A Qarshiev, T P Trofimova, U I Tuleeva
TASHKENT, FTI – L P Chernova, K G Gulamov, F G Kadyrov, N S Lukicheva, V S Navotny, N Saidkhanov, L N Svechnikova, S I Zhokhova
HUA-ZHONG NORMAL U – X Cai, H Huang, L S Liu, W Y Qian, H Q Wang, D C Zhou
YEREVAN PHYS INST – F A Avetyan, N A Marutyan, L G Sarkisova, V R Sarkisyan

Accelerator CERN-SPS *Detector* Emulsion

Reactions

^{16}O nucleus	13–200 GeV (T_{lab}/N)
^{32}S nucleus	200 GeV (T_{lab}/N)

Comments Studies (1) multiplicities of produced charged particles, (2) pseudo-rapidity density distributions globally and in selected regions of pseudo-rapidity, (3) density fluctuations and multiplicity and angular distributions of nuclear fragments and recoiling protons, and (4) cross sections for production and interaction of light and medium projectile fragments. Uses emulsion chambers and emulsion stacks. See also the BNL-815 experiment.

Papers PL B201 (1988) 397, NIM A269 (1988) 134, CPC 55 (1989) 103, CPC 55 (1989) 233, HEPNP 13 (1989) 865, PR C40 (1989) 66, NP A498 (1989) 541c, PL B223 (1989) 262, PL B227 (1989) 285, PL B230 (1989) 175, PRL 62 (1989) 2801, PS T32 (1990) 168, MPL A5 (1990) 169, PL B234 (1990) 180, PL B242 (1990) 512, PRL 65 (1990) 412, HEPNP 15 (1991) 131, NP A525 (1991) 551c, MPL A6 (1991) 469 [erratum: MPL A6 (1991) 1629], ZPHY C49 (1991) 395, PRL 67 (1991) 1201, PL B262 (1991) 369, and PL B263 (1991) 539.

CERN-EMU-002 (May 1984) Approved Nov 1984; Completed Oct 1987.

SEARCH FOR FRACTIONALLY CHARGED NUCLEI IN HIGH-ENERGY OXYGEN-LEAD COLLISIONS

UC, BERKELEY – P B Price (Spokesperson)

Accelerator CERN-SPS *Detector* Plastic

Reactions

^{16}O Pb	200 GeV (T_{lab}/N)
^{32}S Pb	"
^{32}S Cu	"
^{32}S Al	"

Particles studied quark

Comments Uses stacks of CR-39 plastic track detectors to look for fractionally charged projectile fragments produced in collisions of high energy nuclei with a lead target.

Papers PRL 59 (1987) 2535, and PRL 61 (1988) 2193.

CERN-EMU-003 (Oct 1984) Approved Nov 1984; Started 1990; Completed Aug 1990.

INTERACTIONS OF ^{16}O PROJECTILE AND ^{32}S AND THEIR FRAGMENTS IN NUCLEAR EMULSIONS AT ABOUT 60 AND 200 GeV/NUCLEON

CAIRO U – A Abdalla, Z Abou-Moussa, O E Badawy, M El-Nadi (✓ Spokesperson), F Abd El-Wahed, A Fakiha, A A Hamed, A Hussien, S Kamel, N Metwalli, A Mohamed, W Osman, M Selait, E A Shaat, S Talaat, T Talaat

Accelerator CERN-SPS *Detector* Emulsion

Reactions

^{16}O nucleus	60, 200 GeV (T_{lab}/N)
^{32}S nucleus	"

Comments Studies the e^+e^- decays of neutral bosons produced in the inelastic collisions of ^{32}S ions with emulsion nuclei at 200 A GeV. An unbiased sample of 1331 events has been analyzed, 346 e^+e^- pairs observed, and masses and lifetimes of 60 neutral bosons calculated. Studies also the mean free paths, average multiplicities, multiplicity distributions, and correlations of the produced particles, target fragments and projectile fragments, with both ^{32}S and ^{16}O beams. Data analysis in progress (May 92).

CERN-EMU-004 (Oct 1985) Approved Feb 1986, Sep 1987; Completed Oct 1987.

MEASUREMENT OF COULOMB CROSS SECTION FOR PRODUCTION OF DIRECT ELECTRON PAIRS BY HIGH ENERGY IONS AT THE CERN SPS

ALABAMA U, HUNTSVILLE – J C Gregory, T Hayashi, Y Takahashi
BOSTON U – S P Ahlen, A Marin
KOBE U – S Dake
MICHIGAN U – J A Musser, G Tarle
NASA, MARSHALL – J H Derrickson, P B Eby, W F Fountain, T A Parnell (Spokesperson), F E Roberts, T Tabuki, J W Watts
TOKYO U – T Ogata, T Tominaga

Accelerator CERN-SPS *Detector* Emulsion

Reactions

^{16}O nucleus $\rightarrow e^+ e^-$ ^{16}O nucleus	60, 200 GeV (T_{lab}/N)
^{32}S nucleus $\rightarrow e^+ e^-$ ^{32}S nucleus	"

Comments Aims to establish cross sections to compare with recent calculations and for use in measuring energies of very high energy cosmic rays.

CERN-EMU-005 (Oct 1985) Approved Feb 1986; Completed Aug 1990.

STUDY OF EXTREMELY SHORT-RANGE PARTICLE CORRELATIONS IN HIGH-ENERGY ION COLLISIONS

ALABAMA U, HUNTSVILLE – C H Chan, B L Dong, J G Duthie, J C Gregory, T Hayashi, T Shiina, Y Takahashi (Spokesperson)
COLUMBIA U – S Nagamiya
NASA, MARSHALL – M J Christl, J H Derrickson, P B Eby, W F Fountain, T A Parnell, F E Roberts, J W Watts
TOKYO U – S Dake, M Fuki, A Iyono, O Miyamura, T Ogata

Accelerator CERN-SPS *Detector* Emulsion

Reactions
^{16}O nucleus 15, 50, 200 GeV (T_{lab}/N)

Comments Uses an emulsion chamber with air gaps between plates in a 2-tesla magnetic field. Measures two-particle angular correlations for both like-charge and unlike-charge pairs. Took data in 1987 and 1990.

Papers NP A498 (1989) 529c.

CERN-EMU-006 (Mar 1986) Approved Jun 1986; Completed Nov 1986.

STUDY OF THE PRODUCTION MECHANISMS AND DECAY PROPERTIES OF CHARMED PARTICLES OBSERVED IN NUCLEAR EMULSIONS COUPLED TO THE NA14 SPECTROMETER

BOLOGNA U & INFN, BOLOGNA A Forino, R Gessaroli, A Quareni-Vignudelli, F Viaggi
CERN G Vanderhaeghe
FLORENCE U & INFN, FLORENCE M Bocciolini, A Conti (Spokesperson), M G Dagliana, M Meschini, G Parrini
GENOA U & INFN, GENOA G Tomasini
LEBEDEV INST M I Adamovich, Y A Alexandrov, N M Chernyavsky, S G Gerassimov, S P Kharlamov, V G Larionova, G I Orlova, N G Peresadko, N A Salmanova, M I Tretyakova

Accelerator CERN-SPS *Detector* Emulsion, Spectrometer

Reactions
γ nucleus $\rightarrow$ charm X 70 200 GeV/c

Particles studied Λ_c^+, charm

Comments A hybrid experiment, using the particle identification power and microstrip vertex detector of the CERN-NA-014 spectrometer to speed and enrich the detection of charmed particles.

Papers NP (Proc. Suppl.) B1 (1988) 33.

CERN-EMU-007 (Mar 1987) Approved Jun 1987, Feb 1989; Completed Aug 1990.

INTERACTIONS OF 60–200 GeV/NUCLEON ^{16}O AND ^{32}S (Pb) NUCLEI IN LIGHT AND HEAVY ABSORBERS

CRACOW R Holynski, A Jurak, A Olszewski, M Szarska, A Trzupek, B Wilczynska, H Wilczynski, W Wolter, B Wosiek, K Wozniak
LOUISIANA STATE U M L Cherry, W V Jones, K Sengupta, J P Wefel (√ Spokesperson)
MOSCOW, ITEP A I Dubinina, O K Egorov, E D Kolganova, E A Pozharova, T Yu Skorotko, V A Smirnitski
MINNESOTA U P S Freier, C J Waddington

Accelerator CERN-SPS *Detector* Emulsion

Reactions
^{16}O nucleus 60, 200 GeV (T_{lab}/N)
^{32}S nucleus "

Comments Studies (1) projectile fragmentation modes, including transverse momentum distributions and possible dependencies on topology. (2) pseudo-rapidity distributions, including searches for structure and correlations, (3) the dependence of charged particle multiplicity on the number of interacting nucleons, and (4) possible enhanced production of direct photons or electrons in high density matter. Ran in 1987 and 1990.

Papers PRL 60 (1988) 405, PRL 62 (1989) 733, NP A498 (1989) 535c, PR C39 (1989) 1385, and PR C40 (1989) 2449.

CERN-EMU-008 (Feb 1987) Approved Sep 1987; Completed Oct 1987.

STUDY OF PARTICLE PRODUCTION IN RELATIVISTIC HEAVY-ION COLLISIONS

SUNY, BUFFALO P L Jain (√ Spokesperson), K Sengupta, G Singh

Accelerator CERN-SPS *Detector* Emulsion

Reactions
^{16}O nucleus 60, 200 GeV (T_{lab}/N)
^{32}S nucleus 200 GeV (T_{lab}/N)

Comments Searches for evidence for quark matter by analyzing events produced in central collisions.

Papers PRL 59 (1987) 2531, EPL 5 (1988) 135, PRL 61 (1988) 1073, PL B213 (1988) 548, PL B214 (1988) 480, EPL 8 (1989) 15, PL B222 (1989) 301, NP A498 (1989) 547c, PR C39 (1989) 1835, MPL A5 (1990) 285, PL B235 (1990) 351, PL B236 (1990) 219, PL B241 (1990) 273, PR C41 (1990) 999, PR C42 (1990) 1757, MPL A6 (1991) 29, ZPHY C52 (1991) 465, PR C43 (1991) 2027, PR C43 (1991) 2417, PR C44 (1991) 844, PR C44 (1991) 854, IJMP A7 (1992) 1907, and ZPHY C53 (1992) 355.

CERN-EMU-009 (Jan 1989) Approved Apr 1989; Started 1990; Completed Aug 1990.

AN EMULSION HYBRID SETUP FOR THE STUDY OF SULPHUR-NUCLEUS COLLISIONS AT 200 GeV/N

BARI U & INFN, BARI N Armenise, M T Muciaccia, S Simone
CERN G Poulard
UNIVERSITY COLL, DUBLIN A C Breslin
ALABAMA U, HUNTSVILLE J C Gregory, T Hayashi, Y Takahashi
NASA, MARSHALL J H Derrickson, T A Parnell, J Watts
UNIVERSITY COLL, LONDON D H Davis, D Tovee
NAGOYA U S Aoki, K Hoshino, H Kitamura, M Kobayashi, K Kodama, M Miyanishi, K Nakamura, M Nakamura, S Nakanishi, K Niu, K Niwa, H Tajima
ROME U & INFN, ROME S Dell'Uomo, S Di Liberto, M A Mazzoni, F Meddi, G Rosa, C Sgarbi
SALERNO U & INFN, SALERNO G Grella, G Romano (√ Spokesperson)
TURIN U & INFN, TURIN B Allessandro, V Bisi, P Giubellino, A Marzari-Chiesa, L Ramello, L Riccati

Accelerator CERN-SPS *Detector* Emulsion

Reactions
^{32}S nucleus 200 GeV (T_{lab}/N)

Particles studied charm

Comments The setup includes silicon detectors and emulsion tapes or chambers. Some of the exposures will be in a 2.5 T field. The main aims are (1) a search for charm particles produced in central interactions on silver and lead targets, (2) a study of charged-particle correlations as a function of charge and momentum differences, and (3) a search for electromagnetic dissociation of sulfur in the field of iron, silver, and lead targets. Data analysis in progress (April 92).

CERN-EMU-010 (Nov 1989) Approved Feb 1990; Started 1990; Completed Aug 1990.

STUDY OF EVENT STRUCTURES OF 200 GeV/NUCLEON ^{32}S INTERACTIONS WITH NUCLEI BY THE MAGNETIC EMULSION SPECTROMETER AT THE CERN SPS

GIFU U K Nakazawa
MIYAZAKI U T Hasegawa, T Shuin
SAGA U, JAPAN A Hisatomi, H Itoh (Spokesperson), T Murooka
SAKUYO COLL R Ihara
TOHOKU U T Hayashino

Accelerator CERN-SPS *Detector* Spectrometer

Reactions
^{32}S nucleus 200 GeV (T_{lab}/N)

Comments A search for anomalous event structure, which may be caused by phase transitions. Investigates the space-time structure of nuclear collisions by pion interferometry, through the charged particle exclusive measurement. Uses ten magnetic emulsion spectrometers (ESSPER's).

CERN-EMU-011 (1991) Approved Nov 1991.

STUDY OF PARTICLE PRODUCTION AND NUCLEAR FRAGMENTATION IN RELATIVISTIC HEAVY ION COLLISIONS IN NUCLEAR EMULSION

SUNY, BUFFALO A Z M Ismail, P L Jain (√ Spokesperson), A Mukhopadhyay, G Singh

Accelerator CERN-SPS *Detector* Emulsion

Reactions

^{197}Au nucleus	200 GeV (T_{lab}/N)
^{207}Pb nucleus	60, 200 GeV (T_{lab}/N)

Comments Measures (1) the shower particle multiplicity, the pseudorapidity density, and density fluctuations of charged particles, (2) the charge multiplicity and angular distributions of projectile fragments, and (3) production and interaction cross sections of heavily ionizing particles emitted from the target fragmentation. Emphasis is placed on the central collisions. Uses stacks of pellicles. In preparation (March 92).

CERN-EMU-012 (1991) Approved Nov 1991.

PARTICLE PRODUCTION, DENSITY FLUCTUATIONS, AND BREAK UP OF DENSE NUCLEAR MATTER IN CENTRAL Pb+Ag AND Pb+Pb INTERACTIONS AT 60–160 A GeV

ALMA ATA, PHYS INST N P Andreeva, Z V Anson, V I Bubnov, I Y Chasnikov, G Z Eligbaeva, L E Eremenko, A S Gaitinov, G S Kalyachkina, E K Kanygina, V N Lepetan, C I Shakova
BEIJING, IHEP G F Xu, P Y Zheng
PANJAB U M M Aggarwal, R Arora, V S Bhatia, I S Mittra
DUBNA M Karabova, S A Krasnov, S Kulikova, T N Maksimkina, J J Musulmanbekov, G S Shabratova, K D Tolstov, S Vokal
YEREVAN PHYS INST F A Avetyan, N A Marutyan, L G Sarkisova, V R Sarkisyan
HUNAN EDUCATION INST Y X Li, L Liang, Z G Liu, Z Q Weng, Y L Xia
RAJASTHAN U K B Bhalla, S K Gupta, V Kumar, P Lal, S Lokanathan, S Mokerjee, H S Palsania, R Raniwala, S Raniwala
JAMMU U S K Badyal, A Bhasin, V K Gupta, S Kachroo, S Kitroo, L Mangotra, N K Rao
KOSICE U L Just, M Karabova, M Tothova, S Vokal, J Vrlakova
LUND U S Garpman, B Jakobsson, J Nystrand, I Otterlund (Spokesperson), K Soderstrom, E Stenlund
MARBURG U E Ganssauge, J T Rhee
LEBEDEV INST M I Adamovich, Y A Alexandrov, M M Chernyavsky, S G Gerassimov, S P Kharlamov, V G Larionova, N V Maslennikova, G I Orlova, N G Peresadko, V M Rappoport, N A Salmanova, M I Tretyakova
KHLOPIN RADIUM INST V G Bogdanov, V A Plyushchev, Z I Solovieva
SHANXI NORMAL U S B Lou, Y M Qin, D H Zhang
TASHKENT, IFY E S Basova, H Nasrullaeva, S Z Nasyrov, N V Petrov, D A Qarshiev, T P Trofimova, U I Tuleeva
TASHKENT, FTI L P Chernova, K G Gulamov, F G Kadyrov, N S Lukicheva, V S Navotny, N Saidkhanov, L N Svechnikova, S I Zhokhova
WASHINGTON U, SEATTLE T H Burnett, J Grote, J J Lord, D Skelding, R J Wilkes
HUA-ZHONG NORMAL U X Cai, H Huang, L S Liu, W Y Quian, H Q Wang, D C Zhou

Accelerator CERN-SPS *Detector* Emulsion

Reactions

^{207}Pb nucleus	60 160 GeV (T_{lab}/N)

Comments Studies the multiparticle production globally and locally, fluctuations in particle densities, and the break up of dense nuclear matter in central interactions. Uses emulsion chambers with thin Pb and Ag target foils as well as conventional emulsion pellicle stacks. Scheduled to run in 93/94.

CERN-EMU-013 (1991) Approved Nov 1991.

INTERACTIONS OF 180 GeV/NUCLEON ^{207}Pb NUCLEI IN EMULSION CHAMBERS WITH COPPER AND LEAD TARGETS

CRACOW A Dabrowska, R Holynski, A Jurak, A Olszewski, M Szarska, A Trzupek, B Wilczynska, H Wilczynski, W Wolter (Spokesperson), B Wosiek, K Wozniak
LOUISIANA STATE U M L Cherry, W V Jones, K Sengupta, J P Wefel
MINNESOTA U P S Freier, C J Waddington

Accelerator CERN-SPS *Detector* Emulsion

Reactions

^{207}Pb nucleus	180 GeV (T_{lab}/N)

Comments Measures the pseudorapidity distributions of charged particles, including analysis of particle fluctuations in pseudorapidity and azimuthal angle distributions, and the transverse momentum distribution of α fragments from the projectile nucleus. In preparation (March 92).

CERN-IS-010 (1982) Approved Apr 1982; Completed Dec 1987.

DETERMINATION OF THE ν_e MASS FROM EXPERIMENTS ON ELECTRON-CAPTURE BETA DECAY

AARHUS U P G Hansen, K Riisager
CERN H L Ravn, A De Rujula
CHALMERS UNIV TECH H Axelsson, M Cronqvist, B Jonson (√ Spokesperson), G Nyman
MADRID U M J G Borge
ZFK, ROSSENDORF G J Beyer

Accelerator CERN-SC *Detector* ?

Particles studied ν_e, axion

Comments Measures the shape of the internal bremsstrahlung spectrum in electron capture near its upper end point. Uses ^{163}Ho and ^{81}Kr.

Papers PS 34 (1986) 591, JPHY G14 (1988) 1301, and PL B210 (1988) 249. No other papers expected.

CERN-IS-021 Approved Apr 1990; Completed Dec 1990.

A SEARCH FOR AXIONS BY NUCLEAR RESONANCE SCATTERING

AARHUS U P Kringhoj, H L Nielsen, J W Petersen, G Weyer (Spokesperson)
CERN H L Ravn, A De Rujula

Accelerator CERN-SC *Detector* ?

Particles studied axion

Comments A search for axions utilizing a strong, high purity source of ^{125}I produced at ISOLDE.

CERN-IS-300 Approved Sep 1991.

A SEARCH FOR AXIONS AND MASSIVE NEUTRINOS

AARHUS U P Hornshoj, H Loft Nielsen, J W Petersen, K Riisager, G Weyer (Spokesperson)
CERN H L Ravn, A De Rujula
CHALMERS UNIV TECH B Jonson, G Nyman

Accelerator CERN-SC *Detector* ?

Particles studied axion, ν

Comments A search for axions and a heavy neutrino by using a strong, high purity source of ^{125}I. In preparation (March 92).

CERN-LEP-ALEPH (1982) Approved Nov 1982.

THE ALEPH DETECTOR (*A*PPARATUS FOR *LEP PH*YSICS)

ALEPH COLLABORATION

ANNECY D Buskulic, D Decamp, B Deschizeaux, P Ghez, C Goy, J P Lees, M N Minard, B Mours
ATHENS U I Efthymiopoulos, G Gounaris, A Kyriakys, E Matsinos, E Simopoulou, M Spyropoulou-Stassinaki, A Vayaki
BARCELONA, AUTONOMA U R Alemany, F Ariztizabal, P Comas-Illas, J M Crespo, M Delfino, E Fernandez, V Gaitan, L Garrido-Beltram, L M Mir, A Pacheco, A Pascual
BARI U D Creanza, A Farilla, A Ghiselli, G Iaselli, G Maggi, M Maggi, A Mastrogiacomo, S Natali, S Nuzzo, M De Palma, A Quattromini, T Ranieri, G Raso, F Romano, F Ruggieri, P Sciacovelli, G Selvaggi, L Silvestris, P Tempesta, G Zito

BEIJING, IHEP – Y Chen, Y Gao, H Hu, D Huang, X Huang, Y Jiang, J Lin, R Liu, J Lou, W Lu, H Pu, C Qiao, T Ruan, X Song, T Wang, X Wang, Z Wang, D Wu, Y Xie, D Xu, R Xu, Y Xu, W Yan, M Ye, J Zhang, H Zhao, W Zhao
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BOHR INST – H Bertelsen, A Engelhardt, J D Hansen, J R Hansen, P Hansen, A Lindahl, R Mollerud, B S Nilsson
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FLORENCE U & INFN, FLORENCE – A Conti, G Della Lunga, L Moneta, G Parrini
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GLASGOW U – B Altoon, O Boyle, P Coirain, A J Flavell, A Halley, I Ten Have, J G Lynch, W Maitland, D J Martin, W Morton, P J Negus, R O'Neill, C Raine, D Saxon, J M Scarr, K Smith, A S Thompson, R M Turnbull
HEIDELBERG U, IHEP – B Brandl, O Braun, C Geweniger, G Graefe, P Hanke, V Hepp, W Heyde, C Karger, E E Kluge, J Krause, Y Maumary, A Putzer, B Rensch, A Stahl, K Tittel, M Wunsch
INNSBRUCK U – P Girtler, E Kneringer, D Kuhn, G Rudolph, R Vogl
LANCASTER U – C Bowdery, T Brobdeck, A Finch, F Foster, G Hughes, D J Jackson, N Keemer, M Nuttal, A Patel, B Rowlingson, T Sloan, S Snow, E Whelan
IMPERIAL COLL – A Belk, R Beuselinck, D M Binnie, W Cameron, M Cattaneo, D Colling, S Dugeay, A Greene, J Hassard, N Lieske, S Patton, D Payne, M Phillips, D Price, J E Ratcliffe, J K Sedgbeer, G Taylor, I Tomalin, A C Wright
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MARSEILLE U, LUMINY – T Arnouil, J J Aubert, R Bazzoli, C Benchouk, V Bernard, A Bonissent, J Carr, P Coyle, J Drinkard, F Etienne, Y Gally, R Ossa, S Papalexiou, P Payre, B Pietrzyk, Z Qian, J Raguet, D Rousseau, P Schwemling, M Talby
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ECOLE POLYTECHNIQUE – J Badier, A Blondel, G Bonneaud, J Brient, J R Fanchon, G Fouque, A Gamess, J Harvey, P Matricon, S Orteu, A Rosowski, A Rouge, C Roy, M Rumpf, R Tanaka, H Videau, C Violet
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RUTHERFORD – D Botterill, R Clifft, R Edgecock, M Edwards, S M Fisher, E Holtom, T Jones, G McPherson, P R Norton, D Salmon, G Tappern, J C Thompson
SACLAY – R Bernard, B Bloch-Devaux, P Colas, H Desportes, R Gastaud, M Jacquemet, A Joudon, E Locci, S Loucatos, E Monnier, F Perez, J A Perlas, F Perrier, B Peyaud, J Rander, J F Renardy, A Roussarie, J P Schuller, J Schwindling, B Vallage
UC, SANTA CRUZ – R Johnson, A Litke, M McNeil, J Wear
SHEFFIELD U – J Ashman, W Babbage, C Booth, C Buttar, R E Carney, S Cartwright, F Combley, M Dogru, F Hatfield, Y Hou, P Reeves, L Thompson
SIEGEN U – E Barberio, S Brandt, G Gillessen, C Grupen, G Heitner, G Lutters, L Mirabito, U Schaefer, H Seywerd, C Stupperich, H Trier, V Zeuner
TRIESTE U – G Apollinari, G Giannini, B Gobbo, A Gregorio, R Della Marina, F Ragusa, C Strizzolo
WISCONSIN U – L Bellantoni, X Chen, D Cinabro, B Le Claire, J Conway, Z Feng, D Ferguson, Y Gao, J Grahl, J Harton, O Hayes, J Jacobsen, R Jared, C Lishka, Y Pan, J Pater, V Sharma, Z Shi, Y Tang, M Walsh, D Weber, M Whitney, S L Wu, G Zobernig

Accelerator CERN-LEP *Detector* ALEPH

Reactions
e^+e^- < 120 GeV (E_{cm})

Particles studied W^+, W^-, Z^0, hvy-lepton, higgs, hvy-flavor

Comments A 4π detector designed to give as much detailed information as possible about complex events. The strong points of the detector are the precision of momentum measurements for charged particles, due to a high magnetic field and a TPC, the good identification of electrons and muons, even when they are immersed in jets, and the spatial resolution obtained in $e\gamma$ calorimetry. Taking data (March 92).

Papers NIM 225 (1984) 481, NIM 226 (1984) 82, NIM A252 (1986) 392, NIM A252 (1986) 399, NIM A252 (1986) 403, IEEE TNS 34 (1987) 133, CPC 45 (1987) 229, CPC 45 (1987) 283, CPC 45 (1987) 433, NIM A257 (1987) 587, IEEE TNS 35 (1988) 316, NIM A263 (1988) 43, NIM A263 (1988) 58, NIM A271 (1988) 449, IEEE TNS 36 (1989) 1459, IEEE TNS 36 (1989) 1464, IEEE TNS 36 (1989) 1514, NIM A277 (1989) 358, NIM A283 (1989) 573, PL B231 (1989) 519, IEEE TNS 37 (1990) 1210, NIM A286 (1990) 61, NIM A289 (1990) 176, NIM A294 (1990) 121 [erratum: NIM A303 (1991) 393], NIM A297 (1990) 153, NIM A297 (1990) 390, HEPNP 14 (1990) 966, PL B234 (1990) 209, PL B234 (1990) 399, PL B235 (1990) 399, PL B236 (1990) 86, PL B236 (1990) 233, PL B236 (1990) 501, PL B236 (1990) 511, PL B237 (1990) 291, PL B241 (1990) 141, PL B241 (1990) 623, PL B241 (1990) 635, PL B244 (1990) 541, PL B244 (1990) 551, PL B245 (1990) 289, PL B246 (1990) 306, PL B250 (1990) 172, ZPHY C48 (1990) 365, NIM A306 (1991) 446, PL B255 (1991) 623, PL B257 (1991) 479, PL B257 (1991) 492, PL B258 (1991) 236, PL B259 (1991) 377, PL B262 (1991) 139, PL B263 (1991) 112, PL B263 (1991) 325, PL B264 (1991) 476, PL B265 (1991) 430, PL B265 (1991) 475, PL B266 (1991) 218, PL B273 (1991) 181, ZPHY C53 (1992) 1, ZPHY C53 (1992) 21, and ZPHY C53 (1992) 375.

CERN-LEP-DELPHI (1982) Approved Nov 1982.

THE DELPHI DETECTOR (*DE*TECTOR WITH *L*EPTON *P*HOTON AND *H*ADRON *I*DENTIFICATION)

NIKHEF, AMSTERDAM – G W Van Apeldoorn, A Augustinus, M Bonapart, N Brummer, P Van Dam, M Donszelmann, N De Groot, S Haider, D Holthuizen, P M Kluit, B Koene, M Los, H Palka, W Ruckstuhl, J Timmermans, D Z Toet
ANTWERP U – H De Boeck, F Verbeure
DEMOCRITOS NUCLEAR RESEARCH CENTER – P Beltran, H Borner, P Kokkinias, C Lambropoulos, D Loukas, A Maltezos, A Markou, G Stavropoulos, G Theodosiou, E Zevgolatakos

SUMMARIES OF CERN EXPERIMENTS

ATHENS U – E Anassontzis, P Ioannou, G Kalkanis, S Katsanevas, C Kourkoumelis, L Resvanis, G Voulgaris
ATHENS, TECH UNIV – M Dris, D Fassouliotis, T A Filippas, E Fokitis, E N Gazis, E C Katsoufis, S Maltezos, T Papadopoulou
BERGEN U – S J Alvsvaag, A G Frodesen, P S Iversen, A Klovning, E Lillethun
INFN, BOLOGNA – F R Cavallo, F Navarria, A Perrotta, U Rossi, T Rovelli, G Valenti, S Volponi
BRUSSELS U, IIHE – D Bertrand, C Bricman, F Cao, C De Clerq, W K Van Doninck, J Lemonne, F Stichelbaut, S Tavernier, C Vander Velde, J H Wickens, S Zhang
CERN – U Amaldi (✓ Spokesperson), P Baillon, R C A Brown, H Burmeister, J A M A Buytaert, M Caccia, J J Gomez y Cadenas, J E Campagne, T Camporesi, A Cattai, P Charpentier, M Davenport, D Delikaris, S Delorme, H Dijkstra, M Dracos, P Eerola, N Van Eijndhoven, H Foeth, J Fuster, P Gavillet, P Giacomelli, R Gokieli, A Grant, F Hahn, H Herr, H J Hilke, M Jonker, G Kantardjian, N J Kjaer, H Klein, W Klempt, B Korzen, M Lokajicek, J C Marin, K Moenig, H R Muller, L Pape, M E Pol, J Ridky, E Rosso, P Siegrist, C J Stubenrauch, D Treille, W Trischuk, A Tsirou, S Tzamarias, O Ullaland, P Vaz, P Weilhammer, A M Wetherell, P Yepes
BOHR INST – E Dahl-Jensen, G Damgaard, J E Hooper, R Moeller, B S Nielsen
CRACOW – P Jalocha, P Kapusta, K Korcyl, W Krupinski, G Polok, K Rybicki, M Turala, A Zalewska
DUBNA – G D Alekseev, D Yu Bardine, M S Bilenky, P N Bogolioubov, Y Bonushkin, G A Chelkov, J N Denissov, V Kadyshevsky, B A Khomenko, N N Khovansky, O Kouzietsov, Z Kroumshtein, V Malyshev, G V Mitselmakher, A Olchevski, I Potashnikova, V N Pozdnyakov, A A Sazonov, Y V Sedykh, A N Sissakian, N Skachkov, V G Timofeev, L G Tkatchev, E N Tsyganov, L S Vertogradov, A S Vodopyanov, N I Zimin
GENOA U & INFN, GENOA – M Begalli, M Bozzo, C Caso, R Contri, G Crosetti, G Darbo, F Fontanelli, V Gracco, G Medla, M R Monge, P Morettini, I Rongagliolo, M Sannino, G Sette, S Simonetti, S Squarcia, U Trevisan
GRENOBLE U – R Barate, F Ledroit, G Sajot, T Spassov
HELSINKI U – S Czellar, L Hietanen, R Keranen, K Kurvinen, R Lauhakangas, J Lindgren, R Orava, J Pyyhtia, C Ronqvist, H Saarikko, T Tuuva, M Voutilainen
IOWA STATE U – H B Crawley, A Firestone, R Holmes, R Mc Kay, J W Lamsa, W T Meyer, E I Rosenberg, M Wayne
KARLSRUHE U – W D Apel, W De Boer, D C Fries, H Furstenau, M Hahn, J H Koehne, M Kopf, H Mueller, P Privitera, H Schneider, R Seufert
LISBON, LIFEP – P Abreu, F Barao, M Pimenta, J Varela
LIVERPOOL U – P S L Booth, A Campion, L Carroll, M Houlden, J N Jackson, D Johnson, B King, M McCubbin, R McNulty, B Nijjhar, D Reid, M Richardson
LUND U – T Akesson, S Almehed, O Barring, J Bjarne, H Carling, A Hakansson, G Jarlskog, L Jonsson, I J Kronkvist, B Lorstad, U Mjornmark, I A Tyapkin
LYON, IPN – P Antilogus, G Smadja
MILAN U & INFN, MILAN – M Bonesini, N Bonivento, M Calvi, T Tabarelli de Fatis, W Kucewicz, C Matteuzzi, C Meroni, A De Min, P Negri, A Pullia, S Ragazzi, N G Redaelli, C Troncon, G Vegni
MONS U – S Braibant, E Daubie, F Grard, P Herquet, J Kesteman, O Pingot
ORSAY, LAL – J E Augustin (✓ Spokesperson), P Bambade, M Berggren, B Bouquet, G Cosme, F Couchot, S Dagoret, B Dalmagne, F Fulda-Quenzer, G Grosdidier, B Jean-Marie, V Lepeltier, A Lopez-Fernandez, F Richard, P Roudeau, A Stocchi, T K Tkuong, G Wormser, P Zalewski
OSLO U – L Bugge, T Buran, M Dam, G Maehlum, A L Read, T B Skaali, G Skjevling, J Wikne
OXFORD U – M J Bates, C J Beeston, J H Bibby, S Blyth, P Collins, P D Dauncey, F J Harris, S D Hodgson, J G Loken, L Lyons, G Myatt, D Radojicic, P Ratoff, P B Renton, A M Segar, M T Trainor, G R Wilkinson, W S C Williams
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COLLEGE DE FRANCE – P Beilliere, J M Brunet, M Crozon, C Defoix, P Delpierre, J Dolbeau, Y Y Dufour, P Frenkiel, P F Honore, P Lutz, J Maillard, L Mathis, A Tilquin, G Tristram, R Zukanovich-Funchal
PARIS, CURIE UNIV VI – P Astier, M Baubillier, P Billoir, V Chorowicz, P David, B Grossetete, F Kapusta, A Letessier-Selvon, F Naraghi, R Pain, C De la Vaissiere, R Zitoun
ROME, ISS & INFN, ROME – A Baroncelli, C Bosio, P Branchini, E Graziani, A Passeri, E Spiriti, C Stanescu, L Tortora, V Vrba
ROME U, TORVERGATA & INFN, ROME – V Canale, L Cerrito, L Di Ciaccio, G Matthiae
RUTHERFORD – T Adye, D Crennell, B Franek, G Gopal, J Guy, G Kalmus, N Murray, R Sekulin, G R Smith, M Tyndel, W Venus
SACLAY – F Adami, M De Beer, T Bolognese, P Borgeaud, L Chevalier, P Jarry, J P Laugier, G Hamel de Monchenault, A Ouraou, F Pierre, V Ruhlmann, Y Sacquin, M L Turluer, D Vilanova, M Zito
SANTANDER U – A J Camacho-Rozas, J Cuevas-Maestro, M Fernandez-Alonso, J Garcia, M A Lopez-Aguera, J Marco, F Matorras, A Ruiz
SERPUKHOV – I Belokopytov, G Borissov, M Chapkin, P Chliapnikov, A Fenyuk, S Gumenyuk, V Kostioukhin, V Lapin, V Nikolaenko, V Obraztsov, A Ostankov, V Perevozchikov, N E Smirnov, O Tchikilev, N E Tyurin, V A Uvarov, E V Vlasov, A Zaitsev
STOCKHOLM U – B Asman, G Ekspong, A Goobar, S Holmgren, P O Hulth, K Hultqvist, E K Johansson, T Moa, C Walck, N Yamdagni
STRASBOURG, CRN – D Benedic, D Bloch, F Djama, W Dulinski, J P Engel, J P Gerber, D Husson, P Juillot, A Lounis, M Schaeffer, R Strub, R Turchetta, M Winter
TRIESTE U – G Barbiellini, E Castelli, P Poropat, M Sessa
TURIN U & INFN, TURIN – F Bianchi, R Cirio, M P Clara, N Demaria, Y E Derkaoui, D Gamba, M Koratzinos, E Menichetti, G Rinaudo, A Romero, E Vallazza
UDINE U & INFN, UDINE – A De Angelis, L Lanceri, B De Lotto, F Scuri, F Waldner
RIO DE JANEIRO U – I Roditi, R C Shellard, Z Thome
UPPSALA U – O Botner, L O Eek, T Ekelof, J Eriksson, A Hallgren, K Woschnagg
VALENCIA U – M V Castillo-Gimenez, A Ferrer, C Garcia, F Gonzalez, J J Hernandez, E Higon, C Lacasta, M D M De Fez Laso, J J Lozano, S Marti, Y Salt, E Sanchez, J A Valls-Ferrer, J Zuniga
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WARSAW, INR – K Doroba, M Gorski, T Hofmokl, J Krolikowski, A Lipniacka, R Sosnowski, M Szczekowski, M Szeptycka, P Szymanski
WUPPERTAL U – K H Becks, J Drees, H Forsbach, K W Glitza, K Hamacher, U Kruener-Marquis, G Lenzen, E Lieb, H Staeck, S Ueberschaer, B Veberschaer, M Vollmer, H Wahlen, J Werner, G Zhang

Accelerator CERN-LEP *Detector* DELPHI

Reactions

$e^+ e^-$ < 200 GeV (E_{cm})

Particles studied W^+, W^-, Z^0, hvy-lepton, higgs, hvy-flavor

Comments A general purpose LEP detector for physics on and above the Z^0, offering 3-dimensional information on curvature and energy deposition with fine spatial granularity, as well as identification of leptons and hadrons over most of the solid angle. A superconducting coil provides a 1.2 T solenoidal field of high uniformity. Tracking relies on a microvertex detector, an inner detector, a Time Projection Chamber (TPC), an outer detector, and forward drift chambers. The 3-layer silicon microvertex detector allows the precision measurement of the interaction vertex and the decay vertices of short-lived particles such as bottom and charm hadrons and τ leptons. Electromagnetic showers are measured in the barrel with high granularity by the High Density Projection Chamber (HPC) and in the endcaps by $1^\circ \times 1^\circ$ projective towers composed of lead glass as active material and phototriode readout. Hadron identification is provided mainly by liquid and gas Ring Imaging Cherenkov Counters (RICH). The segmented yoke serves for hadron calorimetry and as a filter for muons which are identified in two drift chamber layers. In addition, scintillator systems are

implemented in the barrel and forward regions. A Small Angle Tagger (SAT) is used for the luminosity determination. Taking data (April 92).

Papers NIM 225 (1984) 477, NIM 225 (1984) 606, NIM A235 (1985) 310, NIM A241 (1985) 429, NIM A243 (1986) 77, NIM A243 (1986) 91, NIM A248 (1986) 317, NIM A252 (1986) 188, NIM A252 (1986) 413, NIM A252 (1986) 418, NIM A252 (1986) 435, NIM A252 (1986) 524, NIM A252 (1986) 573, NIM A254 (1987) 111, NIM A256 (1987) 65, NIM A256 (1987) 267, NIM A257 (1987) 499, NIM A260 (1987) 124, IEEE TNS 34 (1987) 227, NIM A263 (1988) 215, NIM A265 (1988) 218, NIM A269 (1988) 652, NIM A270 (1988) 393, NIM A273 (1988) 553, NIM A273 (1988) 565, NIM A273 (1988) 841, NIM A273 (1988) 847, IEEE TNS 36 (1989) 390, NIM A275 (1989) 49, NIM A277 (1989) 154, NIM A277 (1989) 160, NIM A277 (1989) 338, NIM A277 (1989) 347, NIM A279 (1989) 473, NIM A279 (1989) 518, NIM A283 (1989) 502, NIM A283 (1989) 567, NIM A283 (1989) 792, NIM A289 (1990) 400, NIM A290 (1990) 320, NIM A290 (1990) 327, NIM A292 (1990) 75, NIM A292 (1990) 319, NIM A292 (1990) 551, NIM A294 (1990) 424, PL B231 (1989) 539, PL B240 (1990) 271, PL B241 (1990) 435, PL B241 (1990) 449, PL B242 (1990) 536, PL B245 (1990) 276, PL B247 (1990) 137, PL B247 (1990) 148, PL B247 (1990) 157, PL B247 (1990) 167, PL B252 (1990) 140, PL B252 (1990) 149, NP B342 (1990) 1, NIM A303 (1991) 233, NIM A310 (1991) 596, PL B255 (1991) 466, PL B260 (1991) 240, PL B267 (1991) 422, PL B268 (1991) 296, NP B367 (1991) 511, ZPHY C50 (1991) 185, ZPHY C51 (1991) 25, PL B274 (1992) 230, PL B274 (1992) 498, PL B275 (1992) 222, PL B275 (1992) 231, PL B276 (1992) 247, PL B276 (1992) 254, PL B276 (1992) 536, PL B277 (1992) 371, ZPHY C53 (1992) 555, and ZPHY C53 (1992) 567.

CERN-LEP-L3 (1982) Approved Nov 1982.

L3 EXPERIMENT

L3 COLLABORATION

AACHEN, TECH HOCHSCH, I PHYS INST – P Bloemecke, M Buchholz, H Esser, A Fischer, E Gevlig, H Haan, K Hilgers, W Karpinski, G Kirchhoff, H Kleinmanns, O Kornadt, R Krankenhagen, W Krenz, T Lehmann, B Lindemann, K Lubelsmeyer, H T Meinholz, L Niessen, D Pandoulas, Y Pei, K Reissmann, M Roehner, K Schmiemann, D Schmitz, M Schontag, H Schreiner, J Schwenke, G Schwering, R Siedling, M Vollmar, W Wallraff, A Weber, Y Zeng, J F Zhou

AACHEN, TECH HOCHSCH, III PHYS INST – S Bachmann, M Bischops, V Commichau, H Fesefeldt, G Fetchenhauer, S Hancke, T Hebbeker, U Herten, C Jakobs, D Lanske, J Mnich, M Moller, A Ricker, S Roehner, J Rose, M Sassowsky, C Schaefer, P Schmitz, S Schulte, T Spickermann, R Starosta, H Szczesny, M Tonutti, U Uwer

ALABAMA U – L Borksay, J Busenitz, D DiBitonto, R Munoz, P Razis

NIKHEF, AMSTERDAM – G J Bobbink, B Bouwens, P Duinker, F Erne, T Foreman, H Van der Graaf, H Groenstege, D Hauschildt, M Ijzerman, X Leijtens, G G G Massaro, G Raven, J C Sens, D Zhang

ANNECY – S Beingessner, Y Bertsch, J Blaising, D Boutigny, F Chollet, G Coignet, A Degre, C Girard, S Jezequel, M Lebeau, J Lecoq, S Lees-Rosier, F Marion, R Morand, M Moynot, D Perret-Gallix, G Perrot, X Ricadonna, G Sauvage, M Schneegans, M Vivargent

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BOLOGNA U & INFN, BOLOGNA – D Antreasyan, A Contin, G Sartorelli

TATA INST – T Aziz, S Banerjee, S N Ganguli, S Katta, P K Malhotra, K Mazumdar, S Saran, S Tonwar

BOSTON U – S Ahlen, S Otwinowski, J Rohlf

BUDAPEST, CRIP – K Banicz, G Bencze, E Denes, G Mortory, E Nagy, J Toth, L Urban

CAL TECH – A E Allder, G Dalgert, G Gratta, M Gruenewald, M Mafeez, R Mount, H B Newman, F Roeber, F Sticozzi, C Tully, C Zaccardelli, R Y Zhu

CARNEGIE MELLON U – I Brock, A Engler, T Ferguson, R Kraemer, J Rudman, X R Shi, J Shukla, G Tsipolitis, H Vogel, G Wang

CERN – B Adeva, A Boehm, N Colino, G Von Dardel, I Duran, F Ferroni, J M Le Goff, A Herve, V Innocente, M Janssen, J Karyotakis, P Lecoq, L Leistam, F Linde, H Lubbers, C Luci, L L Martinez, E Menant, R Morino, D Peach, M Pieri, L Pigni, M Plasse, J Pothier, J Rodriguez-Lopez, E Saint-Aubert, J Salicio-Diez, H Schopper, R Stampfli, B T'Hart, G Trinquart, F Wittgenstein, A Zichichi

HEFEI, CUST – H Chen, Z Gong, Z Lin, W Ma, C Wang, X Wang, Z Xu, B Yang, J Ye, X Q Yu

FLORENCE U – O Adriani, F Becattini, M Bocciolini, F Carminati, A M Cartacci, G Castellini, C Civinini, R D'Alessandro, E Gallo, G Landi, M Lenti, M Meschini, B Monteleoni, S Paoletti, G Passaleva, P Spillantini, Y F Wang

GENEVA U – A Bay, P Bene, M Bourquin, W Burger, A Christinet, D Duchesneau, P Extermann, J H Field, G Forconi, D Goujon, H Hoorani, M N Kienzle, V Lalieu, A Leger, D La Marra, P Martin, G Morand, J Perrier, E Perrin, N Produit, J P Richeux, H Stone, J Wenninger, M Zofka

HARVARD U – K Kumar, P McBride, I Scott, K Strauch, Q F Wang

IOWA STATE U – W Anderson, J Hauptman

JOHNS HOPKINS U – H Akbari, J Bao, C Chien, P Fisher, A Gougas, J Krizmanic, A Pevsner, W Spangler, C Spartiotis

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KYUNGPOOK NATIONAL U – Y Keum, S Kim, S Lee, S Oh, Y Oh, Y Park, D Son

LAUSANNE U – M Gailloud, A Kasser, E Lejeune, J Moser, P Rosselet, C Roth, L Vuilleumier, R Weill

LIVERMORE – M Capell, O Fackler, W Stoeffl, T Wenaus

LOS ALAMOS – M Brock, T Coan, W Kinnison, D Lee, G Mills, G Sanders

LYON, IPN – C Buisson, J P Burq, M Chemarin, J Fay, D Gele, M Goyot, B Ille, M El Kacimi, P Lebrun, N Madjar, M Maire, H El Mamouni, J Martin

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MICHIGAN U – T Azemoon, R C Ball, J W Chapman, M Chen, M Chmeissani, S Goldfarb, R Gustafson, G Hurst, L W Jones, C Leggett, D Mao, J Qian, O Rind, B P Roe

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NAPLES U, IFS & INFN, NAPLES – A Aloisio, M G Alviggi, M Armenante, R De Asmundis, E Brambilla, D Campana, F Carbonara, G Carlino, G Chiefari, P Criscuolo, E Drago, S Lanzano, F Manna, G Manto, L Merola, M Napolitano, P Paolucci, G Paternoster, S Patricelli, D Piccole, G Russo, C Sciacca, F Visco

NIKHEF, AMSTERDAM & NIJMEGEN U – T Driever, F Filthaut, W Kittel, P F Klok, A Konig, H P Kuijten, H M Merk, W Metzger, R Rosmalen, D J Schotanus, C Timmermans, R Van de Walle

NORTHEASTERN U – G Alverson, G Fairley, M Glaubman, I Leedom, S Reucroft, C Spartiotis, L Taylor

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OHIO STATE U – N Reay

PSI, VILLIGEN – R Fabbretti, P G Seiler

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PRINCETON U – W S Anderson, M Convery, P Denes, F Osterberg, P Piroue, E Soderstrom, D Stickland, D Wright
PURDUE U – A Bujak, L Gutay, T McMahon, B C Riemers
ROME U & INFN, ROME – P Bagnaia, L Barone, R Bizzarri, B Borgia, F Camilli, F Cesaroni, S Codino-Falciano, M Consoli, S Constantini, C Dionisi, G M De Divitiis, G Finocchiaro, S Gentile, S Giagu, E Leonardi, J Locci, E Longo, L Ludovici, L Luminari, M Lusignoli, L Maiani, F Marzano, G Mirabelli, S Morganti, F De Notaristefani, G Organtini, M Rescigno, E Trasatti, E Valente
SHANGHAI INST CERAMICS – Z Xue
SOFIYA, AUTOMATION SCI INSTRUM LAB – T Angelov, L Antonov, B Betev, S Botev, V Dimitrov, G Sultanov, L Urban
UC, SAN DIEGO – J Branson, I Sheer, A Sopczak
TAIWAN, HEP GROUP – C Chang, A Chen, S S Gau, L S Hsu, W T Lin, Y P Tong, S C Yeh
CCAST WORLD LAB, BEIJING – S Aksouh, A Ali, Q An, D Antreasyan, P V K S Baba, X D Cai, U K Chaturvedi, W Chen, A Contin, X Y Cui, X Cui, M T Dova, M Gourdin, C Gu, M Guanziroli, A Hasan, G Hu, M Kaur, R A Khan, S Khokhar, V A Kumar, C Li, R Malik, Y Mi, Y Mir, I Mirza, N E Moulai, M A Niaz, T Osborne, K Qureshi, Z L Ren, H A Rizvi, G Sartorelli, R K Sehgal, L Sun, J Swain, A A Syed, P Vikas, U Vikas, M Wadhwa, Z M Wang, S Wu, G Yang, C Ye, Q Ye, J You, N Yunus, M Zeng, Z Zhang
BERLIN-ZEUTHEN ADW – W Friebel, J Groschler, S Kirsch, H Kirst, R Leiste, W Lohmann, W Lustermann, H Nowak, S Riemann, M Sachwitz, H Schreiber, F Streit, F Tonisch, G Trowitzsch, K Truetzschler
ZURICH, ETH – H Anderhub, T Behner, J Behrens, A Biland, P Le Coultre, M Dhina, L Djambazov, G Faber, M Fabre, K Freudenreich, J Herrmann, H Hofer, I Horvath, E Isiksal, M G Jongmanns, H Jung, P Lecomte, J Lettry, L Li, X Lue, M MacDermott, M Maolinbay, P Marchesini, D McNally, C Neyer, F Pauss, M Pohl, G Rahal-Callot, D Ren, H Rykaczewski, B Spiess, H Suter, J Ulbricht, G Viertel, S Waldmeier, J Weber, C Yang, J Ye, P Zemp

Accelerator CERN-LEP *Detector* L3

Reactions
$e^+ e^-$ < 100 GeV (E_{cm})

Particles studied Z^0, hvy-lepton, higgs, higgs, s-particle

Comments The detector consists of a high-volume low-field solenoid magnet, a small central tracking chamber with very high resolution, a high resolution electromagnetic calorimeter encapsulating the central detector, a hadron calorimeter acting also as a muon filter, and high precision muon tracking chambers. The detector is designed to measure energy and position of leptons with the highest obtainable precision allowing a mass resolution $\Delta m/m$ smaller than 2% in dilepton final states. Hadronic energy flux is detected by a fine-grained calorimeter, which also serves as a muon filter and tracking device. Taking data (April 92).

Papers NIM 214 (1983) 525, NIM 225 (1984) 493, NIM 228 (1985) 294, NIM A235 (1985) 464, NIM A251 (1986) 258, NIM A252 (1986) 304, CPC 45 (1987) 391, NIM A253 (1986) 15, NIM A254 (1987) 535, NIM A256 (1987) 261, NIM A257 (1987) 125, NIM A257 (1987) 528, HEPNP 12 (1987) 587, NIM A258 (1987) 58, NIM A263 (1988) 14, NIM A263 (1988) 343, NIM A265 (1988) 50, NIM A265 (1988) 252, NIM A270 (1988) 397, NIM A272 (1988) 713, NIM A273 (1988) 471, NIM A273 (1988) 814, NIM A274 (1989) 113, NIM A275 (1989) 71, NIM A275 (1989) 81, NIM A277 (1989) 187, NIM A278 (1989) 699, NIM A279 (1989) 671, NIM A280 (1989) 25, NIM A283 (1989) 799, NIM A285 (1989) 403, PL B231 (1989) 509, PL B233 (1989) 530, MPL A5 (1990) 1381, NIM A288 (1990) 364, NIM A289 (1990) 35, NIM A289 (1990) 103, NIM A289 (1990) 335, NIM A290 (1990) 115, PL B236 (1990) 109, PL B237 (1990) 136, PL B238 (1990) 122, PL B241 (1990) 416, PL B247 (1990) 177, PL B247 (1990) 473, PL B248 (1990) 203, PL B248 (1990) 227, PL B248 (1990) 464, PL B249 (1990) 341, PL B250 (1990) 183, PL B250 (1990) 199, PL B250 (1990) 205, PL B251 (1990) 311, PL B251 (1990) 321, PL B252 (1990) 511, PL B252 (1990) 518, PL B252 (1990) 525, PL B252 (1990) 703, PL B252 (1990) 713, NIM A302 (1991) 53, NIM A306 (1990) 150, NIM A309 (1991) 318, PL B257 (1991) 450, PL B257 (1991) 469, PL B259 (1991) 199, PL B261 (1991) 169, PL B261 (1991) 177, PL B262 (1991) 155, PL B263 (1991) 551, PL B265 (1991) 451, PL B270 (1991) 111, PL B271 (1991) 453, PL B271 (1991) 461, and ZPHY C51 (1991) 179.

CERN-LEP-OPAL (1982) Approved Nov 1982.

THE OPAL DETECTOR (AN OMNI PURPOSE APPARATUS FOR LEP)

OPAL COLLABORATION

BIRMINGHAM U – I J Bloodworth, P M Hattersley, S J Hillier, R J Homer, M Jobes, P Jovanovic, T J Mc Mahon, D L Rees, W N Stokes, N J Thackray, J P Walker, P M Watkins, A T Watson, M Whalley, J A Wilson
BOLOGNA U & INFN, BOLOGNA – S Arcelli, P Capiluppi, M Cuffiani, G M Dallavalle, M M Deninno, F Fabbri, G Giacomelli, C Grandi, M Jimack, S Marcellini, A Montanari, F Odorici, B Poli, A M Rossi, G P Siroli
BONN U – O Biebel, B Boden, A Eyring, H M Fischer, C Geich-Gimbel, S Gross, T P K Kokott, S Levegrun, G Maringer, P Mattig, E Mauer, U Maur, B Nellen, A Rollnik, S Schreiber, J Schwiening, N A Simon, J Thiebes
CAMBRIDGE U – P P Allport, J R Batley, J R Carter, W J Collins, V C Dunwoody, P A Elcombe, V Gibson, M J Goodrick, F C Grant, J C Hill, L A Del Pozo, M F Turner, C P Ward, D R Ward
CARLETON U – J C Armitage, R K Carnegie, D Dumas, P E Estabrooks, R J Hemingway, L Janissen, D Karlen, R Kowalewski, J Mildenberger, M Ogg, A Pouladdej, P Routenburg, S Sanghera, W Schappert, P Weber
CERN – T Behnke, H Breuker, R Brun, A Buijs, H J Burckhart, D G Charlton, M Fillion, W Glessing, J Hagemann, R Hammarstrom, M Hansroul, J Hart, M Hauschild, C M Hawkes, R D Heuer, J D Hobbs, B Holl, S J De Jong, C Kleinwort, L Koepke, R Van Kooten, J F Kral, G Linser, R Lorenzi, M Mannelli, M Mast, F Meijers, A Michelini (✓ Spokesperson), S W O'Neale, B Panzer-Steindel, D Plane, E J Prebys, G Quast, A Renoux, D Robinson, E Ros, O Runolfsson, P Scharff-Hansen, G Schmidlin, D M Sendall, A M Smith, T J Smith, M Uldry, P Vande-Vyvre, N Watson, S Weisz, P Wells, M Weymann, P Wicht, I Wingerter, S Wotton, K Zankel, W Zeuner
CHICAGO U – K J Anderson, R L Armstrong, H Evans, S W Gensler, P Hart, J Kroll, F S Merritt, B Mertens, H Nguyen, M J Oreglia, J E Pilcher, E Pod, M W Redmond, J M Roney, H Sanders, D M Strom, D Wagner
FREIBURG U – J Becker, P Berlich, U Binder, H Gao, R Humbert, D Joos, R Kolpin, J Ludwig, W Mohr, P Pfister, S Rossberg, K Runge, A D Schaile, O Schaile, J Schwarz, H E Stier, C Wahl, M Webel, H C Weber, V Winterer
HEIDELBERG U, IHEP – S Bethke, P Bock, H M Bosch, A Dieckmann, G Duckeck, G Eckerlin, P Igo-Kemenes, H Ihssen, J von Krogh, P Lennert, D Menszner, H von der Schmitt, R Stroehmer, P Teixeira-Dias, G Tysarczyk, A Wagner, P von Walter, M Weber, N Wermes
INDIANA U – B Brabson, G Hanson, X C Lou, R Mir, T Mouthuy, H O Ogren, D R Rust, M Settles, E do Couto e Silva, T Sulanke
KOBE U – M Kuwano, M Nozaki, H Takeda
BIRKBECK COLL – K Ahmet, M Coupland
BRUNEL U – P Acton, P Clarke, P Hobson, D C Imrie, J McNutt, G Transtromer
QUEEN MARY - WESTFIELD COLL – G Barker, G A Beck, A A Carter, W R Gibson, P F Harrison, R W L Jones, P Kyberd, S L Lloyd, A J Martin, T W Pritchard, S A Robins, P Singh
UNIVERSITY COLL, LONDON – B Anderson, A Charalambous, J E Conboy, R Cranfield, G J Crone, M N Frary, C J Howarth, B W Kennedy, M H Lehto, D J Miller, P Sherwood
MANCHESTER U – J Allison, P Ashton, G Bahan, J T M Baines, J Banks, R J Barlow, J T M Chrin, I P Duerdoth, R E Hughes-Jones, G D Lafferty, F K Loebinger, R F McGowan, M W Moss, S Pawley, K Stephens, N C Wood, T R Wyatt
MARYLAND U – A Ball, R Bard, C Y Chang, J D Colmer, H Deng, D Fong, P R Goldey, S Hou, H Jawahery, R G Kellogg, R Lahmann, A Lee, J M Lorah, A Skuja, G A Snow, W Springer, G T Zorn
MONTREAL U – G Azuelos, G Beaudoin, M Beaulieu, A Bellerive, P Bentkowski, J Gascon, D Hinshaw, H Jeremie,

F Lamarche, P Leblanc, C Leroy, L Lessard, B Lorazo, J Martin, C Moisan, D Van den Plas, H Przysiezniak, P Taras, M Yurko
CRPP, OTTAWA – M S Dixit, C K Hargrove, M J Losty, H Mes, F G Oakham
NATIONAL RESEARCH COUNCIL, OTTAWA – D Klem, C J Virtue
UC, RIVERSIDE – G J Van Dalen, M Dittmar, J W Gary, W Gorn, E Heflin, C Ho, W Larson, J G Layter, J R Letts, B O'Neill, H Oh, K Riles, B C Shen, Y Yang
RUTHERFORD – K W Bell, R M Brown, N I Geddes, J D Gillies, F Jacob, S Jaroslawski, P W Jeffreys, R P Middleton, G N Patrick, W G Scott, M Sproston
SACLAY – P Debu, P Le Du, A Gaidot, F Gentit, J P Pansart, G Vasseur, G W Wilson
TECHNION – M Cooper, S Dado, J Goldberg, N Lupu
TEL AVIV U – G Alexander, A Beck, G Bella, I Cohen, E Etzion, C Milstene
TOKYO U – C Fukunaga, K Kawagoe, T Kawamoto, T Kobayashi, S Komamiya, T Mashimo, M Minowa, T Mori, S Orito, M Sasaki, T Takeshita, T Tsukamoto
BRITISH COLUMBIA U – D A Axen, S Bougerolle, R Howard, R Shypit, R J Sobie
VICTORIA U – A Astbury, G A Beer, M Fincke-Keeler, A Honma, R K Keeler, M Lefebvre, G R Mason, J Mckenna, C J Oram, D Pitman, P Poffenberger, L P Robertson, M Rosvick, P Schenk
WEIZMANN INST – E Duchovni, O Ganel, D Hochman, D Lellouch, L Levinson, G Mikenberg, A Ney, P Paschievici, J L Pinfold, M Shoa, S Tarem, T Wlodek, R Yaari, G Yekutieli

Accelerator CERN-LEP *Detector* OPAL

Reactions

$e^+ e^-$	< 120 GeV (E_{cm})

Particles studied Z^0, W^+, W^-, hvy-lepton, higgs, hvy-flavor, gluon, s-particle

Comments OPAL is a general-purpose detector. The apparatus is particularly suitable for a study of (1) Z^0 and $W^\pm$ bosons, (2) heavy flavors, including the spectroscopy of b-quarks and mixing of B states, and (3) Higgs bosons and other new and hypothetical particles. Taking data (April 92).

Papers NIM A242 (1986) 247, NIM A244 (1986) 416, NIM A252 (1986) 331, IEEE TNS 34 (1987) 240, CPC 47 (1987) 55, NIM A260 (1987) 132, NIM A260 (1987) 329, NIM A265 (1988) 11, NIM A265 (1988) 445, IEEE TNS 36 (1989) 380, NIM A278 (1989) 725, NIM A279 (1989) 236, NIM A279 (1989) 523, NIM A283 (1989) 492, NIM A283 (1989) 515, NIM A283 (1989) 650, PL B231 (1989) 530, IEEE TNS 37 (1990) 1584, NIM A286 (1990) 99, NIM A286 (1990) 107, NIM A286 (1990) 117, NIM A290 (1990) 76, NIM A293 (1990) 145, NIM A294 (1990) 431, PL B235 (1990) 379, PL B235 (1990) 389, PL B236 (1990) 224, PL B236 (1990) 364, PL B240 (1990) 250, PL B240 (1990) 261, PL B240 (1990) 497, PL B241 (1990) 133, PL B242 (1990) 299, PL B244 (1990) 135, PL B246 (1990) 285, PL B247 (1990) 448, PL B247 (1990) 458, PL B247 (1990) 617, PL B248 (1990) 211, PL B251 (1990) 211, PL B252 (1990) 159, PL B252 (1990) 290, ZPHY C47 (1990) 505, NIM A302 (1991) 434, NIM A305 (1991) 275, PL B253 (1991) 511, PL B254 (1991) 293, PL B257 (1991) 531, PL B261 (1991) 334, PL B262 (1991) 341, PL B262 (1991) 351, PL B263 (1991) 123, PL B263 (1991) 311, PL B264 (1991) 219, PL B264 (1991) 467, PL B265 (1991) 462, PL B266 (1991) 201, PL B266 (1991) 485, PL B267 (1991) 143, PL B268 (1991) 122, PL B273 (1991) 338, PL B273 (1991) 355, ZPHY C49 (1991) 1, ZPHY C49 (1991) 49, ZPHY C49 (1991) 375, ZPHY C50 (1991) 373, ZPHY C52 (1991) 175, and ZPHY C52 (1991) 543.

CERN-LEP-05 Approved Apr 1989; Completed Oct 1991.

A SINGLE BREMSSTRAHLUNG MONITOR TO MEASURE LUMINOSITY AT LEP

ROME U & INFN, ROME – C Bini, G Di Cosimo, G Diambrini-Palazzi (√ Spokesperson), A Di Domenico, P Gauzzi, D De Pedis, D Zanello, G De Zorzi

Accelerator CERN-LEP *Detector* Calorimeter

Comments Measures the luminosity and the beam divergence by detecting the energy and the angular distribution of single-bremsstrahlung photons emitted at a very forward angle. The Compton scattering of thermal photons has also been measured for the first time in a particle accelerator. The apparatus consists of a low Z absorber and of an EM calorimeter made of lead and scintillating fibres. Data analysis in progress (April 92).

Papers NIM A306 (1991) 467, PL B262 (1991) 135, and NIM A315 (1992) 327.

CERN-LEP-06 Approved Sep 1989; Completed 1992.

THE SEARCH FOR HIGHLY IONIZING PARTICLES IN e^+e^- COLLISIONS AT LEP USING MODAL-MONOPOLE DETECTOR AT LEP

ALBERTA U – J L Pinfold (√ Spokesperson)
BOLOGNA U & INFN, BOLOGNA – G Giacomelli, F Patrizii, F Predieri, P Serra
HARVARD U – K Kinoshita

Accelerator CERN-LEP *Detector* Plastic

Particles studied monopole

Comments The MODAL detector is designed to search for monopoles, dyons, and other highly ionizing particles. It is formed from Lexan/CR-39 dielectric track detector modules arranged in a polyhedral configuration around the intersection region.

Papers PRL (submitted).

CERN-NA-012-2 (Aug 1985) Approved Feb 1986.

SEARCH FOR MESONS AND GLUEBALLS DECAYING INTO MULTIPHOTON FINAL STATES PRODUCED IN CENTRAL HADRON COLLISIONS AND STUDY OF INCLUSIVE PRODUCTION OF HEAVY QUARK MESONS

ANNECY – M Gouanere, J P Peigneux, M Poulet, M Spighel
BRUSSELS U, IISN & BRUSSELS U, IISN – F Binon, J P Stroot (√ Spokesperson)
KEK – S Inaba, M Kobayashi, K Takamatsu, T Tsuru
LOS ALAMOS – D Alde, E A Knapp
PISA U & INFN, PISA – R Bellazzini, A Brez, M M Massai, M R Torquati
SERPUKHOV – S V Donskov, A V Inyakin, G V Khaustov, A V Kulik, A A Lednev, S A Polovnikov, V A Polyakov, Y D Prokoshkin (√ Spokesperson), V I Rykalin, S A Sadovsky, V D Samoylenko, P M Shagin, A V Shtannikov, A V Singovsky, V P Sugonyaev
CHIBA U – H Kawai
MIYAZAKI U – T Nakamura
NAGOYA U – T Kinashi
YAMAGATA U – H Shimizu

Accelerator CERN-SPS *Detector* GAMS-4000

Reactions

$\pi^- p \to p \pi^- 2\gamma$ (γ's)	300 GeV/c
$\pi^- p \to 2\gamma$ (γ's) X	"
$\pi^- n \to n \pi^- 2\gamma$ (γ's)	"
$\pi^- n \to 2\gamma$ (γ's) X	"
$p p \to 2p\, 2\gamma$ (γ's)	450 GeV/c

Particles studied glueball, exotic, meson^0, $\eta_c(1S)$, χ_c(unspec)

Comments Searches for neutral mesons, exotics like glueballs, hybrids, and many-quark states produced in central hadron-proton collisions. Studies the inclusive hadronic production of neutral heavy quark mesons. Uses the 4092-cell electromagnetic calorimeter GAMS-4000, supplemented with a forward magnetic spectrometer and microstrip gas chambers. Taking data (April 92).

Papers PL B201 (1988) 160, YF 47 (1988) 1273, YF 47 (1988) 1639, YF 49 (1989) 712, ZPHY C43 (1989) 541, and DANS 316 (1991) 900.

CERN-NA-014-2 Approved Apr 1983; Completed Nov 1986.

A PROGRAM OF HEAVY FLAVOR PHOTOPRODUCTION

ATHENS, TECH UNIV – A Filippas, E Fokitis, E N Gazis, E C Katsoufis, A Maltezos, T Papadapoulou, H Rahmani
BARCELONA, AUTONOMA U – M P Alvarez, F Calvino, J M Crespo
CERN – L Andersson, R Barate (✓ Spokesperson), H Burmeister, L di Caccio, Y Giomataris, A Lopez, B Pattison, D Treille, Y Zolnierowski
IMPERIAL COLL – G Barber, M Cattaneo, A Duane, R Forty, M Koratzinos, D M Websdale
ORSAY, LAL – B D'Almagne, P Druet, C Krafft, P Roudeau, J Six, M Wayne, G Wormser
COLLEGE DE FRANCE – J M Brunet, B Lefievre, D Poutot, P Triscos, G Tristram, A Volte
SACLAY – P Bonamy, P Borgeaud, M David, Y Lemoigne, F Louis, C Magneville, J Poinsignon, M Primout, J F Thomas, G Villet
SOUTHAMPTON U – J G McEwen
STRASBOURG, CRN – D Bloch, J P Engel, P Foucault, J P Gerber, R Strub
WARSAW U, IEP – T Hofmokl

Accelerator CERN-SPS *Detector* Spectrometer

Reactions

$\gamma\, p$ 50–200 GeV/c

Particles studied D^0, D^+, D_s^+, Λ_c^+, charm

Comments Measures the photoproduction of charm. Uses a silicon active target and microstrip hodoscopes.

Papers NIM A235 (1985) 235, NIM A253 (1987) 530, ZPHY C47 (1990) 539, PL B246 (1990) 256, PL B246 (1990) 261, ZPHY C50 (1991) 11, PL B255 (1991) 639, and PL B278 (1992) 385.

CERN-NA-031 (Dec 1981) Approved Sep 1982, Nov 1987; Completed Dec 1989.

MEASUREMENT OF $|\eta_{00}|^2/|\eta_{+-}|^2$

CAMBRIDGE U – V Gibson
CERN – G Barr, P Buchholz, H Burkhardt, R Carosi, D C Cundy, N Doble, D Fournier, L Gatignon, P Grafstrom, R Hagelberg, M Holder, G Kesseler, J van der Lans, G Quast, J Steinberger, H Wahl (Spokesperson)
EDINBURGH U – D J Candlin, K J Peach
MAINZ U, INST PHYS – H Bluemer, R Heinz, K Kleinknecht, P Mayer, P Panzer, B Renk, H Rohrer
ORSAY, LAL – E Auge, I Harrus, P Heusse, L Iconomidou-Fayard, O Perdereau, , A C Schaffer, L Serin
PISA U & INFN, PISA – L Bertanza, A Bigi, P Calafiura, M Calvetti, M C Carrozza, R Casali, C Cerri, R Fantechi, A Giacomucci, I Mannelli, V Marzolli, A Nappi, G M Pierazzini
UC, SANTA BARBARA – B Keay, H Nelson
SIEGEN U – A Kreutz, M Rost, H G Sander, W Weihs, R Werthenbach, G Zech

Accelerator CERN-SPS *Detector* Calorimeter, Wire chamber

Reactions

$K_L \to \pi^+\pi^-$	50–150 GeV/c
$K_L \to \pi^0\pi^0$	"
$K_S \to \pi^+\pi^-$	"
$K_S \to \pi^0\pi^0$	"

Particles studied K_L, K_S

Comments Measures the two decay modes $K^0 \to 2\pi^0$ and $K^0 \to \pi^+\pi^-$ simultaneously, and alternately in K_L and K_S beams.

Papers PL B199 (1987) 139, NIM A268 (1988) 116, PL B206 (1988) 169, and PL B214 (1988) 303.

CERN-NA-031-2 (Mar 1986) Approved Jun 1986; Completed Sep 1987.

A MEASUREMENT OF THE PHASE DIFFERENCE OF η_{00} AND η_{+-} IN CP VIOLATING $K^0 \to 2\pi$ DECAYS

CERN – P Clarke, D Coward, D C Cundy, N Doble, L Gatignon, V Gibson, P Grafstrom, R Hagelberg, G Kesseler, J Steinberger, H Taureg, H Wahl (Spokesperson)
EDINBURGH U – R Black, D J Candlin, J Muir, K J Peach
MAINZ U, INST PHYS – H Bluemer, M Kasemann, K Kleinknecht, P Mayer, B Panzer, B Renk, S Roehn, H Rohrer
ORSAY, LAL – E Auge, D Fournier, P Heusse, L Iconomidou-Fayard, A M Lutz, H G Sander, A C Schaffer
INFN, PISA – L Bertanza, A Bigi, M Calvetti, R Carosi, R Casali, C Cerri, G Gargani, I Mannelli, E Massa, A Nappi, G M Pierazzini
SIEGEN U – C Becker, H Burkhardt, M Holder, G Quast, M Rost, W Weihs, G Zech

Accelerator CERN-SPS *Detector* Calorimeter, Wire chamber

Reactions

$K_L \to \pi^+\pi^-$	50–150 GeV/c
$K_L \to \pi^0\pi^0$	"
$K_S \to \pi^+\pi^-$	"
$K_S \to \pi^0\pi^0$	"

Particles studied K_L, K_S

Comments The phase of the ratio of the decay amplitudes η of CP conserving and CP violating decays is determined from the time dependence of the rate of $K \to \pi\pi$ decays with the K_S and K_L in interference. For papers see CERN-NA-031.

CERN-NA-032 (Jul 1982) Approved Nov 1982; Completed Aug 1986.

INVESTIGATION OF CHARM PRODUCTION IN HADRONIC INTERACTIONS USING HIGH-RESOLUTION SILICON DETECTORS

ACCMOR COLLABORATION

NIKHEF, AMSTERDAM – C Daum, H Tiecke, L Wiggers
BRISTOL U – R Gilmore, T Gooch, J Malos
CERN – V Castillo, V Chabaud, D P Kelsey, S Kwan, V Lueth, P Weilhammer (✓ Spokesperson)
CRACOW – L Goerlich, Z Hajduk, H Palka, K Rybicki, M Turala
MUNICH, MAX PLANCK INST – S Barlag, M Bosman, H Dietl, B Luecking, G Lutjens, G Lutz, W Manner, H Seebrunner, U Stierlin
RUTHERFORD – C Damerell, A Gillman, M Pepe, J A Richardson, S Watts, F J Wickens
LAUSANNE U – T Boehringer
VALENCIA U – P Gras, E Higon
DESY – R Klanner

Accelerator CERN-SPS *Detector* Spectrometer

Reactions

π^- Si $\to$ charm X	200 GeV/c
K^- Si $\to$ charm X	"
p Si $\to$ charm X	"
π^- Cu $\to$ charm X	230 GeV/c

Particles studied D^0, D^+, $D^*(2010)^+$, D_s^+, Λ_c^+, Ξ_c^+, Ξ_c^0

Comments Uses the spectrometer from CERN-NA-011. In the first stage, a silicon microstrip vertex detector was used together with an active target made from segmented silicon detectors and an interaction trigger. In the second stage, a 2.5 mm thick Cu target followed by two CCD's was added to the microstrip detector and a trigger on $(K/p)^+$ $(K/p)^-$ pairs was used. Data analysis in progress (April 92).

Papers NIM 213 (1983) 201, NIM 226 (1984) 56, NIM A235 (1985) 481, IEEE TNS 33 (1986) 51, PL B184 (1987) 277, PL B184 (1987) 283, ZPHY C37 (1987) 17, NIM A253 (1987) 460, NIM A253 (1987) 478, ZPHY C39 (1988) 451, PL B218 (1989) 374, PL B232 (1989) 561, PL B233 (1989) 522, PL B236 (1990) 495, PL B247 (1990) 113, ZPHY C46 (1990) 513, ZPHY C46 (1990) 521, ZPHY C46 (1990) 563, ZPHY C48 (1990) 29, PL B257 (1991) 519, and ZPHY C49 (1991) 555.

CERN-NA-034 (Aug 1983) Approved Mar 1984; Completed Dec 1989.

LEPTON PRODUCTION

HELIOS COLLABORATION

BARI U – M T Muciaccia, S Simone
BROOKHAVEN – V A Polychronakos, D C Rahm, J Stumer, C Woody

CERN - H W Atherton, H Beker, C W Fabjan, V Hedberg, A Mazzoni, F Piuz, G Poulard, J Schukraft, H Sletten, W J Willis (√ Spokesperson)
HEIDELBERG U, PHYS INST - L Olsen, A Pfeiffer
KYOTO SANGYO U - H En'yo
UNIVERSITY COLL, LONDON - J Dodd, M J Esten
LUND U - S Johansson
MCGILL U - C Leroy, P Yepes
MONTREAL U - P Aubry, G Beaudoin, P Depommier
LEBEDEV INST - A Chikanian, S Muraviev, A Shmeleva, V Tikhomirov
MOSCOW PHYS ENG INST - B Dolgoshein, A Kalinovsky, S Smirnov, V Tcherniatin
NOVOSIBIRSK, IYF - S Eidelman, V Sidorov
PITTSBURGH U - M Clemen, Y M Park, P Pomianowski, E Stern, J Thompson, L Weber
ROME U & INFN, ROME - F Meddi
RUTHERFORD - N A McCubbin
STOCKHOLM U - B Sellden
TEL AVIV U - O Benary, S Dagan, Y Oren
TURIN U & INFN, TURIN - P Giubellino
NIKHEF, AMSTERDAM - R Veenhof
FERRARA U - E Mazzucato
MUNICH U, EXP PHYS - K Dederichs
VIENNA, OAW - C Erd

Accelerator CERN-SPS *Detector* HELIOS

Reactions

p Be $\rightarrow e^{\pm}$(s) X	450 GeV/c
p Be $\rightarrow$ muon(s) X	"
p Be $\rightarrow \nu$(s) X	"
p Be $\rightarrow e^{\pm}$ muon X	"
p Be $\rightarrow e^{\pm}\ \nu$ X	"
p Be $\rightarrow$ muon ν X	"
p Be $\rightarrow \gamma$ X	"
p Be $\rightarrow e^{+}\ e^{-}\ \gamma$ X	"
p Be $\rightarrow \mu^{+}\ \mu^{-}\ \gamma$ X	"

Particles studied charm

Comments Investigates open questions in lepton production by hadrons, such as e/μ universality, anomalies in single-lepton production, the contribution of charm decay to lepton pair production, and 'anomalous' low-mass pair and low-p_T photon production.

Papers NIM A252 (1986) 272, NIM A252 (1986) 471, NIM A253 (1987) 500, NIM A262 (1987) 243, NP A461 (1987) 403c, ZPHY C38 (1988) 397, ZPHY C49 (1991) 355, and ZPHY C52 (1991) 219.

CERN-NA-034-2 (May 1984) Approved Nov 1984; Completed May 1988.

STUDY OF HIGH ENERGY DENSITIES OVER EXTENDED NUCLEAR VOLUMES VIA NUCLEUS-NUCLEUS COLLISIONS AT THE SPS

HELIOS COLLABORATION

BARI U - N Armenise, M T Muciaccia
CERN - T Akesson, U Goerlach
UNIVERSITY COLL, DUBLIN - A Breslin, A Montwill
HEIDELBERG U, PHYS INST - H W Bartels, A Drees, V Kroh, H J Specht
JAPAN U GROUP COLLAB - K Chiba, T Hayashino, K Hoshino, M Kazuno, K Kodama, Y Maeda, K Niu, K Niwa, M Ohashi, M Okabe, Y Sato, S Tasaka, M Teranaka, I Tezuka, M Ushida, J Yokota
LOS ALAMOS - H van Hecke, B Jacak, J W Sunier
LUND U - R Haglund
MCGILL U - A Angelis, F Lamarche, C Leroy
MONTREAL U - G Beaudoin, J M Beaulieu, L A Hamel, L Lessard, A Lounis, P Taras
LEBEDEV INST - I Gavrilenko, S Mayburov, A Shmeleva
MOSCOW PHYS ENG INST - B Dolgoshein, V Kantserov, A Sumarokov
PITTSBURGH U - M Murray
ROME U & INFN, ROME - G Baroni, S Dell'Uomo, S Diliberto, G Rosa, C Sgarbi
SACLAY - A Gaidot, G W London (√ Spokesperson), J P Pansart, G Vasseur
STOCKHOLM U - B Erlandsson
TURIN U & INFN, TURIN - V Bisi, F Martelli, A Marzari-Chiesa, M Masera, L Ramello, L Riccati
WEIZMANN INST - I Blevis, Z Fraenkel
SALERNO U - G Romano

Accelerator CERN-SPS *Detector* HELIOS

Reactions

^{16}O nucleus	200 GeV/c (P_{lab}/N)
^{32}S nucleus	"
p nucleus	450 GeV/c

Comments Uses disk targets or a multiwire active target and combines 4π calorimeter coverage with measurements, in restricted rapidity regions, of charged particle multiplicity, inclusive identified particle spectra, 2-particle correlations, low- and high-mass muon pairs, and photons. The disk targets are Al, Ag, W, Pt, Pb, and U. The target wires are aluminum, silver, and tungsten. Data analysis in progress (April 92).

Papers NIM A262 (1987) 243, IEEE TNS 35 (1988) 432, EPL 6 (1988) 131, ZPHY C38 (1988) 15, ZPHY C38 (1988) 59, ZPHY C38 (1988) 73, ZPHY C38 (1988) 85, ZPHY C38 (1988) 383, ZPHY C38 (1988) 397, PL B214 (1988) 295, NIM A283 (1989) 762, PL B252 (1990) 303, ZPHY C46 (1990) 361, ZPHY C46 (1990) 369, NP B333 (1990) 48, NP B342 (1990) 279, ZPHY C49 (1991) 355, ZPHY C52 (1991) 219, NP B353 (1991) 1, and ZPHY C53 (1992) 183.

CERN-NA-034-3 (1988) Approved Nov 1988; Started Jun 1990; Completed Aug 1990.

MEASUREMENT OF LOW MASS MUON PAIRS IN SULPHUR-NUCLEUS COLLISIONS WITH AN OPTIMIZED HELIOS MUON SPECTROMETER

HELIOS COLLABORATION

BARI U & INFN, BARI - G Catanesi, M Gallio, M T Muciaccia, S Simone
CERN - A L S Angelis, H Beker, S Dagan, M Esten, C W Fabjan, U Goerlach, G Poulard
KOSICE, IEF - J Antos, I Kralik, L Sandor, J Urban
MONTREAL U - M Beaulieu, L Hamel, J P Martin, P Taras
MOSCOW PHYS ENG INST - B Dolgoshein, S Smirnov
LEBEDEV INST - S Konovolov, S Muraviev, A Shmeleva
ROME U & INFN, ROME - S Di Liberto, M A Mazzoni, F Meddi, G Rosa
SACLAY - J Bystricky, C Guerra, G W London (√ Spokesperson)
TURIN U & INFN, TURIN - P Cerello, G Dellacasa, P Giubellino, F Martelli, M Masera, L Ramello, L Riccati, E Scomparin, E Vercellin

Accelerator CERN-SPS *Detector* HELIOS

Reactions

Su Wt $\rightarrow \mu^{+}\ \mu^{-}$ X	200 GeV/c (P_{lab}/N)
Su Wt $\rightarrow \mu^{+}\ \mu^{-}$ X	"

Comments Measures the low mass dimuon continuum and production of vector resonances in order to test the possible formation of a quark-gluon plasma in heavy ion collisions. Uses the HELIOS muon spectrometer in combination with a light absorber and silicon ring detectors. Data analysis in progress (April 92).

CERN-NA-035 (1982) Approved Feb 1983, Nov 1984.

STUDY OF RELATIVISTIC NUCLEUS-NUCLEUS COLLISIONS

ATHENS U - A Panagiotou, A Petridis, G Vasileiadis, M Vassiliou
BARI U - E Nappi, F Posa
CERN - G Paić
CRACOW - J Bartke, E Gladysz
DARMSTADT, GSI - R Bock, R Brockmann, B Fleischmann, M Fuchs, A Sandoval
FRANKFURT U - H Appelshaeuser, J Eschke, W Heck, S Kabana, A Kuehmichel, M Lahanas, J Y Lee, S Margetis, R Renfordt, D Roehrich, G Roland, H Rothardt, E Schmidt, I Schneider, R Sendelbach, R Stock, H Stroebele, S Wenig

FREIBURG U – J Baechler, M Hoffmann, K Runge, E Schmoetten
LBL – M Bloomer, S Chase, J Harris, P Jacobs, R Morse, G Odyniec, A Poskanzer, G Rai, J Schambach, L Teitelbaum, S Tonse
MARBURG U – A Pieper, F Puehlhofer
MUNICH, MAX PLANCK INST – I Derado, V Eckardt, H Fessler, M Kowalki, W Rauch, N Schmitz, J Seyboth, P Seyboth (√ Spokesperson), J Seyerlein
WARSAW, INST NUCL STUDIES – H Bialkowska
WARSAW U, IEP – M Gazdzicki, J Kosiec, E Skrzypczak
WASHINGTON U, SEATTLE – W J Braitwaite, J G Cramer, T A Trainor, X Zhu
BOSKOVIC INST, ZAGREB – P Bunčić, D Ferenc, K Kadija, A Ljubičić, D Vranić

Accelerator CERN-SPS *Detector* Streamer chamber, TPC, Calorimeter

Reactions

p nucleus	60, 200 GeV (T_{lab})
^{16}O nucleus	60, 200 GeV (T_{lab}/N)
^{32}S nucleus	"

Comments Determines for each event the charged-particle multiplicity, the proton and pion rapidity distributions, the charged-pion transverse momentum distribution, the energy flow, and strange-particle production. Studies the stopping power of nuclear matter with different nuclear targets, and searches for evidence of formation of quark matter or quark-gluon plasma. Taking data (April 92).

Papers PL B184 (1987) 271, NP A461 (1987) 465c, PL B203 (1988) 320, PL B205 (1988) 583, ZPHY C38 (1988) 19, ZPHY C38 (1988) 79, ZPHY C38 (1988) 89, ZPHY C38 (1988) 125, ZPHY C43 (1989) 25, ZPHY C48 (1990) 191, NP A525 (1991) 59c, NP A525 (1991) 221c, NP A525 (1991) 327c, NP A525 (1991) 689c, ZPHY C51 (1991) 157, and ZPHY C52 (1991) 239.

CERN-NA-036 (Feb 1984) Approved Nov 1984; Completed Aug 1990.

THE PRODUCTION OF STRANGE BARYONS AND ANTIBARYONS IN RELATIVISTIC ION COLLISIONS

BERGEN U – E Andersen, G Lovhoiden, T F Thorsteinsen
BIRMINGHAM U – E Judd, J M Nelson, R Zybert
CARNEGIE MELLON U – P D Barnes, G Diebold, G Franklin, B Quinn
CERN – B Powell
CRACOW – B Dulny, Z Natkaniec, I Sakrejda, K Wozniak
CREIGHTON U – M Cherny
LBL – D Greiner (√ Spokesperson), C R Gruhn, P G Jones
MADRID, CIEMAT – B De la Cruz, P Ladron de Guevara, C Perez de los Heros
SANTIAGO DE COMPOSTELA U – C Fernandez, C Garabatos, J Garzon, S Lopez-Ponte, J Mosquera, M Plo, A Ramil, A Yanez
STRASBOURG, CRN – H Braun, J M Brom, W M Geist, M Hafidouni, E Jegham, M Ladrem, M E Michalon-Mentzer, A Michalon, J L Riester, C Voltolini
VIENNA, OAW – J McNaughton, G Neuhofer, P Porth, H Rohringer, J Traxler
YORK U, ENGLAND – J P M Kuipers

Accelerator CERN-SPS *Detector* TPC, Wire chamber, Calorimeter

Reactions

^{16}O nucleus $\rightarrow \Lambda$ X	200 GeV/c (P_{lab}/N)
^{16}O nucleus $\rightarrow \Xi$ X	"
^{16}O nucleus $\rightarrow \Omega^-$ X	"
^{16}O nucleus $\rightarrow K_S$ X	"
^{32}S nucleus $\rightarrow \Lambda$ X	"
^{32}S nucleus $\rightarrow \Xi$ X	"
^{32}S nucleus $\rightarrow \Omega^-$ X	"
^{32}S nucleus $\rightarrow K_S$ X	"

Comments Measures differential cross sections of K^0's and strange baryons and antibaryons as a possible indicator of the quark-gluon plasma. Targets are Al, Cu, Fe, Ag, and Pb. Data analysis in progress (April 92).

Papers NP A461 (1987) 391c, PL B206 (1988) 146, and PL B220 (1989) 328.

CERN-NA-037 (Feb 1985) Approved Jun 1985; Completed Dec 1989.

DETAILED MEASUREMENTS OF STRUCTURE FUNCTIONS FROM NUCLEONS AND NUCLEI

NIKHEF, AMSTERDAM – J Beaufays, R van Dantzig, M van der Heijden, M de Jong, T Ketel, G van Middelkoop (√ Spokesperson)
BIELEFELD U – G Baum, F Sever, M Siebler
FREIBURG U – A Bruell, H Engelin, R Kaiser, U Landgraf, A Witzmann
HEIDELBERG, MAX PLANCK INST – I G Bird, W Brueckner, D von Harrach, E Kabuss, Y Mizuno, D Nowotny, B Povh, K Rith, C Scholz, T A Shibata, F Zetsche
MAINZ U, INST PHYS – F Klein, G Mallot, R Rieger, T Walcher
MONS U – R Windmolders
NEUCHATEL U – C Broggini, L D Fluri, A Paić, D Schenker, J L Vuilleumier
UC, SANTA CRUZ – C Heusch, F Lettenstrom
PSI, VILLIGEN – M Botje, W Burger, J Domingo, Q Ingram, U Sennhauser
TURIN U & INFN, TURIN – D Allasia, M Arneodo, M I Ferrero, C Mariotti, C Peroni-Predazzi, A Staiano
UCLA – G Igo, S Trentalange, C Whitten
UPPSALA U – A Arvidson, B Badelek, K Janson, S Kullander, T Lindqvist
WARSAW U, IEP – J Ciborowski, J Nassalski, E Rondio, L Ropelewski, A Sandacz

Accelerator CERN-SPS *Detector* EMC

Reactions

muon p	90, 120, 280 GeV/c
muon deut	"
muon nucleus	90, 120, 200, 280 GeV/c

Comments Studies the deep inelastic muon scattering for Q^2 from 1 to 200 GeV^2 and x from 0.005 to 0.75. Investigates the structure function F_2^A on hydrogen, deuterium, and heavier nuclei, the ratio $R = \sigma_L/\sigma_T$, the cross section for J/ψ production, the EMC effect, *etc.* Uses the modified EMC detector.

Papers PL B249 (1990) 366, PL B258 (1991) 493, PRL 66 (1991) 2712, ZPHY C51 (1991) 387, NP B371 (1992) 3, NP B371 (1992) 553, ZPHY C53 (1992) 73, and ZPHY C (accepted).

CERN-NA-038 (Mar 1985) Approved Sep 1985, Feb 1989.

STUDY OF HIGH-ENERGY NUCLEUS-NUCLEUS INTERACTIONS WITH THE ENLARGED NA10 DIMUON SPECTROMETER

ANNECY – C Baglin, A Bussiere, J P Guillaud, R Kossakowski, P Liaud
CERN – P Sonderegger
CLERMONT-FERRAND U – A Baldit, J Castor, T Chambon, A Devaux, J Fargeix, P Force, L Fredj, G Landaud, F Vazeille
LISBON, LIFEP – M C Abreu, P Bordalo, R Ferreira, J M Gago, C Lourenco, L Peralta, S Ramos, S Silva, J Varela
LYON, IPN – M Bedjidian, D Contardo, E Descroix, O Drapier, J Y Grossiord, A Guichard, R Haroutunian, J R Pizzi
ORSAY, IPN – C Gerschel, D Jouan, S Papillon, X Tarrago
ECOLE POLYTECHNIQUE – P Busson, C Charlot, B Chaurand, L Kluberg (√ Spokesperson), A Romana, R Salmeron
STRASBOURG, CRN – P Gorodetzky, B Grosdidier, R Mazini, C Racca

Accelerator CERN-SPS *Detector* Spectrometer

Reactions

$p\ ^{238}U \rightarrow \mu^+ \mu^-$ X	200 GeV/c (P_{lab}/N)
$^{16}O\ ^{238}U \rightarrow \mu^+ \mu^-$ X	"
$^{32}S\ ^{238}U \rightarrow \mu^+ \mu^-$ X	"

Comments Aims to detect evidence for the quark-gluon plasma produced in collisions of ultrarelativistic ions on heavy nuclear targets. Signatures studied are thermal muon pairs in the 1–3

GeV mass range, suppressed J/ψ production, and enhanced ϕ and ω production. Taking data (April 92).

Papers ZPHY C38 (1988) 117, ZPHY C38 (1988) 129, PL B220 (1989) 471, PL B251 (1990) 465, PL B251 (1990) 472, PL B255 (1991) 459, PL B262 (1991) 362, PL B268 (1991) 453, PL B270 (1991) 105, and PL B272 (1991) 449.

CERN-NA-039 (Feb 1986) Approved Apr 1986; Completed Oct 1987.

A SEARCH FOR QUARKS PRODUCED IN HEAVY-ION INTERACTIONS

UC, IRVINE - G Shaw (✓ Spokesperson)
LBL - H Matis, H Pugh
SAN FRANCISCO STATE U - G Alba, R Bland, D Calloway, S Dickson, C Hodges, R Johnson, T Palmer, D Stricker
LOS ALAMOS - R Slansky

Accelerator CERN-SPS *Detector* Other

Reactions

^{16}O Hg → quark X	60, 200 GeV (T_{lab}/N)
Su Hg → quark X	200 GeV (T_{lab}/N)

Particles studied quark

Comments Free quarks produced in a mercury target (part of the beam stop for NA-038) are concentrated by distillation of the mercury and searched for using an automated Millikan-like apparatus.

Papers PL B232 (1989) 549, and NP A225 (1991) 513c.

CERN-NA-040 (Feb 1986) Approved Apr 1986; Completed Oct 1987.

ELECTROMAGNETIC DISSOCIATION OF TARGET NUCLEI BY ^{16}O AND ^{32}S PROJECTILES

AMES LAB - J C Hill (Spokesperson), J A Winger, F K Wohn

Accelerator CERN-SPS *Detector* Photon spectrometer

Reactions

^{16}O nucleus	60, 200 GeV/c (P_{lab}/N)
^{32}S nucleus	200 GeV/c (P_{lab}/N)

Comments The target nucleus is ^{197}Au. Measures in particular one-neutron-removal cross sections. A test of the energy dependence of the electromagnetic dissociation process.

Papers PRL 60 (1988) 999.

CERN-NA-041 (Feb 1986) Approved Jun 1986; Completed Oct 1987.

SEARCH FOR NUCLEI IN HEAVY ION COLLISIONS AT ULTRARELATIVISTIC ENERGIES

SACLAY - B Berthier, R Boisgard, C Cerruti, J M Hisleur, J Julien, R Lucas, C Mazur, C Ngo (✓ Spokesperson), M Ribrag

Accelerator CERN-SPS *Detector* Counter

Reactions

^{16}O ^{197}Au → nucleus X	60, 226 GeV (T_{lab}/N)
^{32}S Au → nucleus X	226 GeV (T_{lab}/N)

Comments Studies whether nuclei survive the collision of heavy ions at ultrarelativistic energies. This is relevant for a better understanding of possible critical phenomena in nuclear matter (multifragmentation of nuclei). Uses silicon telescopes to detect nuclei.

Papers PL B193 (1987) 417.

CERN-NA-042 (Jul 1986) Approved Oct 1986; Completed May 1988.

STUDY OF UNEXPLAINED HARD PHOTON PRODUCTION BY ELECTRONS CHANNELED IN A CRYSTAL

ANNECY - G Bologna, J Peigneux, D Sillou, M Spighel
LYON, IPN - X Artru, A Belkacem, M Chevallier, N Cue, M J Gaillard, R Genre, R Kirsch, J C Poizat, J Remillieux (✓ Spokesperson)
SUNY, ALBANY - N Cue, J C Kimball, B Marsh

Accelerator CERN-SPS *Detector* Counter, Calorimeter

Reactions

$e^{\pm}$ crystal → γ(s) $e^{\pm}$ crystal	20–200 GeV/c

Comments Continues studies of CERN-NA-033. Devoted to the systematic study of radiation spectra and associated photon multiplicities for axially aligned e^- and e^+ between 20 and 200 GeV in very thin (75–200 μm) targets.

Papers PL B206 (1988) 561.

CERN-NA-043 (Sep 1987) Approved Feb 1988; Completed Sep 1991.

INVESTIGATIONS OF THE ENERGY AND ANGULAR DEPENDENCE OF ULTRASHORT RADIATION LENGTHS IN Si, Ge, AND W SINGLE CRYSTALS

AARHUS U - K Elsener, R Medenwaldt, S P Moller, A H Sorensen, S Tang-Petersen, E Uggerhoj (✓ Spokesperson)
STRASBOURG, CRN - P Siffert, J Stoqkurt
STUTTGART, MAX PLANCK INST - K Maier
FLORENCE U - P Sona

Accelerator CERN-SPS *Detector* Calorimeter

Reactions

e^- crystal	> 30 GeV/c
e^+ crystal	"

Comments Following on CERN experiments NA-033 and WA-081, this experiment investigates the shower development in Si, Ge, and W crystals of different thickness for energies 30 GeV and up. The earlier experiments found remarkable enhancements in radiation energy loss for energetic $e^{\pm}$ incident along crystal axes.

Papers PL B227 (1989) 483, PRL 63 (1989) 2827, PL B242 (1990) 517, and PL B260 (1991) 235.

CERN-NA-043-2 (1991) Approved Feb 1991.

INVESTIGATIONS OF THE COHERENT HARD PHOTON YIELDS FROM 50–300 GeV/c $e^{\pm}$ IN STRONG CRYSTALLINE FIELDS OF DIAMOND, Si, AND Ge CRYSTALS

AARHUS U - R Medenwaldt, S P Moller, A H Sorensen, E Uggerhoj (✓ Spokesperson), T Worm
YEREVAN PHYS INST - R O Avakian, H I Avetisian, S P Taroian
FLORENCE U & INFN, FLORENCE - P Sona
WITWATERSRAND U - S H Connell, J P F Sellschop
STRASBOURG, CRN - M Hage-Ali, P Siffert, J Stoquert

Accelerator CERN-SPS *Detector* Drift chamber, Spectrometer

Reactions

e^- crystal	50–300 GeV/c
e^+ crystal	"

Comments The aim is to measure the influence of strong fields on emission of coherent radiation. Multi GeV electrons and positrons penetrate single crystals near axial/planar directions. Taking data (April 92).

CERN-NA-044 (Oct 1988) Approved Feb 1989.

A FOCUSSING SPECTROMETER FOR ONE AND TWO PARTICLES

BROOKHAVEN - V Polychronakos, D Rahm
CERN - H W Atherton, K Bussmann, C W Fabjan, A Franz, F Piuz, G Poulard, J M Rieubland, H Sletten, D Williams
COLUMBIA U - J R Dodd, M Leltchouk, S Nagamiya, H Tam, W J Willis, T H Zhu
BOHR INST - H Boggild (✓ Spokesperson), J Bondorf, K Hansen
CREIGHTON U - M Cherney, J Downing
HIROSHIMA U - S Esumi, T Ikemoto, N Maeda, S Nishimura, A Sakaguchi, T Sugitate, Y Sumi
KEK - T Kobayashi, K Shigaki

LOS ALAMOS J Boissevain, H van Hecke, B Jacak, M Murray, M Sarabura, J Simon-Gillo, W Sondheim, J Sullivan
LUND U B Lorstad, A Miyabayaski
PITTSBURGH U T J Humanic, H Kalechofsky, Y Y Lee, S Pandey

Accelerator CERN-SPS *Detector* Spectrometer

Reactions

p Be $\rightarrow \pi^{\pm}$ X	450 GeV (T_{lab})
p Be $\rightarrow K^{\pm}$ X	"
p Be $\rightarrow p$ X	"
p Be $\rightarrow \bar{p}$ X	"
p Su $\rightarrow \pi^{\pm}$ X	"
p Su $\rightarrow K^{\pm}$ X	"
p Su $\rightarrow p$ X	"
p Su $\rightarrow \bar{p}$ X	"
p Pb $\rightarrow \pi^{\pm}$ X	"
p Pb $\rightarrow K^{\pm}$ X	"
p Pb $\rightarrow p$ X	"
p Pb $\rightarrow \bar{p}$ X	"
Su Su $\rightarrow \pi^{+}\ \pi^{-}$ X	200 GeV (T_{lab}/N)
Su Su $\rightarrow K^{+}\ K^{+}$ X	"
Su Su $\rightarrow K^{-}\ K^{-}$ X	"
Su Su $\rightarrow p\ p$ X	"
Su Su $\rightarrow \bar{p}\ \bar{p}$ X	"
Su Ag $\rightarrow \pi^{+}\ \pi^{-}$ X	"
Su Ag $\rightarrow K^{+}\ K^{+}$ X	"
Su Ag $\rightarrow K^{-}\ K^{-}$ X	"
Su Ag $\rightarrow p\ p$ X	"
Su Ag $\rightarrow \bar{p}\ \bar{p}$ X	"
Su Pb $\rightarrow \pi^{+}\ \pi^{-}$ X	"
Su Pb $\rightarrow K^{+}\ K^{+}$ X	"
Su Pb $\rightarrow K^{-}\ K^{-}$ X	"
Su Pb $\rightarrow p\ p$ X	"
Su Pb $\rightarrow \bar{p}\ \bar{p}$ X	"
Pb Pb $\rightarrow \pi^{+}\ \pi^{-}$ X	"
Pb Pb $\rightarrow K^{+}\ K^{+}$ X	"
Pb Pb $\rightarrow K^{-}\ K^{-}$ X	"
Pb Pb $\rightarrow p\ p$ X	"
Pb Pb $\rightarrow \bar{p}\ \bar{p}$ X	"

Comments A dedicated spectrometer for high precision measurements of single particle spectra and for intensity interferometry in hadronic systems of high energy density using hadrons and heavy ions. Taking data (April 92).

CERN-NA-045 (Jun 1988) Approved Feb 1989.

STUDY OF ELECTRON PAIR PRODUCTION IN HADRON AND NUCLEAR COLLISIONS AT THE CERN SPS

CERES COLLABORATION

BROOKHAVEN P Holl, J Kemmer, P Rehak
CERN J Schukraft
HEIDELBERG, MAX PLANCK INST U Faschingbauer, J P Wurm
HEIDELBERG U, PHYS INST R Baur, A Drees, P Fischer, J Frieben, P Glaessel, T Guenzel, D Irmscher, H Klein, R Maenner, L H Olsen, A Pfeiffer, A Schoen, H J Specht (✓ Spokesperson), S Tapprogge, T S Ullrich
MILAN POLYTECHNIC E Gatti, A Longoni, M Sampietro
WEIZMANN INST A Breskin, R Chechik, Z Fraenkel, A Shor, V Steiner, G Tel-Zur, I Tserruya

Accelerator CERN-SPS *Detector* Spectrometer

Reactions

p nucleus $\rightarrow e^{+}\ e^{-}$ X	60, 200 GeV/c (P_{lab}/N)
^{32}S nucleus $\rightarrow e^{+}\ e^{-}$ X	"

Particles studied ρ, ω, ϕ

Comments Studies the $e^{+}e^{-}$ pair continuum in the mass range 0.1–3 GeV and the vector mesons. Also can study production of real photons and high-$p_{\perp}$ pions. Uses a magnetic spectrometer based solely on ring-imaging Čerenkov (RICH) techniques. Taking data (April 92).

CERN-NA-046 (Oct 1988) Approved Apr 1989; Completed Jul 1991.

DARMSTADTON HUNTING IN THE INTERACTION γ-CRYSTAL

ANNECY G Bassompierre, D Boget, J Dufournaud, M Gouanere, M Richard, D Sillou, M Spighel
LYON, IPN M A Chevallier (✓ Spokesperson), B Farizon-Mazuy, M Farizon, M J Gaillard, R Genre, B Ille, R Kirsch, P Lautesse
TURIN U & INFN, TURIN G Bologna, E Botta, S Costa, A Feliciello, R Garfagnini, E Rossetta

Accelerator CERN-SPS *Detector* Calorimeter, Microstrip

Reactions

γ crystal $\rightarrow e^{+}\ e^{-}$ X

Particles studied axion, neutral

Comments A search for evidence of the "darmstadton" at 1.8 MeV mass in the $e^{+}e^{-}$ spectrum. The γ beam is obtained from a 150 GeV e^{-} beam. The angular measurements are performed by a microstrip detector at a large distance ($\simeq$ 80 m) from the target. Energy measurements are done by magnetic analysis and independently with lead glass calorimeters.

CERN-NA-047 (Dec 1988) Approved Apr 1989; Started Aug 1991.

MEASUREMENT OF THE SPIN-DEPENDENT STRUCTURE FUNCTIONS OF THE NEUTRON AND PROTON

SPIN MUON COLLABORATION (SMC)

NIKHEF, AMSTERDAM M Ballintijn, R van Dantzig, M de Jong, T J Ketel, L Klostermann, G van Middelkoop, J E J Oberski, F Sever
BIELEFELD U G Baum, S Bueltmann, W Thiel
CERN P Hautle, T O Niinikoski, J M Rieubland, R Voss
DELFT UNIV TECH H Postma
DUBNA I A Golutvin, M Kadykov, A Karev, I U T Kiryushin, Y Kisselev, V Krivokhizhin, V Kukhtin, B Neganov, D Peshekhonov, D Pose, A Prokesh, I Savin, S Sergeev, G Smirnov, Y Yatsunenko
FREIBURG U A Bruell, H Engelien, R Kaiser, H J Kessler, U Landgraf, A Witzmann
GKSS, GEESTHACHT W Knopp, H Stuhrmann, R Wagner
HELSINKI U OF TECH P Berglund, J Kyynaeraeinen
HOUSTON U K Lau, B Mayes, L Pinsky, J Pyrlik, D Sanders, Y Tzamouranis, R Weinstein
UCLA C Dulya, M Grosse-Perdekamp, G Igo, S Trentalange, C Whitten
MAINZ U, INST KERNPHYS D von Harrach, E M Kabuss, G K Mallot, R Seitz
MONS U R Windmolders
MUNICH U, EXP PHYS L Betev, C Heusch, U Meyer-Berkhout, A Staude
NAGOYA U T Hasegawa, N Hayashi, N Horikawa, S Ishimoto, T Iwata, A Kishi, S Okumi
NORTHEASTERN U E von Goeler, J Moromisato
RICE U D L Adams, A Ahmad, B E Bonner, J Buchanan, J Clement, M D Corcoran, J Cranshaw, S Eichblatt, T Gaussiran, M Lowe, H E Miettinen, G S Mutchler, J B Roberts
SACLAY G Bardin, I G Bird, N de Botton, J Bystricky, C Cavata, J C Faivre, F Feinstein, B Frois, F Lehar, A de Lesquen, A Magnon, F Marie, J Martino, F Perrot-Kunne, S Platchkov, T Pussieux
SANTIAGO DE COMPOSTELA U B Adeva, C Fernandez, C Garabatos, J A Garzon, A Gomez, S Lopez-Ponte, M Plo, M Rodriguez, A Yanez
TEL AVIV U J Lichtenstadt, I Sabo
TRIESTE U & INFN, TRIESTE R Birsa, F Bradamante, M Giorgi, M Lamanna, A Martin, A Penzo, G Salvato, P Schiavon, F Tessarotto, S Dalla Torre, A Villari, A M Zanetti
UPPSALA U A Arvidson, P Bjorkholm, A Dyring, S Kullander, T Lindqvist
VIRGINIA U J P Chen, D Crabb, D Day, J McCarthy, J Mitchell, O Rondon

WARSAW, INST NUCL STUDIES – J Nassalski, A Sandacz
WARSAW U – B Badelek, E Rondio, L Ropelewski
YALE U – M Boutemeur, S Dhawan, V W Hughes (✓ Spokesperson), R Piegaia, P Schueler

Accelerator CERN-SPS *Detector* EMC

Reactions Polarized beam and target
muon $p \rightarrow$ muon X 100 – 200 GeV (E_{lab})
muon deut $\rightarrow$ muon X "

Comments Measures the spin-dependent asymmetries A_1 and A_2 in deep inelastic scattering of longitudinally polarized muons by longitudinally and transversely polarized protons and deuterons. It is similar to the EMC polarization experiment. Tests the nucleus structure models. Next data taking scheduled for May 92.

CERN-NA-048 Approved Nov 1991.

A PRECISION MEASUREMENT OF ϵ'/ϵ IN CP-VIOLATING $K^0 \rightarrow 2\pi$ DECAYS

CAGLIARI U & INFN, CAGLIARI – A Lai, L Musa, A Nappi, M G Setzu
CAMBRIDGE U – R S DeWolf, P A Elcombe, D J Munday, M A Parker, T O White
CERN – G D Barr, P Buchholz, D Cundy, N Doble, L Gatignon, A Gonidec, P Grafstroem, G Kesseler, A Norton, D Schinzel, H Taureg, H Wahl
DUBNA – D Ebert, A M Kalinin, V D Kekelidze, D A Kirilov, Y A Kozhevnikov, N A Kuz'min, A V Pose
EDINBURGH U – N McKay, K J Peach, E Veitch, L L J Vick, A Walker
FERRARA U & INFN, FERRARA – D Bettoni, R Calabrese, P Dalpiaz, P F Dalpiaz, J Duclos, E Luppi, M Martini, F Petrucci, L Piemontese, M Savrie
MAINZ, MAX PLANCK INST – T Beier, H Bluemer, K Kleinknecht, F Leber, P Mayer, B Renk, H Rohrer, J Staeck, A Wagner
PERUGIA U & INFN, PERUGIA – M Calvetti, P Cenci, P Lariccia, P Lubrano, F Tondini
PISA U & INFN, PISA – L Bertanza, A Bigi, P Calafiura, R Carosi, M C Carrozza, C Cerri, R Fantechi, I Mannelli, V Marzulli, G M Pierazzini
SACLAY – J Alitti, M De Beer, J Cheze, P Debu, A Migliori, B Peyaud (✓ Spokesperson), B Vallage, J Zsembery
SIEGEN U – M Bender, M Holder, A Kreutz, M Rost, W Weish, R Werthenbach
TURIN U & INFN, TURIN – C Biino, A Ceccucci, R Cester, F Marchetto, E Menichetti, R Mussa, S Palestini, N Pastrone, L Pesando, M Sozzi
VIENNA, OAW – E Griesmayer, M Markytan, G Neuhofer, M Pernicka, A Taurok, C E Wulz

Accelerator CERN-SPS *Detector* Calorimeter, Spectrometer

Comments The experiment uses two nearly collinear K_S and K_L beams produced concurrently which are distinguished by tagging the protons generating the K_S component. The detector is optimized for the detection of $\pi^+\pi^-$ and $\pi^0\pi^0$ final states from neutral kaons with momenta between 70 and 170 GeV/c. Charged decays are measured in a magnetic spectrometer with a central dipole magnet and two sets of large and high-precision drift chambers on each side. Neutral decays are recorded in a homogeneous liquid krypton calorimeter designed for high rate capability, good energy and space resolution, and sub-nanosecond time resolution. This configuration permits collecting simultaneously all four modes with minimal systematic error. In preparation. Scheduled to run in 1994.

CERN-NA-049 Approved Sep 1991.

LARGE ACCEPTANCE HADRON DETECTOR FOR AN INVESTIGATION OF Pb-INDUCED REACTIONS AT THE CERN SPS

ATHENS U – A Panagiotou, A Petridis, G Vasileiadis, M Vassiliou
BUDAPEST, CRIP – L Boroczky, S Hegyi, I Szentpetery, J Sziklai, G Vesztergombi, J Zimanyi
CERN – H G Fischer, G Paić
CRACOW – J Bartke, E Gladysz, M Kowalski, P Stefanski
DARMSTADT, GSI – R Bock, R Brockmann, B Fleischmann, M Fuchs, M Wensveen
FRANKFURT U – J Eschke, S Kabana, A Kuchmichel, M Lahanas, J Y Lee, S Margetis, R Renfordt, D Roehrich, G Roland, H Rothard, E Schmidt, I Schneider, R Stock (Spokesperson), H Stroebele, S Wenig
FREIBURG U – J Baechler, M Hoffmann, K Runge, E Schmoetten
LBL – M Bloomer, S Chase, J Harris, P Jacobs, P Jones, R Morse, G Odyniec, A M Poskanzer, H Ritter, J Schambach, L Teitelbaum
MARBURG U – F Eckhardt, V Manske, A Piper, F Puchlhofer
MUNICH, MAX PLANCK INST – I Derado, V Eckardt, H Fessler, W Rauch, N Schmitz, J Seyboth, P Seyboth, J Seyerlein
WARSAW, INST NUCL STUDIES – H Bialkowska
WARSAW U – W Dominik, M Gazdzicki, J Kosiec, E Skrzypczak
WASHINGTON U, SEATTLE – W J Braitwaite, J Cramer, T Trainor, X Zhu
BOSKOVIC INST, ZAGREB – P Bunčić, D Ferenc, K Kadija, A Ljubičić, D Vranić

Accelerator CERN-SPS *Detector* TPC

Reactions
Pb nucleus

Comments A study of the production of charged hadrons $\pi^\pm, K^\pm, p, \bar{p}$, and neutral strange particles $K^0_S, \Lambda, \bar{\Lambda}$, in a search for the deconfinement transition predicted by lattice QCD. Uses a large volume, fine granularity TPC, and two intermediate size TPC's for vertex tracking of neutral strange particle decays. In preparation (March 92).

CERN-NA-050 Approved Feb 1992.

STUDY OF MUON PAIRS AND VECTOR MESONS PRODUCED IN HIGH ENERGY Pb-Pb INTERACTIONS

ANNECY – C Baglin, A Bussiere, J P Guillaud, R Kossakowski, P Liaud
CERN – P Sonderegger (✓ Spokesperson)
CLERMONT-FERRAND U – A Baldit, C Barriere, J Castor, T Chambon, A Devaux, B Espagnon, J Fargeix, P Force, L Fredj, G Landaud, F Vazeille
LISBON, LIFEP – M C Abreu, P Bordalo, R Ferreira, J Gago, C Lourenco, L Peralta, S Ramos, S Silva, J Varela
ORSAY, IPN – C Gerschel, D Jouan, X Tarrago
ECOLE POLYTECHNIQUE – B Chaurand, L Kluberg (✓ Spokesperson), A Romana
STRASBOURG, CRN – P Gorodetzky, B Gorsdidier, D Lazic, R Mazini, C Racca
TURIN U & INFN, TURIN – V Bisi, P Cerello, E Chiavassa, W Dabrowski, G Dellacasa, F Ferrero, M Gallio, P Giubellino, P Guaita, N De Marco, F Martelli, A Marzari, M Masera, A Musso, A Piccotti, L Ramello, L Riccati, S Sartori, E Scomparin, E Vercellin

Accelerator CERN-SPS *Detector* Calorimeter, Spectrometer

Reactions
Pb nucleus

Comments Studies dimuons produced in Pb-Pb and other ion collisions at the nucleon-nucleon c.m. energy of 18 GeV. The setup is optimized for the range which includes both signals probing QGP (Quark and Gluon Plasma), and Drell-Yan dimuons. The detector is an improved version of the NA-038 setup, with the beam traversing the muon spectrometer. In preparation (April 92).

CERN-PS-170 (Aug 1980) Approved Nov 1980, Feb 1987; Completed Aug 1988.

PRECISION MEASUREMENTS OF THE PROTON ELECTROMAGNETIC FORM FACTORS IN THE TIME-LIKE REGION AND VECTOR MESON SPECTROSCOPY

FERRARA U – R Calabrese, P Dalpiaz (Spokesperson), P F Dalpiaz, F Petrucci, M Savrie
PADUA U – R Carlin, U Dosselli, F Gasparini, S Limentani, M Posocco, R Stroili, C Voci

SACLAY - G Bardin, G Burgun, J Derre, J Duclos, J L Faure, M Huet, C Kochowsky, G Marel, N Zekri
FRASCATI - G Capon
TURIN U - L Tecchio
CERN - E Mazzucato

Accelerator CERN-LEAR *Detector* Wire chamber

Reactions

$\bar{p}\,p \to e^+\,e^-$	0 2 GeV/c
$\bar{p}\,p \to e^+\,e^-$ neutrals	0 GeV/c

Particles studied vmeson^0

Comments The first reaction is for the form factors, the second is for the vector meson ($\to e^+e^-$) mass spectrum from 1.0 1.7 GeV.

Papers NIM A259 (1987) 376, PL B192 (1987) 471, PL B195 (1987) 292, NP (Proc. Suppl.) B8 (1989) 203, and PL B257 (1991) 514.

CERN-PS-171 (Aug 1980) Approved Nov 1980; Completed Jul 1986.

A STUDY OF $\bar{p}p$ INTERACTIONS AT REST IN AN H_2 GAS TARGET AT LEAR

ASTERIX COLLABORATION

CERN - R Armenteros, D Bailey, J Butler, U Gastaldi, R Landua
MAINZ U, INST PHYS - K D Duch, M Heel, H Kalinowsky, F Kayser, E Klempt (✓ Spokesperson), B May, J Reifenroether, M Ziegler
MUNICH U, EXP PHYS - W Dahme, F Feld, U Schaefer
ORSAY, LAL - J C Bizot, B Delcourt, J Jeanjean, H Nguyen, N Prevot
BRITISH COLUMBIA U - E G Auld, D A Axen, M Comyn, K L Erdman, B Howard, R Howard, G Marshall, B L White
VICTORIA U - G A Beer, L P Robertson
VIENNA, INST RADIUMFORSCH, KERNPHYS - M Botlo, C Laa, H Vonach
ZURICH U - C Amsler, M Doser, J Riedelberger, U Straumann, P Truoel
GENEVA U - C Sabev

Accelerator CERN-LEAR *Detector* Combination

Reactions

$\bar{p}\,p \to \bar{p}\,p$ X-ray	0 GeV/c
$\bar{p}\,p \to$ annihil	"
$\bar{p}\,p \to \pi^+\,\pi^-$	"
$\bar{p}\,p \to K^0\,\bar{K}^0$	"
$\bar{p}\,p \to K^+\,K^-$	"
$\bar{p}\,p \to K^+\,K^-\,\pi^0$	"
$\bar{p}\,p \to K^+\,K^-\,\eta$	"
$\bar{p}\,p \to K^+\,K^-\,\omega$	"
$\bar{p}\,p \to$ pions (γ)	"
$\bar{p}\,p \to \pi^+\,\pi^-\,\pi^0$	"
$\bar{p}\,p \to \pi^+\,\pi^-\,K^+\,K^-$	"
$\bar{p}\,p \to \pi^+\,\pi^-\,\eta$	"
$\bar{p}\,p \to \pi^+\,\pi^-\,\eta'$	"

Particles studied baryonium, exotic-meson, glueball, $\eta(1440)$, $f_2'(1525)$

Comments A final paper in preparation (April 92).

Papers NIM 217 (1983) 169, PL B152 (1985) 135, PL B157 (1985) 333, PL B206 (1988) 151, PL B214 (1988) 325, PL B215 (1988) 792, NP A486 (1988) 493, PL B225 (1989) 450, ZPHY C45 (1989) 223, PR C40 (1989) 2717, NP A495 (1989) 451, NIM A286 (1990) 76, ZPHY C46 (1990) 191, ZPHY C46 (1990) 203, ZPHY C47 (1990) 353, NP A508 (1990) 317c, and PL B267 (1991) 299.

CERN-PS-172 (Jul 1980) Approved Nov 1980; Completed Aug 1986.

$\bar{p}p$ TOTAL CROSS SECTIONS AND SPIN EFFECTS IN $\bar{p}p \to K^+K^-$, $\pi^+\pi^-$, $\bar{p}p$ ABOVE 200 MeV/c

NIKHEF, AMSTERDAM - K Bos, J Kluyver, R A Kunne, L Linssen
GENEVA U - E Heer, R Hess, C Lechanoine-LeLuc, Y Onel, D Rapin
QUEEN MARY - WESTFIELD COLL - D Bugg (✓ Spokesperson), J Hall
SURREY U - A S Clough
TRIESTE U & INFN, TRIESTE - R Birsa, F Bradamante, A Martin, A Penzo, P Schiavon, S Dalla Torre, A Villari

Accelerator CERN-LEAR *Detector* Wire chamber

Reactions Polarized target

$\bar{p}\,p \to \pi^+\,\pi^-$	300 1550 MeV/c
$\bar{p}\,p \to K^+\,K^-$	"
$\bar{p}\,p \to \bar{p}\,p$	"
$\bar{p}\,p \to X$	220 800 MeV/c
$\bar{p}\,p \to$ neutrals	"

Particles studied baryonium

Papers PL B146 (1984) 299, PL B155 (1985) 437, PL B194 (1987) 563, NP A469 (1987) 726, PL B206 (1988) 557, NP A487 (1988) 563, NP A505 (1989) 595, NP B323 (1989) 1, PL B261 (1991) 191, and NP B (accepted). No other papers expected.

CERN-PS-173 (Aug 1980) Approved Nov 1980; Completed May 1986.

MEASUREMENT OF $\bar{p}p$ CROSS SECTIONS AT LOW $\bar{p}$ MOMENTA

HEIDELBERG, MAX PLANCK INST - W Brueckner, H Dobbeling, K Dworschak, D von Harrach, S Paul, B Povh, M Treichel
HEIDELBERG U, PHYS INST - M Nomachi, T A Shibata
LAVAL U - B Cujec
MAINZ U, INST KERNPHYS - T Walcher (✓ Spokesperson)
RUTGERS U - R Ransome

Accelerator CERN-LEAR *Detector* Combination

Reactions

$\bar{p}\,p \to \bar{p}\,p$	150 600 MeV/c
$\bar{p}\,p \to \bar{n}\,n$	"
$\bar{p}\,p \to$ annihil	"
$\bar{p}\,p \to X$	"

Particles studied baryonium

Comments A search for baryonium and a measurement of differential cross sections.

Papers PL B158 (1985) 180, PL B166 (1986) 113, PL B169 (1986) 302, PL B189 (1987) 232, PL B197 (1987) 463, NIM A269 (1988) 527, NP A478 (1988) 623c, ZPHY A335 (1990) 217, ZPHY A339 (1991) 367, and ZPHY A339 (1991) 379.

CERN-PS-174 (Aug 1980) Approved Dec 1980; Completed Jul 1986.

PRECISION SURVEY OF X-RAYS FROM $\bar{p}p$ ($\bar{p}d$) ATOMS USING THE INITIAL LEAR BEAM

NIKHEF, AMSTERDAM - E W A Lingeman
BIRMINGHAM U - J D Davies (✓ Spokesperson), J Lowe, J M Nelson, G J Pyle, A Selvarajah, G T A Squier
DELFT UNIV TECH - C Van Eijk, R Hollander, D Langerveld, W J C Okx, A Zoutendijk
RUTHERFORD - C A Baker, C J Batty, S Sakamoto
WILLIAM AND MARY COLL - R E Welsh, R Winter

Accelerator CERN-LEAR *Detector* Photon spectrometer

Reactions

$\bar{p}\,p \to \bar{p}\,p$ X-ray	0 MeV/c
$\bar{p}$ deut $\to \bar{p}$ deut X-ray	"

Comments The detector is a Si(Li) crystal. Uses gas targets. Measurements are made at several gas pressures.

Papers PL B145 (1984) 319, PL B162 (1985) 71, NP A483 (1988) 631, NP A486 (1988) 604, and NP A494 (1989) 507. No other papers expected.

CERN-PS-175 (1980) Approved Dec 1980, Jun 1987; Completed Oct 1988.

MEASUREMENT OF THE ANTIPROTONIC LYMAN AND BALMER X-RAYS OF $\bar{p}$ H AND $\bar{p}d$ ATOMS AT VERY LOW TARGET PRESSURES

CERN – K Elsener
KERNFORSCHUNGSANLAGE, JULICH – D Gotta
KERNFORSCHUNGSZENTRUM, KARLSRUHE & KARLSRUHE U – P Bluem, K Heitlinger
PSI, VILLIGEN – R Bacher, A Badertscher, J Egger, E Morenzoni, L M Simons (✓ Spokesperson)

Accelerator CERN-LEAR *Detector* Photon spectrometer

Reactions

$\bar{p}\ p \rightarrow \bar{p}\ p\ X$-ray	0 GeV/c
$\bar{p}$ deut $\rightarrow \bar{p}$ deut X-ray	"
$\bar{p}\ ^3$He $\rightarrow \bar{p}\ ^3$He X-ray	"
$\bar{p}$ He $\rightarrow \bar{p}$ He X-ray	"

Comments The 5 MeV antiprotons from LEAR are stopped in the cyclotron trap. X-rays are detected in Si(Li) crystals.

Papers PS T22 (1988) 90, ZPHY A334 (1989) 93, ZPHY A338 (1991) 217, and ZPHY A (accepted). No other papers expected.

CERN-PS-177 (Jul 1980) Approved Dec 1980, Jun 1987; Completed Nov 1988.

STUDY OF THE FISSION DECAY OF HEAVY HYPERNUCLEI

CEBAF – J Mougey
DARMSTADT, GSI – S M Polikanov
GRENOBLE, CEN – M Maurel, E Monnand, P Perrin, C Ristori
GRENOBLE U – J P Bocquet, H Nifenecker, M Rey-Campagnolle (✓ Spokesperson)
PENN STATE U – T A Armstrong, R A Lewis, J Passaneau, G A Smith
UPPSALA U – G Ericsson, T Johansson, G Tibell
WARSAW U, IEP – T Krogulski

Accelerator CERN-LEAR *Detector* Wire chamber

Reactions

$\bar{p}$ nucleus	0 GeV/c

Particles studied hypernuc

Comments Searches for heavy hypernuclei and measures their yields and lifetimes by using the fission mode as a decay signature. The reaction chain is as follows: $\bar{p}$'s stopping in heavy-element targets annihilate and occasionally produce kaons, and a K^- then occasionally interacts to produce a Λ which sticks to the nucleus, forming a hypernucleus. This is an extension of the original PS-177, running to disentangle the two processes quoted above and thus increase the accuracy of the lifetime measurements, and to add a strangeness signature.

Papers PL B182 (1986) 146, PL B192 (1987) 312, NC 102A (1989) 653, NP A531 (1991) 539, and ZPHY A (accepted).

CERN-PS-178 (Aug 1980) Approved Dec 1980; Completed Aug 1986.

$\bar{n}$ PRODUCTION AT LEAR

CAGLIARI U – L Cugusi, M P Macciotta, S Marcello, A Masoni, G Puddu, S Serci
PADUA U – M Morandin, R A Ricci, C Voci
TURIN U – T Bressani (Spokesperson), E Chiavassa, S Costa, G Dellacasa, M Gallio, F Iazzi, B Minetti, A Musso

Accelerator CERN-LEAR *Detector* Calorimeter

Reactions

$\bar{p}\ p \rightarrow \bar{n}\ n$	0.1–0.6 GeV/c
$\bar{n}$ Fe $\rightarrow$ pions X	"
$\bar{n}$ C $\rightarrow \bar{p}\ ^{12}$N	"
$\bar{n}$ Al $\rightarrow \bar{p}$ Si	"
$\bar{n}$ Cu $\rightarrow \bar{p}$ Zn	"
$\bar{n}$ Pb $\rightarrow \bar{p}$ Bi	"

Comments Studies $\bar{n}$ production near 0°, with an eye toward future experiments on $\bar{n}p$, $\bar{n}n$, and $\bar{n}d$ reactions. Studies the charge-exchange reaction at 0° in nuclei versus the mass number, measures $\bar{n}$ annihilation in iron versus the $\bar{n}$ momentum to compare with the analogous $\bar{p}$ reaction, and measures the charged-pion multiplicity distribution in the annihilation at low energy.

Papers IEEE TNS 32 (1985) 733, IEEE TNS 33 (1986) 374, EPL 2 (1986) 587, NIM A270 (1988) 354, and EPL 7 (1988) 13.

CERN-PS-179 (Aug 1980) Approved Dec 1980; Completed Jul 1986.

STUDY OF THE INTERACTION OF LOW-ENERGY ANTIPROTONS WITH ^{2}H, ^{3}He, ^{4}He, AND Ne NUCLEI USING A STREAMER CHAMBER IN A MAGNETIC FIELD

BERGEN U – A Haatuft, A Halsteinslid, K Myklebost, J M Olsen
BRESCIA U – E Lodi-Rizzini
DUBNA – Y A Batusov, S A Bunyatov, I V Falomkin, G B Pontecorvo, M G Sapozhnikov
FRASCATI – C Guaraldo, A Maggiora
OSLO U – F O Breivik, T Jacobsen, S O Sorensen
PADUA U – L Peruzzo, G Sartori, M Vascon
PAVIA U – G Bendiscioli, G Fumagalli, C Marciano, A Rotondi, A Zenoni
TURIN U – F Balestra, S Bossolasco, M P Bussa, L Busso, L Ferrero, R Garfagnini, A Grasso, D Panzieri, G Piragino (Spokesperson), F Tosello

Accelerator CERN-LEAR *Detector* Streamer chamber

Reactions

$\bar{p}\ p$	0–200 MeV/c
$\bar{p}$ deut	"
$\bar{p}\ ^3$He	"
$\bar{p}$ He	0–600 MeV/c
$\bar{p}$ Ne	"

Papers NIM 188 (1981) 69, RNC 5 (1982) NO. 10, LNC 38 (1983) 83, LNC 38 (1983) 211, NIM 222 (1984) 524, LNC 41 (1984) 223, PL B149 (1984) 69, NC 79A (1984) 193, NIM A234 (1985) 30, PL B165 (1985) 265, EPL 2 (1986) 115, NP A452 (1986) 573, NIM A257 (1987) 114, PL B194 (1987) 192, PL B194 (1987) 343, NP A465 (1987) 714, NP A469 (1987) 669, NP A471 (1987) 651, NC 100A (1988) 323, PL B217 (1989) 43, PL B230 (1989) 36, NP A491 (1989) 541, NP A491 (1989) 572, PS 42 (1990) 263, and NP A526 (1991) 415.

CERN-PS-182 (Jan 1981) Approved May 1981; Completed Jul 1986.

INVESTIGATIONS ON BARYONIUM AND OTHER RARE $\bar{p}p$ ANNIHILATION MODES USING HIGH-RESOLUTION π^0 SPECTROMETERS

BASEL U – G Backenstoss, M Hugi, U Mall, R Rickenbach, A Schopper, L Tauscher (Spokesperson)
STOCKHOLM, RES INST ATOMIC PHYS – L Adiels, I Bergstrom, A Kerek
THESSALONIKI U – S Charalambous, D Hadjifotiadou, K Papastefanou, K Zioutas
CERN – P Pavlopoulos, D Troester

Accelerator CERN-LEAR *Detector* Spectrometer

Reactions

$\bar{p}\ p \rightarrow \pi^0$ X	0 GeV/c
$\bar{p}\ p \rightarrow \eta$ X	"
$\bar{p}\ p \rightarrow \gamma$ X	"

Particles studied baryonium, meson^0

Comments Measures inclusive spectra of π^0's and η's to search for new mesons. Uses high-resolution γ detectors, as well as scintillators for charged particles.

Papers NIM A244 (1986) 380, PL B182 (1986) 405, ZPHY C35 (1987) 15, and ZPHY C42 (1989) 49.

CERN-PS-183 (Aug 1980) Approved May 1981; Completed Aug 1986.

SEARCH FOR BOUND $N\overline{N}$ STATES USING A PRECISION γ AND CHARGED-PION SPECTROMETER AT LEAR

ATHENS U – A Angelopoulos, A Apostolakis, P Papaelias, H Rozaki, L Sakelliou, M Spyropoulou-Stassinaki
UC, IRVINE – M Fero, M Y Gee, N Graf, M A Mandelkern, R Ray, J Schultz, T Usher
KERNFORSCHUNGSZENTRUM, KARLSRUHE & KARLSRUHE U – G Bueche, H Koch, W Rohrbach, D Walther
NEW MEXICO U – B Bassalleck, N Komninos, D M Wolfe
PENN STATE U – T A Armstrong, R A Lewis, S M Playfer, G A Smith (√ Spokesperson), M Soulliere

Accelerator CERN-LEAR *Detector* Spectrometer

Reactions

$\bar{p}\,p \to \gamma$ X	0 GeV/c
$\bar{p}\,p \to \pi^+$ X	"
$\bar{p}\,p \to \pi^-$ X	"
$\bar{p}\,p \to K^+$ X	"
$\bar{p}\,p \to K^-$ X	"
$\bar{p}\,p \to$ annihil	0–300 MeV/c

Particles studied baryonium, meson

Comments Continues studies of BNL-708.

Papers NIM A236 (1985) 354, PL B159 (1985) 210, PL B178 (1986) 441, PL B205 (1988) 590, PL B212 (1988) 129, ZPHY A331 (1988) 519, ZPHY A332 (1989) 467, NP (Proc. Suppl.) B8 (1989) 54, NP (Proc. Suppl.) B8 (1989) 238, ZPHY A336 (1990) 461, PR D44 (1991) 1945, and ZPHY A (accepted).

CERN-PS-185 (Aug 1981) Approved Oct 1981, Feb 1987.

STUDY OF THRESHOLD PRODUCTION OF $\bar{p}p \to \overline{Y}Y$ AT LEAR

CARNEGIE MELLON U – P D Barnes, G Franklin, C Maher, B Quinn, M Rozon, R Schumacher, V Zeps
CERN – N Hamann, S Ohlsson
ERLANGEN U – W Eyrich, M Kirsch, R Kraft, F Stinzing
FREIBURG U – P Birien, W Dutty, H Fischer, J Franz, J Kuipers, E Roessle, H Schmitt, R Todenhagen, H Urban
ILLINOIS U, URBANA – R A Eisenstein, P Harris, D Hertzog, R Tayloe
KERNFORSCHUNGSANLAGE, JULICH – G Decker, K Kilian (√ Spokesperson), C Lippert, W Oelert, E Roderburg, T Sefzick, M Ziolkowski
UPPSALA U – T Johansson
VIENNA, INST RADIUMFORSCH, KERNPHYS – W Breunlich, R Geyer

Accelerator CERN-LEAR *Detector* Wire chamber

Reactions

$\bar{p}\,p \to \overline{\Lambda}\,\Lambda$	1.2–2.0 GeV/c
$\bar{p}\,p \to \overline{\Lambda}\,\Sigma^0$	"
$\bar{p}\,p \to \overline{\Sigma}^-\,\Sigma^+$	"
$\bar{p}\,p \to \overline{\Sigma}^+\,\Sigma^-$	"
$\bar{p}\,p \to K_S\,K_S$	"

Particles studied baryonium, $f_4(2220)$

Comments Measures cross sections, polarizations, and spin correlations. Emphasis is on the $\overline{\Lambda}\Lambda$ channel. Investigates the $Y\overline{Y}$ final-state interaction and decays and compares Λ and $\overline{\Lambda}$ decay asymmetries and lifetimes. Taking data (April 92).

Papers PL B189 (1987) 249, PL B199 (1987) 147, PL B229 (1989) 432, PL B246 (1990) 273, NP A508 (1990) 311c, and NP A526 (1991) 575.

CERN-PS-186 (Aug 1980) Approved Oct 1981; Completed Jul 1986.

NUCLEAR EXCITATIONS BY ANTIPROTONS AND ANTIPROTONIC ATOMS

MUNICH, TECH U – H Daniel, T von Egidy (√ Spokesperson), H Hagn, F J Hartmann, W Kanert, E Moser, H Plendl, G Schmidt
KERNFORSCHUNGSANLAGE, JULICH – H Machner, G Riepe
MISSISSIPPI U – J J Reidy

Accelerator CERN-LEAR *Detector* Photon spectrometer

Reactions

$\bar{p}$ nucleus $\to \gamma$ charged X	0 GeV/c

Comments Uses Ge and Si(Li) γ spectrometers, and Ge and Si telescopes for charged particles. Studies antiprotonic atoms, especially the E2 resonance effect. Measures charged-particle emission after $\bar{p}$ annihilation in nuclei from C to U. Determines the distribution of residual nuclei after $\bar{p}$ annihilation in ^{92}Mo, ^{95}Mo, ^{98}Mo, ^{138}Ba, ^{165}Ho, and ^{238}U.

Papers PRL 56 (1986) 2368, PL B176 (1986) 327, PL B179 (1986) 25, ZPHY A325 (1986) 261, Nature 328 (1987) 773, ZPHY A326 (1987) 523, NP A466 (1987) 667, ZPHY A329 (1988) 235, ZPHY C37 (1988) 557, NP A485 (1988) 445, ZPHY A333 (1989) 89, ZPHY A335 (1990) 451, NP A512 (1990) 669, and ZPHY A341 (1991) 79.

CERN-PS-189 (Nov 1981) Approved Feb 1983.

HIGH PRECISION MASS MEASUREMENTS WITH A RADIOFREQUENCY MASS SPECTROMETER — APPLICATION TO THE MEASUREMENT OF THE $p\bar{p}$ MASS DIFFERENCE

CERN – E Haebel, H Herr, R Klapisch, G Lebee, G Petrucci, G Stefanini
ORSAY, CSNSM – A Coc, R Le Gac, M de Saint-Simon, C Thibault (√ Spokesperson), F Touchard

Accelerator CERN-LEAR *Detector* Spectrometer

Reactions

$\bar{p}$	20 MeV/c

Particles studied $\bar{p}$

Comments Uses a radiofrequency spectrometer. The resolving power of the spectrometer is around 5×10^5. The $\bar{p}$ mass is compared with that of the H^- ion in order to check the CPT theorem. Scheduled to run June 92.

Papers NIM A271 (1988) 512, NP (Proc. Suppl.) B8 (1989) 454, and NIM A305 (1991) 143.

CERN-PS-194 (Nov 1982) Approved Nov 1984; Completed Jul 1986.

MEASUREMENTS OF THE RATIO BETWEEN DOUBLE AND SINGLE IONIZATION OF HELIUM FOR ANTIPROTONS

AARHUS U – J Bak, P Hvelplund, H Knudsen, E Uggerhoj (√ Spokesperson)
CERN – S P Moller, A H Sorensen
STOCKHOLM, RES INST ATOMIC PHYS – G Astner, I Bergstrom, L Liljeby

Accelerator CERN-LEAR *Detector* Spectrometer

Reactions

$\bar{p}$ He	0.5–4 MeV (T_{lab})

Comments See also PS-194-2 and PS-194-3.

Papers PRL 57 (1986) 2147, PR A36 (1987) 3612, PRL 62 (1989) 1731, PR A40 (1989) 7366, PR A41 (1990) 6536, JPHY B23 (1990) L395, NIM B58 (1991) 1, and PL A155 (1991) 155.

CERN-PS-194-2 (1986) Approved Feb 1987; Completed Sep 1990.

NEW MEASUREMENTS OF $\bar{p}$-ATOM COLLISIONS: IONIZATION, dE/dx, X-RAYS, AND CHANNELLING

AARHUS U – L H Andersen, P Hvelplund, H Knudsen, S P Moller, J O P Pedersen, E Uggerhoj (√ Spokesperson)
CERN – K Elsener
PSI, VILLIGEN – E Morenzoni

Accelerator CERN-LEAR *Detector* Counter

Reactions

$\bar{p}$ He	10, 200 MeV/c
$\bar{p}$ crystal	30, 200 MeV/c

Comments Investigates (1) the double ionization of helium by antiprotons, (2) the Barkas effect (different dE/dx for particle and antiparticle with the same speed), (3) K-shell excitation by antiprotons, (4) channeling of MeV antiprotons by crystals, and (5) single ionization of hydrogen by antiprotons.

Papers For papers see CERN-PS-194.

CERN-PS-194-3 Approved Jun 1991.

MEASUREMENT OF STOPPING POWERS AND SINGLE IONIZATION CROSS SECTIONS FOR ANTIPROTONS AT LOW ENERGIES

AARHUS U - P Hvelplund, H Knudsen, R Medenwaldt, S P Moller, E Uggerhoj (√ Spokesperson), T Worm
PSI, VILLIGEN - E Morenzoni

Accelerator CERN-LEAR *Detector* ?

Reactions

$\bar{p}$ nucleus	0.2-4 MeV/c
$\bar{p}$ He	0.01-0.1 MeV/c

Comments Continues the investigation of new phenomena in collisions of antiprotons with atoms. Taking data (April 92).

Papers For papers see CERN-PS-194.

CERN-PS-195 (Jan 1985) Approved Sep 1985.

TEST OF CP VIOLATION WITH $\overline{K}^0$ AND K^0 AT LEAR

ATHENS U - A Angelopoulos, A Apostolakis, E Rozaki, L Sakeliou, K Sarigiannis
BASEL U - R Adler, G Backenstoss, B Eckard, C Felder, B Pagels, P Pavlopoulos (√ Spokesperson), G Polivka, R Rickenbach, C Santoni, L Tauscher
BOSTON U - A Go, T J Lawry, J P Miller, B L Roberts, G Varner, D Zimmerman
CERN - E Aslanides, C P Bee, P Bloch, M Fidecaro, R Gamet, A Schopper
COIMBRA U - E Van Beveren, J Carvalho, R Ferreira-Marques, A Onofre, J Pinto-da-Cunha, A Policarpo
DELFT UNIV TECH - C W E Van Eijk, R W Hollander, R Kreuger, H Postma
FRIBOURG U - J C Dousse, L Faravel, H U Johner, J Kern, L Schaller
IOANNINA U - I Evangelou, P Kokkas, N Manthos, F Triantis
LIVERPOOL U - J M Bennet, E Cawley, M Dodgson, J R Fry, E Gabathuler, P J Hayman, P D Maley, L E Sacks, P M Sanders, S Vlachos
LJUBLJANA U & STEFAN INST, LJUBLJANA - A Filipcic, I Mandic, U Seljak, D Zavrtanik
MARSEILLE, CPP - T Alhalel, V Bertin, A Ealet, P Fassnacht, T Geralis, F Montanet, F Pelucchi
ORSAY, CSNSM - R Le Gac, C Thibault, F Touchard
PSI, VILLIGEN - C Bula, P Kettle, T Nakada, O Wigger
SACLAY - G Burgun, G Chardin, M Dejardin, J Derre, J Duclos, D Francis, D Garreta, C Guyot, C Kochowski, G Marel, P Schune, C Yeche
STOCKHOLM, RES INST ATOMIC PHYS - P Carlson, C Fuglesang, K Jansson, K Jon-And, A Kerek, S Szilagyi
THESSALONIKI U - S Charalambous, M Chardalas, S Dedoussis, A Lolios, C Touramanis
ZURICH, ETH - H Bienlein, W Fetscher, H J Gerber, T Ruf, M Schaefer, P Weber, M Wolter

Accelerator CERN-LEAR *Detector* Spectrometer, Calorimeter

Reactions

$\bar{p}\,p \rightarrow K^0$ X	0 GeV/c
$\bar{p}\,p \rightarrow \overline{K}^0$ X	"

Particles studied K^0, $\overline{K}^0$

Comments The aim of the experiment is to carry out precision tests of CP and CPT on the neutral kaon system through K^0-$\bar{K}^0$ interferometry. All the semileptonic and two and three pion decays are recorded identically under the same operating conditions using tracking chambers and a gaseous electromagnetic calorimeter. Taking data (April 92).

Papers NIM A279 (1989) 285, NIM A279 (1989) 305, NC 102A (1989) 127, NIM A297 (1990) 126, PL B267 (1991) 154, PW 3 (1992) 40, and NIM A311 (1992) 78.

CERN-PS-196 (Mar 1985) Approved Nov 1985.

PRECISION COMPARISON OF $\bar{p}$ AND p MASSES IN A PENNING TRAP

HARVARD U - G Gabrielse (√ Spokesperson), W Jhe, D Phillips, W Quint
MAINZ U, INST PHYS - J Grobner, H Kalinowsky

Accelerator CERN-LEAR *Detector* Other

Particles studied $\bar{p}$, p

Comments Aims to compare p and $\bar{p}$ masses to an accuracy of one part in 10^9 within the small volume of an ion trap. Antiprotons have been trapped below 3 keV. Electron cooling from keV to $< 10^{-3}$ eV has been observed in the trap. Also measures the antiproton storage lifetime. Taking data (April 92).

Papers PRL 57 (1986) 2504, RSI 58 (1987) 2197, PL A129 (1988) 38, and PRL 65 (1990) 1317.

CERN-PS-197 (Oct 1985) Approved Apr 1986.

THE CRYSTAL BARREL: MESON SPECTROSCOPY AT LEAR WITH A 4π NEUTRAL AND CHARGED DETECTOR

BUDAPEST, CRIP - T Gemesy, P Hidas, Z Javorfi, G Pinter
CERN - M Burchell, M Doser, N Hessey, M Kobel, R Landua, L Montanet, J Zoll
HAMBURG U - R Beckmann, F Heinsius, B Kaemmle, T Kiel, U Strohbusch, U Wiedner
KARLSRUHE U - I Augustin, P Bluem, D Engelhardt, N Winter
LBL - P Birien, J Bistirlich, R Bossingham, H Bossy, T Case, K M Crowe
QUEEN MARY - WESTFIELD COLL - D V Bugg, A Cooper, A Sanjari
MAINZ U, INST PHYS - H Kalinowsky, E Klempt, M Merkel, J Merlo, K Peters, E Schaefer, C Strassburger
MUNICH U, EXP PHYS - K Braune, H P Dietz, W Duennweber, M Englert, M A Faessler, C Felix, G Folger, P Illinger, D Jamnik, K Koenigsmann (√ Spokesperson), U Meyer-Berkhout, C Zupancic
RUHR U, BOCHUM - K Beuchert, H Koch, M Kunze, H Matthaey, S Ravndal, D Walther
RUTHERFORD - C A Baker, C J Batty
STRASBOURG, CRN - M Suffert
UCLA - R P Haddock
ZURICH U - C Amsler, B Barnett, C A Meyer, T Noble, B Schmid, D Urner

Accelerator CERN-LEAR *Detector* CRYSTAL-BARREL

Reactions

$\bar{p}\,p \rightarrow$ annihil	0-2000 MeV/c

Particles studied glueball, meson

Comments High detection efficiency for both neutral and charged particles at nearly all angles means nearly all annihilation channels are accessible. Taking data (April 92).

Papers NP (Proc. Suppl.) B8 (1989) 65, and PL B260 (1991) 249.

CERN-PS-198 (Oct 1985) Approved Apr 1986; Completed May 1988.

MEASUREMENT OF SPIN-DEPENDENT OBSERVABLES IN $\bar{p}N$ ELASTIC SCATTERING FROM 300 TO 700 MeV/c

KERNFORSCHUNGSZENTRUM, KARLSRUHE & KARLSRUHE U - E Boschitz, W Gyles, W List, R Olszewski, C R Ottermann, T Tacik, M Wessler

LYON, IPN – E Descroix, J Y Grossiord, A Guichard
PSI, VILLIGEN – B Van den Brandt, D R Gill, J Konter, S Mango, G D Wait
SACLAY – J Arvieux, H Catz, A Chaumeaux, J C Faivre, Y Terrien, E Vercellin, J Yonnet
CERN – R Bertini (Spokesperson), F Perrot

Accelerator CERN-LEAR *Detector* Spectrometer, SPES-II

Reactions Polarized target

$\bar{p}\,p \to \bar{p}\,p$	300–700 MeV/c
$\bar{p}$ deut $\to \bar{p}$ deut	"

Papers NP (Proc. Suppl.) B8 (1989) 149, NP (Proc. Suppl.) B8 (1989) 156, PL B228 (1989) 531, and PL B261 (1991) 188.

CERN-PS-199 (Nov 1985) Approved Apr 1986; Completed 1991.

STUDY OF THE SPIN STRUCTURE OF THE $\bar{p}p \to \bar{n}n$ CHANNEL AT LEAR

CAGLIARI U & INFN, CAGLIARI – M P Macciotta, A Masoni, G Puddu, S Serci
GENEVA U – A Ahmidouch, E Heer, R Hess, C Lechanoine-LeLuc, C Mascarini, D Rapin
SACLAY – J Arvieux, R Bertini, H Catz, J C Faivre, R A Kunne, F Perrot
TRIESTE U & INFN, TRIESTE – R Birsa, F Bradamante (√ Spokesperson), S Dalla-Torre, M Giorgi, M Lamanna, A Martin, A Penzo, P Schiavon, F Tessarotto, A Villari
TURIN POLYTECHNIC & INFN, TURIN – M Agnello, F Iazzi, B Minetti
TURIN U & INFN, TURIN – T Bressani, E Chiavassa, N De Marco, A Musso, A Piccotti

Accelerator CERN-LEAR *Detector* Counter

Reactions Polarized target

$\bar{p}\,p \to \bar{n}\,n$	500–1300 MeV/c

Particles studied meson

Comments Measures over the whole angular range the polarization parameter P in 100 MeV/c steps, and the polarization transfer parameter D. Searches for resonances in the s channel. Uses a frozen-spin polarized target, and plastic streamer tubes.

Papers PL B246 (1990) 267, NIM A300 (1991) 43, and PL B273 (1991) 533.

CERN-PS-200 (Jan 1986) Approved Apr 1986.

A MEASUREMENT OF THE GRAVITATIONAL ACCELERATION OF THE ANTIPROTON

LEWIS AND CLARK COLL, PORTLAND – T Van Dekop, D Oakley
LOS ALAMOS – R E Brown, T Darling, P Dyer, T Goldman, M H Holzscheiter (√ Spokesperson), R J Hughes, N Jarmie, N S P King, M M Nieto, M M Schauer, J A Schecker
NASA, AMES – F C Witteborn
TEXAS A AND M – S Cornford, K Hosea, R A Kenefick
COLORADO U – S Hoibraten, M Midzor, S Parry, R Ristinen

Accelerator CERN-LEAR *Detector* Other

Comments Measures time of flight of ultra-low-velocity $\bar{p}$'s up a vertical drift tube. In preparation (April 92).

CERN-PS-201 (Jan 1986) Approved Sep 1986; Started Aug 1990.

STUDY OF ANTINUCLEON ANNIHILATIONS AT LEAR WITH OBELIX, A LARGE-ACCEPTANCE AND HIGH RESOLUTION DETECTOR BASED ON THE OPEN AXIAL FIELD SPECTROMETER

OBELIX COLLABORATION

BOLOGNA U & INFN, BOLOGNA – A Bertin, M Bruschi, M Capponi, S De Castro, I D'Antone, D Galli, V Marconi, I Massa, M Piccinini, M Poli, N Semprini-Cesari, M Villa, A Vitale, G Zavattini, A Zoccoli
BRESCIA U – G Belli, E Lodi-Rizzini, L Venturelli
CAGLIARI U & INFN, CAGLIARI – A Adamo, C Cicalo, A Lai, A Masoni, G Puddu, S Serci, G L Usai
DUBNA – I V Falomkin, F Nichitiu, G B Pontecorvo, A M Rozhdestvensky, M G Sapozhnikov, P Temnikov
FRASCATI – C Guaraldo (√ Spokesperson), A Lanaro, V Lucherini
LEGNARO – P Boccaccio, U Gastaldi, L Lombardi, G Maron, R A Ricci, L Vannucci, G Vedovato
PADUA U – M Morando
PAVIA U – G Bendiscioli, V Filippini, C Marciano, P Montagna, A Rotondi, P Salvini, V Tretyak, A Zenoni
TRIESTE U & INFN, TRIESTE – G Margagliotti, G Pauli, S Tessaro, E Zavattini
TURIN U & INFN, TURIN – F Balestra, G C Bonazzola, T Bressani (√ Spokesperson), M P Bussa, L Busso, D Calvo, S Costa, D D'Isep, L Fava, A Feliciello, L Ferrero, R Garfagnini, P Gianotti, A Grasso, A Maggiora, S Marcello, D Panzieri, G Piragino, E Rossetto, F Tosello, G Zosi
TURIN POLYTECHNIC & INFN, TURIN – M Agnello, F Iazzi, B Minetti
UDINE U & INFN, UDINE – L Santi

Accelerator CERN-LEAR *Detector* Spectrometer

Reactions

$\bar{p}\,p \to$ annihil	0–1.8 GeV/c
$\bar{p}$ deut $\to$ annihil	"
$\bar{p}$ nucleus $\to$ annihil	"
$\bar{n}\,p \to$ annihil	0–0.3 GeV/c
$\bar{n}$ nucleus $\to$ annihil	"

Comments Studies (1) spectroscopy of $q\bar{q}$, exotic, glueball, and hybrid mesons, (2) dynamics of $N\bar{N}$ interactions, (3) atomic physics with $\bar{p}$'s, and (4) $\bar{p}$ annihilations onto more than one nucleon. Taking data (April 92).

Papers IEEE TNS 38 (1991) 331, IEEE TNS 38 (1991) 337, IEEE TNS 38 (1991) 393, NIM A306 (1991) 305, and PL B256 (1991) 349.

CERN-PS-202 (1986) Approved Feb 1987; Started Jul 1991.

JETSET: PHYSICS AT LEAR WITH AN INTERNAL GAS JET TARGET AND AN ADVANCED GENERAL PURPOSE DETECTOR

CERN – R K Bock, E Chesi, D Drijard, M Ferro-Luzzi, N Hamann, R Jones, B Mouellic, S Ohlsson, J Perreau, M J Price
FREIBURG U – P Birien, W Dutty, J Franz, A Klett, J Kuipers, E Roessle, H Schmitt, H Urban
GENOA U & INFN, GENOA – D Bassi, A Buzzo, S Easo, K Kirsebom, M Lovetere, M Macri (√ Spokesperson), M Marinelli, L Mattera, S Passaggio, M Pia, A Pozzo, A Santroni, A Scalisi
ILLINOIS U, URBANA – P Debevec, R A Eisenstein (√ Spokesperson), P Harris, D Hertzog, S Hughes, P Reimer, J Ritter, R Tayloe
KERNFORSCHUNGSANLAGE, JULICH – K Kilian, W Oelert, K Roehrich, O Steinkamp, B Stugu
OSLO U – H Korsmo
UPPSALA U – A Johansson, T Johansson

Accelerator CERN-LEAR *Detector* JETSET

Reactions

$\bar{p}\,p \to \phi\,\phi$	0.6–1.9 GeV/c
$\bar{p}\,p \to K^+\,K^-\,K^+\,K^-$	"
$\bar{p}\,p \to K_S\,K_S$	"

Particles studied glueball

Comments Uses an internal gas-jet target surrounded by an advanced, compact non magnetic detector. Initial aim is a search for glueballs (gg or ggg) and hybrids ($gq\bar{q}$) over the mass range 2.04 to 2.4 GeV. Taking data (April 92).

Papers NP (Proc. Suppl.) B8 (1989) 69.

CERN-PS-203 (Jan 1988) Approved Apr 1988.

ANTIPROTON INDUCED FISSION AND FRAGMENTATION OF NUCLEI

BONN U – P David
FLORIDA STATE U – H S Plendl

GEORGE MASON U - B J Lieb
HAHN-MEITNER INST - D Hilscher, D Polster, H Rossner
KERNFORSCHUNGSANLAGE, JULICH - H Machner, G Riepe
MICHIGAN STATE U - D Bowman, W Lynch
MUNICH, TECH U - H Daniel, T von Egidy (✓ Spokesperson), T Haninger, F J Hartmann, P Hofmann, Y S Kim, W Schmid
VIRGINIA U - B Wright, K Ziock
WARSAW U - J Jastrzebski, W Kurcewicz

Accelerator CERN-LEAR *Detector* Semiconductor

Reactions

$\bar{p}$ nucleus 0 GeV/c

Comments Studies fission and fragmentation processes induced by a large, highly localized deposition of energy when an antiproton annihilates with a nucleus. Measures energy, mass, and folding angle of coincident fission fragments from Bi, Th, and U targets. Light fragments ($K, n, p, d, ...$) are measured for a series of targets with semiconductor detectors and TOF techniques. Taking data (April 92).

CERN-PS-204 (Nov 1987) Approved Jun 1989; Completed Aug 1990.

MEASUREMENTS OF WAKE-RIDING ELECTRONS IN ANTIPROTON-CARBON-FOIL COLLISIONS

AARHUS U - L H Andersen, K Elsener, P Hvelplund, H Knudsen, S P Moller, E Uggerhoj
TOKYO U - K Kuroki, Y Yamazaki (✓ Spokesperson)

Accelerator CERN-LEAR *Detector* Counter

Reactions

$\bar{p}$ C 100 MeV/c

Comments The target is a carbon foil. A charged particle passing through a dielectric produces an oscillating wake. The experiment searches for electrons riding the moving wake. It also measures the number distribution of multiply emitted secondary electrons.

Papers JPSJ 59 (1990) 2643.

CERN-PS-205 Approved Apr 1991.

STUDY OF EXOTIC TRAPPING OF ANTIPROTONS IN LIQUID/GAS HELIUM

CERN - J Eades
MUNICH, TECH U - H Daniel, T von Egidy, F J Hartmann, P Hofmann, W Schmid
TOKYO U - R S Hayano, M Iwasaki, S N Nakamura, H Tamura
TOKYO U, INS - H Outa, E Widmann, T Yamazaki (✓ Spokesperson)

Accelerator CERN-LEAR *Detector* Plastic

Reactions

$\bar{p}$ He —

Comments Studies the exotic atom trapping of $\bar{p}$ by observing the resulting delayed annihilation products. Most models of the cascade process in antiprotonic atoms predict lifetimes of the order of picoseconds or less. However, it has been observed that a few percent of antiprotons stopped in liquid helium have a lifetime of microseconds. The experiment aims to study this effect in great detail using the improved beam intensity and emittance available at LEAR. The program includes investigations of ^{3}He and ^{4}He in solid, liquid, and gas phases. This may be complemented later with a visible region spectroscopy, and a laser pumping of the metastable exotic atoms. The use of positron and positronium reactions with the metastable atoms is also being contemplated as a route to antihydrogen formation. Four weeks of data taking is scheduled in 1992.

CERN-UA-001 (Jan 1978) Approved Jun 1978, Jun 1983, Sep 1983, Feb 1984, Nov 1984; Completed Feb 1990.

A 4π SOLID ANGLE DETECTOR FOR THE SPS USED AS A $\bar{p}p$ COLLIDER AT A C.M. ENERGY OF 630 GeV

AACHEN, TECH HOCHSCH, III PHYS INST - A Bohrer, H Faissner, A Geiser, S Lammel, H Moser, A Moulin, H Reithler, H Teykal, H Tuchscherer, K Wacker, H Wagner
NIKHEF, AMSTERDAM - K Bos, A Van Dijk, J P Dorenbosch, W Van de Guchte, I Ten Have, D Holthuizen, M Schroeder, I Zacharov
ANNECY - B Aubert, F Cavanna, J Colas, D Linglin, J P Vialle, M Yvert
BIRMINGHAM U - G F Cox, J D Dowell, N Ellis, I Fensome, J Garvey, J Gregory, I R Kenyon, M Nikitas
BOSTON U - G Bauer, M Felcini, K Morgan, S Otwinowski, J Rohlf
CERN - T Rodrigo Amoro, A Bezaguet, G Bocquet, R Bonino, M Botlo, P Cennini, S Cittolin, M Demoulin, D Drijard, K Eggert, A Givernaud, A Gonidec, F Diez Hedo, W Jank, F Lacava, M Marguina, G Maurin, T Meyer, T Muller, R Munoz, L Naumann, M Della Negra, A Norton (✓ Spokesperson), F Pauss, A Placci, J P Porte, E Radermacher, J P Revol, C Rubbia, D Samyn, D Schinzel, T P Shah, P Sphicas, O Ullaland, T S Virdee, V Vuillemin, I Zacharov
HELSINKI U - V Karimaki, R Kinnunen, E Pietarinen, M Pimia, J Tuominiemi
KIEL U - O C Allkofer, S Bartha, H G Boerst, H Bohn, D Brockhausen, D Dau, S Levegrun, A Morsch, R Prosi, M Rauschkolb
IMPERIAL COLL - E Clayton, A Khan, C Markou, S McMahon, C Seez, I Siotis, L Taylor
QUEEN MARY COLL - P Biddulph, E Eisenhandler, P Kalmus, M Landon, S Robins, D Robinson, W Von Schlippe, G Thompson, C Topping
MADRID, JEN - J Salicio Diez, A Ferrando, I Josa, E Torrente
MIT - T Fuess, G Pancheri, S Pavlon, K C T O Sumorok, Q Tan, S Tether, X Wu
PADUA U - A Bettini, G Busetto, A Caner, P Casoli, S Centro, R Conte, M De Giorgi, R Martinelli, A Meneguzzo, M Nicoletto, Y Zolnirowski, P Zotto
COLLEGE DE FRANCE - B Andrieu, L Dobrzynski, D Kryn, D Marchand, J P Mendiburu, P Nedelec, G Sajot, J Vrana
ROME U - U Aglietti, C Bacci, V Cecconi, F Ceradini, A Di Ciaccio, G Ciapetti, M Moricca, A Nisati, E Petrolo, G Piano-Mortari, G Salvini, M Torelli, A Tusi, S Veneziano, L Zanello
RUTHERFORD - M G Albrow, R Apsimon, J Coughlan, V O'Dell
SACLAY - D Denegri, Y Lemoigne, J P Merlo
UCLA - K Ankoviak, C Buchanan, D Cline, H Evans, L Fortson, J Gronberg, T Kubic, M Mohammadi, J Rhoades, D Stork, M Vargas
VIENNA, OAW - B Buschbeck, H Dibon, M Krammer, P Lipa, M Markytan, F Szoncso, A Taurok, C Wulz
MADRID, AUTONOMA U - C Albajar

Accelerator CERN-PBAR/P *Detector* UA1

Reactions

$\bar{p}\,p$ 540, 630 GeV (E_{cm})

Particles studied W^+, W^-, Z^0, higgs, s-particle

Comments In the first phase of operation has discovered the W and Z bosons and found limits on the top quark, heavy lepton, and supersymmetric particles masses. Also studied $B\bar{B}$ mixing, b quark production, QCD (via jets), and intermediate bosons and photon production. For the second phase of operation (88/89 collider runs) the following items were upgraded: the muon detection system, the data acquisition system, and the central detector. Data analysis in progress (April 92).

Papers NIM 176 (1980) 175, NIM 176 (1980) 217, NIM 176 (1980) 223, NIM 176 (1980) 233, NIM 176 (1980) 255, NIM 186 (1980) 533, PL B107 (1981) 320, PL B118 (1982) 167, PL B118 (1982) 173, IEEE TNS 30 (1983) 71, LNC 37 (1983) 255, PL B121 (1983) 77, PL B122 (1983) 103, PL B122 (1983) 189, PL B123 (1983) 108, PL B123 (1983) 115, PL B126 (1983) 398, PL B128 (1983) 336, PL B129 (1983) 273, PL B132 (1983) 214, PL B132 (1983) 223, NP B224 (1983) 523, NIM 224 (1984) 153, PL B134 (1984) 469, PL B135 (1984) 250, PL B136 (1984) 294, PL B139 (1984) 115, PL B147 (1984) 222, PL B147 (1984) 241, PL B147 (1984) 493, ZPHY C25 (1984) 167, IEEE TNS 32 (1985) 1463, RMP 57 (1985) 699, LNC 44 (1985) 1, PL B150 (1985) 223, PL B155 (1985) 442, PL B158 (1985) 494, ZPHY C27 (1985) 155, IEEE TNS 33 (1986) 163, NIM A243 (1986) 45, NIM A252 (1986) 387, EPL 1 (1986) 327, PL B166 (1986) 484, PL B172 (1986) 461, PL B177 (1986) 244, NP B276 (1986) 253, NIM A253 (1987) 179, NIM A253 (1987) 189, NIM A256

(1987) 23, NIM A257 (1987) 552, PL B185 (1987) 233, PL B185 (1987) 241, PL B186 (1987) 237, PL B186 (1987) 247, PL B193 (1987) 389, PL B198 (1987) 261, PL B198 (1987) 271, ZPHY C36 (1987) 33, NIM A263 (1988) 26, NIM A263 (1988) 174, NIM A265 (1988) 303, NIM A272 (1988) 669, PL B200 (1988) 380, PL B209 (1988) 127, PL B209 (1988) 385, PL B209 (1988) 397, PL B213 (1988) 405, ZPHY C37 (1988) 489, ZPHY C37 (1988) 505, ZPHY C40 (1988) 527, PR D38 (1988) 1616, NP B309 (1988) 405, IEEE TNS 36 (1989) 364, NIM A279 (1989) 114, NIM A279 (1989) 169, NIM A279 (1989) 297, FORT 37 (1989) 339, PL B226 (1989) 410 [erratum: PL B229 (1989) 439], ZPHY C44 (1989) 15, NIM A289 (1990) 482, NIM A292 (1990) 113, NIM A292 (1990) 401, NIM A291 (1990) 587, APP B21 (1990) 327, PL B241 (1990) 283, PL B244 (1990) 566, ZPHY C48 (1990) 1, NP B335 (1990) 261, NP B345 (1990) 1, NIM A301 (1991) 445, NIM A302 (1991) 331, NIM A305 (1991) 331 [erratum: NIM A311 (1992) 395], PL B253 (1991) 503, PL B256 (1991) 112, PL B256 (1991) 121 [erratum: PL B262 (1991) 497], PL B257 (1991) 459, PL B262 (1991) 163, PL B262 (1991) 171, PL B273 (1991) 540, and PL B275 (1992) 186.

CERN-UA-002 (Jan 1978) Approved Dec 1978, Sep 1984, Feb 1985, Jun 1987; Started Nov 1981; Completed Dec 1990.

STUDY OF $\bar{p}p$ INTERACTIONS AT 630-GeV c.m. ENERGY

BERN U - K Borer, E Hugentobler, L Mueller, T Pal, K P Pretzl, J Schacher
CALABRIA U - L Malgeri, M Primavera, M Valdata-Nappi
CAMBRIDGE U - R S DeWolf, D J Munday, M A Parker, T O White
CERN - M Borghini, A Dell'Acqua, D Froidevaux, J M Gaillard, O Gildemeister, S Hellman, J Hrivnac, K Jakobs, P Jenni, L Di Lella (√ Spokesperson), L Linssen, L Mapelli, F Nessi-Tedaldi, M Nessi, C Onions, M Pentney, M S Pepe, H Plothow-Besch, A Poppleton, V Simak, S Stapnes
DORTMUND U - C Goessling, H Hufnagel, D Pollmann, B Schmidt, V Sondermann, R Spiwoks, E Tsesmelis
HEIDELBERG U, IHEP - S Gruenendahl, E E Kluge, N Kurz
MELBOURNE U - I Bertram, S N Tovey
MILAN U & INFN, MILAN - D Cavalli, G Costa, L Cozzi, F Gianotti, L Mandelli, M Mazzanti, L Perini
ORSAY, LAL - R Ansari, J C Chollet, L Fayard, B Merkel, M Moniez, G Parrour, P Petroff, J P Repellin, G Unal, D Wood
PAVIA U & INFN, PAVIA - G Ambrosini, C Conta, R Ferrari, M Fraternali, G Fumagalli, V Goggi, M Livan, F Pastore, E Pennacchio, G Polesello, A Rimoldi, M Sacchi, V Vercesi
PERUGIA U & INFN, PERUGIA - P Cenci, P Lariccia, P Lubrano, M Punturo, P Scampoli, C Talamonti, F Tondini
PISA U & INFN, PISA - D Autiero, G Carboni, V Cavasinni, M Curatolo, B Esposito, E Iacopini, S Lami, M Morganti, C Petridou, T Del Prete
SACLAY - J Alitti, P Bareyre, P Bonamy, M Bourliaud, Y Ducros, C Magneville, J P Meyer, H Zaccone, A Zylberstejn

Accelerator CERN-PBAR/P *Detector* UA2

Reactions

$\bar{p}\,p \to e^{\pm}$ X	630 GeV (E_{cm})
$\bar{p}\,p \to$ jet(s) X	"
$\bar{p}\,p \to \gamma$ X	"

Particles studied W^+, W^-, Z^0, top, γ, lepton − quark, higgs$^{\pm}$

Comments The main aims are a study of the W and Z bosons and a search for the top quark. Other topics include the production of direct photons at high p_T, establishing new bounds on leptoquark masses, and a search for the charged Higgs from the top decay. The apparatus has complete calorimetry, both electromagnetic and hadronic, down to about 5° to the beams. Electron identification is achieved by means of calorimetry, preshower, and transition radiation detectors. A total of 6096 independent silicon counters give a precise dE/dx measurement. Scintillating fibers are used to measure charged particle tracks. The detector includes a lead converter to detect photons.

Papers PL B115 (1982) 59, PL B118 (1982) 203, PL B121 (1983) 187, PL B122 (1983) 322, PL B122 (1983) 476, PL B129 (1983) 130, ZPHY C20 (1983) 117, NIM 224 (1984) 65, NIM 224 (1984) 360, NIM 227 (1984) 29, PL B138 (1984) 430, PL B139 (1984) 105, PL B144 (1984) 283, PL B144 (1984) 291, ZPHY C24 (1984) 1, PL B154 (1985) 338, PL B156 (1985) 129, PL B160 (1985) 349, PL B165 (1985) 441, ZPHY C25 (1985) 329, ZPHY C27 (1985) 329, NIM A252 (1986) 590, PL B176 (1986) 239, ZPHY C30 (1986) 1, ZPHY C30 (1986) 341, NIM A253 (1987) 548, PL B186 (1987) 440, PL B186 (1987) 452, PL B194 (1987) 158, PL B195 987) 613, ZPHY C36 (1987) 175, NIM A263 (1988) 31, NIM A265 (1988) 33, NIM A273 (1988) 605, NIM A273 (1988) 826, PL B215 (1988) 175, ZPHY C40 (1988) 527, ZPHY C41 (1988) 395, IEEE TNS 36 (1989) 29, NIM A283 (1989) 646, NIM A286 (1990) 128, NIM A287 (1990) 417, PL B235 (1990) 363, PL B236 (1990) 488, PL B238 (1990) 442, PL B241 (1990) 150, ZPHY C46 (1990) 179, ZPHY C47 (1990) 11, ZPHY C47 (1990) 523, PL B257 (1991) 232, PL B263 (1991) 544, PL B263 (1991) 563, PL B268 (1991) 145, ZPHY C49 (1991) 17, ZPHY C52 (1991) 209, PL B274 (1991) 507, PL B275 (1991) 202, PL B276 (1992) 354, PL B276 (1992) 365, PL B277 (1992) 194, and PL B277 (1992) 203.

CERN-UA-004-2 Approved Jul 1990.

A PRECISE MEASUREMENT OF THE REAL PART OF THE ELASTIC SCATTERING AMPLITUDE AT THE S$\bar{p}p$S

GENOA U & INFN, GENOA - M Bozzo, G Sette, M Zito
ECOLE POLYTECHNIQUE - C Augier, D Bernard, J Bourotte, M Haguenauer (Spokesperson)
PRAGUE, INST PHYS - V Kundrat, S Nemecek, M Novak, M Smizanska
ROME U, TORVERGATA & INFN, ROME - R Cardarelli, L Cerrito, G Matthiae, F Natali
VALENCIA U - F Alted, R Cases, E Sanchis, J Velasco

Accelerator CERN-PBAR/P *Detector* Wire chamber

Reactions

$\bar{p}\,p \to \bar{p}\,p$	630 GeV (E_{cm})

Comments Measures the total cross section and the ratio ρ of the real to the imaginary part of the forward elastic scattering amplitude. The setup is composed of two pairs of Roman Pots placed symmetrically at 45 m from the crossing point. The horizontal scattering angle is measured by drift chambers, and the vertical coordinate is obtained by using an hodoscope. Taking data (March 92).

CERN-UA-006 (Aug 1980) Approved Apr 1981, Feb 1987; Completed Dec 1990.

AN INTERNAL HYDROGEN JET TARGET IN THE SPS TO STUDY INCLUSIVE ELECTROMAGNETIC FINAL STATES AT LARGE TRANSVERSE MOMENTUM IN $\bar{p}p$ AND pp INTERACTIONS AT $\sqrt{s}$ = 24.3 GeV

BOLOGNA U & INFN, BOLOGNA - G Valenti
CERN - G Ballocchi, L Camilleri (√ Spokesperson), P Giacomelli, W Kubischta
LAUSANNE U - C Comtat, A Ebongue, F Gaille, C Joseph, J F Loude, C Morel, P Oberson, J Pages, J P Perroud, D Ruegger, G Sozzi, L Studer, M T Tran, M Werlen
MICHIGAN U - T Dershem, E C Dukes, D B Hubbard, O E Overseth, G R Snow
ROCKEFELLER U - P T Cox, R W Rusack, A Vacchi
LUND U - G Von Dardel
MILAN U & INFN, MILAN - L Dick
YALE U - P Cushman, V Singh

Accelerator CERN-PBAR/P *Detector* Double-arm spectrometer

Reactions

$\bar{p}\,p \to e^+\,e^-$ X	24.3 GeV (E_{cm})
$\bar{p}\,p \to \pi^0$ X	"
$\bar{p}\,p \to \gamma$ X	"
$\bar{p}\,p \to \bar{p}\,p$	"
$\bar{p}\,p \to$ X	"
$p\,p \to e^+\,e^-$ X	"
$p\,p \to \pi^0$ X	"
$p\,p \to \gamma$ X	"
$p\,p \to p\,p$	"
$p\,p \to$ X	"

Particles studied $J/\psi(1S)$

Comments The $\bar{p}$ and p beams in the collider are in turn incident upon a gas jet target. In the reactions above, the emphasis is on large-mass electron pair production, the π^0 and γ inclusive cross sections at high p_t, and the elastic and inelastic cross sections at low t.

Papers NIM A252 (1986) 498, HPA 59 (1986) 584, PL B194 (1987) 568, NIM A273 (1988) 865, PL B206 (1988) 163, PL B216 (1989) 459, NIM A286 (1990) 49, and PL B252 (1990) 505.

CERN-UA-007 (Jan 1985) Approved Apr 1985; Completed May 1986.

MEASUREMENT BY SILICON SHOWER DETECTORS OF THE INVARIANT CROSS SECTION OF PHOTONS AND π^0's EMITTED CLOSE TO 0°

NAPLES U, IFS & INFN, NAPLES – V Innocente, S Lanzano
TOKYO U, COSMIC RAY LAB – K Kasahara, Y Muraki (✓ Spokesperson), T Nakada, T Yuda
RIKKYO U – H Murakami, A Nakamoto
WASEDA U – T Doke, T Kashiwagi, J Kikuchi, K Masuda
ECOLE POLYTECHNIQUE – J Bourotte, M Haguenauer, E Pare

Accelerator CERN-PBAR/P *Detector* Calorimeter

Reactions

$\bar{p}\,p \to \gamma\,X$	630 GeV (E_{cm})
$\bar{p}\,p \to \pi^0\,X$	"
$\bar{p}\,p \to K_S\,X$	"
$\bar{p}\,p \to \eta\,X$	"

Comments Measures the invariant cross section and the transverse momentum distribution of π^0's produced at large Feynman x. Uses finely segmented silicon shower calorimeters placed inside the Roman Pots of CERN-UA-004.

Papers NIM A274 (1989) 129, and PL B242 (1990) 531. No other papers expected.

CERN-UA-008 (Oct 1984) Approved Apr 1985; Completed Jun 1989.

STUDY OF JET STRUCTURE IN $\bar{p}p$ EVENTS TAGGED WITH LARGE-x PROTONS

UCLA – A Brandt, J B Cheze, S Erhan, A Kuzucu, D Lynn, M Medinnis, N Ozdes, P Schlein (✓ Spokesperson), M Zeyrek, J Zsembery, J Zweizig

Accelerator CERN-PBAR/P *Detector* UA2, Spectrometer

Reactions

$\bar{p}\,p \to \bar{p}\,p$ jet(s) X	630 GeV (E_{cm})
$\bar{p}\,p \to \bar{p}\,p\,X$	"
$\bar{p}\,p \to p\,X$	"
$\bar{p}\,p \to \bar{\Lambda}\,X$	"

Particles studied pomeron, p

Comments Studies large-x protons and antiprotons in the UA2 calorimeter system, and the jet structure in high-mass diffraction to investigate the pomeron and its possible parton contents. Uses four Roman Pot spectrometers and a fast (400 ns) data driven trigger processor. Interfaced to the CERN-UA-002 experiment. Several papers in preparation (April 92).

Papers PL B211 (1988) 239.

CERN-WA-069 (Mar 1980) Approved Apr 1981, Jun 1982, Jun 1985; Completed Jul 1986.

PHOTOPRODUCTION IN THE ENERGY RANGE 70–200 GeV

BONN U – M Baake, B Diekmann, F Fiedler, C Gapp, F Gebert, K Heinloth, C Hoeger, R P Hofmann, A Holzkamp, S Holzkamp, H P Jakob, D Joseph, J Kingler, G Koersgen, E Paul (✓ Spokesperson), H Rotscheidt, S Soeldner-Rembold, A S Weigend
CERN – D Barberis, T Charity, M Davenport, J Eades, R McClatchey
YEREVAN PHYS INST – L S Bagdassaryan, S Danagulyan, P I Galumyan, A G Oganessyan
LANCASTER U – T J Brodbeck, T Charity, A B Clegg, R C W Henderson, M T Hickmann, N R Keemer, D Newton, A O'Connor, G W Wilson
MANCHESTER U – M Atkinson, N Brook, P Coyle, B Dickinson, A Donnachie, A T Doyle, R J Ellison, J M Foster, R E Hughes-Jones, M Ibbotson, S D Kolya, G D Lafferty, H McCann, C McManus, D Mercer, P J Ottewell, D Reid, R J Thompson, J Waterhouse
RUTHERFORD – R Apsimon, P S Flower, G Hallewell, J A G Morris, J V Morris, C N Paterson, P H Sharp
SHEFFIELD U – S Danaher, W Galbraith, N A Thacker, L Thompson

Accelerator CERN-SPS *Detector* OMEGA

Reactions

$\gamma\,p \to$ hadrons	65–180 GeV/c
$\pi^+\,p \to$ hadrons	80, 140 GeV/c
$\pi^-\,p \to$ hadrons	"
$K^+\,p \to$ hadrons	"
$K^-\,p \to$ hadrons	"

Comments Continues photoproduction studies of WA-004 and WA-057 to higher energies, with comparison to hadronic beam data. Aim is to study the lowest order QCD processes giving evidence of point-like interactions of photons, and to compare the photon and hadron-induced production of π^0, $\pi^\pm$, η, ρ^0's, f_2's, f_0's, $K^*(892)$, and ϕ in the transition region from soft to hard processes. Data analysis in progress (April 92).

Papers IEEE TNS 30 (1983) 35, IEEE TNS 32 (1985) 674, NIM A241 (1985) 339, IEEE TNS 33 (1986) 122, IEEE TNS 34 (1987) 504, NP (Proc. Suppl.) B7 (1989) 255, ZPHY C42 (1989) 527, ZPHY C43 (1989) 63, ZPHY C44 (1989) 71, NP (Proc. Suppl.) B16 (1990) 236, ZPHY C46 (1990) 35, ZPHY C47 (1990) 397, ZPHY C50 (1991) 179, ZPHY C52 (1992) 397, and ZPHY C (accepted).

CERN-WA-070 (Aug 1980) Approved Oct 1981; Completed Nov 1986.

STUDY OF DIRECT PHOTON EVENTS IN HADRONIC COLLISIONS

GENEVA U – R Bopp, S U Chung, M Donnat, P A Dorsaz, J Fischer, M N Kienzle, M Martin (✓ Spokesperson), L Mathys, L Rosselet, M Werlen
GLASGOW U – S Jack, J G Lynch, A Maxwell, P J Negus, A S Thompson, R M Turnbull, J Wells
LIVERPOOL U – P S L Booth, L J Carroll, A J Cass, D N Edwards, J N Jackson, R Poultney, W H Range, S Snow
MILAN U & INFN, MILAN – M Bonesini, D Cavalli, G Costa, E Galluzzi, F Gianotti, L Mandelli, M Mazzanti, L Perini, G Polesello
NEUCHATEL U – E Bonvin, L Fluri, A Jornod

Accelerator CERN-SPS *Detector* OMEGA

Reactions

$\pi^+\,p \to \gamma\,X$	280 GeV/c
$\pi^+\,p \to \pi^0\,X$	"
$\pi^+\,p \to \eta\,X$	"
$\pi^-\,p \to \gamma\,X$	"
$\pi^-\,p \to \gamma\,\gamma\,X$	"
$\pi^-\,p \to \pi^0\,X$	"
$\pi^-\,p \to \eta\,X$	"
$p\,p \to \gamma\,X$	"
$p\,p \to \pi^0\,X$	"
$p\,p \to \eta\,X$	"

Comments Uses a fine-grained γ detecting calorimeter (lead plates and liquid scintillator in teflon tubes) together with the Omega spectrometer. γ's, π^0's, and η's are measured in all reactions in the p_T range between 4 and 7 GeV/c.

Papers NIM A261 (1987) 471, ZPHY C37 (1987) 39, ZPHY C37 (1988) 535, NIM A263 (1988) 325, NIM A264 (1988) 205, NIM A270 (1988) 21, NIM A270 (1988) 32, ZPHY C38 (1988) 371, NP (Proc. Suppl.) B7 (1989) 243, ZPHY C41 (1989) 591, ZPHY C42 (1989) 527, ZPHY C44 (1989) 71, PL B236 (1990) 523, and ZPHY C51 (1991) 163. No other papers expected.

CERN-WA-076 (Jan 1982) Approved Apr 1982, Nov 1984; Completed Nov 1986.

STUDY OF THE MESONS PRODUCED CENTRALLY IN THE REACTION $pp \to ppX^0$ AT 300 GeV/c

ATHENS U – M Spyropoulou-Stassinaki, G D Vassiliadis
BARI U – M Caponero, C Evangelista, B Ghidini, M Girone, V Lenti, F Navach, A Palano (✓ Spokesperson), G Zito
BIRMINGHAM U – I J Bloodworth, J N Carney, R Childs, J B Kinson, A Kirk, H R Shaylor, O Villalobos-Baillie, M F Votruba
CERN – W Beusch, B R French, Y Goldschmidt-Clermont, K Knudson, J C Lassalle, E Quercigh, N Redaelli, L Rossi
COLLEGE DE FRANCE – M Benayoun, J Kahane, P Leruste, A Malamant, J L Narjoux, M Sene, R Sene
PARIS, CURIE UNIV VI – A Jacholkowski, R Zitoun

Accelerator CERN-SPS *Detector* OMEGA

Reactions

$p\,p \to p\,p\,X$	85, 300 GeV/c
$\pi^+\,p \to \pi^+\,p\,X$	85 GeV/c

Particles studied $f_1(1420)$, meson^0, $f_0(975)$, $f_2(1720)$, glueball

Comments Examines many specific exclusive channels. The first phase completed in 1982 was at 85 GeV/c, the second phase was at 300 GeV/c. Data analysis in progress (April 92).

Papers PL B146 (1984) 273, IEEE TNS 32 (1985) 674, PL B166 (1986) 245, PL B167 (1986) 133, ZPHY C34 (1987) 23, ZPHY C34 (1987) 33, ZPHY C35 (1987) 167, NIM A274 (1989) 165, PL B221 (1989) 216, PL B221 (1989) 221, PL B227 (1989) 186, PL B228 (1989) 536, ZPHY C43 (1989) 55, NP (Proc. Suppl.) B16 (1990) 304, ZPHY C46 (1990) 405, ZPHY C48 (1990) 213, NP (Proc. Suppl.) B21 (1991) 49, ZPHY C51 (1991) 351, and ZPHY C52 (1991) 389.

CERN-WA-077 (Sep 1982) Approved Nov 1982; Completed Jul 1987.

SEARCH FOR DIRECT PRODUCTION OF GLUONIUM STATES IN HIGH p_t $\pi^- N$ COLLISIONS AT 350 GeV/c

ATHENS U – A Bellogianni, M Spyropoulou-Stassinaki, G Vassiliadis, I Vichou
BARI U – D Di Bari, C Evangelista, R Fini, B Ghidini, V Lenti, F Navach, A Palano, G Zito
BIRMINGHAM U – I J Bloodworth, J N Carney, J B Kinson, A Kirk, M T Trainor, O Villalobos-Baillie, M F Votruba
CERN – W Beusch, B R French, Y Goldschmidt-Clermont, A Jacholkowski, K Knudson, J C Lassalle, R Petronzio, E Quercigh
COLLEGE DE FRANCE – M Benayoun (✓ Spokesperson), J Kahane, P Leruste, A Malamant, J L Narjoux, K Safarik, M Sene, R Sene, A Volte
PARIS, CURIE UNIV VI – R Zitoun

Accelerator CERN-SPS *Detector* OMEGAPRIME

Reactions

π^- Be $\to$ hadrons	150, 300 GeV/c

Particles studied glueball, ρ, η', $f_2(1270)$, $f_0(975)$, $K^*(892)$, ϕ

Comments The aim is to study the prompt production mechanism expected to give rise to an abnormal rate of ρ and η' mesons, in contrast to what is predicted by the standard production mechanism of color string fragmentation. Also studies the production of glueball candidates, the *e.g.*, the $f_0(975)$. Analyzes correlations in particle pair production at p_{lab} = 300 GeV/c, and the higher twist production mechanism for ρ and η'. A study of $f_0(975)$ production is foreseen. Data analysis in progress (April 92).

Papers NIM A249 (1986) 391, PL B183 (1987) 412, PL B198 (1987) 281, NP (Proc. Suppl.) B7 (1989) 228, and ZPHY C (accepted).

CERN-WA-079 (Apr 1983) Approved Jun 1983; Started Aug 1986; Completed Aug 1991.

STUDY OF NEUTRINO-ELECTRON SCATTERING AT THE SPS

CHARM-II COLLABORATION
MIDDLE EAST TECH U, ANKARA – B Akkus, E Arik, M Serin-Zeyrek, R Sever, P Tolun, M T Zeyrek
BRUSSELS U, IIHE – P Vilain, G Wilquet
CERN – W Flegel, H Grote, H Overas, J Panman, A Rozanov, K Winter (✓ Spokesperson), G Zacek, V Zacek
HAMBURG U – R Beyer, F W Buesser, L Gerland, F Niebergall, G Raedel, P Stachelin, T Voss
LOUVAIN U – D Favart, G Gregoire, E Knoops, T Mouthuy
MOSCOW, ITEP – P Gorbunov, E A Grigoriev, V D Khovansky, A Maslennikov
MUNICH U, EXP PHYS – A Nathaniel, A Staude
NAPLES U, IFS & INFN, NAPLES – A Ereditato, V Palladino, P Strolin
INFN, ROME – A Capone, E Di Capua, U Dore, P F Loverre, D De Pedis, G Piredda, A Rambaldi-Frenkel, R Santacesaria
BERLIN-ZEUTHEN ADW – K Hiller, R Nahnhauer, H E Roloff

Accelerator CERN-SPS *Detector* CHARM-II

Reactions

$\nu_\mu\,e^-$	5–100 GeV/c
$\bar{\nu}_\mu\,e^-$	"

Comments The experiment aims at determining the electroweak mixing angle θ_W and the ratio g_A/g_V from the ratio of νe^- and $\bar{\nu} e^-$ scattering cross sections. The obtained values are to be compared to those determined at LEP for Q^2 values 10^6 times larger. The CHARM-II neutrino detector consists of a massive, fine-grained, and low-density electronic calorimeter, followed by a muon spectrometer made of magnetized iron, with scintillators and drift chambers as active elements. The measurements are performed in the horn-focused wide-band neutrino beam.

Papers NIM A252 (1986) 443, NIM A260 (1987) 368, NIM A263 (1988) 109, PL B213 (1988) 554, NIM A277 (1989) 83, NIM A277 (1989) 170, NIM A278 (1989) 670, PL B231 (1989) 317, PL B232 (1989) 539, PL B245 (1990) 271, PL B247 (1990) 131, NP (Proc. Suppl.) B19 (1991) 306, and PL B259 (1991) 499.

CERN-WA-080 (1982) Approved Feb 1983, Nov 1984; Completed Aug 1991.

STUDY OF RELATIVISTIC NUCLEUS-NUCLEUS COLLISIONS AT THE CERN SPS

BROOKHAVEN – C Chasman, R Debbe, O Hansen, B Moskowitz, H Wegner
CERN – P Beckmann, A Franz
DARMSTADT, GSI – R Albrecht, R Bock, H H Gutbrod, B Kolb, H R Schmidt
GRONINGEN U – H Loehner, I Lund
LBL – M Bloomer, P Jacobs, A Poskanzer
LUND U – G Claesson, A Eklund, S Garpmann, H A Gustafsson, J Idh, A Oskarsson, I Otterlund, K Soederstrom, E Stenlund
KURCHATOV INST, MOSCOW – V Antonenko, S Fokin, M Ippolitov, K Karadjev, A Lebedev, V Manko, S Nikolaev, A Vinogradov
MUNSTER U – F Berger, D Bock, G Clewing, L Dragon, R Glasow, M Hartig, G Hoelker, K H Kampert, T Peitzmann, M Purschke, B Roters, R Santo (✓ Spokesperson), R Schmidt, K Steffens, P Steinhauser, D Stucken, A Twyhues
OAK RIDGE – T Awes, F Obenshain, F Plasil, S Saini, M Tincknell, G Young
TENNESSEE U – S Sorensen

Accelerator CERN-SPS *Detector* Calorimeter, Spectrometer, PLASTIC-BALL

Reactions

^{16}O nucleus	60, 200 GeV (T_{lab}/N)
^{32}S nucleus	200 GeV (T_{lab}/N)
p nucleus	"

Comments Forward and transverse energies are determined in calorimeters. Photons, π^0's, and η's are measured in the finely granulated lead-glass spectrometer at midrapidity. Multiplicity distributions and fluctuations are studied in streamer tube arrays, and the target rapidity is investigated using the Plastic Ball detector.

Papers PL B199 (1987) 297, NP A461 (1987) 487c, PL B201 (1988) 390, PL B202 (1988) 596, NP A488 (1988) 651c, APP

B19 (1988) 399, ZPHY C38 (1988) 3, ZPHY C38 (1988) 51, ZPHY C38 (1988) 97, ZPHY C38 (1988) 109, NIM A276 (1989) 131, NIM A279 (1989) 479, NIM A279 (1989) 503, PL B221 (1989) 427, NP A498 (1989) 53c, NP A498 (1989) 391c, NP A498 (1989) 397c, ZPHY C45 (1989) 31, PS T32 (1990) 118, PS T32 (1990) 147, NP A519 (1990) 449c, NP (Proc. Suppl.) B16 (1990) 420, ZPHY C47 (1990) 367, NP A525 (1991) 305c, NP A525 (1991) 333c, NP A525 (1991) 657c, PR C44 (1991) 2736, ZPHY C51 (1991) 1, and ZPHY C53 (1992) 225.

CERN-WA-081 (1983) Approved Nov 1984; Completed Jun 1986.

MEASUREMENTS OF PAIR PRODUCTION UNDER CHANNELLING CONDITIONS BY 70–180 GeV PHOTONS INCIDENT ON SINGLE CRYSTALS

AARHUS U – J Bak, S P Moller, G Oades, K Ostergaard, J B B Petersen, E Uggerhoj (✓ Spokesperson)
CERN – A Sorensen
STRASBOURG, CRN – P Siffert, M Suffert

Accelerator CERN-SPS *Detector* OMEGA

Reactions

γ crystal $\rightarrow e^+ e^- X$ 15–150 GeV/c

Comments Uses the setup of CERN-WA-069.

Papers PL B202 (1988) 615, PL B212 (1988) 537, and PL B213 (1988) 242.

CERN-WA-082 (Oct 1985) Approved Feb 1986; Completed Sep 1989.

HIGH STATISTICS STUDY OF CHARM HADROPRODUCTION USING AN IMPACT PARAMETER TRIGGER

BOLOGNA U & INFN, BOLOGNA – A Forino, R Gessaroli, P Mazzanti, A Quareni-Vignudelli, F Viaggi
CERN – D Barberis, W Beusch, M Dameri, M Davenport, J P Dufey, B R French, A Jacholkowski, K Knudson, J C Lassalle, F Muller
GENOA U & INFN, GENOA – R Hurst, B Osculati, L Rossi (✓ Spokesperson), G Tomasini
INFN, MILAN & MILAN U – C Meroni, N Redaelli, D Torretta
MONS U – J L Bailly, A Buys, F Grard, P Legros
LEBEDEV INST – M I Adamovich, Y A Alexandrov, S G Gerassimov, S P Kharlamov, L V Malinina, M V Zavertyaev

Accelerator CERN-SPS *Detector* OMEGA

Reactions

π^- nucleus $\rightarrow$ charm X 340 GeV/c
p nucleus $\rightarrow$ charm X 370 GeV/c

Particles studied charm, D^+, D^0, D_s^+, Λ_c^+

Comments Triggers on charm decays by measuring the impact parameter. Uses silicon-strip counters as a microvertex detector.

Papers NP (Proc. Suppl.) B1 (1988) 303, IEEE TNS 37 (1990) 236, NIM A288 (1990) 82, NP (Proc. Suppl.) B16 (1990) 302, and PL B268 (1991) 142.

CERN-WA-083 (Oct 1985) Approved Feb 1986; Completed Nov 1986.

INVESTIGATION OF SOFT PHOTON PRODUCTION IN HADRONIC COLLISIONS USING THE OMEGA SPECTROMETER

ATHENS U – S Abatzis, A Belogianni, M Spyropoulou-Stassinaki (✓ Spokesperson), G Vassiliadis, I Vichou
TATA INST – S Banerjee, A Subramanian
CERN – D Barberis, W Beusch, B French, Y Goldschmidt-Clermont, M Grabowski, U Kerres, K Knudson, J A G Morris, E Quercigh, P Sonderegger
LANCASTER U – T J Brodbeck, G W Wilson

Accelerator CERN-SPS *Detector* OMEGA

Reactions

$\pi^- p \rightarrow \gamma(s)$ X 280 GeV/c

Comments Investigates an observation made in BEBC that the yield of soft γ's, after the subtraction of gammas from hadronic decays, exceeds the QED prediction of hadronic bremsstrahlung. Data analysis in progress (May 92).

Papers NP A525 (1991) 487c.

CERN-WA-084 (Jan 1987) Approved Apr 1987; Completed Sep 1991.

STUDY OF THE PRODUCTION AND DECAY PROPERTIES OF BEAUTY FLAVORED HADRONS

BRUSSELS U, IIHE – G Wilquet
CERN – F Antinori, W Beusch, J P Fabre, D R O Morrison
IMPERIAL COLL – A Duane, K Harrison, D M Websdale
PISA U & INFN, PISA – M Adinolfi, C Angelini, A Cardini, V Flaminio, D Lucchesi, C Roda
ROME U & INFN, ROME – A Frenkel, E Lamanna, G Martellotti (✓ Spokesperson), G Penso, S Petrera, A Sciubba, M Di Vincenzi
RUTHERFORD – D J Crennell
SOUTHAMPTON U – J G McEwen

Accelerator CERN-SPS *Detector* OMEGA

Reactions

π^- nucleus $\rightarrow B \overline{B}$ X 350 GeV/c

Comments Developing an active target composed of 30-μm-diameter scintillating plastic optical fibers. Aims are to measure the $B^\pm$ and B^0 lifetimes separately, the ratio $(b \rightarrow u)/(b \rightarrow c)$, and to search for $B^0\overline{B}^0$ mixing. Temporarily inactive (April 92).

Papers NIM A277 (1989) 132, NIM A289 (1990) 342, NIM A289 (1990) 356, NIM A295 (1990) 299, and NIM A311 (1992) 91.

CERN-WA-085 (Oct 1984, Mar 1987) Approved Apr 1987; Completed Sep 1991.

STUDY OF HIGH ENERGY NUCLEUS-NUCLEUS INTERACTIONS USING THE Ω' SPECTROMETER EQUIPPED WITH A MULTIPARTICLE HIGH p_T DETECTOR

ATHENS U – S Abatzis, G Vassiliadis
BARI U – N Di Bari, C Evangelista, R Falcone, R Fini, B Ghidini, M Girone, V Lenti, R A Loconsole, V Manzari, F Navach, A Palano
BERGEN U – N Amelin, L P Csernai, H Helstrup, A K Holme, E F Staubo
BIRMINGHAM U – R Barnes, J N Carney, D Evans, J B Kinson, O Villalobos-Baillie, M F Votruba
CERN – W Beusch, B R French, A Jacholkowski, A Kirk, K Knudson, J C Lassalle, E Quercigh (✓ Spokesperson)
GENOA U & INFN, GENOA – F Antinori
MADRID, CIEMAT – B de la Cruz, P Ladron de Guevara
COLLEGE DE FRANCE – M Benayoun, A Diaczek, J Kahane, P Leruste, L Lima-Frances, A Malamant, J L Narjoux, K Safarik, M Sene, R Sene, M Tamazouzt, A Volte
TRIESTE U & INFN, TRIESTE – A Bravar, A Penzo

Accelerator CERN-SPS *Detector* OMEGAPRIME

Reactions

^{32}S Wt 200 GeV (T_{lab}/N)

Comments An exploratory experiment to look for new physics, and particularly for evidence for a quark-gluon plasma.

Papers NP A498 (1989) 369c, PL B244 (1990) 130, NP (Proc. Suppl.) B16 (1990) 409, PL B259 (1991) 508, PL B270 (1991) 123, NP A525 (1991) 441c, and NP A525 (1991) 445c.

CERN-WA-086 (Mar 1987) Approved Jun 1987; Completed Sep 1991.

EXPOSURE OF CR39 STACKS TO OXYGEN AND/OR SULPHUR BEAMS AT THE CERN-SPS

BOLOGNA U & INFN, BOLOGNA G Giacomelli (✓ Spokesperson), A Margiotta-Neri, L Patrizii, P Serra-Lugaresi, G Sini, M Spurio, G Vanderhaeghe

Accelerator CERN-SPS *Detector* Plastic

Reactions

^{16}O nucleus	50, 200 GeV (T_{lab}/N)
^{32}S nucleus	"

Comments The main purpose is to calibrate CR-39 sheets to be used in a large-area search for magnetic monopoles (see UNDERGROUND-MACRO) at the Gran Sasso Laboratory. A byproduct is to obtain upper limits on the production of nuclei with attached fractional charge.

CERN-WA-087 (Mar 1987) Approved Jun 1987; Completed Oct 1987.

INVESTIGATION OF NUCLEAR FRAGMENTATION IN RELATIVISTIC HEAVY ION COLLISIONS USING PLASTIC NUCLEAR TRACK DETECTORS

SIEGEN U - C Brechtmann, J Dreute, W Heinrich (Spokesperson)

Accelerator CERN-SPS *Detector* Plastic

Reactions

^{32}S nucleus	200 GeV (T_{lab}/N)
^{16}O nucleus	60, 200 GeV (T_{lab}/N)

Comments Uses CR-39 track detectors to measure cross sections for production of nuclear fragments. Studies coulomb dissociation for various targets and energies.

Papers PL B200 (1988) 583, ZPHY A330 (1988) 407, ZPHY A331 (1988) 463, and MPL A4 (1989) 1879.

CERN-WA-088 (May 1987) Approved Jun 1987; Started Oct 1987; Completed Oct 1987.

TEST OF BUBBLE DAMAGE DETECTORS IN A HEAVY ION BEAM FROM THE SPS

CARLETON U - J L Pinfold (✓ Spokesperson), J Waterhouse
CHALK RIVER, AECL - H Ing
NATIONAL RESEARCH COUNCIL, OTTAWA - F G Oakham, C J Virtue

Accelerator CERN-SPS *Detector* Other

Reactions

^{32}S	200 GeV (T_{lab}/N)

Comments Studies properties of a polymer that holds droplets of a super-heated liquid in suspension. The threshold dE/dx to cause bubble formation varies with temperature and pressure, and the polymer can be reset with sufficient overpressure. Such a detector could be used to detect ionizing particles from cosmic rays or high energy particle interactions.

CERN-WA-089 (Aug 1987) Approved Feb 1988.

NEW HYPERON BEAM EXPERIMENT AT THE CERN-SPS USING THE OMEGA FACILITY

BOLOGNA U & INFN, BOLOGNA - A Forino, R Gessaroli, P Mazzanti, A Quareni-Vignudelli, F Viaggi
CERN - W Beusch, M Dameri, J P Dufey, B R French
GENOA U & INFN, GENOA - A Brunengo, R B Hurst, B Osculati, L Rossi, G Tomasini
GRENOBLE U - D Barberis, C Berat, M Buenerd, F Charignon, J Chauvin, J Y Hostachy, P Martin, M Rey-Campagnolle, R Touillon
HEIDELBERG, MAX PLANCK INST - E Albertson, K Brenzinger, S Brons, W Brueckner, F Dropmann, S G Gerassimov, M Godbersen, M Heydrich, T Kallakowsky, R Michaels, S Paul (✓ Spokesperson), B Povh, L Schmitt, A Trombini, A Wenzel, R Werding
HEIDELBERG U - J Engelfried, F Faller, J Heintze, P Lennert, S Ljungfelt, K Martens, H Rieseberg, H W Siebert, A Simon, G Waelder
MAINZ U, INST PHYS - E Chudakov, U Mueller, G Rosner, H Rudolph, B Volkemer, T Walcher
LEBEDEV INST - M I Adamovich, Y A Alexandrov, S P Kharlamov, L N Malinina, N G Peresadko, M V Zavertyaev

Accelerator CERN-SPS *Detector* OMEGA

Reactions

Σ^- Cu	360 GeV/c
Σ^- Be	"
Ξ^- Cu	270 GeV/c
Ξ^- Be	"
Ω^- Cu	"
Ω^- Be	"

Particles studied Λ_c^+, $\Sigma_c(2455)$, Ξ_c^0, Ξ_c^+, Ω_c^0, Ω^-, Ω^*(unspec), Ξ^*(unspec), dibaryon($S = -2$), $U(3100)$

Comments The aims are (1) to study charmed strange baryons, (2) to see if the $U(3100)$ actually exists, (3) to study Ω decays and Ξ and Ω resonances, and (4) to look for the doubly strange dibaryon, the H. Taking data (April 92).

CERN-WA-090 Approved Apr 1990.

MEASUREMENTS OF PAIR PRODUCTION AND ELECTRON CAPTURE FROM THE CONTINUUM IN HEAVY PARTICLE COLLISIONS

SIEGBAHN INST PHYS, STOCKHOLM - H Gao, R H Schuch
LUND U - R Hutton
OAK RIDGE - C Bottcher, S Datz (Spokesperson), P F Dittner, H F Krause, M Strayer, C R Vane

Accelerator CERN-SPS *Detector* ?

Reactions

^{32}S nucleus	200 GeV (T_{lab}/N)

Comments Runs parasitic to WA-093. Studies the electron capture from pair production. This is the only electron capture process which increases with energy, and as such, dominates all others in the ultrarelativistic energy regime. Thin Au, Pd, and Al targets are placed in a beam line dipole magnet: e^+e^- pairs created in the forward direction are split and bent into the detector planes on either side of the target. Taking data (March 92).

CERN-WA-091 Approved Apr 1990.

SEARCH FOR CENTRALLY PRODUCED NON-$q\bar{q}$ MESONS IN PROTON-PROTON INTERACTIONS AT 450 GeV/c BY USING THE CERN Ω SPECTROMETER

ATHENS U - S Abatzis, G Vassiliadis
BARI U & INFN, BARI - N Di Bari, C Evangelista, R Fini, B Ghidini, M Girone, V Lenti, A Loconsole, V Manzari, F Navach
BIRMINGHAM U - R P Barnes, J N Carney, C J Dodenhoff, D Evans, J B Kinson, O Villalobos-Baillie, M F Votruba
CERN - W Beusch, B R French, A Jacholkowski, A Kirk (✓ Spokesperson), K Knudson, J C Lassalle, E Quercigh
DUBNA - J Budagov, S Maljukov, I Minashvili, N Russakovich, A Semenov, A Solovjev, G Tchlatchidze
COLLEGE DE FRANCE - M Sene, R Sene

Accelerator CERN-SPS *Detector* OMEGA

Reactions

$p\,p \rightarrow p\,p\,X$	450 GeV/c

Comments A search for new, non-$q\bar{q}$ states in the central region, with at least 10 times the statistics of the CERN-WA-076 experiment. Taking data (April 92).

CERN-WA-092 Approved Jul 1990.

MEASUREMENT OF BEAUTY PARTICLE LIFETIMES AND HADROPRODUCTION CROSS SECTIONS

BOLOGNA U & INFN, BOLOGNA - A Forino, R Gessaroli, L Malferrari, P Mazzanti, A Quareni
CERN - F Antinori, W Beusch, J P Dufey, J P Fabre, B R French, A Kirk, J C Lassalle, D R O Morrison, G Schuler
GENOA U & INFN, GENOA - D Barberis, D Casanova, M Dameri, G Darbo, R Hurst, P Martinengo, B Osculati, L Rossi (✓ Spokesperson), C Salvo
IMPERIAL COLL - A Duane, D M Websdale
LEBEDEV INST - M Adamovich, Y Alexandrov, S Gerasimov, S Kharlamov, P Nechaeva, M Zaveryaev
PISA U & INFN, PISA - C Angelini, A Cardini, V Flaminio, C Roda
ROME U & INFN, ROME - C Bacci, F Ceradini, G Ciapetti, A Frenkel, K Harrison, F Lacava, G Martellotti, A Nisati,

G Penso, E Petrolo, L Pontecorvo, M Torelli, S Veneziano, L Zanello
ROME U, TORVERGATA & INFN, ROME – R Cardarelli, A Di Ciaccio, R Santonico
SOUTHAMPTON U – J G McEwen

Accelerator CERN-SPS *Detector* ?

Comments An experimental search for beauty particles produced in fixed target hadronic interactions. Uses a high precision "decay detector" and a fast secondary vertex trigger processor. Taking data (April 92).

CERN-WA-093 Approved Nov 1990.

A LIGHT UNIVERSAL DETECTOR FOR THE STUDY OF CORRELATIONS BETWEEN PHOTONS AND CHARGED PARTICLES

CALCUTTA, VECC – S Chattopadhyay, A Das, M R Dutta-Mazumdar, T Ghosh, G N S Murhty, B Sinha, D K Srivastava, M D Trivedi, Y P Viyogi
DARMSTADT, GSI – R Bock, H H Gutbrod (✓ Spokesperson), B W Kolb, M Purschke, B Roters, H R Schmidt, P Steinhaeuser
GENEVA U – A L S Angelis, P Doenni, E Durieux, M Izycki, M Martin, L Rosselet, N Solomey
GRONINGEN U – H Loehner, I Lund, S Slegt
LUND U – A Eklund, S Garpman, H A Gustafsson, J Idh, A Oskarsson, I Otterlund, K Soederstrom, E Stenlund, H J Whitlow
JAMMU U – S K Badyal, B P V K S Devanand, S Kachroo, N K Rao, S Sambyal
KURCHATOV INST, MOSCOW – V Antonenko, S Fokin, M Ippolitov, K Karadjev, A Lebedev, V Manko, S Nikolaev, A Vinogradov
MUNSTER U – F Berger, D Bock, G Clewing, L Dragon, R Glasow, M Hartig, G Hoelker, K Kampert, T Peitzmann, R Santo, K Steffens, D Stueken, A Twyhues
OAK RIDGE – T C Awes, H Kim, J Kreke, F E Obenshain, F Plasil, S Saini, G R Young
PANJAB U – M M Aggarwal, V S Bhatia, I S Mittra
RAJASTHAN U – K B Bhalla, S K Gupta, V Kumar, S Lokanathan, S Mukherjee, S Raniwala
TENNESSEE U – X He , S P Sorensen
UTRECHT U – N van Eijndhoven, F Geurts, E van Heeringen, R Kamermans, P Kuijer, C Twenhoevel
WARSAW, INST NUCL STUDIES – T Siemiarczuk, G Stefanek

Accelerator CERN-SPS *Detector* ?

Reactions

Su nucleus 200 GeV (T_{lab}/N)

Comments The experiment combines two essential means of quark matter diagnosis: the measurement of photon production rates relative to charged particles, and the measurement of transverse momenta of charged and neutral particles and their correlations. The setup consists of highly segmented lead glass arrays, a preshower detector that can be operated in a hadron-blind mode, and a set of multistep avalanche chambers read out by CCD cameras downstream of the GOLIATH vertex magnet. Scheduled to run till May 92.

CERN-WA-094 Approved Apr 1991.

STUDY OF BARYON AND ANTIBARYON SPECTRA IN SULPHUR–SULPHUR INTERACTIONS AT 200 GeV/c PER NUCLEON

ATHENS U – S Abatzis, G Vassiliadis
BARI U – D Di Bari, R Fini, B Ghidini, M Girone, V Lenti, R A Loconsole, V Manzari, F Navach
BERGEN U – N S Amelin, L P Csernai, H Helstrup, A K Holme, E F Staubo
BIRMINGHAM U – R P Barnes, J N Carney, C J Dodenhoff, D Evans, J B Kinson, O Villalobos-Baillie, M F Votruba
CERN – F Antinori, W Beusch, J P Dufey, B R French, A Jacholkowski, A Kirk, K Knudson, J C Lassalle, F Piuz, E Quercigh (✓ Spokesperson)
KOSICE, IEF – J Ban, J Boehm, L Sandor, J Urban, P Zavada
LEGNARO – R A Ricci
MADRID, CIEMAT – C Burgos, B de la Cruz, P Ladron de Guevara, C Willmot
PADUA U & INFN, PADUA – M Morando
COLLEGE DE FRANCE – M Benayoun, A Diaczek, J Kahane, P Leruste, L Lima-Frances, A Malamant, J L Narjoux, M Pairat, K Safarik, M Sene, R Sene, A Volte
SERPUKHOV – V A Kachanov, A V Singovsky
STRASBOURG, CRN – R Blaes, J M Brom, B Escoubes, W Geist, J L Jacquot, M E Michalon-Mentzer, A Michalon, J L Riester, C Voltolini
TRIESTE U & INFN, TRIESTE – A Bravar, A Penzo

Accelerator CERN-SPS *Detector* OMEGA

Reactions

Su Su 200 GeV (T_{lab}/N)

Comments Extends analysis of CERN-WA-085 from S W to S S interactions. For the 1992 run the apparatus has been modified to measure charged particle spectra (in particular p and $\bar{p}$) with particle identification using an array of Si-microstrip detectors and a newly upgraded Ring Imaging Čerenkov detector. Taking data (April 92).

CERN-WA-095 Approved Sep 1991.

A NEW SEARCH FOR ν_μ–ν_τ OSCILLATIONS

MIDDLE EAST TECH U, ANKARA – E Arik, G Onengut, E Pesen, M Serin-Zeyrek, R Sever, P Tolun, M T Zeyrek
BARI U – N Armenise, M G Catanesi, M T Muciaccia, S Simone
HUMBOLDT U, BERLIN – K Hopfner, P Lendermann, T Patzak
BRUSSELS U, IIHE – M Gruwe, C Mommaert, P Vilain, G Wilquet
CERN – R Beyer, J Fabre, W Flegel, K Hiller, P Lendermann, H Overas, J Panman, A Rozanov, G Stefanini, K Winter (✓ Spokesperson), H Wong, G Zacek, V Zacek
FERRARA U – E Di Capua, B Saitta
LOUVAIN U – D Favart, G Gregoire, V Lemaitre, L Michel
MOSCOW, ITEP – A Artamonov, P Gorbunov, V Khovansky, V Shamanov, V Smirnitsky
LEBEDEV INST – M Adamovich, M Chernyavsky, G Orlova, N Peresadko, V Rapoport, V Tsarev
NAPLES U, IFS & INFN, NAPLES – S Buontempo, A Ereditato, V Palladino, P Strolin
ROME U & INFN, ROME – G Baroni, A Capone, U Dore, S Di Liberto, P F Loverre, D Macina, M A Mazzoni, F Meddi, D De Pedis, G Piredda, G Rosa, R Santacesaria
SALERNO U & INFN, SALERNO – G Grella, G Romano
AICHI U OF EDUCATION – K Kodama, N Ushida
GIFU U – K Nakazawa
KOBE U – S Aoki, H Fukushima, T Hara, T Takahashi
KINKI U, HIZUKA – H Chikawa
NAGOYA U – K Hoshino, M Kobayashi, M Miyanishi, M Nakamura, Y Nakamura, S Nakanishi, T Nakano, K Niu, K Niwa, M Nomura, K Saito, O Sato, H Tajima, K Teraoka, S Yoshida
OSAKA CITY U – K Nakamura, T Okusawa, M Teranaka, T Tominaga, T Yoshida, H Yuuki
OSAKA PREFECTURE U – H Okabe, J Yokoto
TOHO U – M Adachi, T Jinya, M Kazuno, E Niu, H Shibuya, M Tairadate, Y Umezawa
UTSUNOMIYA U – Y Sato, I Tezuka
YOKOHAMA NATIONAL U – Y Maeda
KANGWEON NATIONAL U – C H Hahn
GYEONGSANG NATIONAL U – K S Chung, S H Chung, D C Kim, S H Oh, I G Park, M S Park, J S Song, C S Yoon

Accelerator CERN-SPS *Detector* Spectrometer, Calorimeter

Reactions

ν_τ nucleon $\rightarrow \tau^-$ X

Comments The setup consists of a target region, an aircore magnet, a high-precision calorimeter, and a muon spectrometer. Nuclear emulsion stacks form the 800-kg mass of the fiducial target volume. Decays of short-lived particles, such as the τ, are visualized with high efficiency. Tracks are located in the emulsion with high-precision scintillating fiber trackers, and read out with optoelectronic image intensifiers coupled to CCD cameras, thus permitting computer-assisted scanning. The hexagonal aircore magnet provides the measurement of the charge-sign of low energy hadrons and muons. The high-precision calorimeter, which is based on spaghetti technology, tags the τ^- decay by its transverse momentum imbalance. The

spectrometer identifies muons and measures their momentum and charge. In preparation (April 92).

CERN-WA-096 Approved Sep 1991.

SEARCH FOR THE OSCILLATION $\nu_\mu \rightarrow \nu_\tau$

ALGIERS, ECOLE NAT POLYTECH - M Kadi-Hanifi, M R Ouared, Y Touaibia, N Zenine
BOSTON U - R Cormack, E T Kearns, S Merritt, J L Stone
CERN - L Camilleri, L Di Lella, C Sobczynski
DORTMUND U - C Goessling, D Pollmann, V Sondermann
DUBNA - S A Baranov, Y A Batusov, S A Bunyatov, O L Klinov, O M Kuznetsov, V V Lyukov, Y A Nefedov, V I Snyatkov
ANNECY - M Gouanere, H Pessard, D Sillou
PARIS, CURIE UNIV VI & PARIS, UNIV VII, LPNHE - P Astier, J Dumarchez, A Letessier, J M Levy, A M Touchard, F Vannucci (✓ Spokesperson)
LUND U - T Akesson
MELBOURNE U - S Tovey
MICHIGAN U - G Ballocchi, D B Hubbard, O E Overseth, G R Snow
PADUA U - M Baldo-Ceolin, F Bobisut, D Gibin, A Guglielmi, M Laveder, M Mezzetto, G Puglierin
PAVIA U - G Ambrosini, P Cattaneo, M Fraternali, G Fumagalli, G Goggi, F Pastore, G Polesello
PISA U - D Anterio, V Cavasinni, N DelPrete
SACLAY - A Baldisseri, M Banner, J Bouchez, J P Meyer, X Stolarczyk, H Zaccone
BOSKOVIC INST, ZAGREB - D Kekez, A Ljubičić, E Manola, M Stipčević, T Tustonić

Accelerator CERN-SPS *Detector* ?

Comments Searches for the oscillation $\nu_\mu \rightarrow \nu_\tau$ in the wide-band neutrino beam. Aims at detecting ν_τ charged current interactions by observing the production of the τ through its various decay modes by means of kinematical criteria. The detector reconstructs the event kinematics. It uses the CERN-UA-001 magnet. The target consists of 145 drift chambers, with a total mass of 2.9 tons. It is followed by transition radiation detectors and an electromagnetic calorimeter which includes a preshower detector. In preparation (April 92).

CERN-WA-097 Approved Sep 1991.

STUDY OF BARYON AND ANTIBARYON SPECTRA IN Pb–Pb INTERACTIONS AT 160 GeV/c PER NUCLEON

BARI U & INFN, BARI - N Armenise, D Di Bari, M G Catanesi, C Evangelista, R A Fini, B Ghidini, M Girone, V Lenti, V Manzari, M T Muciaccia, E Nappi, F Navach, A Palano, F Posa, T Scognetti, S Simone, G Tomasicchio
BERGEN U - E Anderson, L P Csernai, H Helstrup, A K Holme, G Lovhoiden, E F Staubo, T F Thorsteinsen
BIRMINGHAM U - R P Barnes, J N Carney, C J Dodenhoff, D Evans, J B Kinson, O Villalobos-Baille, M F Votruba
CERN - F Antinori, W Beusch, E Chesi, J P Dufey, B R French, A Jacholkowski, A Kirk, K Knudson, J C Lassalle, F Piuz, E Quercigh (Spokesperson), G Vassiliadis
COLLEGE DE FRANCE - M Benayoun, A Diaczek, J Kahane, P Leruste, L Lima-Frances, A Malamant, J L Narjoux, M Pairat, K Safarik, M Sene, R Sene, A Volte
GENOA U & INFN, GENOA - M Dameri, G Darbo, P Martinengo, B Osculati, L Rossi, C Salvo
KOSICE, IEF - J Ban, J Boehm, L Sandor, J Urban, P Zavada
LEGNARO - R A Ricci
PADUA U & INFN, PADUA - M Morando, F Pellegrini, G Segato
ROME U & INFN, ROME - H Beker, S Di Liberto, M A Mazzoni, F Meddi, G Rosa, T Virgili
SALERNO U & INFN, SALERNO - G Grella, G Romano
SERPUKHOV - U A Kachanov
STRASBOURG, CRN - R Blaes, J M Brom, B Escoubes, W Geist, J L Jacquot, M E Michalon-Mentzer, A Michalon, J L Riester, C Voltolini
TRIESTE U & INFN, TRIESTE - A Bravar, A Penzo

Accelerator CERN-SPS *Detector* OMEGA

Reactions

Pb Pb 260 GeV (T_{lab}/N)

Comments Hyperons are expected to be a useful probe for the dynamics of hadronic matter under extreme conditions. In particular, the onset of a quark-gluon plasma phase in a heavy ion collision is expected to enhance the hyperon yield with respect to normal hadronic interactions. The experiment measures the spectra of hyperons and antihyperons produced in ultrarelativistic lead-lead interactions over a wide phase-space window. The principal aim is to compare the production of baryons carrying one unit of strangeness (Λ) with those carrying two (Ξ^-) and three units of strangeness (Ω^-). In preparation (March 92).

CESR Experiments

CESR-CLEO Started Oct 1979.

THE CLEO EXPERIMENT AT CESR

CAL TECH - D S Akerib, B Barish, M Chadha, D F Cowen, G Eigen, J S Miller, J Urheim, A J Weinstein
UC, SAN DIEGO - D Acosta, G Masek, B Ong, H Paar, M Sivertz
UC, SANTA BARBARA - S Menary, R J Morrison, H Nelson, J Richman, D Schmidt, D Sperka, H Tajima, M Witherell
CARNEGIE MELLON U - M Procario
COLORADO U - M Daoudi, W T Ford, D R Johnson, K Lingel, M Lohner, P Rankin, J G Smith
CORNELL U - J Alexander, C Bebek, K Berkelman, D Besson, T E Browder, D G Cassel, E Cheu, D M Coffman, P S Drell, R Ehrlich, R S Galik, M Garcia-Sciveres, B Geiser, M G D Gilchriese, B Gittelman, S W Gray, D L Hartill, B K Heltsley, K Honscheid, C Jones, J Kandaswamy, N Katayama, P C Kim, D L Kreinick, G S Ludwig, J Masui, J Mevissen, N B Mistry, S Nandi, C R Ng, E Nordberg, C O'Grady, J R Patterson, D Peterson, D Riley, M Sapper, M Selen, H Worden, M Worris, F Wuerthwein
FLORIDA U - P Avery, A Freyberger, J Rodriguez, R Stephens, J Yelton
HARVARD U - S Henderson, K Kinoshita, F Pipkin, M Saulnier, R Wilson, J Wolinski, D Xiao, H Yamamoto
ITHACA COLL - A J Sadoff
KANSAS U - R Ammar, S Ball, P Baringer, D Coppage, R Davis, M Kelly, N Kwak, H Lam, S Ro
MINNESOTA U - Y Kubota, M Lattery, J K Nelson, D Perticone, R Poling, S Schrenk, R Wang
SUNY, ALBANY - M S Alam, I J Kim, B Nemati, J J O'Neill, V Romero, H Severini, C R Sun, P Wang, M M Zoeller
OHIO STATE U - G Crawford, R Fulton, K K Gan, H Kagan, R Kass, J Lee, R Malchow, F Morrow, M K Sung, C White, J Whitmore, P Wilson
OKLAHOMA U - F Butler, X Fu, G Kalfbleisch, M Lambrecht, P Skubic, J Snow, P Wang
PURDUE U - D Bortoletto, D N Brown, J Dominick, R L McIlwain, D H Miller (√ Spokesperson), M Modesitt, S F Schaffner, E I Shibata, I P J Shipsey
ROCHESTER U - M Battle, J Ernst, H Kroha, S Roberts, K Sparks, E H Thorndike, C Wang
SOUTHERN METHODIST U - R Stroynowski
SYRACUSE U - M Artuso, M Goldberg, T Haupt, N Horwitz, R Kennett, G C Moneti, S Playfer, Y Rozen, P Rubin, T Skwarnicki, S Stone, M Thulasidas, W Yao, G Zhu
VANDERBILT U - A V Barnes, J Bartelt, S E Csorna, V Jain, T Letson, M D Mestayer

Accelerator CESR *Detector* CLEO

Reactions

$e^+ e^- \to$ hadrons	9.0-12.0 GeV (E_{cm})
$e^+ e^- \to e^+ e^-$	"
$e^+ e^- \to \mu^+ \mu^-$	"
$e^+ e^- \to e^+ e^-$ hadrons	"
$e^+ e^- \to \tau^+ \tau^-$	"

Particles studied $\Upsilon(1S)$, $\Upsilon(2S)$, $\Upsilon(3S)$, $\Upsilon(4S)$, B, τ, D^+, D^0, D_s^+, charmed-baryon

Comments Studies e^+e^- interactions in the energy range of the Υ resonances. Topics include $b\bar{b}$ spectroscopy, b-quark decays, decays of the Υ's, τ decays, charm spectroscopy and decays, and two-photon physics. The CLEO-II detector (operational since 1989) consists of drift chambers for tracking charged particles and measuring dE/dx, time-of-flight counters, a 7800-element cesium iodide electromagnetic calorimeter, a 1.5-Tesla superconducting solenoid, iron for flux return and muon identification, and muon chambers. Taking data (April 92).

Papers PRL 44 (1980) 1108, PRL 45 (1980) 219, PRL 46 (1981) 84, PRL 46 (1981) 88, PRL 46 (1981) 1181, PRL 48 (1982) 1070, PRL 49 (1982) 357, PRL 49 (1982) 610, PRL 49 (1982) 617, PR D27 (1983) 475, PR D27 (1983) 1665, NIM 211 (1983) 47, PL B122 (1983) 317, PRL 50 (1983) 807, PRL 50 (1983) 877, PRL 50 (1983) 881, PRL 51 (1983) 347, PRL 51 (1983) 634, PRL 51 (1983) 1139, PRL 51 (1983) 1143, PR D29 (1984) 1285, PRL 52 (1984) 799, PL B137 (1984) 277, PRL 52 (1984) 1084, PRL 53 (1984) 24, PRL 53 (1984) 1309, PR D30 (1984) 1433, PR D30 (1984) 1996, PR D30 (1984) 2279, PRL 54 (1985) 381, PRL 54 (1985) 1894, PRL 55 (1985) 923, PRL 55 (1985) 1248, PR D31 (1985) 2161, PR D31 (1985) 2386, PR D32 (1985) 2294, PR D32 (1985) 2468, PRL 56 (1986) 800, PRL 56 (1986) 1222, PRL 56 (1986) 1893, PRL 56 (1986) 2676, PR D33 (1986) 300, PR D34 (1986) 905, PRL 56 (1986) 2781, PR D34 (1986) 3279, PL B183 (1987) 429, PL B191 (1987) 319, PRL 58 (1987) 183, PR D35 (1987) 19, PRL 58 (1987) 307, PRL 58 (1987) 1814, PR D35 (1987) 1081, PR D35 (1987) 2747, PR D35 (1987) 3533, PR D36 (1987) 690, PR D36 (1987) 1289, PRL 59 (1987) 22, PRL 59 (1987) 407, PRL 59 (1987) 1993, PRL 60 (1988) 1614, PR D37 (1988) 1719 [erratum: PR D39 (1989) 1471], PR D38 (1988) 2679 [erratum: PR D40 (1989) 1701], PRL 62 (1989) 8, PRL 62 (1989) 863, PRL 62 (1989) 1240, PRL 62 (1989) 2233, PRL 62 (1989) 2436, PR D39 (1989) 3528, PL B223 (1989) 470, PL B224 (1989) 445, PR D40 (1989) 263, PR D40 (1989) 712 [erratum: PR D40 (1989) 3790], PL B226 (1989) 192, PL B226 (1989) 401, PRL 63 (1989) 1667, PRL 64 (1990) 16, PRL 64 (1990) 2117, PRL 64 (1990) 2226, PRL 65 (1990) 1184, PRL 65 (1990) 1531, PRL 65 (1990) 2842, PR D41 (1990) 805, PR D41 (1990) 774, PR D41 (1990) 1401, PL B243 (1990) 169, PL B251 (1990) 223, PRL 67 (1991) 1692, PRL 67 (1991) 1696, PR D43 (1991) 651, PR D43 (1991) 1448, PR D43 (1991) 2836, PR D43 (1991) 3599, PR D44 (1991) 593, PR D44 (1991) 3383, PR D44 (1991) 3394, PRL 68 (1992) 1275, PRL 68 (1992) 1279, PR D45 (1992) 1, PR D45 (1992) 752, and PR D45 (1992) 2212.

CESR-CUSB-II (1978) Approved Jun 1984; Started Dec 1985; Completed May 1991.

CUSB-II — HIGH RESOLUTION BGO CALORIMETER TO STUDY Υ SPECTROSCOPY AND B PHYSICS

COLUMBIA U - P Franzini (√ Spokesperson), S Kanekal, P M Tuts (√ Spokesperson), Q W Wu
SUNY, STONY BROOK - U Heintz, T M Kaarsberg, J Lee-Franzini (√ Spokesperson), D M J Lovelock, M Narain, R D Schamberger, Jr , J Willins, C Yanagisawa

Accelerator CESR *Detector* CUSB-II

Reactions

$e^+ e^- \to$ hadrons	9.4-11.6 GeV (E_{cm})
$e^+ e^- \to e^+ e^-$	"
$e^+ e^- \to \mu^+ \mu^-$	"
$e^+ e^- \to \gamma$ X	"

Particles studied $\Upsilon(1S)$, $\Upsilon(2S)$, $\Upsilon(3S)$, $\Upsilon(4S)$, $\Upsilon(10860)$, $\Upsilon(11020)$, $\chi_{b0}(1P)$, $\chi_{b1}(1P)$, $\chi_{b2}(1P)$, $\chi_{b0}(2P)$, $\chi_{b1}(2P)$, $\chi_{b2}(2P)$, B, B^*, higgs, axion, $\zeta(8300)$, η_b, s-quark

Comments Continues the CESR-CUSB-I experiment with an upgraded detector. The detector consists of a bismuth germanate (BGO) electromagnetic calorimeter inserted in the CUSB-I NaI and Pb-glass array. Covers a solid angle of about 2/3 of 4π. A drift chamber between the beam pipe and the BGO cylinder provides charged-particle tracking.

Papers Includes CESR-CUSB-I papers: PRL 44 (1980) 1111, PRL 45 (1980) 222, PRL 46 (1981) 1115, PRL 47 (1981) 771, PRL 48 (1982) 906, PR D26 (1982) 717, PR D26 (1982) 720, PL B114 (1982) 277, NP B206 (1982) 1, PRL 49 (1982) 1612, PRL 49 (1982) 1616, PL B118 (1982) 453, PRL 51 (1983) 160, PL B130 (1983) 439, PL B130 (1983) 444, PR D29 (1984) 2483, NP B242 (1984) 31, PL B138 (1984) 225, PL B139 (1984) 332, PL B141 (1984) 271, PR D30 (1984) 1985, PRL 54 (1985) 377, PRL 55 (1985) 36, PRL 56 (1986) 2672, PL B186 (1987) 233, PR D35 (1987) 2265, PR D35 (1987) 2883, NIM A263 (1988) 35, NIM A265 (1988) 243, PRL 62 (1989) 2077, PRL 65 (1990) 2749, PRL 65 (1990) 2947, NIM A309 (1991) 450, PL B273 (1991) 177, PRL 66 (1991) 1563, PRL 66 (1991) 2436, and PRL 66 (1991) 3113.

DESY Experiments

DESY-DORIS-ARGUS Approved 1979; Started Sep 1982.

ARGUS — A NEW DETECTOR FOR DORIS

DESY – H Albrecht, H I Cronstroem, H Erlichmann, T Hamacher, R P Hofmann, T Kirchhoff, A Nau, S Nowak, M Reidenbach, R Reiner, H Schroeder (✓ Spokesperson), H D Schulz, M Walter, R Wurth
DORTMUND U – R D Appuhn, C Hast, H Kolanoski, A Lange, A Lindner, R Mankel, M Schieber, T Siegmund, B Spaan, H Thurn, D Toepfer, A Walther, D Wegener
ERLANGEN U – M Paulini, K Reim, H Wegener
HAMBURG U – R Mundt, T Oest, W Schmidt-Parzefall
HEIDELBERG U. IHEP – W Funk, J Stiewe, S Werner
HEIDELBERG, MAX PLANCK INST – K Ehret, A Hoelscher, W Hofmann, A Huepper, S Khan, K T Knoepfle, J Spengler
IPP, CANADA – D I Britton, C E K Charlesworth, K W Edwards, E R F Hyatt, H Kapitza, P Krieger, D B MacFarlane, P M Patel, J D Prentice, P R B Saull, S C Seidel, K Tzamariudaki, R G Van de Water, T Yoon
KARLSRUHE U – D Ressing, M Schmidtler, M Schneider, K R Schubert, K Strahl, R Waldi, S Weseler
STEFAN INST, LJUBLJANA & LJUBLJANA U – G Kernel, P Krizan, E Kriznic, T Podobnik, T Zivko
LUND U – L Joensson
MOSCOW, ITEP – V Balagura, I Belyaev, M Danilov, A Droutskoy, A Golutvin, I Gorelov, G Kostina, V Lubimov, P Murat, P Pakhlov, F Ratnikov, S Semenov, V Shibaev, V Soloshenko, I Tichomirov, Y Zaitsev

Accelerator DESY-DORIS-III *Detector* ARGUS

Reactions

$e^+ e^-$	9.3–10.6 GeV (E_{cm})
$e^+ e^- \to$ charm X	"
$e^+ e^- \to$ bottom X	"
$e^+ e^- \to \Upsilon$(unspec)	"
$e^+ e^- \to$ hvy-lepton X	"

Particles studied charm, bottom, Υ(unspec), hvy-lepton, ν_τ

Comments Studies b-quark physics, and the τ and ν_τ. The detector consists of a Si strip detector and a microvertex drift chamber surrounding the beam pipe, a tracking chamber, shower and TOF counters, solenoid coils, and a large iron yoke. Upgraded in 1990/91. Taking data (April 92).

Papers NIM 163 (1979) 77, NIM 195 (1982) 475, NIM 205 (1983) 125, NIM 216 (1983) 35, NIM 217 (1983) 153, PL B134 (1984) 137, PL B135 (1984) 498, PL B146 (1984) 111, NIM A235 (1985) 26, NIM A237 (1985) 464, PL B150 (1985) 235, PL B153 (1985) 343, PL B154 (1985) 452, PL B156 (1985) 134, ZPHY C28 (1985) 45, PL B157 (1985) 326, PL B158 (1985) 525, PL B160 (1985) 331, PL B162 (1985) 395, PL B163 (1985) 404, ZPHY C29 (1985) 167, NIM A249 (1986) 277, NIM A252 (1986) 384, PTE 2 (1986) 66, PRL 56 (1986) 549, PL B167 (1986) 360, ZPHY C31 (1986) 181, PL B179 (1986) 398, PL B179 (1986) 403, PL B182 (1986) 95, ZPHY C33 (1986) 7, ZPHY C33 (1987) 359, PL B185 (1987) 218, PL B185 (1987) 223, PL B185 (1987) 228, PL B187 (1987) 425, PL B192 (1987) 245, PL B195 (1987) 102, PL B195 (1987) 307, PL B196 (1987) 101, PL B197 (1987) 452, PL B198 (1987) 255, PL B198 (1987) 577, ZPHY C35 (1987) 283, PL B199 (1987) 291, PL B199 (1987) 447, PL B199 (1987) 451, PL B199 (1987) 457, PL B199 (1987) 580, PL B202 (1988) 149, ZPHY C39 (1988) 177, PL B207 (1988) 109, PL B207 (1988) 349, PL B209 (1988) 119, PL B209 (1988) 380, PL B210 (1988) 258, PL B210 (1988) 263, PL B210 (1988) 267, PL B210 (1988) 273, PL B211 (1988) 489, PL B212 (1988) 528, PL B215 (1988) 424, PL B215 (1988) 429, ZPHY C41 (1988) 1, ZPHY C41 (1988) 405, NIM A274 (1989) 189, NIM A275 (1989) 1, NIM A283 (1989) 544, NAT WISS 76 (1989) 52, ZPHY C41 (1989) 557, PL B217 (1989) 205, PL B219 (1989) 121, PL B221 (1989) 422, ZPHY C42 (1989) 349, ZPHY C42 (1989) 519, ZPHY C42 (1989) 543, ZPHY C43 (1989) 45, ZPHY C43 (1989) 181, ZPHY C44 (1989) 547, PL B229 (1989) 175, PL B229 (1989) 304, PL B230 (1989) 162, PL B230 (1989) 169, PL B231 (1989) 208, PL B232 (1989) 398, PL B232 (1989) 554, MPL A5 (1990) 73, ZPHY A335 (1990) 231, ZPHY C46 (1990) 9, ZPHY C46 (1990) 15, ZPHY C48 (1990) 183, ZPHY C48 (1990) 543, PL B234 (1990) 409, PL B236 (1990) 102, PL B241 (1990) 278, PL B245 (1990) 315, PL B246 (1990) 278, PL B247 (1990) 121, PL B249 (1990) 359, PL B250 (1990) 164, ZPHY C49 (1991) 349, ZPHY C50 (1991) 1, ZPHY C52 (1991) 353, PL B254 (1991) 288, PL B255 (1991) 297, PL B255 (1991) 634, PL B260 (1991) 259, PL B262 (1991) 148, PL B267 (1991) 535, PL B269 (1991) 234, ZPHY C53 (1992) 361, ZPHY C53 (1992) 367, PL B274 (1992) 239, and PL B275 (1992) 195.

DESY-DORIS-CRYSTAL-BALL (Jun 1981) Started Jul 1982; Completed 1986.

A LARGE SOLID ANGLE NEUTRAL DETECTOR (THE CRYSTAL BALL)

CAL TECH – C Peck, F C Porter, P Ratoff
CARNEGIE MELLON U – I Brock, A Engler, R W Kraemer, D Marlow, F Messing, D Prindle, B Renger, C Rippich, H Vogel
CRACOW – Z Jakubowski, T Lesiak, B Muryn, G Nowak
DESY – H W Bartels, J K Bienlein, K Brockmueller, K Karch, T Kloiber, W Koch, W Maschmann, H Meyer, A Schwarz, T Skwarnicki, H Trost, A Voigt, K Wachs, P Zschorsch
ERLANGEN U – G Folger, G Glaser, M Kobel, B Lurz, J Schuette, U Volland, H Wegener
FLORENCE U & INFN, FLORENCE – A Bizzeti, A Cartacci, A Compagnucci, G Conforto, G Landi, B Monteleoni, P G Pelfer
HAMBURG U – C Bieler, K Graaf, F H Heimlich, F H Heinsius, T Kiel, S Krueger, R Lekebusch, R Nernst, D Sievers, V Stock, U Strohbusch
HARVARD U – D Antreasyan, J Irion, P McBride, K Strauch
NIJMEGEN U & NIKHEF, NIJMEGEN – H Janssen, A C Koenig, W J Metzger, M Reidenbach, D J Schotanus, W Walk, R T Van de Walle
PRINCETON U – D Besset, R Cabenda, R Cowan
UC, SANTA CRUZ – M Cavalli-Sforza, D Coyne, D A Williams
SLAC – E D Bloom, R Clare, S Cooper (✓ Spokesperson), K Fairfield, A Fridman, J Gaiser, G Godfrey, S Leffler, W Lockman, S Lowe, H Marsiske, B Niczyporuk, B van Uitert, K Wacker
STANFORD U – D Gelphman, R Hofstadter, I Kirkbride, R Lee, A M Litke, B Pollock, J Tompkins
WURZBURG U – S Keh, H Kilian, K Koenigsmann (✓ Spokesperson), M Scheer, P Schmitt

Accelerator DESY-DORIS-II *Detector* CRYSTAL-BALL

Reactions

$e^+ e^- \to \gamma$ X	4.4–11.2 GeV (E_{cm})
$e^+ e^- \to$ hadron(s)	"
$e^+ e^- \to e^+ e^- \gamma \gamma$	"

Particles studied $\Upsilon(1S)$, $\Upsilon(2S)$, $\chi_{b0}(1P)$, B, τ, meson

Comments An extension of earlier SLAC studies of quarkonium and gluonium to the upsilon system, with special emphasis on γ transitions. In addition, τ and B decays, and light mesons in γ-γ reactions are studied. The detector consists of 712 sodium-iodide crystals arranged around the electron-positron interaction point.

Papers PL B135 (1984) 498, PRL 54 (1985) 2195, PR D32 (1985) 2893, PR D33 (1986) 1847, PR D34 (1986) 2611, ZPHY C36 (1987) 383, PRL 58 (1987) 972, PR D36 (1987) 2633, ZPHY C40 (1988) 49, ZPHY C40 (1988) 199, PR D38 (1988) 1365, PL B212 (1988) 123, ZPHY C42 (1989) 33, PL B228 (1989) 273, PR D41 (1990) 3324, ZPHY C46 (1990) 555, ZPHY C48 (1990) 553, ZPHY C48 (1990) 561, PL B249 (1990) 353, PL B251 (1990) 204, ZPHY C49 (1991) 225, PL B259 (1991) 216, and PL B267 (1991) 286.

DESY-HERA-H1 (Jun 1985) Approved Jul 1986.

H1: A DETECTOR FOR HERA

AACHEN, TECH HOCHSCH, I PHYS INST – C Berger, W Braunschweig, H Genzel, H Martyn, F Raupach, J Tutas, E Vogel
AACHEN, TECH HOCHSCH, III PHYS INST – G Fluegge, H Graessler, H Jung, R Steinberg, W Struczinski
BIRMINGHAM U – J D Dowell, N N Ellis, I F Fensome, J Garvey, I R Kenyon

BRUSSELS U, IIHE – G Bertrand-Coremans, D Johnson, P Marage, J Moreels, R Roosen, J Sacton
CRACOW – L Goerlich, L Hajduk, S Mikocki, G Nowak, K Rybicki, J Turnau
UC, DAVIS – M Forbush, L Godfrey, R L Lander, S Mani, J R Smith
DESY – W Bartel, H Behrend, F Brasse, J Buerger, L Criegee, E Deffur, A DeRoeck, G Eckerlin, F Eisele (✓ Spokesperson), E Elsen, M Erdmann, R Felst, J Ferencei, G Franke, J Gayler, M Gennis, R Gerhards, D Haidt, P Hill, G Knies, V Korbel, H Krehbiel, H Kuester, A Leuschner, E Levin, K H Meier, J Meyer, J E Olsson, M Savitsky, V Schroeder, L Smolik, P Steffen, J Strachota, G G Winter, M Zimmer
DORTMUND U – H Kolanoski, A Lindner, K Wacker, A Walter, D Wegener
ECOLE POLYTECHNIQUE – B Andrieu, J Cvach, F Moreau, S Orenstein, Y Sirois
GLASGOW U – A J Campbell, J Marks, I O Skillicorn
HAMBURG U – V Blobel, F Buesser, H H Duhm, E Fretwurst, J Harjes, G Heinzelmann, C Kleinwort, R Langkau, G Lindstroem, B Naroska, F Niebergall, V Riech, H Spitzer, G Weber
MOSCOW, ITEP – A Babayev, M Danilov, V I Efremenko, A Fedotov, B Fomynich, I Gorelov, P Goritchev, V Lubimov, V Nagovizin, A Rostovtsev, A Semenov, V Shekelyan, I Tichomirov, V Tschernysov
KIEL U – W D Dau, G Siegmon
LANCASTER U – A B Clegg, R C W Henderson, D Newton, I W Walker
LIVERPOOL U – S Burke, J B Dainton, E Gabathuler, T Greenshaw, S J Maxfield, S J McMahon, G D Patel
LEBEDEV INST – V F Andreev, P S Baranov, A S Belousov, A M Fomenko, A I Lebedev, S V Levonian, E I Malinovski, S V Rusakov, I P Sheviakov, P A Smirnov, Y V Soloviev, A P Usik, J Vasdik
LUND U – V Hedberg, L Joensson
MANCHESTER U – P Biddulph, R J Ellison, J M Foster, K C Hoeger, M Ibbotson, D Kolya, G C Lopez, R Marshall
MUNICH, MAX PLANCK INST – G Buschhorn, K Gamerdinger, G Grindhammer, C Kiesling, M Kuhlen, H Oberlack, P Ribarics, E Sanchez, P Schacht
ORSAY, LAL – J C Bizot, V Brisson, A Courau, B Delcourt, A Jacholkowska, M Jaffre, C Pascaud, F Zomer
PARIS, CURIE UNIV VI & PARIS, UNIV VII, LPNHE – E Barrelet, G Bernardi, L DelBuono, J Duboc, Y Feng, M Goldberg, D Hamon, H K Nguyen, C Vallee, T P Yiou
KOSICE, IEF – J Ban, D Bruncko
PRAGUE, INST PHYS – I Herynek, J Hladky, P Reimer, M Vecko, P Zavada
CHARLES U – J Formanek, S Valkar, A Valkarova, J Zacek
QUEEN MARY - WESTFIELD COLL – E Eisenhandler, P I P Kalmus, M P J Landon, W von Schlippe, G Thompson
ROME U & INFN, ROME – F Ferrarotto, H Shoostari, B Stella
RUTHERFORD – D Clarke, J A Coughlan, P S Flower, W J Haynes, J V Morris, D P Sankey
SACLAY – M Besancon, C Coutures, G Cozzika, M David, J Feltesse, M A Jabiol, W Krasny, J F Laporte, P Verrecchia, J Villet
WUPPERTAL U – B Kuznik, W Magnussen, H Meyer, D Schmidt
BERLIN-ZEUTHEN ADW – H Baerwolff, H Henschel, H H Kaufmann, M Klein, P Kostka, T Naumann, A Schwind, M Winde
ZURICH U – S Egli, C A Meyer, U Straumann, P Trouel
ZURICH, ETH – R Eichler, C Grab, D Pitzl, J Riedlberger

Accelerator DESY-HERA *Detector* H1

Comments Measures energy and direction of electrons, photons, and particle jets. Identifies leptons by the shower shape, neutrinos by precise missing energy measurements. The detector consists of a large superconducting solenoid with tracking chambers and a liquid argon calorimeter inside. An additional iron absorber instrumented with streamer tubes is outside the solenoidal coil. Scheduled to run March 92.

DESY-HERA-ZEUS (Jun 1985, Mar 1986) Approved Nov 1986.

ZEUS: A DETECTOR FOR HERA

MANITOBA U – F Ikraiam, J Mayer, G Smith
MCGILL U – F Corriveau, D Gilkinson, D Hanna, W Hung, M St Laurent, J Mitchell, P Patel, L Sinclair, D Stairs
TORONTO U – D Bailey, D Bandyopadhyay, D Barillari, F Benard, S Bhadra, M Brkic, B Burow, F Chlebana, M Crombie, G Hartner, G Levman, J Martin, R Orr, J Prentice, C Sampson, R Teuscher, T S Yoon
YORK U, CANADA – W Frisken, Y Iga
BONN U – A Bargende, J Crittenden, H Dabbous, B Diekmann, J Gajewski, G Geitz, A Grunenberg, B Gutjahr, H Hartmann, J Hartmann, D Haun, K Heinloth, E Hilger, H Jakob, S Kramarczyk, M Kueckes, A Mass, H Muesch, E Paul, R Schattevoy, B Schneider, H Schneider, R Wedemeyer, M Zachara
DESY – J K Bienlein, C Coldewey, A Dannemann, K Dierks, W Dorth, G Drews, P Erhard, I Fleck, A Fuertjes, R Glaeser, T Haas, L Hagge, D Hasell, H Hultschig, G Jahnen, P Joos, M Kasemann, R Klanner, W Koch, U Koetz, A Kotanski, H Kowalski, A Ladage, B Loehr, D Lueke, J Mainusch, O Manczak, M Momayezi, S Nickel, D Notz, I Park, K U Poesnecker, M Rohde, A Savine, U Schneekloth, J Schroeder, W Schuette, W Schulz, F Selonke, D Trines, E Tscheslog, W Vogel, T Woeniger, G Wolf (✓ Spokesperson), C Youngman
DESY, ZEUTHEN – K Deiters, H J Grabosch, A Leich, C Rethfeldt, S Schlenstedt
FREIBURG U – A Bamberger, A Freidhof, T Poser, G Theisen
HAMBURG U – U Behrens, U Holm, H Kammerlocher, B Krebs, W Kroeger, J Krueger, E Lohrmann, M Nakahata, N Pavel, G Poelz, T Tsurugai, K Wick, B H Wiik
KERNFORSCHUNGSANLAGE, JULICH – P Cloth, D Filges, R D Neef, N Paul, C Reul, H Schaal, G Sterzenbach
SIEGEN U – E Badura, H Chaves, M Rost, R J Seifert, A H Walenta, W Weihs, G Zech
TEL AVIV U – R Heifetz, A Levy, D Zer-Zion
WEIZMANN INST – Y Eisenberg, C Glasman, U Karshon, A Montag, D Revel, A Shapira
BOLOGNA U – F Arzarello, G Barbagli, G Bari, M Basile, L Bellagamba, D Boscherini, G Bruni, P Bruni, M Chiarini, L Cifarelli, F Cindolo, F Ciralli, A Contin, S D'Auria, F Fiori, F Frasconi, P Giusti, G Iacobucci, G Laurenti, Q Lin, B Lisowski, G Maccarrone, A Margotti, T Massam, R Nania, V O'Shea, F Palmonari, C Del Papa, G Cara Romeo, G Sartorelli, M Scioni, R Timellini, M Willutzky, A Zichichi
CALABRIA U – M Schioppa, G Susinno
FLORENCE U – R Casalbuoni, E Celeghini, S De Curtis, D Dominici, F Francescato, S De Gennaro, M Nuti, P Pelfer, R Salimbeni, U Vanni
FRASCATI – G Anzivino, R Casaccia, B Dulach, I Laakso, S De Pasquale, S Qian, L Votano
AQUILA U – R Scrimaglio
PADUA U – R Brugnera, R Carlin, F Dal Corso, U Dosselli, C Fanin, F Gasparini, M De Giorgi, S Limentani, M Morandin, M Posocco, L Stanco, R Stroili, C Voci
ROME U – M Bonori, U Contino, G D'Agostini, M Guida, M Iacovacci, M Iori, S Mari, G Marini, M Mattioli, D Monaldi, A Nigro
TURIN U – C Aglietta, D Allasia, P Antonioli, M Arneodo, G Badino, A Castellina, M Costa, M Dardo, M I Ferrero, W Fulgione, P Galeotti, L Lamberti, S Maselli, L Panaro, C Peroni, O Saavedra, A Solano, A Staiano, G C Trinchero, S Vernetto
TOKYO U, INS – T Hasegawa, M Hazumi, T Ishii, S Kasai, M Kuze, Y Nagasawa, M Nakao, H Okuno, K Tokushuku, T Watanabe, S Yamada
TOKYO METROPOLITAN U – M Chiba, R Hamatsu, T Hirose, S Kitamura, S Nagayama, Y Nakamitsu
NIKHEF, AMSTERDAM – S Bentvelsen, A Dake, J Engelen, P de Jong, P Kooijman, H van der Lugt, A Tenner, H Tiecke, H Uijterwaal, J Vermeulen, L Wiggers, E de Wolf, R van Woudenberg
CRACOW – J Chwastowski, A Dwurazny, A Eskreys, Z Jakubowski, K Piotrzkowski, L Zawiejski
CRACOW, INST PHYS NUCL TECH – K Eskreys, K Jelen, D Kisielewska, T Kowalski, J Kulka, M Przybycien, E Rulikowska-Zarebska, L Suszycki
JAGELLONIAN U – A Kotanski
WARSAW U, IEP – H Abramowicz, M Adamus, K Charchula, J Ciborowski, K Genser, G Grzelak, M Krzyzanowski, K Muchorowski, R J Nowak, J M Pawlak, K Stojda,

A Stopczynski, R Szwed, T Tymieniecka, R Walczak, A K Wroblewski, J A Zakrzewski, A F Zarnecki
MADRID, AUTONOMA U - F Barreiro, G Cases, L Hervas, L Labarga, J del Peso, J Terron, J F de Troconiz
BRISTOL U - D G Cussans, M Dyce, H F Fawcett, B Foster, R Gilmore, G P Heath, T J Llewellyn, J Malos, C J S Morgado, T L Short, R J Tapper, S Wilson
GLASGOW U - N H Brook, P J Bussey, A T Doyle, J R Forbes, C Raine, D H Saxon
IMPERIAL COLL - T C Bacon, J Giddings, C Markou, D McQuillan, D B Miller, M M Mobayyen, T J Mortimer, A Vorvolakis
UNIVERSITY COLL, LONDON - F W Bullock, T W Jones, A Khan, J Lane, G J Lush, P L Makkar, G Nixon, S F Salih, J Shulman
OXFORD U - G Blair, M G Bowler, I M Butterworth, R J Cashmore, A M Cooper-Sarkar, R C E Devenish, D M Gingrich, P M Hallam-Baker, N Harnew, T Khatri, M Lancaster, K R Long, P Luffman, P Morawitz, J Nash, N C Roocroft, A Weidberg, F F Wilson
RUTHERFORD - J C Hart, N A McCubbin, T P Shah
ARGONNE - M Derrick, D Krakower, S Magill, B Musgrave, J Repond, R Stanek, R Talaga, T Throh
BROOKHAVEN - B Radeka, R Rau
COLUMBIA U - A Bernstein, A Caldwell, D Chen, I Gialas, A Parsons, S Ritz, F Sciulli, L Wai, S Wang, F Xu, J Xu
IOWA U - T Bienz, H Kreutzmann, U Mallik, M Roco
LOUISIANA STATE U - L Chen, R Gunashinga, R Imlay, N Kartik, H Kim, R McNeil, W Metcalf
OHIO STATE U - B Bylsma, L S Durkin, C Li, T Y Ling, K McLean, S K Park, T A Romanowski, R Seidlein
PENN STATE U - J N Lim, B Y Oh, J Whitmore
UC, SANTA CRUZ - N Cartiglia, C Heusch, B Hubbard, K O'Shaughnessy, H F Sadrozinski, A Seiden
VIRGINIA TECH - K Blankenship, B Lu, L W Mo
WISCONSIN U - I Ali, B Behrens, U Camerini, C Fordham, C Foudas, A Gossiou, K Iordanidis, M Lomperski, R J Loveless, D D Reeder, S Silverstein, W H Smith

Accelerator DESY-HERA *Detector* ZEUS

Comments Measures neutral and charged current processes in electron-proton interactions and searches for new processes. Emphasis is on accurate identification and measurement of jets and leptons. The main detector component is a high-resolution compensating uranium-scintillator calorimeter surrounding a superconducting coil equipped with drift chambers. An instrumented iron absorber catches the tail of hadronic showers and identifies muons. Bending magnets of the machine are used as a spectrometer for forward scattered protons. Scheduled to run April 92.

DESY-PETRA-CELLO (Jul 1976) Approved Oct 1976; Started Mar 1980; Completed Nov 1986.

A 4π MAGNETIC DETECTOR FOR PETRA — CELLO

DESY-KARLSRUHE-MUNCHEN-ORSAY-PARIS-SACLAY COLLABORATION

DESY - H J Behrend, J H Field, V Schroeder, H Sindt
KERNFORSCHUNGSZENTRUM, KARLSRUHE & KARLSRUHE U - D Apel, J Bodenkamp, D Crobaczek, J Engler, G Fluegge, D Fries, F Moennig, H Mueller, H Randoll, G Schmidt, H Schneider
MUNICH, MAX PLANCK INST - W de Boer, G Buschhorn, G Grindhammer, P Grosse-Wiesmann, B Gunderson, C Kiesling (✓ Spokesperson), R Kotthaus, H Lierl, D Luers, T Meyer, L Moss, H Oberlack, P Schacht, M J Schachter, A Snyder, H Steiner
ORSAY, LAL - G Carnesecchi, A Cordier, M Davier, F Le Diberder, D Fournier, J F Grivaz, J Haissinski, V Journe, F Laplanche, J J Veillet, A Weitsch
PARIS, CURIE UNIV VI - R George, M Goldberg, B Grossetete, F Kapusta, F Kovacs, G London, L Poggioli, M Rivoal
SACLAY - R Aleksan, J Bouchez, G Cozzika, Y Ducros, A Gaidot, J Pamela, J P Pansart, F Pierre

Accelerator DESY-PETRA *Detector* CELLO

Reactions

$e^+ e^-$	14–47.3 GeV (E_{cm})

Comments The central part of the CELLO detector consists of proportional and drift chambers placed within a superconducting coil. The coil is surrounded by liquid argon calorimeters which measure electron and photon energies with high accuracy. Lead glass counter systems cover forwards and backwards directions. The detector is optimized for studies involving $e^{\pm}$ and γ's.

Papers PS 23 (1981) 610, PL B103 (1981) 148, PL B110 (1982) 329, PL B113 (1982) 427, PL B114 (1982) 282, PL B114 (1982) 287, PL B114 (1982) 378, ZPHY C14 (1982) 95, ZPHY C14 (1982) 189, ZPHY C14 (1982) 283, PL B118 (1982) 211, NP B211 (1983) 369, NP B218 (1983) 269, ZPHY C16 (1983) 301, PL B123 (1983) 127, PL B126 (1983) 384, PL B126 (1983) 391, PL B127 (1983) 270, ZPHY C19 (1983) 291, ZPHY C20 (1983) 207, ZPHY C21 (1984) 205, PL B138 (1984) 311, ZPHY C23 (1984) 103, ZPHY C23 (1984) 223, PL B140 (1984) 130, PL B141 (1984) 145, PL B144 (1984) 297, PL B158 (1985) 536, PL B161 (1985) 182, PL B168 (1986) 420, PL B176 (1986) 274, PL B178 (1986) 452, PL B181 (1986) 178, PL B191 (1987) 209, PL B193 (1987) 157, PL B193 (1987) 376, ZPHY C35 (1987) 181, PL B200 (1988) 226, PL B202 (1988) 154, PL B212 (1988) 515, PL B215 (1988) 186, ZPHY C41 (1988) 7, ZPHY C42 (1989) 367, PL B218 (1989) 493, ZPHY C43 (1989) 1, ZPHY C43 (1989) 91, PL B222 (1989) 163, ZPHY C44 (1989) 63, ZPHY C46 (1990) 397, ZPHY C46 (1990) 537, ZPHY C46 (1990) 583, ZPHY C47 (1990) 1, ZPHY C47 (1990) 333, PL B245 (1990) 298, ZPHY C49 (1991) 43, ZPHY C49 (1991) 401, ZPHY C51 (1991) 143, ZPHY C51 (1991) 149, ZPHY C51 (1991) 365, and PL B256 (1991) 97.

DESY-PETRA-JADE Approved Oct 1976; Started Jun 1978; Completed Nov 1986

A COMPACT MAGNETIC DETECTOR AT PETRA — JADE

DESY - W Bartel, L Becker, T Canzler, D Cords, P Dittmann, R Eichler, R Felst (✓ Spokesperson), D Haidt, S Kawabata, G Knies, H Krehbiel, K Meinke, B Naroska, L H O'Neill, J Olsson, P Steffen, H Wenninger, W L Yen, M Zachara, Y Zhang
HAMBURG U - G Dietrich, E Elsen, J Hagemann, S Hegner, G Heinzelmann, M Helm, H Kado, K Kawagoe, C Kleinwort, M Kuhlen, K Meier, T Oest, F Ould-Saada, A Petersen, D Pitzl, R Pust, R Ramcke, U Schneekloth, A Wagner, G Weber
HEIDELBERG U, IHEP - K Ambrus, S Bethke, A Dieckmann, H Drumm, J Heintze, K H Hellenbrand, R D Heuer, S Komamiya, J von Krogh, P Lennert, H Matsumura, H Rieseberg, J Spitzer, A Wagner
WUPPERTAL U - H Junge, N Magnussen, D Schmidt
LANCASTER U - A Bell, C Bowdery, D C Darvill, A Finch, F Foster, G Hughes, T Nozaki, J Nye, H Wriedt
MANCHESTER U - J Allison, J Armitage, J Baines, A H Ball, G Bamford, R Barlow, J Chrin, I P Duerdoth, I Glendinning, T Greenshaw, J F Hassard, B T King, F K Loebinger, A A Macbeth, H E Mills, P G Murphy, H Prosper, P Rowe, K Stephens
MARYLAND U - R G Glasser, P Hill, B Sechi-Zorn, J A J Skard, S Wagner, G T Zorn
RUTHERFORD - S L Cartwright, D Clarke, M C Goddard, R Hedgecock, R Marshall, G F Pearce, J B Whittaker
HELSINKI U - J Huttunen, P Laurikainen, E Pietarinen
TOKYO U - M Imori, J Kanzaki, T Kawamoto, T Kobayashi, M Koshiba, T Mashimo, M Minowa, M Nozaki, S Odaka, S Orito, A Sato, T Suda, H Takeda, Y Totsuka, Y Watanabe, S Yamada, C Yanagisawa

Accelerator DESY-PETRA *Detector* JADE

Reactions

$e^+ e^- \to$ hadrons	10–44 GeV (E_{cm})
$e^+ e^- \to e^+ e^-$	"
$e^+ e^- \to \mu^+ \mu^-$	"
$e^+ e^- \to \tau^+ \tau^-$	"
$e^+ e^- \to \gamma \gamma$	"
$e^+ e^- \to e^+ e^-$ hadrons	"

$e^+ e^- \rightarrow e^+ X$	"
$e^+ e^- \rightarrow e^- X$	"
$e^+ e^- \rightarrow \mu^+ X$	"
$e^+ e^- \rightarrow \mu^- X$	"
$e^+ e^- \rightarrow e^+ \mu^- X$	"
$e^+ e^- \rightarrow e^- \mu^+ X$	"

Particles studied τ, quark, hvy-lepton, $D^*(2010)$, s-particle

Comments Provides full solid angle coverage for both charged and neutral particles, dense sampling for charged tracks, and fine granularity for electromagnetic showers. Tests quantum electrodynamics down to very small distances, and studies hadronic processes. The main components of the detector are the inner track chamber, the lead glass array, and the muon filter.

Papers PL B88 (1979) 171, PL B89 (1979) 136, PL B91 (1980) 142, PL B91 (1980) 152, PL B92 (1980) 206, ZPHY C6 (1980) 295, PL B99 (1981) 277, PL B99 (1981) 281, PL B100 (1981) 364, PL B101 (1981) 129, PL B101 (1981) 361, ZPHY C9 (1981) 315, PL B104 (1981) 325, PL B107 (1981) 163, PL B108 (1982) 140, PL B113 (1982) 190, PL B114 (1982) 71, PL B114 (1982) 211, PL B115 (1982) 338, PL B119 (1982) 239, PL B121 (1983) 203, PL B123 (1983) 353, PL B123 (1983) 460, ZPHY C19 (1983) 197, ZPHY C20 (1983) 187, PL B129 (1983) 145, PL B130 (1983) 454, PL B132 (1983) 241, ZPHY C21 (1983) 37, PL B134 (1984) 275, PL B139 (1984) 327, ZPHY C24 (1984) 223, ZPHY C24 (1984) 231, ZPHY C25 (1984) 231, PL B145 (1984) 441, PL B146 (1984) 121, PL B146 (1984) 126, PL B146 (1984) 437, ZPHY C26 (1985) 507, PL B152 (1985) 385, PL B152 (1985) 392, PL B155 (1985) 288, ZPHY C28 (1985) 343, PL B157 (1985) 340, PL B158 (1985) 511, PL B160 (1985) 337, PL B160 (1985) 421, ZPHY C29 (1985) 505, PL B161 (1985) 188, PL B161 (1985) 197, PL B163 (1985) 277, ZPHY C30 (1986) 371, ZPHY C30 (1986) 545, ZPHY C31 (1986) 349, ZPHY C31 (1986) 359, PL B174 (1986) 350, PL B182 (1986) 216, ZPHY C33 (1986) 23, PL B184 (1987) 288, ZPHY C33 (1987) 339, ZPHY C36 (1987) 15, ZPHY C39 (1988) 1, PL B213 (1988) 235, ZPHY C42 (1989) 1, ZPHY C42 (1989) 7, ZPHY C42 (1989) 355, ZPHY C44 (1989) 567, ZPHY C46 (1990) 1, ZPHY C46 (1990) 349, ZPHY C46 (1990) 547, ZPHY C47 (1990) 343, ZPHY C48 (1990) 393, ZPHY C48 (1990) 401, ZPHY C49 (1991) 29, and ZPHY C51 (1991) 531.

DESY-PETRA-MARK-J (Jul 1976) Approved Oct 1976; Completed Nov 1986.

A SIMPLE DETECTOR TO MEASURE e^+e^- REACTIONS AT HIGH ENERGIES — MARK J

AACHEN, TECH HOCHSCH, III PHYS INST - R Becker-Szendy, A Boehm, C Camps, V Commichau, E Deffur, H S Fesefeldt, U Herten, D Hueser, W Krenz, D Linnhoefer, J Mnich, H Nierobisch, F P Poschmann, U Schroeder, J Schug, D Teuchert, M Tonutti, S X Wu
BROOKHAVEN - R R Rau (✓ Spokesperson)
CAL TECH - H Ma, H Newman, H Stone, R Y Zhu
DESY - S Ansari, M Hussain, K Nadeem, M Rohde, H G Wu, M F Wyne
MIT - U Becker, J G Branson, J D Burger, M Capell, Y H Chang, M Chen, M L Chen, M Y Chen, M Dhina, D Fong, M Fukushima, G Herten, M M Ilyas, D Luckey, H Rykaczewski, S C C Ting (✓ Spokesperson), M White, B Wyslouch, B Zhou
MADRID, JEN - B Adeva, J Berdugo, M Cerrada, L Garrido, C Mana, M A Marquina, M Martinez, S Rodriguez, J A Rubio, M Sachwitz, J Salicio
NIKHEF, AMSTERDAM - M Demarteau, P Duinker, D Harting, P Kuijer, E J Luit, G G G Massaro, G M Swider
GENEVA U - M Bourquin, R Hausammann, M Nusbaumer
BEIJING, IHEP - C C Chang, H S Chen, Y K Chi, B Z Dong, K Z Guo, R D Han, M C Ho, D Z Jiang, W Ma, H W Tang, K L Tung, M Q Wang, Z M Wang, B X Yang, X Yu, L S Zhang, Z H Zhang
BERLIN-ZEUTHEN ADW - K Deiters, W Friebel, M Klein, R Leiste, W D Nowak, H J Schreiber, R Schulte, H Vogt
ZURICH, ETH - J Fehlmann, K Hangarter, H Hofer, Q Z Li, M Pohl, D Ren, D Twerenbold, G Viertel

Accelerator DESY-PETRA *Detector* MARK-J

Reactions

$e^+ e^- \rightarrow \mu^+ \mu^-$	12-47 GeV (E_{cm})
$e^+ e^- \rightarrow e^+ e^-$	"
$e^+ e^- \rightarrow \tau^+ \tau^-$	"
$e^+ e^- \rightarrow$ muon X	"
$e^+ e^- \rightarrow$ hadrons	"

Particles studied τ, B, gluon, jet

Comments Measures asymmetries, looks for structures in the total hadronic cross section, determines properties of B mesons and gluons, searches for the t quark and a wide variety of new particles up to E_{cm} =46.78 GeV, studies hadronic jets, etc.

Papers PRL 42 (1979) 1110, PRL 42 (1979) 1113, PRL 43 (1979) 830, PL B85 (1979) 463, PRL 43 (1979) 901, PRL 43 (1979) 1915, PRPL 63 (1980) 337, PL B89 (1979) 139, PRL 44 (1980) 1722, PL B95 (1980) 149, PRL 45 (1980) 1904, PRL 46 (1981) 1663, PL B108 (1982) 63, PRL 48 (1982) 721, PRL 48 (1982) 967, PRL 48 (1982) 1701, PL B115 (1982) 345, PRL 50 (1983) 799, PRL 50 (1983) 2051, PRL 51 (1983) 443, PRPL 109 (1984) 131, PRL 53 (1984) 134, PRL 53 (1984) 1806, PL B152 (1985) 439, PRL 54 (1985) 1750, PRL 55 (1985) 665, PL B179 (1986) 177, PL B180 (1986) 181, PR D34 (1986) 681, PL B194 (1987) 167, and PR D38 (1988) 2665. No other papers expected.

DESY-PETRA-TASSO (Jul 1976) Approved Oct 1976; Started Jan 1979; Completed Nov 1986.

A LARGE 4π MAGNETIC DETECTOR FOR PETRA — TASSO

AACHEN, TECH HOCHSCH, I PHYS INST - W Braunschweig, R Gerhards, F J Kirschfink, H Martyn
BONN U - H M Fischer, H Hartmann, J Hartmann, E Hilger, A Jocksch, R Wedemeyer
BRISTOL U - B Foster, A J Martin
DESY - E Bernardi, J Chwastowski, A Eskreys, K Genser, H Hultschig, P Joos, H Kowalski, A Ladage, B Loehr (✓ Spokesperson), D Lueke, P Maettig, D Notz, J M Pawlak, K Poesnecker, E Ros, D Trines, R Walczak, G Wolf
DORTMUND U - H Kolanoski
HAMBURG U - J Krueger, E Lohrmann, G Poelz, W Zeuner
IMPERIAL COLL - D Binnie, J Hassard, J Shulman, D Su, I Tomalin, A Watson
MADRID, AUTONOMA U - F Barreiro, G Cases, L Hervas, J del Peso
OXFORD U - M G Bowler, P N Burrows, R J Cashmore, M E Veitch
RUTHERFORD - J C Hart, D H Saxon
SIEGEN U - S Brandt, M Holder
WEIZMANN INST - Y Eisenberg, U Karshon, A Montag, D Revel, E Ronat, N Wainer
WISCONSIN U - A Caldwell, D Muller, S Ritz, D Strom, M Takashima, S Lan Wu, G Zobernig

Accelerator DESY-PETRA *Detector* TASSO

Reactions

$e^+ e^- \rightarrow$ hadrons	12-47 GeV (E_{cm})
$e^+ e^- \rightarrow$ lepton$^+$ lepton$^-$	"
$e^+ e^- \rightarrow \gamma \gamma$	"
$e^+ e^- \rightarrow e^+ e^-$ hadrons	"

Particles studied hvy-lepton, unspec

Comments Studies formation of jets, gluon bremsstrahlung, inclusive particle production, lifetimes of the τ, charmed, and bottom particles, electroweak asymmetries in muon pair production, and inclusive and exclusive two-photon reactions. Tests QED and QCD, searches for new particles. TASSO stands for Two Arm Spectrometer SOlenoid.

Papers PL B83 (1979) 261, PL B86 (1979) 243, PL B88 (1979) 199, PL B89 (1980) 418, ZPHY C4 (1980) 87, PL B92 (1980) 199, PL B94 (1980) 91, PL B94 (1980) 259, PL B94 (1980) 437, PL B94 (1980) 444, PL B97 (1980) 448, PL B97 (1980) 453, PL B99 (1981) 163, PL B100 (1981) 357, ZPHY C10 (1981) 117, PL B105 (1981) 75, PL B107 (1981) 290, PL B108 (1982) 67, PL B108 (1982) 71, PL B110 (1982) 173, PL B113 (1982) 98, PL B113 (1982) 499, PL B114 (1982) 65, PL B117 (1982) 135, PL B117 (1982) 365, ZPHY C16 (1982) 13, PL B121 (1983) 216, PL B122 (1983) 95, ZPHY C17 (1983) 5, PL B126 (1983)

493, PL B130 (1983) 340, PL B130 (1983) 449, ZPHY C22 (1984) 13, PL B135 (1984) 243, PL B136 (1984) 130, PL B138 (1984) 219, PL B138 (1984) 317, PL B138 (1984) 441, PL B139 (1984) 126, ZPHY C22 (1984) 219, ZPHY C22 (1984) 307, PL B141 (1984) 264, PL B142 (1984) 135, PL B146 (1984) 443, PL B147 (1984) 487, ZPHY C26 (1984) 157, ZPHY C26 (1984) 181, ZPHY C26 (1984) 337, PL B149 (1984) 524, ZPHY C26 (1985) 521, ZPHY C27 (1985) 27, PL B154 (1985) 236, ZPHY C29 (1985) 29, ZPHY C29 (1985) 189, ZPHY C29 (1985) 347, ZPHY C30 (1986) 355, ZPHY C31 (1986) 527, ZPHY C31 (1986) 537, ZPHY C32 (1986) 11, ZPHY C32 (1986) 343, ZPHY C33 (1986) 13, ZPHY C35 (1987) 317, ZPHY C36 (1987) 349, ZPHY C37 (1988) 171, ZPHY C38 (1988) 543, ZPHY C39 (1988) 331, PL B214 (1988) 286, ZPHY C40 (1988) 163, ZPHY C41 (1988) 353, ZPHY C41 (1988) 359, ZPHY C41 (1988) 385, ZPHY C41 (1988) 533, ZPHY C42 (1989) 17, ZPHY C42 (1989) 189, ZPHY C42 (1989) 348, ZPHY C43 (1989) 549, ZPHY C44 (1989) 1, ZPHY C44 (1989) 365, ZPHY C45 (1989) 1, ZPHY C45 (1989) 11, ZPHY C45 (1989) 193, ZPHY C45 (1989) 209, PL B231 (1989) 548, ZPHY C47 (1990) 167, ZPHY C47 (1990) 181, ZPHY C47 (1990) 187, ZPHY C47 (1990) 499, and ZPHY C48 (1990) 433.

FNAL Experiments

FNAL-581-704 (Jan 1978, Sep 1981) Approved Nov 1979, Dec 1981, Dec 1983; Completed Aug 1990.

EXPERIMENTS WITH THE POLARIZED BEAM FACILITY

ARGONNE - K G Bailey, D P Grosnick, D A Hill, D Lopiano, Y Ohashi, T Shima, H Spinka, R W Stanek, D G Underwood, A Yokosawa (✓ Spokesperson)
SACLAY - J Bystricky, F Lehar, A De Lesquen, L K Van Rossum
FERMILAB - D C Carey, R Coleman, J D Cossairt, A L Read
HIROSHIMA U - K Iwatani
IOWA U - N Akchurin, A Nuval, Y Onel
KEK - S Ishimoto
KYOTO SANGYO U - F Takeutchi
KYOTO U - H Enyo, T Iijima, K Imai, S Makino, A Masaike, K Miyake, T Nagamine, N Tamura, T Yoshida
KYOTO U OF EDUCATION - R Takashima
ANNECY - K Kuroda, A Michalowicz
LOS ALAMOS - N Tanaka
NORTHWESTERN U - F Luehring, D H Miller, P N Shanahan
KITAKYUSHU, UNIV OCCUP ENVIR HEALTH - T Maki
RICE U - D Adams, B Bonner, M D Corcoran, B Mayes, H E Miettinen, G S Mutchler, M Nessi, C T Nguyen, G C Phillips, J B Roberts, F Tedaldi-Nessi, J L White
SERPUKHOV - V Apokin, A A Derevchtchikov, N Galyaev, Y A Matulenko, A P Meshchanin, N Mikhalin, K Myznikov, S B Nurushev, D I Patalakha, V L Rykov, R A Rzayev, A Saraykin, A Shkuratov, V L Solovianov, V Solovyev, A N Vasiliev
TRIESTE U - F Bradamante, M Giorgi, A Martin, A Penzo, P P Schiavon, S Dalla Torre-Collautti, A Villari, A Zanetti
UDINE U - C Boneschi, G Pauletta, C Santini

Accelerator FNAL-TEV *Detector* Spectrometer, Calorimeter, Wire chamber

Reactions Polarized beam and target

$p\,p \to X$	200 GeV/c
$p\,p \to$ pion X	"
$p\,p \to \Lambda$ X	"
$p\,p \to \Sigma^0$ X	"
$\bar{p}\,p \to X$	"
$\bar{p}\,p \to$ pion X	"

Comments The experiments measure (1) the helicity asymmetry in total pp and $\bar{p}p$ cross sections, (2) the spin dependence of inclusive π^0 production, (3) the production of charged mesons at high x, and (4) the production of Λ's at large x. FNAL-581 ran for 400 hours, and FNAL-704 ran for 1200 hours.

Papers PRL 61 (1988) 1918, IJMP A3 (1988) 2753, PL B229 (1989) 299, PRL 64 (1990) 357, NIM A290 (1990) 269, PL B261 (1991) 197, PL B261 (1991) 201, and PL B276 (1992) 531.

FNAL-605 (May 1978, Nov 1978) Approved Mar 1979; Completed Aug 1985.

STUDY OF LEPTONS AND HADRONS NEAR THE KINEMATIC LIMITS

FERMILAB - C N Brown, W Cooper, D Finley, A Ito, A Jonckheere, H Jostlein, L Lederman, G Moreno, R Orava, S Smith, K Sugano
SUNY, STONY BROOK - M Adams, H Glass, D Jaffe, J Kirz, R McCarthy, D Sieh
WASHINGTON U, SEATTLE - D A Forbush, R Gray, K B Luk, R Plaag, J Rothberg, J Rutherfoord (✓ Spokesperson), P B Straub, F C Toevs, R W Williams, K Young
COLUMBIA U - J A Crittenden, Y B Hsiung, W Sippach
SACLAY - J R Hubbard, P Mangeot, J Mullie, M Neveu, R Praca, J Tichit, A Zadra
KYOTO U - Y Hemmi, K Imai, K Miyake, T Nakumura, Y Sakai, N Sasao, N Tamura, T Yoshida
KEK - A Maki
CERN - R P Bouclier, G Charpak, G P Million, J Santiard, F Sauli
FLORIDA STATE U - D Kaplan

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

p nucleus $\to \mu^+\,\mu^-$ X	400, 800 GeV/c
p nucleus $\to e^+\,e^-$ X	"
p nucleus $\to$ hadron$^+$ hadron$^-$ X	"

Particles studied axion, $\Upsilon(1S)$, $\Upsilon(2S)$, $\Upsilon(3S)$

Comments Studies single and pair production of leptons and hadrons at very high transverse momenta. The nuclear targets include H_2, D_2, Be, Cu, and W. The dilepton invariant mass resolution is exceptionally good. Ran for 3970 hours.

Papers IEEE TNS 28 (1981) 514, IEEE TNS 28 (1981) 528, IEEE MAG 17 (1981) 1903, IEEE TNS 29 (1982) 323, NIM 205 (1983) 403, NIM 216 (1983) 79, NIM 217 (1983) 237, IEEE TNS 30 (1983) 30, IEEE TNS 31 (1984) 1028, IEEE TNS 32 (1985) 692, PRL 55 (1985) 457, NIM A244 (1986) 440, NIM A245 (1986) 338, NIM A248 (1986) 69, PRL 57 (1986) 2101, PR D34 (1986) 2584, PR D38 (1988) 1016, NIM A273 (1988) 177, PR D39 (1989) 3516, PR D40 (1989) 2777, PRL 63 (1989) 2637, PR D43 (1991) 2815, and PRL 68 (1992) 452.

FNAL-621 (May 1979) Approved Jul 1981; Completed Aug 1985.

A MEASUREMENT OF THE CP VIOLATION PARAMETER η_{+-0}

RUTGERS U - A Beretvas, A J Carracappa, T Devlin, U P Joshi, K Krueger, A Pal, P Petersen, S Teige, G Thomson (✓ Spokesperson)
MICHIGAN U - P Border, M Longo, O E Overseth
MINNESOTA U - N Grossman, K Heller, C James, M Shupe, K Thorne

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

$K_L \to \pi^+\,\pi^-\,\pi^0$	70-400 GeV/c
$K_S \to \pi^+\,\pi^-\,\pi^0$	"
$K_L \to \pi^+\,\pi^-$	"
$K_S \to \pi^+\,\pi^-$	"

Particles studied K_L, K_S

Comments Uses the neutral hyperon spectrometer. Ran for 2470 hours. Data analysis in progress (April 92).

Papers PRL 59 (1987) 18, and PRL 63 (1989) 2717.

FNAL-632 (May 1980) Approved Jun 1982; Completed Feb 1988.

AN EXPOSURE OF THE 15-FOOT BUBBLE CHAMBER WITH A NEON-HYDROGEN MIXTURE TO A WIDE-BAND NEUTRINO BEAM FROM THE TEVATRON

BIRMINGHAM U - P J W Faulkner, G T Jones, R J Krawiec, K E Varvell
UC, BERKELEY - H C Ballagh, H H Bingham, W B Fretter, J E Lys, G P Yost
SACLAY - J Baton, C Coutures, M A Jabiol, F Kasper, M Neveu
CERN - H Foeth, K K Geissler, G G Harigel, D R O Morrison (✓ Spokesperson), H W Wachsmuth
FERMILAB - H I Bjelkhagen, J E Hanlon, W M Smart, L Voyvodic
HAWAII U - R J Cence, F A Harris, V Jain, M D Jones, M W Peters (✓ Spokesperson), V Z Peterson
ILLINOIS TECH - R A Burnstein, R Naon, H A Rubin
SERPUKHOV - V V Ammossov, G S Gapienko, A A Ivanilov, V A Korablev
IMPERIAL COLL - J R Campbell, E F Clayton, D B Miller, M M Mobayyen, P R Nailor, S Wainstein
MOSCOW, ITEP - A Andryakov, A E Asratyan, V S Kaftanov, M A Kubantsev, V Moskalev
JAMMU U - S K Badyal, Devanand, V K Gupta, N K Rao, S S Sambyal
BRUSSELS U, IIHE - M Barth, P Marage, J Moreels, J Sacton, L Verluyten, E A de Wolf
MUNICH, MAX PLANCK INST - M Aderholz, N Schmitz, W Wittek

MOSCOW STATE U – P Ermolov, I Erofeeva, V Kobrin, O Lukina, S Lyutov, V Murzin, S Ryasakov, S Sivoklolov, L Smirnova
OXFORD U – P P Allport, G Myatt
PANJAB U – M M Aggarwal, T K Chaterjee, J Kohli, I S Mitra, J Singh
RUTGERS U – D F Deprospo, P Jacques, M S Kalelkar, M A Lauko, R J Plano, P E Stamer
RUTHERFORD – R L Sekulin
STEVENS TECH – E B Brucker, E L Koller
TUFTS U – H Akbari, T Kafka, R H Milburn, A Napier, D Passmore, J Schneps, S Y Willocq

Accelerator FNAL-TEV *Detector* HLBC-15FT

Reactions

ν_μ nucleus $\rightarrow \mu^-$ X	10–400 GeV/c
ν_μ nucleus $\rightarrow \nu_\mu$ X	"
$\bar{\nu}_\mu$ nucleus $\rightarrow \mu^+$ X	"
$\bar{\nu}_\mu$ nucleus $\rightarrow \bar{\nu}_\mu$ X	"

Particles studied hadron, strange, charm, $e^\pm$, muon

Comments The main aim is an exploratory search for new particles and effects in a new energy range. Also studies like-sign dileptons, and neutral current interactions with the Internal Picket Fence to identify such events. Other topics include coherent effects, strange particle production, *etc.* Uses three conventional cameras with 500 micron resolution, and a high-resolution holographic optical system with 100 micron resolution in the central part of the chamber. Data analysis in progress (March 92).

Papers NIM 220 (1984) 300, AOPT 25 (1986) 4102, NIM A257 (1987) 614, NIM A279 (1989) 249, NIM A283 (1989) 24, NIM A284 (1989) 311, PRL 63 (1989) 2349, PR D41 (1990) 2057, NIM A290 (1990) 264, NIM A292 (1990) 313, NIM A292 (1990) 571, NIM A297 (1990) 364, and PR D45 (1992) 2232.

FNAL-653 (May 1980) Approved Jul 1981; Completed Feb 1988.

STUDY OF CHARM AND BEAUTY USING HADRONIC PRODUCTION IN A HYBRID EMULSION SPECTROMETER

AICHI U OF EDUCATION – N Ushida
UC, DAVIS – W Ko, R L Lander, A Moktarani V Paolone, J T Volk, P M Yager
CARNEGIE MELLON U – R M Edelstein, R Fisher, R J Lipton, W R Nichols, D Potter, J S Russ
CHONNAM NATIONAL U – J Kim, K H Oh
GIFU U – S Tasaka
GYEONGSANG NATIONAL U – I G Park, J S Song
JEONBUG NATIONAL U – P W Rho
KOBE U – G Fujioka, H Fukushima, T Hara, Y Homma, T Nakayama, Y Takahashi, Y Tsuzuki, C Yokoyama
KOREA U – K P Hong, J S Kang, C O Kim, S N Kim, K A Moon, K S Sim
NAGOYA U – S Aoki, K Chiba, H Fuchi, K Hoshino, M Miyanishi, M Nakamura, K Niu, K Niwa, M Ohashi, H Sasaki, O Yamakawa, Y Yanagisawa
OHIO STATE U – J Dunlea, S F Krivatch, S Kuramata, B G Lundberg, G A Oleynik, N W Reay (Spokesperson), K Reibel, R A Sidwell, N R Stanton
OKAYAMA U – K Moriyama, H Shibata
OKLAHOMA U – G R Kalbfleisch, P L Skubic, J M Snow, J A White, S E Willis
OSAKA U – O Kusumoto, Y Noguchi, M Teranaka
OSAKA PREFECTURE U, SCI EDUC INST – H Okabe, J Yokota
SOOKMYONG WOMENS U – D Kim, J N Park
TOHO U – M Kazuno, H Shibuya
WON KWANG U – S Y Bahk

Accelerator FNAL-TEV *Detector* Emulsion, Spectrometer

Reactions

π^- nucleus $\rightarrow$	600 GeV/c
p nucleus $\rightarrow$	800 GeV/c

Particles studied charm, bottom

Comments Ran for 1800 hours.

Papers PRL 66 (1991) 1819, PL B263 (1991) 573, PL B263 (1991) 579, and PL B274 (1992) 246.

FNAL-665 (Oct 1980) Approved Jul 1981, Jan 1989; Started 1987; Completed Jan 1992.

MUON SCATTERING WITH HADRON DETECTION AT THE TEVATRON

FREIBURG U – T Dreyer, M Erdmann, J Haas, M Lenski, W Mohr, G Seigert, H Stier, M Wilhelm
ARGONNE – D F Geesaman, R Gilman, M C Green, H E Jackson, S Kaufman, T B W Kirk, V Papavassiliou, D Potterveld, S Tentindo-Repond, H Trost, A Zghiche
UC, SAN DIEGO – R D Kennedy, H G E Kobrak, P Madden, A Salvarani, R A Swanson
COLORADO U – E Kinney
FERMILAB – B R Baller, G B Coutrakon, J E Hanlon, S Krzywdzinski, H Melanson, H E Montgomery, J G Morfin, C Salgado, S A Wolbers
HARVARD U – J M Conrad, G Y Fang, A V Kotwal, D G Michael, R B Nickerson, F M Pipkin, M H Schmitt, R Wilson
ILLINOIS U, CHICAGO – M R Adams, D A Averill, T J Carroll, R Guo, C Halliwell, D E Jaffe, S R Magill, D W Mcleod, T McKibben
CRACOW – A Eskreys, J Figiel, P Malecki, K Olkiewicz, B Pawlik, P Stopa
CRACOW, INST PHYS NUCL TECH – K Dziunikowska
LIVERMORE – P Anthony, F S Dietrich
MARYLAND U – S Aid, S Kunori, S C O'Day, E J Ramberg, A Skuja, G A Snow, P H Steinberg, R Talaga
MIT – M Baker, W Busza, L S Osborne, J J Ryan
MUNICH, MAX PLANCK INST – I Derado, V Eckardt, H J Gebauer, D Hantke, G Jancso, A S Manz, N Schmitz, H J Seyerlein, S Soldner-Rembold, M Vidal, W Wittek
NORTHWESTERN U – H M Schellman (✓ Spokesperson), P Spentzouris
OHIO U – H L Clark, R W Finlay, K H Hicks
PENN U – A Banerjee, K Griffioen
WASHINGTON U, SEATTLE – A A Bhatti, U Bratzler, R Davisson, W Dougherty, D M Jansen, J J Lord, H J Lubatti, R S Perry, R J Wilkes, T Zhao
WUPPERTAL U – H M Braun, H Breidung, U Ecker, R Otten, A Roeser
YALE U – S K Dhawan, V W Hughes, K P Schueler, H Venkataramania

Accelerator FNAL-TEV *Detector* CCM

Reactions

muon $p \rightarrow$ muon hadrons	< 750 GeV/c
muon deut $\rightarrow$ muon hadrons	"
muon nucleus $\rightarrow$ muon hadrons nucleus	"

Comments Studies (1) the properties of hadron systems recoiling from deep inelastic muon collisions, and (2) the nucleon structure functions. Also uses the superconducting vertex magnet from CERN. The first run was completed in 1988, the second run, with a number of different targets and an upgrade of the vertex spectrometer tracking system, in 1990/91.

Papers IEEE TNS 33 (1986) 205, NIM A291 (1990) 533, and PL B272 (1991) 163.

FNAL-667 Approved Mar 1990; Completed Aug 1990.

STUDY OF PION-NUCLEUS INTERACTIONS IN PURE EMULSION STACKS AND EMULSION CHAMBERS AT ENERGIES ABOVE 500 GeV

CRACOW – A Dabrowska, R Holynski, M Szarska, W Wolter (✓ Spokesperson), K Wozniak
LEBEDEV INST – N I Adamovich, M M Chernyavsky, S D Kharlamov, V G Larionova, G I Orlova, N G Peresadko, N A Salmanova, M I Tretyakova
LOUISIANA STATE U – M L Cherry, W Vernon Jones, K Sengupta, J P Wefel
TASHKENT, FTI – E Baklickya, L P Chernova, K G Gulamov, N Kasymova, N S Lukicheva, V Sh Nawotny, N Sh Saidkhanov, L N Svechnikova, S I Zhochova

Accelerator FNAL-TEV *Detector* Emulsion

Reactions

pion nucleus >500 GeV (T_{lab})

Comments The aim is to study global characteristics of pion-nucleus interactions (minimum bias).

FNAL-672A (Feb 1981) Approved Jul 1981; Started 1987; Completed Jan 1992.

A STUDY OF HADRONIC FINAL STATES PRODUCED IN ASSOCIATION WITH HIGH-MASS DIMUONS

FERMILAB - J C Krider
ILLINOIS U, CHICAGO - H S Goldberg, R L Jesik, S Margulies (√ Spokesperson), H Mendez, J Solomon, F Vaca
INDIANA U - R R Crittenden, A R Dzierba, A Gribushin, S Kartik, R Li, T R Marshall, H J Martin, A Zieminski (√ Spokesperson)
LOUISVILLE U - C L R Davis
MICHIGAN U - L J Dauwe
SERPUKHOV - V V Abramov, Y Antipov, B Baldin, S Denisov, A Dyshkant, V Glebov, Y Gorin, V I Koreshev, A Krinitsyn, A A Petrukhin, V I Sirotenko, R Sulayev

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

p nucleus $\rightarrow \mu^+ \mu^- X$	500, 800 GeV/c
π^- nucleus $\rightarrow \mu^+ \mu^- X$	500 GeV/c

Particles studied $J/\psi(1S)$, $\psi(2S)$, $\chi_{c1}(1P)$, $\chi_{c2}(1P)$, ρ, ω, ϕ, bottom

Comments Studies particles produced in association with vector mesons (including J/ψ) and high mass dimuons. Ran with H, Be and Cu targets. Collected approximately 2M fully linked dimuon events (over 30K ψ's) with different beams. Uses E672/E706 spectrometer. Data analysis in progress (April 92).

Papers NIM A270 (1988) 99, and PR D41 (1990) 1.

FNAL-683 (Feb 1981) Approved Dec 1983, Apr 1987; Started 1990; Completed Jan 1992.

PHOTOPRODUCTION OF HIGH p_t JETS

BALL STATE U - W L Davis, G P Thomas
FERMILAB - C Cihangir, P H Kasper, J C Krider, J M Marraffino
IOWA U - N Akchurin, J M Mcpherson, Y Onel
MARYLAND U - H Breuer, C Chang, H D Holmgren, M Khandaker, D Naples
MICHIGAN U - H R Gustafson, M J Longo
RICE U - D Adams, S Ahmad, B Bonner, J M Clement, M D Corcoran (√ Spokesperson), D Lincoln, H E Miettinen, G P Morrow, G S Mutchler, J B Roberts, J D Skeens, M M Traynor, J Xu, Q Zhu
VANDERBILT U - P J Birmingham, J W Waters, M S Webster

Accelerator FNAL-TEV *Detector* Spectrometer, Calorimeter

Reactions

$\gamma\, p \rightarrow$ jets X	200-400 GeV/c
$\gamma\, p \rightarrow \gamma$ jets	"
$\gamma\, p \rightarrow$ pion X	"

Comments Studies in particular 3- and 4-jet events and the A dependence of jet production. Photons are tagged with a momentum uncertainty of about 2 %. The apparatus consists of a wide angle magnetic spectrometer, a large solid angle calorimeter, and a forward calorimeter.

FNAL-687 (Jan 1981) Approved Dec 1983; Started 1987; Completed Jan 1992.

HIGH ENERGY PHOTOPRODUCTION OF STATES CONTAINING HEAVY QUARKS AND OTHER RARE PHENOMENA

BOLOGNA U - P L Frabetti, V Giordano, G Molinari
COLORADO U, BOULDER - C W Bogart, H W K Cheung, P Coteus, S W Culy, J P Cumalat (√ Spokesperson), C Dallapiccola, J Ginkel, V Greene, W E Johns, M Nehring
FERMILAB - J N Butler (√ Spokesperson), S Cihangir, A Cotta-Ramusino, I Gaines, P H Garbincius, L Garren, S A Gourlay, D J Harding, P H Kasper, A E Kreymer, P L G Lebrun, S Shukla, M Vittone
FRASCATI - S Bianco, F Fabbri, M Giardoni, L Passamonti, V Russo, A Spallone, A Zallo
ILLINOIS U, URBANA - R L Culbertson, M Diesburg, R W Gardner, R Greene, G R Jaross, T Kroc, K L Lingel, J E Wiss
KOREA U - B G Cheon, J S Kang, K Y Kim
MILAN U & INFN, MILAN - G Alimonti, D Alliata, G Bellini, B Caccianiga, W R Cavaletti, L Cinquini, M Di Corato, P D'Angelo, M G Giammarchi, D Hazan, P Inzani, F Leveraro, S Malvezzi, P F Manfredi, D Menasce, E Meroni, L Moroni, D Pedrini, L Perasso, F Ragusa, A Sala, S Sala, D Torretta
NORTHWESTERN U - D A Buchholz, C Castoldi, D R Claes, B Gobbi, B O'Reilly, S Park, R Yoshida
NOTRE DAME U - B W Baumbaugh, J M Bishop, J K Busenitz, N M Cason, J D Cunningham, C J Kennedy, G N Kim, T Lin, E J Mannel, R J Mountain, D Puseljic, R C Ruchti, W D Shephard, J A Swiatek, Z Y Wu, M Zanabria
PAVIA U - V Arena, G Boca, R Diaferia, S P Ratti, C Riccardi, P Vitulo
UC, DAVIS - G P Grim, V Paolone, P M Yager
PUERTO RICO U, MAYAGUEZ - A Lopez
MEXICO, IPN - H Mendez
NORTH CAROLINA U - T F Davenport
WESTERN KENTUCKY U - J Filasetta
SOUTH CAROLINA U - J R Wilson
TENNESSEE U - G Blackett, W Bugg, K Danyo, T Handler, G Kondo, M Phisharody

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

γ nucleus $\rightarrow \mu^+ \mu^- X$	200-500 GeV/c
γ nucleus $\rightarrow$ muon X	"
γ nucleus $\rightarrow e^+ e^- X$	"
γ nucleus $\rightarrow e^\pm X$	"

Particles studied ψ(unspec), charm, Υ(unspec), bottom

Comments Continues studies of FNAL-087 and -401. Uses γ's from a new wideband electron beam, a new large-aperture multiparticle spectrometer, an active silicon target, and a silicon microstrip decay-vertex detector. Studies the dynamics of heavy quark photoproduction.

Papers IEEE TNS 30 (1983) 3768, NIM 225 (1984) 619, NIM A241 (1985) 107, NIM A251 (1986) 40, NIM A252 (1986) 366, PL B251 (1990) 639, PL B263 (1991) 584, and NIM A305 (1991) 48.

FNAL-690 (Feb 1981) Approved Jul 1981, Nov 1983, Apr 1987; Started 1990; Completed Jan 1992.

STUDY OF HADRONIC PRODUCTION AND SPECTROSCOPY OF STRANGE, CHARM AND BOTTOM PARTICLES AT THE TEVATRON

COLUMBIA U - A G Gara, E Gottschalk, B C Knapp (Spokesperson), L R Wiencke
FERMILAB - D C Christian, G Gutierrez, S D Holmes, J B Strait, A A Wehmann
GUANAJUATO U - A Antillon, C Avilez, B Hoeneisen, G Lopez, M A Murguia
MASSACHUSETTS U - E P Hartouni, D A Jensen, B Klima, M N Kreisler, S Lee, K Markianos, L M Mayhew, M. S Z Rabin, J Uribe
TEXAS A AND M - M Forbush, F R Huson, J T White, J Whiteman, J A Wightman

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

hadron p 200-2000 GeV/c

Particles studied charm, bottom

Comments Initial goals include (1) a systematic study of exclusive reactions, particularly diffraction dissociation, (2) cataloging of the remaining stable charmed particles, with details of production and decay, and (3) determining the scale

of bottom production. Uses an innovative spectrometer with a hardware processor.

FNAL-691 (Feb 1981) Approved Nov 1983; Completed Aug 1985.

CHARM PRODUCTION WITH THE TAGGED PHOTON SPECTROMETER

FERMILAB - J A Appel, V K Bharadwaj, P M Mantsch, T Nash, M V Purohit, K Sliwa, M D Sokoloff, W J Spalding, M E Streetman
UC, SANTA BARBARA - A Bean, T Browder, J Duboscq, J Huber, S F McHugh, R J Morrison, G Punkar, J Raab, D M Schmidt, D Sperka, M S Witherell (√ Spokesperson)
CARLETON U - P Estabrooks, J Pinfold
RIO DE JANEIRO, CBPF - J Anjos, A Santoro, M Souza
COLORADO U - L M Cremaldi, J R Elliott, M Gibney, U Nauenberg
NATIONAL RESEARCH COUNCIL, OTTAWA - M J Losty
TORONTO U - S B Bracker, G F Hartner, B R Kumar, G J Luste, J F Martin, S Menary, A Stundzia
SAO PAULO U - C Escobar
YALE U - P Karchin, W R Ross
CINCINNATI U - A L Shoup

Accelerator FNAL-TEV *Detector* TPS

Reactions

$\gamma\, p \rightarrow$ charm X	100-260 GeV/c

Particles studied D^0, D^+, $D^*(2010)$, D_s^+, $J/\psi(1S)$, Λ_c^+, $\Sigma_c(2455)^0$

Comments Ran for 1400 hours and collected 100 million events with a silicon microstrip detector. See also FNAL-516. Data analysis in progress (March 92).

Papers PRL 57 (1986) 3003, PRL 58 (1987) 311, NP B282 (1987) 626, PRL 58 (1987) 1818, NIM A260 (1987) 55, PRL 60 (1988) 897, PRL 60 (1988) 1239, PRL 60 (1988) 1379, PR D37 (1988) 2391, PRL 62 (1989) 125, PRL 62 (1989) 513, PRL 62 (1989) 722, PRL 62 (1989) 1587, PRL 62 (1989) 1717, PRL 62 (1989) 1721, PL B223 (1989) 267, PRL 64 (1990) 2885, PRL 65 (1990) 2503, PRL 65 (1990) 2630, PR D41 (1990) 801, PR D41 (1990) 2705, PR D42 (1990) 2414, PR D43 (1991) 635, PR D43 (1991) 2063, PR D44 (1991)3371, and PRL 67 (1991) 1507.

FNAL-704 (Sep 1981) Approved Dec 1981, Dec 1983; Completed Aug 1990.

INTEGRATED PROPOSAL ON FIRST ROUND EXPERIMENTS WITH THE POLARIZED BEAM FACILITY

Accelerator FNAL-TEV *Detector* Spectrometer, Calorimeter, Wire chamber

Comments For description, list of participants, and published papers see FNAL-581/704.

FNAL-705 (Oct 1981) Approved Dec 1981; Completed Feb 1988.

A STUDY OF CHARMONIUM AND DIRECT PHOTON PRODUCTION BY 300 GeV/c $\bar{p}$, p, π^+, AND π^- BEAMS

ARIZONA U - T Y Chen, K Lai, N Yao
ATHENS U, NUCL PHYS LAB - P Ioannou, C Kourkoumelis, A Manousakis-Kaftsikakis, P Premantiotis, L Resvanis, G Voulgaris
DUKE U - L Cortney, Q Shen, R Tesarek, T Turkington
FERMILAB - L Antoniazzi, S Delchamps, M Haire, C M Jenkins, P Mazur, C T Murphy, R Smith, L Spiegel, F Turkot, W Yang
FLORIDA A AND M U - B Etemadi, K Guffey, W P Tucker
MCGILL U - S Conetti, J Kuzminski, A Marchionni, M Rosati, A Simard, D Stairs, G Zioukas
NORTHWESTERN U - T LeCompte, J Rosen, Y Tan, S Tzamarias
PRAIRIE VIEW A AND M - D J Judd, L Turnbull, D E Wagoner
SHANDONG U - Z Cao, H Mao, C Shen, C Wang, N Zhang, X Zhang, B Zou
VIRGINIA U - M Arenton, B Cox (√ Spokesperson)

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

$p\ ^7\mathrm{Li} \rightarrow \gamma(s)$ X	300 GeV/c
$p\ ^7\mathrm{Li} \rightarrow J/\psi(1S)\ \gamma$ X	"
$p\ ^7\mathrm{Li} \rightarrow \chi_c(\mathrm{unspec})$ X	"
$\bar{p}\ ^7\mathrm{Li} \rightarrow \gamma(s)$ X	"
$\bar{p}\ ^7\mathrm{Li} \rightarrow J/\psi(1S)\ \gamma$ X	"
$\bar{p}\ ^7\mathrm{Li} \rightarrow \chi_c(\mathrm{unspec})$ X	"
$\pi^+\ ^7\mathrm{Li} \rightarrow \gamma(s)$ X	"
$\pi^+\ ^7\mathrm{Li} \rightarrow J/\psi(1S)\ \gamma$ X	"
$\pi^+\ ^7\mathrm{Li} \rightarrow \chi_c(\mathrm{unspec})$ X	"
$\pi^-\ ^7\mathrm{Li} \rightarrow \gamma(s)$ X	"
$\pi^-\ ^7\mathrm{Li} \rightarrow J/\psi(1S)\ \gamma$ X	"
$\pi^-\ ^7\mathrm{Li} \rightarrow \chi_c(\mathrm{unspec})$ X	"

Particles studied $J/\psi(1S)$, $\chi_c(\mathrm{unspec})$

Comments Uses the upgraded FNAL-537 spectrometer, a large-aperture general-purpose detector with a high-resolution scintillating glass electromagnetic calorimeter. Ran for 3600 hours.

Papers NIM 219 (1984) 487, NIM 219 (1984) 491, NIM A236 (1985) 42, NIM A238 (1985) 315, NIM A238 (1985) 321, IEEE TNS 36 (1989) 112, IEEE TNS 36 (1989) 117, and IEEE TNS 36 (1989) 680.

FNAL-706 (Oct 1981) Approved Dec 1981, Oct 1983; Completed Jan 1992.

A COMPREHENSIVE STUDY OF DIRECT PHOTON PRODUCTION IN HADRON INDUCED COLLISIONS

UC, DAVIS - J Bacigalupi, S Mani, D Pellett
DELHI U - B Chandra Choudhary, V Kapoor, R K Shivpuri, V Zutshi
FERMILAB - W F Baker, D C Carey, C Johnstone, P T Lukens, D D Skow, G Wu
MICHIGAN STATE U - L Apanasevich, C M Bromberg, D S Brown, J W Huston, A Maul, R J Miller, L Sorrell, C M Yosef
NORTHEASTERN U - G O Alverson, P Chang, W Dlugosz, W Faissler, D Garelick, M J Glaubman, C B Lirakis, E L Pothier, D L Striley, T Yasuda
OKLAHOMA U - P Gutierrez
PENN STATE U - K W Hartman, B Y Oh, W Toothacker, J Whitmore
PITTSBURGH U - S Blusk, W Chung, E Engels, P F Shepard, D Weerasundara
ROCHESTER U - L de Barbaro, M Begel, L Debarbaro, W E Desoi, J Dunlea, G K Fanourakis, T Ferbel, J Ftacnik, G Ginther, F Lobkowicz, J P Mansour, G Osborne, E Prebys, R M Roser, P F Slattery (√ Spokesperson), N Varelas, M Zielinski

Accelerator FNAL-TEV *Detector* Spectrometer, Calorimeter

Reactions

p nucleon $\rightarrow \gamma$ X	530, 800 GeV/c
p nucleon $\rightarrow \pi^0$ X	"
p nucleon $\rightarrow \eta$ X	"
p nucleon $\rightarrow \pi^0\ \pi^0$ X	"
π^+ nucleon $\rightarrow \gamma$ X	530 GeV/c
π^+ nucleon $\rightarrow \pi^0$ X	"
π^+ nucleon $\rightarrow \eta$ X	"
π^+ nucleon $\rightarrow \pi^0\ \pi^0$ X	"
π^- nucleon $\rightarrow \gamma$ X	"
π^- nucleon $\rightarrow \pi^0$ X	"
π^- nucleon $\rightarrow \eta$ X	"
π^- nucleon $\rightarrow \pi^0\ \pi^0$ X	"

Comments Triggers on high transverse momentum electromagnetic showers to study the gluon structure functions of hadrons and investigate gluon fragmentation by analyzing the production of direct γ's and their accompanying hadrons in collisions of pions, kaons, and protons on hydrogen, beryllium, and copper. Uses a liquid argon calorimeter and a tracking spectrometer.

Papers NIM A235 (1985) 332, APP B17 (1986) 435, NIM A253 (1987) 523, NIM A279 (1989) 272, NIM A307 (1991) 292, PRL 68 (1992) 2584, and PR D45 (accepted).

FNAL-710 (Feb 1982) Approved Jun 1982; Started 1988; Completed May 1989.

MEASUREMENTS OF ELASTIC SCATTERING AND TOTAL CROSS SECTIONS AT THE FERMILAB $\bar{p}p$ COLLIDER

BOLOGNA U – M Bertani, G Giacomelli, M R Mondardini, M Spagnoli, I Veronesi, S Zucchelli
CORNELL U – J Orear (✓ Spokesperson)
FERMILAB – N A Amos, C Avila, W F Baker, D P Eartly, B Gomez, A J Lennox, J P Negret, S M Pruss, R Rubinstein (✓ Spokesperson), J Carlos Sanabria, S Shukla
GEORGE MASON U – R W Ellsworth
MARYLAND U – D A Dimitroyannis, J A Goodman
NORTHWESTERN U – M M Block, C M Guss, S Sadr

Accelerator FNAL-COLLIDER *Detector* Counter, Drift chamber

Reactions

$\bar{p}\,p$	300, 546, 1000, 1800 GeV (E_{cm})
$\bar{p}\,p \rightarrow \bar{p}\,p$	"

Comments The range is $0 < -t < 0.6$ GeV^2. Studies σ_T, B, diffraction dissociation, and ρ for $\bar{p}p$ interactions. Elastic scattering is measured by detectors in Roman Pots, the total rate is determined using a 4π detector.

Papers NIM A252 (1986) 263, IJMP A2 (1987) 891, PRL 61 (1988) 525, PRL 63 (1989) 2784, NP (Proc. Suppl.) B12 (1990) 9, NP (Proc. Suppl.) B16 (1990) 431, PL B243 (1990) 158, PL B247 (1990) 127.

FNAL-711 (Aug 1982) Approved Jul 1983; Completed Feb 1988.

A STUDY OF THE ANGULAR AND ENERGY DEPENDENCE OF CONSTITUENT SCATTERING THROUGH MEASUREMENTS OF THE REACTION $pN \rightarrow$ HADRON HADRON X

FERMILAB – M B Crisler, S H Pordes
MICHIGAN U – M A Cummings, H R Gustafson
UC, DAVIS – J T Volk
FLORIDA STATE U – G L Boca, C Georgiopoulos, J H Goldman, S L Hagopian, V Hagopian, K Johnson, D M Kaplan, D A Levinthal (✓ Spokesperson), F V Lopez, J Streets, K R Turner, H B White, C J Young

Accelerator FNAL-TEV *Detector* Spectrometer, Calorimeter

Reactions

p Be $\rightarrow$ hadron hadron X	900 GeV/c

Comments Studies the energy, angular, and flavor dependence of the quark-quark scattering cross section. Ran for 1400 hours.

Papers NIM A264 (1987) 493, PRL 66 (1991) 864, and ZPHY C49 (1991) 543

FNAL-713 (Jan 1982) Approved Jun 1982; Completed May 1989.

A SEARCH FOR HIGHLY IONIZING PARTICLES FOR THE D0 AREA AT FERMILAB

UC, BERKELEY – D M Lowder, H Park, P B Price (Spokesperson)
HARVARD U – K Kinoshita

Accelerator FNAL-COLLIDER *Detector* Plastic

Reactions

$\bar{p}\,p \rightarrow$ monopole X	300–2000 GeV (E_{cm})

Particles studied monopole

Comments Uses Lexan and CR-39 plastic detectors outside and phosphate glass detectors inside the vacuum pipe. Detects any highly ionizing exotic particles, not just monopoles.

Papers PRL 59 (1987) 2523.

FNAL-731 (Feb 1983) Approved Jul 1983; Completed Feb 1988.

A PRECISION MEASUREMENT OF THE CP VIOLATION PARAMETER ϵ'/ϵ IN THE K^0 SYSTEM

CHICAGO U – A Barker, R A Briere, L Gibbons, G Makoff, V Papadimitriou, R Patterson, S V Somalwar, Y Wah, B Winstein (✓ Spokesperson), R Winston, H Yamamoto
ELMHURST COLL – E C Swallow
FERMILAB – G Bock, R Coleman, J Enagonio, B Hsiung, E Ramberg, K Stanfield, R Stefanski, R Tschirhart, T Yamanaka
SACLAY – P Debu, B Peyaud, R Turlay, B Vallage
PRINCETON U – G Gollin, M Karlsson, J Okamitsu

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

$K_L \rightarrow \pi^+\,\pi^-$	50–150 GeV/c
$K_L \rightarrow \pi^0\,\pi^0$	"
$K_L \rightarrow \pi^0\,e^+\,e^-$	"

Particles studied K_L

Comments A next-generation experiment following FNAL-617. A new neutral beam gives six times more flux at the same background rate. The apparatus gives five times greater acceptance for $K_L \rightarrow 2\pi^0$. The K_L and K_S decays are measured simultaneously in a double-beam arrangement. Ran for 3100 hours.

Papers PRL 60 (1988) 1695, PRL 61 (1988) 2661, PRL 63 (1989) 28, PRL 64 (1990) 1491, PRL 64 (1990) 2976, PR D44 (1991) 573, and PRL 68 (1992) 2580.

FNAL-733 (Feb 1983, Sep 1983) Approved Nov 1983; Completed Feb 1988.

STUDY OF HIGH ENERGY ν INTERACTIONS WITH THE TEVATRON WIDE BAND TRIPLET BEAM

FERMILAB – D Bogert, G Koizumi, L Stutte
MIT – J A Bofill, J I Friedman, S Fuess, H W Kendall, V Kistiakowsky, T Lyons, L Osborne, R Pitt, L Rosenson, B Strongin, F E Taylor, R Verdier
MICHIGAN STATE U – M Abolins, R Brock (Spokesperson), W G Cobau, E Gallas, R W Hatcher, D Owen, G J Perkins, M Tartaglia, H Weerts
FLORIDA STATE U – J K Walker, J Womersley

Accelerator FNAL-TEV *Detector* Calorimeter

Reactions

ν_μ nucleus	0–500 GeV/c
$\bar{\nu}_\mu$ nucleus	"

Comments The detector is the Lab-C 200-ton flash-chamber proportional-tube calorimeter. In addition to standard topics such as scaling, studies same-sign dimuon production, weak neutral currents, inverse μ decay, and coherent ν scattering. Ran for 4100 hours.

Papers NIM A267 (1988) 49, and NIM A278 (1989) 447.

FNAL-735 (Apr 1983, Sep 1983) Approved Dec 1983; Completed May 1989.

SEARCH FOR A DECONFINED QUARK-GLUON PHASE OF STRONGLY INTERACTING MATTER IN $\bar{p}p$ INTERACTIONS AT E_{cm} NEAR 2 TeV

DUKE U – T G Carter, A T Goshaw, C A Loomis, S H Oh, W J Robertson, W D Walker, D K Wesson
FERMILAB – V H Areti, P C Bhat, C F Hojvat, C S Lindsey, D F Reeves, F Turkot
IOWA STATE U – E W Anderson, C Wang
NOTRE DAME U – S Banerjee, P Beery, J M Bishop, N N Biswas, V P Kenney, J M Losecco, A P McManus, J Piekarz, S Stampke, B V Varadarajalu, Y Zhan
PURDUE U – C C Allen, A T Bujak, D D Carmony, Y Choi, P L Cole, R J Debonte, L J Gutay (Spokesperson), A S Hirsch, T M Mcmahon, N K Morgan, N T Porile, A Rimai, R P Scharenberg (Spokesperson), B C Stringfellow
WISCONSIN U – T Alexopoulos, A R Erwin, C Findeisen, J R Jennings, K S Nelson, M A Thompson, S L Tufte

Accelerator FNAL-COLLIDER *Detector* Spectrometer

Reactions

$\bar{p}\,p$ 2000 GeV (Ecm)

Comments Measures the transverse momentum distributions up to p_t =1.4 GeV/c and particle ratios for centrally produced p, $\bar{p}$, K^+, K^-, π^+, π^-, and γ as a function of the charged-particle multiplicity.

Papers NIM A254 (1987) 212, NIM A269 (1988) 121, PRL 60 (1988) 1622, PRL 62 (1989) 12, NP A498 (1989) 181c, PRL 64 (1990) 991, and NP A525 (1991) 165.

FNAL-740 (Sep 1983) Approved Feb 1984.

STUDY OF $\bar{p}p$ COLLISIONS USING A LARGE DETECTOR AT D0

ANDES U, BOGOTA – J P Fernandez, B Gomez, L N Granda, B Hoeneisen, C Marin, D Mendoza, J P Negret, B Oostra, J Roldan
ARIZONA U – J Chen, D Fein, G E Forden, E James, K A Johns, M Li, A Milder, J P Rutherfoord, M A Shupe, A Smith
BROOKHAVEN – S H Aronson, M Fatyga, B Gibbard, H A Gordon, J M Guida, W Guryn, S A Kahn, S D Protopopescu, P Yamin
BROWN U – D Cullen-Vidal, D Cutts, J S Hoftun, R Lanou, F Nang, D Nesic, R Partridge, H Xu, R Zeller
UC, RIVERSIDE – K A Bazizi, B Choudhary, J A Ellison, R E Hall, T Huehn, D C Joyce, A Kernan, A Khachatouran, A Klatchko, S Wimpenny
RIO DE JANEIRO, CBPF – G Lima, A K A Maciel, V Oguri, A Santoro, M Souza, M Szajnberg, M Vaz
MEXICO, IPN – H Castilla, G Herrera
COLUMBIA U – I Adam, P Franzini, U Heintz, S Kanekal, P M Tuts
DELHI U – V Kapoor, R K Shivpuri
FERMILAB – S Abachi, S Ahn, N Amos, N A Amos, J F Bartlett, P C Bhat, F O Borcherding, A D Bross, J M Butler, J H Christenson, W E Cooper, N Denisenko, H T Diehl, M Diesburg, R L Dixon, D P Eartly, D Elvira, H E Fisk, S C Fuess, C Gao, K Genser, C Gerber, N Graf, D R Green, H B Greenlee, H F Haggerty, S Igarashi, A S Ito, M E Johnson, A M Jonckheere, H Jostlein, B Klima, S Krzywdzinski, R Li, R J Lipton, L Lueking, E Malamud, I Manning, H Mao, P S Martin, X Meng, W Merritt, H E Montgomery, C T Murphy, M Narain, N Oshima, A Para, C Park, A Peryshkin, H Prosper, P Quintas, R Raja, P Rapidis, A L Read, W Smart, R P Smith, D A Stewart, A Taketani, M A Tartaglia, D Wood, P Xie, R Yamada, M Yang, Y Zhou
FLORIDA STATE U – W Dharmaratna, M Goforth, S L Hagopian, V Hagopian, S L Linn, R Madden, H Piekarz, H Wahl, J Womersley, D Xiao, S Youssef
HAWAII U – J Balderston, R J Cence, M A Cummings, M Jones, M W Peters, C Y Yoshikawa
ILLINOIS U, CHICAGO – M R Adams, H S Goldberg, S Margulies, J Solomon
INDIANA U – G Alverson, T R Marshall, H J Martin, C Murphy, D Zieminska, A Zieminski
IOWA STATE U – W Anderson, J Hauptman, M Pang, A Zinchenko
LBL – H Aihara, L Chen, A R Clark, O I Dahl, A Goldschmidt, P Grudberg, L T Kerth, W O Koellner, S C Loken, R J Madaras, E Oltman, N A Roe, A L Spadafora, M L Stevenson, M W Strovink, T G Trippe, W A Wenzel
MARYLAND U – A Baden, N J Hadley, S Kunori, D Norman, K R T Streets
MICHIGAN U – K De, T L Geld, H R Gustafson, A Majumdar, H A Neal, L Oesch, G R Snow, S Zhang
MICHIGAN STATE U – M A Abolins, R Astor, R L Brock, D Edmunds, S Fahey, N L Grossman, J T Linnemann, J McKinley, P Mooney, D P Owen, B Pi, B G Pope, S Tisserant, H J Weerts, Y Xia
NEW YORK U – J Kotcher, J Kourlas, A Mincer, M Mudan, P Nemethy, J Sculli, J Yang, Q Zhu
NORTHEASTERN U – M Glaubman, S Reucroft, T Yasuda
NORTHERN ILLINOIS U – M R Fortner, J M Green, D R Hedin, R I Morphis, V Sirotenko, S Tentindo-Repond, S E Willis
NORTHWESTERN U – R E Avery, J Bantly, S K Blessing, D A Buchholz, B Gobbi, Y Liu, S Rajagopalan, H M Schellman
NOTRE DAME U – V Balamurali, B Baumbaugh, N N Biswas, J Jaques, R Kehoe, R C Ruchti, J Warchol, M Wayne
PANJAB U – S Beri, J Kohli, J Singh, P Sood
SERPUKHOV – Y M Antipov, B Baldin, V Bezzubov, N Bozko, S Chekulaev, D S Denisov, S Denisov, A Efimov, O Eroshin, V Evdokimov, V Glebov, A Kirunin, V Klyukhin, V Kochetkov, I Kotov, E Kozlovsky, Y Pischalnikov, V Podstavkov, V Riadovikov, A Shkurenkov, D Stoyanova, A Suhanov, A P Vorobiev
PURDUE U – D S Koltick, R L McIlwain
RICE U – D Adams, G Eppley, H E Miettinen, J Skeens
ROCHESTER U – G C Blazey, J P Borders, C Cretsinger, S J Durston, G K Fanourakis, T Ferbel, S Gruenendahl, R Hirosky, K Hodel, F Lobkowicz, E Pitts
SACLAY – Y Ducros, J Glicenstein, J R Hubbard, P Mangeot, B Mansoulie, A Pluquet, J Teiger, A Zylberstejn
SUNY, STONY BROOK – D Chakraborty, W Chen, D Claes, J H Cochran, M Demarteau, R J Engelmann, S Feher, G Finocchiaro, M L Good, P D Grannis (√ Spokesperson), J A Guida, T Heuring, J Jiang, C B Klopfenstein, S Lami, G Landsberg, J Lee-Franzini, Q Li-Demarteau, S Lokos, M D Marx, R L McCarthy, K Ng, M F Paterno, D Pizzuto, L Rasmussen, M Rijssenbeek, P Rubinov, R D Schamberger, S Snyder, F Stocker, J Thompson, C Yanigasawa, J Yu
TATA INST – B S Acharya, M R Krishnaswamy, N K Mondal, V S Narasimham, P V Ramanamurthy, M V S Rao, P Vishwanath
TEXAS U, ARLINGTON – P Draper, J Li, L Sawyer, M Sosebee, A White
TEXAS A AND M – A Boehnlein, F R Huson, J T White, J A Wightman

Accelerator FNAL-COLLIDER *Detector* D0

Reactions

$\bar{p}\,p$ 2000 GeV (E_{cm})

Particles studied W^+, W^-, Z^0, bottom, top

Comments The experiment studies the properties of 2 TeV $\bar{p}p$ collisions with particular emphasis on measurement and identification of leptons. The detector incorporates three main systems: a central detector, uranium-liquid argon calorimetry over nearly 4π solid angle, and a magnetized iron muon spectrometer. The detector was commissioned in 1991. Expected to run in 1992/93.

Papers IEEE TNS 32 (1985) 1473, NIM A244 (1986) 356, NIM A247 (1986) 107, CPC 45 (1987) 245, IEEE TNS 34 (1987) 710, NIM A256 (1987) 305, NIM A257 (1987) 556, NIM A261 (1987) 420, NIM A263 (1988) 78, NIM A265 (1988) 157, NIM A269 (1988) 492 [erratum: NIM A273 (1988) 453], NIM A277 (1989) 401, NIM A279 (1989) 107, NIM A279 (1989) 243, NIM A279 (1989) 310, NIM A279 (1989) 331, NIM A279 (1989) 359, NIM A280 (1989) 36, IEEE TNS 36 (1989) 384, NIM A289 (1990) 438, NIM A289 (1990) 543, NIM A290 (1990) 122, NIM A290 (1990) 346, NIM A293 (1990) 125, NIM A297 (1990) 121, IEEE TNS 38 (1991) 286, and IEEE TNS 38 (1991) 398.

FNAL-741 (Aug 1981) Approved Apr 1982.

STUDY OF $\bar{p}p$ COLLISIONS USING A LARGE DETECTOR AT B0—THE CDF DETECTOR

ARGONNE – R E Diebold, W Li, E N May, L J Nodulman, J Proudfoot, P Schoessow, S Sergo, D G Underwood, R G Wagner, A B Wicklund
BRANDEIS U – J R Bensinger, M Contreras, L M Demortier, M R Fortner, S Gallo, T Kepler, P R Kesten, T E Kirsch, F Lomanno, B Maganson, R B Mattingly, S Moulding, L F Nakae, H Piekarz, R Poster, L J Spencer, S Tarem, R Xu, P Zografou
CHICAGO U – D Amidei, C Campagnari, M Campbell, P F Derwent, H J Frisch, C Grosso-Pilcher, T M Liss, R Mikawa, G Redlinger, A Roodman, M J Shochet (√ Spokesperson), F D Snider, Y Tsay
FERMILAB – M Atac, E J Barsotti, J P Berge, M E Binkley, A E Brenner, J T Carroll, T L Collins, C T Day, J E Elias, G W Foster, J E Freeman, I Gaines, J Grimson, D R Hanssen, J Huth, H B Jensen, D E Johnson, R W Kadel, R D Kephart, C A Nelson, C Neumann-Holmes, T K Ohska, J F Patrick, R A Perchonok, D R Quarrie, S L Segler, M Shibata, D Theriot, A V Tollestrup (√ Spokesperson), R Vidal, R L Wagner, R Yamada, G Yeh, J Yoh

FRASCATI - B Alpat, S Bartalucci, S Bertolucci, D Bisello, M Cordelli, A Esposito, P Giromini, S Miscetti, M Pallotta, M Pelliccioni, M Pistoni, A Sansoni, L Trasatti
HARVARD U - A Baden, T P Baumann, C A Blocker, G W Brandenburg, D N Brown, R M Carey, R St Denis, M W Eaton, S Geer, C P Jessop, E Kearns, J S T Ng, E Pare, T J Phillips, F Ptohos, T P Schaad, R F Schwitters, M Shapiro, W Trischuk, W A Worstell
ILLINOIS U, URBANA - G Ascoli, S Bhadra, R W Downing, S M Errede, L Fishback, A Gauthier, L E Holloway, P Hurst, D Kardelis, I Karliner, R Keup, H Keutelian, U E Kruse, C Luchini, A J Martin, R D Sard, V E Scarpine, P Schlabach, D A Smith, R L Swartz, T K Westhusing
KEK - Y Arai, Y Fukui, S Mikamo, M Mishina, Y Munehisa, I Nakano, K Ogawa, T Suzaki, K Takahashi, T Taniguchi, F Ukegawa, Y Watase
LBL - R E Beringer, M Bucher, W C Carithers, W Chinowsky, R P Ely, A Galtieri, M S Gold, C H Haber, R M Harris, B Hubbard, N Hunt, H S Kaye, M E Levi, A P T Palounek, J Siegrist, P Tipton, W C Wester, B L Winer
PENN U - M R Allen, D A Bauer, R Van Berg, M A Bershady, D F Connor, J W Cooper, L Feldscher, R S Foster, L Gladney, S R Hahn, R J Hollebeek, T Koch, N S Lockyer, M Miller, M Neucomer, M A Puglisi, K J Ragan, T F Rohaly, A M Rosenshine, P K Sinervo, J J Walsh, B Williams
INFN, PISA - S R Amendolia, F Bedeschi, G Bellettini, R Bertani, V Bolognesi, N Bonavita, L Bosisio, M Calvetti, R Castaldi, F Cervelli, G Chiarelli, M Curatolo, R Delfabbro, M Dell'Orso, F Donno-Raffaelli, B Esposito, E Focardi, F Gagliardi, P Giannetti, M A Giorgi, H Grassmann, M Mangano, A Menzione, F Morsani, A Nappi, R Paoletti, D Passuello, G Pierazzini, G Punzi, L Ristori, G Sanguinetti, A Scribano, P Sestini, A Stefanini, C Tazziolli-Corazza, G Tonelli, R Tripiccione, C Vannini, F Zetti
PURDUE U - R Austin, M W Bailey, V E Barnes, S Behrends, A Byon-Wagner, K Chadwick, A Divirgilio, A F Garfinkel, B T Huffman, S E Kuhlmann, A T Laasanen, S Riggs, M Schub, J K Simmons, J Tonnison
ROCKEFELLER U - S Belforte, T J Chapin, R L Cool, N D Giokaris, K Goulianos, J Grunhaus, K A Jenkins, R Plunkett, H Sticker, S N White
RUTGERS U - P S Auchincloss, A F Beretvas, E J Buckley-Geer, T J Devlin, P Hu, U P Joshi, E W Kuns, J Lupton, N M Pearson, T L Watts, T Yang, Q M Zhang
TEXAS A AND M - T J V Bowcock, J R Buchholz, S Cihangir, D D Dibitonto, H Franke, T Hessing, T Kamon, L Keeble, F Marchetto, P M Mcintyre, T Meyer, W M Sampson, X Shen, M J Shepko, J M Thane, M Timko, R C Webb
TSUKUBA U - F Abe, Y Asano, Y Funayama, K Hara, Y Hayashide, T Ino, H Iso, M Ito, Y Kikuchi, S Kim, S Kim, K Kondo, M Kurisu, M Masuzawa, T Mimashi, S Miyashita, H Miyata, S Mori, Y Morita, T Ozaki, F Sato, Y Seiya, M Sekiguchi, Y Takaiwa, M Takano, H Takayama, K Takikawa, H Tsuda, A Yamashita, K Yasuoka, M Yokoyama
WISCONSIN U - I Avgin, K Byrum, D L Carlsmith, D B Cline, R M Handler, J Lamoureux, R J Loveless, R Markeloff, L A Markosky, N K Mondal, E O'Brien, L G Pondrom, D D Reeder, J M Rhoades, M C Sheaff, J E Skarha, C Wendt

Accelerator FNAL-COLLIDER *Detector* CDF

Reactions

$\bar{p}\,p$ 500-2000 GeV (E_{cm})

Particles studied W^+, W^-, Z^0, higgs, top

Comments The first physics results were obtained during 1987, in an engineering run. In a year-long run in 88/89, an integrated luminosity of 4500 nb^{-1} was achieved. Upgrades for the 1991 run are described in the FNAL-775 proposal. Another major improvement of the CDF detector is proposed for the 1993 run.

Papers NIM 204 (1983) 351, NIM 204 (1983) 361, NIM 205 (1983) 113, NIM 216 (1983) 127, NIM 219 (1984) 472, JdeP 45 (1984) 333, NIM A238 (1985) 18, IEEE TNS 34 (1987) 865, NIM A263 (1988) 199, NIM A267 (1988) 249, NIM A267 (1988) 257, NIM A267 (1988) 272, NIM A267 (1988) 280, NIM A267 (1988) 301, NIM A267 (1988) 315, NIM A267 (1988) 330, NIM A267 (1988) 351. NIM A268 (1988) 24, NIM A268 (1988) 33, NIM A268 (1988) 41, NIM A268 (1988) 46, NIM A268 (1988) 50, NIM A268 (1988) 75, NIM A268 (1988) 92, NIM A269 (1988) 33, NIM A269 (1988) 40, NIM A269 (1988) 51, NIM A269 (1988) 63, NIM A269 (1988) 68, NIM A269 (1988) 82, NIM A269 (1988) 93, NIM A271 (1988) 387, PRL 61 (1988) 1819, PRL 62 (1989) 613, PRL 62 (1989) 1005, PRL 62 (1989) 1825, PRL 62 (1989) 3020, PRL 63 (1989) 720, PRL 63 (1989) 1447, NIM A274 (1989) 443, NIM A281 (1989) 485, PR D40 (1989) 3791, NP A498 (1989) 193c, IEEE TNS 36 (1989) 35, IEEE TNS 36 (1989) 347, IEEE TNS 36 (1989) 440, IEEE TNS 36 (1989) 765, PRL 64 (1990) 142, PRL 64 (1990) 147, PRL 64 (1990) 152, PRL 64 (1990) 157, PRL 64 (1990) 348, PRL 65 (1990) 968, PRL 65 (1990) 2243, PR D41 (1990) 1717, PR D41 (1990) 1722, PR D41 (1990) 2330, PRL 66 (1991) 2951, PRL 67 (1991) 2418, PRL 67 (1991) 2609, PR D43 (1991) 664, PR D43 (1991) 2070, PR D44 (1991) 29, and PR D44 (1991) 601.

FNAL-743 (Sep 1983) Approved Dec 1983; Completed Aug 1985.

CHARM PRODUCTION IN *pp* COLLISIONS WITH LEBC-FMPS AT 1 TeV

AACHEN, TECH HOCHSCH, III PHYS INST - V Commichau, A Roth, W Struczinski
BRUSSELS U, IIHE - J Lemonne, B Vonck, J Wickens
CERN - J J Hernandez, J Hrubec, M Iori, H Leutz, A Poppleton, M C Touboul
DUKE U - A Goshaw, W Robertson, W Walker, C F Wild
FERMILAB - R Dixon, H C Fenker, J M Marriffino, M Nikolic, L Voyvodic
KANSAS U - R Ammar, S Ball, R Davis, J Gress, N Kwak, X Liu
MICHIGAN U - R C Ball, C T Coffin, T O Dersham, L W Jones, B P Roe, M F Weber
MICHIGAN STATE U - C Bromberg, R Miller, A Nguyen
MONS U - J Baland, V P Henri, P Legros, P Pilette
NORTHEASTERN U - C Hamilton, I D Leedom, S Reucroft (√ Spokesperson), C Zabounidis
NOTRE DAME U - R Brun, G E Canough, N Giokaris, S Mikocki, J Poirier
VANDERBILT U - C Roos, M F Senko, J Waters, M Webster
TATA INST - T Aziz, S Banerjee, S N Ganguli, A Gurtu, P K Malhotra, R Raghavan, A Subramanian
BERLIN-ZEUTHEN ADW - U Gensch, D Knauss, G E Mendez, T Naumann, H Nowak
INNSBRUCK U & VIENNA, OAW - P Girtler, D Kuhn, G Neuhofer, K Rasner

Accelerator FNAL-TEV *Detector* HBC-LEBC-HYB, FMPS

Reactions

$p\,p \rightarrow$ charm X 800 GeV/c

Particles studied D^0, D^+, D_s^+, Λ_c^+

Comments Uses LEBC from CERN-NA-027 (a similar experiment at 400 GeV) as the vertex detector. The main aim is to measure precisely the charm total cross section at 39-GeV c.m. energy to compare with a similar measurement at 27 GeV. Took 1256 KPIX.

Papers NIM A248 (1986) 301, PL B178 (1986) 124, PL B183 (1987) 110, PL B192 (1987) 478, and PRL 61 (1988) 2185.

FNAL-744 (Sep 1983) Approved Nov 1983; Completed Aug 1985.

HIGH STATISTICS STUDIES OF CHARGED CURRENT INTERACTIONS USING THE TEVATRON QUAD TRIPLET BEAM

CHICAGO U - F Merritt (Spokesperson), M Oreglia, P Reutens, B Schumm
COLUMBIA U - P Auchincloss, K Bachman, R Berstein, R Blair, C Foudas, W C Lefmann, S Mishra, E Oltman, F Sciulli (Spokesperson), M Shaevitz, W Smith
FERMILAB - F O Borcherding, D A Edwards, H E Fisk, D Jovanovic, Q A Kerns, M Lamm, W Marsh, W Merritt, P Rapidis
ROCHESTER U - A Bodek, H Budd, K Lang

Accelerator FNAL-TEV *Detector* LAB-E

Reactions

ν_μ nucleus $\rightarrow$ muon(s) X < 400 GeV/c
$\bar{\nu}_\mu$ nucleus $\rightarrow$ muon(s) X "

Comments Studies opposite-sign dimuon events, same-sign dimuon events, and structure functions. Continues work of FNAL-616 and -701. Ran for 1900 hours.

Papers PRL 60 (1988) 1618, PRL 63 (1989) 132, and PL B252 (1990) 170.

FNAL-745 (Sep 1983) Approved Dec 1983; Completed Feb 1988.

MUON NEUTRINO EXPERIMENT USING THE TOHOKU HIGH RESOLUTION ONE METER BUBBLE CHAMBER

BROWN U - P Allen, M Aryal, D Brick, A Chen, K De, A Desilva, A Shapiro, M Widgoff
FERMILAB - N Gelfand, T Murphy
INDIANA U - E D Alyea, Jr
BEIJING, IHEP - C Mao, L G Mu, Y Tai, S Wang, Y Wu, S W Xu, C Zhao
MIT - D A Goloskie, E S Hafen, J Harton, I A Pless
SUGIYAMA JOGAKUEN U - S Fukui
OAK RIDGE - H O Cohn
TENNESSEE U - J E Brau, W M Bugg, G T Condo, Y C Du, T Handler, J Hargis, E L Hart, R Kroeger, R Majoras, J Shimony
TOHOKU U - T Akagi, Y Chiba, K Furuno, H Hanada, K Hasegawa, J Katayama, T Kitagaki (Spokesperson), H Kurino, Y Morita, S Nakai, T Nakajima, K Numano, M Sasaki, H Suzuki, T Takayama, K Tamai, S Tanaka, A Yamaguchi, T Yamamura
TOHOKU GAKUIN U - M Higuchi, Y Hoshi, M Sato

Accelerator FNAL-TEV *Detector* HLBC-1M

Reactions

ν_μ nucleus $\rightarrow$ charm X	< 500 GeV/c
ν_μ nucleus $\rightarrow$ muon X	"

Particles studied D^+, D^0, D_s^+, Λ_c^+

Comments Uses the Tohoku high-resolution 1-meter freon bubble chamber. Studies charm production and neutrino interactions in the high Q^2 region. Took 553 KPIX.

Papers PL B214 (1988) 281, and NIM A281 (1989) 81.

FNAL-756 (Oct 1984) Approved Jun 1985; Completed Feb 1988.

MEASUREMENT OF THE MAGNETIC MOMENT OF THE Ω^-

FERMILAB - C James, K B Luk (✓ Spokesperson), R Rameika
MICHIGAN U - P M Ho, M Longo, A Nguyen
MINNESOTA U - J Duryea, G Guglielmo, K Heller, K Johns, M Shupe, K Thorne
RUTGERS U - T Diehl, S Teige, G Thompson, Y Zou

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

p Be $\rightarrow \Omega^-$ X	800 GeV/c
Λ Cu $\rightarrow \Omega^-$ X	300-800 GeV/c
Ξ^0 Cu $\rightarrow \Omega^-$ X	"

Particles studied Ω^-, $\overline{\Omega}^+$, Σ^+, Σ^-, Ξ^-, $\overline{\Xi}^+$, K^+, K^-, π^-

Comments Ran for 1700 hours.

Papers PRL 65 (1990) 1713, PR D44 (1991) 3402, PRL 67 (1991) 804, PRL 67 (1991) 1193, and PRL 68 (1992) 768.

FNAL-760 (Mar 1985) Approved Jun 1985; Completed Jan 1992.

INVESTIGATION OF THE FORMATION OF CHARMONIUM STATES USING THE $\bar{p}$ ACCUMULATOR RING

UC, IRVINE - D R Broemmelsiek, J E Fast, K E Gollwitzer, M A Mandelkern, J L Marques, J Schultz, A Smith, M F Weber, G Zioulas
FERMILAB - V K Bharadwaj, M Church, A A Hahn, S Y Hsueh, W L Marsh, J Peoples, S H Pordes, P A Rapidis, R E Ray, S Werkema
FERRARA U - D Bettoni, R Calabrese, P Dalpiaz, P Ferretti-Dalpiaz, E Luppi, M Martini, F Petrucci, M Savrie
INFN, GENOA - A Buzzo, M Dameri, S Ferroni, M Macri, M M Marinelli, L Mattera, S Passaggio, C Patrignani, M Pia, A Santroni, F Tommasina, M Zito
NORTHWESTERN U - D A Dimitroyannis, M Masuzawa, J L Rosen, M Sarmiento, K K Seth, S Trokenheim, J Zhao
PENN STATE U - T A Armstrong, M Abul Hasan, R A Lewis, A Majewska, J D Reid, G A Smith
TURIN U - C Biino, G Borreani, A Ceccucci, R Cester (✓ Spokesperson), F Marchetto, E A Menichetti, A Migliori, R Mussa, S Palestini, N Pastrone, L Pesando, G Rinaudo, L Tecchio

Accelerator FNAL-COLLIDER *Detector* Calorimeter, Counter

Reactions

$\bar{p}\,p \rightarrow \psi$(unspec)	3-7 GeV/c
$\bar{p}\,p \rightarrow 2K^+\,2K^-$	"
$\bar{p}\,p \rightarrow \gamma$'s	"
$\bar{p}\,p \rightarrow e^+\,e^-\,\gamma(s)$	"
$\bar{p}\,p \rightarrow e^+\,e^-\,\pi^+\,\pi^-\,\pi^0$	"

Particles studied charmonium

Comments Studies charmonium states formed exclusively in $\bar{p}p$ collisions, and their decays to electromagnetic final states. Uses a gas-jet hydrogen target in the Fermilab $\bar{p}$ source. The detector consists of a tracking system, hodoscopes, and Čerenkov counters surrounded by a central lead-glass electromagnetic calorimeter, and a planar forward calorimeter.

Papers NIM A271 (1988) 417, NIM A277 (1989) 116, NIM A295 (1990) 73, NIM A301 (1991) 47, NIM A307 (1991) 254, and PRL 68 (1992) 1468.

FNAL-761 (Apr 1985) Approved Jun 1985; Completed Aug 1990.

STUDY OF HYPERON RADIATIVE DECAYS

BEIJING, IHEP - L Chengze, L Fengfei, T Fukun, D Lisheng, H Shi, L Yunshan, W Zhao
RIO DE JANEIRO, CBPF - A M Freire Endler, M C Pommot Maia
FERMILAB - R A Carrigan, P S Cooper, J Lach, A M Morelos-Pineda
IOWA U - E R Mccliment, C R Newsom
MOSCOW, ITEP - P A Goritchev, M A Kubantsev
SAO PAULO U - C O Escobar, P Gouffon, J Mahon
ST PETERSBURG, INP - A S Denisov, V L Golovtsov, V T Gratchev, A V Khanzadeev, A G Krivshich, N P Kuropatkin, V M Samsonov, V A Schegelsky, N N Smirnov, N K Terentiev, L N Uvarov, A A Vorobiev (Spokesperson)
YALE U - M Foucher

Accelerator FNAL-TEV *Detector* Spectrometer, Transition radiation

Reactions

p nucleus $\rightarrow \Sigma^+$ X	800 GeV/c
p nucleus $\rightarrow \Xi^-$ X	"

Particles studied Σ^+, Ξ^-

Comments Measures branching fractions and asymmetry parameters of $\Sigma^+ \rightarrow p\gamma$ and $\Xi^- \rightarrow \Sigma^-\gamma$ decays. Uses a polarized charged hyperon beam and a new very high resolution spectrometer.

FNAL-766 (Jul 1985) Approved Jul 1985; Completed Oct 1985.

NEUTRON ENERGY SPECTRUM MEASUREMENTS IN THE TEVATRON TUNNEL — APPLICATION TO SSC

LBL - J McCaslin (Spokesperson), W P Swanson
FERMILAB - A J Elwyn, W S Freeman, P M Yurista

Accelerator FNAL-TEV *Detector* Neutron spectrometer

Reactions

p nucleus $\rightarrow n$ X	

Comments A test relevant to radiation damage at the SSC.

FNAL-769 (Nov 1985) Approved Dec 1985; Completed Feb 1988.

PION AND KAON PRODUCTION OF CHARM AND CHARM-STRANGE STATES

RIO DE JANEIRO, CBPF – G A Alves, S Amato, J C C Anjos, J R T de Mello-Neto, J M de Miranda, H da Motta, A C dos Reis, A F S Santoro, M H G Souza
FERMILAB – J A Appel (✓ Spokesperson), R Dixon, H Fenker, D Green, S Kwan, L Lueking, P M Mantsch, T Nash, W J Spalding, C Stoughton, M Streetman
MISSISSIPPI U – L M Cremaldi, A Rafatian, D Summers
NORTHEASTERN U – D Kaplan, I D Leedom, S Reucroft
TORONTO U – S B Bracker, C Gay, R Jedicke, G J Luste
TUFTS U – J Metheny, R Milburn, A Napier
WISCONSIN U – D Errede, M Sheaff
YALE U – C Darling, P Karchin, W R Ross, S F Takach, Z Wu

Accelerator FNAL-TEV *Detector* TPS

Reactions

pion nucleus → charm X	250 GeV/c
kaon nucleus → charm X	"
p nucleus → charm X	"

Particles studied D^0, D^+, D^-, $D^*(2010)$, D_s^+, D_s^-, Λ_c^+

Comments A sequel to FNAL-691. Ran for 1900 hours.

Papers IEEE TNS 34 (1987) 870, and IEEE TNS 36 (1989) 106.

FNAL-770 (Dec 1985) Approved Dec 1985; Completed Feb 1988.

NEUTRINO PHYSICS AT THE TEVATRON

CCFR COLLABORATION
CHICAGO U – F Merritt, M Oreglia, B Schumm
COLUMBIA U – C Arroyo, K T Bachmann, R E Blair, C Foudas, B J King, W C Lefmann, W C Leung, S R Mishra, P Z Quintas, S A Rabinowitz, F J Sciulli, B Seligman, M H Shaevitz
FERMILAB – R H Bernstein, F O Borcherding, H E Fisk, D Jovanovic, M Lamm, W Marsh, W Merritt
ROCHESTER U – P de Barbaro, A Bodek, H Budd, W K Sakumoto
WISCONSIN U – T Kinnel, P H Sandler, W H Smith (✓ Spokesperson)

Accelerator FNAL-TEV *Detector* LAB-E

Reactions

pion nucleus → muon X	40, 70, 100 GeV/c
kaon nucleus → muon X	"
ν_μ nucleus → muon(s) X	< 600 GeV/c
$\overline{\nu}_\mu$ nucleus → muon(s) X	"

Comments Uses flash ADC calorimeter drift chamber readout. A continuation of FNAL-744. Ran for 1600 hours. Several papers in preparation (March 92).

Papers NIM A294 (1990) 179, PR D42 (1990) 759, PL B252 (1990) 170, NIM A302 (1991) 254, and PRL 66 (1991) 3117.

FNAL-771 (Feb 1986) Approved Apr 1987; Started 1991.

BEAUTY PRODUCTION AND OTHER HEAVY QUARK PHYSICS ASSOCIATED WITH DIMUON PRODUCTION IN 800 (925) GeV/c pp INTERACTIONS

SOUTH ALABAMA U – R K Clark, C Merrill Jenkins
ATHENS U – S E Anassontzis, P Ioannou, S Katsanevas, C Kourkoumelis, A Manousakis-Katsikak, T Pramantiotis, L K Resvanis, M Vassiliou, G Voulgaris
UC, BERKELEY – H C Ballagh, H H Bingham, W B Fretter, T Kaeding, J Lys, S Misawa
UCLA – A F Boden, D B Cline, S Ramachandran, J M Rhoades
DUKE U – L R Fortney, A T Goshaw, W R Kowald, S H Oh, W J Robertson, B Zou
FERMILAB – P O Mazur, C T Murphy, R P Smith, L Spiegel, W Yang
HOUSTON U – K H Lau, G Mo
DUBNA – J Budagov, D M Khazins, E Kladiva, G O Takhtamyshev, S Tokar, E Tsyganov, A Vodopyanov, A Volodko
LECCE U – P Creti, E Gorini, F Grancagnolo, O A Palamara, M Panareo, P Pistilli
MCGILL U – J M Trischuk
NANJING U – T Chen, N Yao
NORTHWESTERN U – M M Block, T J Lecompte, Y Tan
PAVIA U – L Antoniazzi, G Bressi, G Introzzi, A Lauza, G Liguori, S P Ratti, P Torre
PENN U – R Van Berg, A Blankman, W I Kononenko, W Selove, S Zhang
PRAIRIE VIEW A AND M – M L Haire, D J Judd, K H Paick, L Turnbull, D E Wagoner
SHINSHU U – Z Cao, M He, C Shen, C Wang, C Wei, N Zhang
VANIER COLL – M S Cooper
VIRGINIA U – M W Arenton, S Conetti, G Corti, B B Cox (✓ Spokesperson), E C Dukes, V Golovatyuk, P M Hanlet, A Ledovskoy, A P Mcmanus, K S Nelson, V Pogosyan, M Recagni, J Segal, B Su, J Sun
WISCONSIN U – T Alexopoulos, C Darandet, A Erwin, J Jennings

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

p Si → $\mu^+ \mu^-$ X	800–925 GeV/c
p Si → $B\,\overline{B}$ X	"
p Si → χ_b(unspec) X	"
p Si → χ_c(unspec) X	"

Particles studied B^+, B^0, χ_b(unspec), χ_c(unspec)

Comments Uses the FNAL-705 spectrometer augmented by a 16,000-channel silicon detector and a new single- and dimuon trigger to select $B\overline{B}$ events at a high rate ($\sim 10^7$/s).

FNAL-772 (Mar 1986) Approved Jul 1986; Completed Feb 1988.

STUDY OF THE NUCLEAR ANTIQUARK SEA VIA pN → DIMUONS

LOS ALAMOS – D M Alde, H W Baer, T A Carey, G T Garvey, A Klein, C Lee, M J Leitch, J W Lillberg, P L McGaughey, C S Mishra, J M Moss (✓ Spokesperson), J C Peng
FERMILAB – C N Brown, W E Cooper, Y B Hsiung
ILLINOIS U, CHICAGO – M R Adams
NORTHERN ILLINOIS U – R Guo, D M Kaplan
SUNY, STONY BROOK – R L McCarthy
CASE WESTERN RESERVE U – G Danner, M J Wang
TEXAS U – M Barlett, G W Hoffmann

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

p deut → $\mu^+ \mu^-$ X	800 GeV/c
p nucleus → $\mu^+ \mu^-$ X	"

Comments A precise measurement of the A dependence of the Drell-Yan process with particular emphasis on the kinematic region $M > 4$ GeV, $x > 0.2$, which is most sensitive to the beam-valence-quark target-antiquark annihilation. Also measures the dependence of J/ψ, ψ', and Υ resonances on A, for x(Feynman) between -0.1 and 0.6. Uses the FNAL-605 spectrometer. Targets are deuteron, C, Ca, Fe, and W. Ran for 1700 hours.

Papers NIM A282 (1989) 62, PRL 64 (1990) 2479, PR D41 (1990) 2334, PR D41 (1990) 2924, PR D43 (1991) 954, PRL 66 (1991) 133, and PRL 66 (1991) 2285.

FNAL-773 (Mar 1986) Approved Jul 1986, Jun 1989; Completed Sep 1991.

MEASUREMENT OF THE PHASE DIFFERENCE BETWEEN η_{00} AND η_{+-} TO A PRECISION OF 0.5°

CHICAGO U – A R Barker, R A Briere, L K Gibbons, D Harris, G D Makoff, K Mcfarland, B Schwingenheuer, S Somalwar, Y W Wah, B D Winstein, R Winston
ELMHURST COLL – E C Swallow

FERMILAB – G J Bock, R N Coleman, J Enagonio, Y B Hsiung, D Jensen, E Ramberg, K C Stanfield, R S Tschirhart, T Yamanaka
ILLINOIS U, URBANA – E Collins, G D Gollin (✓ Spokesperson)
RUTGERS U – P Haas, W P Hogan, S Kim, J N Matthews, S S Myung, G Ping, S R Schnetzer, G B Thomson, Y Zou

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

$K_L \to \pi^+ \pi^-$	50–150 GeV/c
$K_L \to \pi^0 \pi^0$	"
$K_S \to \pi^+ \pi^-$	"
$K_S \to \pi^0 \pi^0$	"

Particles studied K_L, K_S

Comments This experiment adds an additional regenerator to the FNAL-731 spectrometer. A double K_L beam is incident on the spectrometer, which has 804 lead glass blocks and four drift chambers. One beam passes through a thin regenerator at the start of the fiducial decay volume, the other traverses a thick regenerator 12 meters further upstream. The regenerators switch beams between machine pulses. The experiment tests CPT invariance.

FNAL-774 (Apr 1986) Approved Dec 1986; Completed Aug 1990.

ELECTRON BEAM DUMP PARTICLE SEARCH IN THE WIDE BAND HALL

FERMILAB – A D Bross, M B Crisler (✓ Spokesperson), H C Fenker, S A Pordes, J T Volk
ILLINOIS U, URBANA – S M Errede
NORTHEASTERN U – I Leedom

Accelerator FNAL-TEV *Detector* Calorimeter, Spectrometer

Reactions

e^- nucleus $\to$	350 GeV (E_{lab})

Particles studied axion

Comments A search for short-lived particles that couple to the electron by looking for their decay in flight downstream from an electron beam dump. Inspired by the observation of an anomalous electron-positron pair production seen in heavy-ion collisions at the GSI.

Papers PRL 67 (1991) 2942.

FNAL-775 (May 1986) Approved Apr 1987, Oct 1988, Jan 1989.

THE UPGRADED CDF DETECTOR AT FERMILAB

ARGONNE – R E Blair, S E Kuhlmann, L J Nodulman, J Proudfoot, R G Wagner, A B Wicklund
BRANDEIS U – S Behrends, J R Bensinger, C A Blocker, L E Kirsch, R B Mattingly, S Moulding
UCLA – J Hauser, S Lummel, J Muller
CHICAGO U – C Campagnari, M Contreras, S C Eno, H J Frisch, C Grosso-Pilcher, M Miller, M J Shochet (✓ Spokesperson), G Sullivan
DUKE U – A T Goshaw, S H Oh, W J Robertson, W D Walker
FERMILAB – M Atac, A F Beretvas, J P Berge, M E Binkley, A Caner, K Chadwick, S Cihangir, J W Cooper, D A Crane, F Dejongh, B H Denby, J E Elias, B Flaugher, G W Foster, J E Freeman, D Frei, T Fuess, S Geer, J Grimson, S R Hahn, R M Harris, J Huth, J Hylen, H B Jensen, R P Johnson, U P Joshi, D Jovanovic, R D Kephart, D H Kim, E Kovacs, P T Lukens, K Maeshima, J P Marriner, A Mukherjee, C A Nelson, C Neumann-Holmes, A Para, S Park, J F Patrick, R Plunkett, E Schmidt, S L Segler, D Theriot, P Tipton, S Tkaczyk, A V Tollestrup (✓ Spokesperson), R Vidal, R L Wagner, N Wainer, A Yagil, G Yeh, J Yoh, J C Yun
FRASCATI – S Bertolucci, G Chiarelli, M Cordelli, P Giromini, S Miscetti, A Sansoni
HARVARD U – T P Baumann, G W Brandenburg, A B Feldman, M Franklin, R Hamilton, C P Jessop, J Konigsberg, T J Phillips, F Ptohos, P Schlabach
ILLINOIS U, URBANA – S M Errede, A Gauthier, L E Holloway, I Karliner, R Keup, T M Liss, A J Martin
JOHNS HOPKINS U – B A Barnett, C M Boswell, J A Matthews, J E Skarha, F D Snider, S Vejcik
KEK – F Abe, Y Fukui, S Mikamo, M Mishina
LBL – W C Carithers, W Chinowsky, R B Drucker, K F Einsweiler, R P Ely, A Galtieri, M S Gold, C H Haber, R W Kadel, M E Levi, M Shapiro, J Siegrist, W C Wester, B L Winer
MICHIGAN U – D Amidei, M Campbell, J Wehrley Chapman, P F Derwent, D Wu, S Y Zhang
OSAKA CITY U – T Okusawa, T Takahashi, Y Teramoto, T Yoshida
PADUA U – N Bacchetta, D Bisello, G Busetto, A Castro, S Centro, M Loreti, R Martinelli, L Pescara, J Wyss
PENN U – Y Cen, L Gladney, R J Hollebeek, R E Hughes, N S Lockyer, E H-L Low, M A Puglisi, K J Ragan, P K Sinervo, L Song, H H Williams
INFN, PISA – F Bedeschi, S Belforte, G Bellettini, F Cervelli, M Dell'Orso, P Giannetti, H Grassmann, M Incagli, M Mangano, A Menzione, R Paoletti, G Punzi, F Rimondi, L Ristori, A Scribano, D A Smith, A Stefanini, G Tonelli, T K Westhusing, A Zanetti, F Zetti
PITTSBURGH U – E Engels, P F Shepard
PURDUE U – M W Bailey, V E Barnes, A F Garfinkel, B T Huffman, A T Laasanen, M Shaw, J Tonnison
ROCHESTER U – P S Auchincloss, A Bodek, H S Budd, P Debarbaro, S L Olsen, W K Sakumoto, H Zheng
ROCKEFELLER U – T J Chapin, N D Giokaris, K Goulianos, S N White
RUTGERS U – E J Buckley-Geer, T J Devlin, C M Hawk, E W Kuns, J A Mueller, T L Watts
SSCL – D P Coupal, A Fry, M Turcotte
TEXAS A AND M – T J V Bowcock, T Kamon, L Keeble, P M Mcintyre, R C Webb
TSUKUBA U – Y Funayama, K Hara, T Ino, S Kim, K Kondo, S Miyashita, Y Morita, I Nakano, Y Seiya, K Takikawa, K Yasuoka, M Yokoyama
TUFTS U – M T Bellino, K J Sliwa
WISCONSIN U – J N Bellinger, D L Cauldsmith, R M Handler, J Lamoureux, P A Maas, L G Pondrom, C Wendt

Accelerator FNAL-COLLIDER *Detector* CDF

Reactions

$\bar{p}\, p$	500–2000 GeV (E_{cm})

Comments The detector used in FNAL-741 is upgraded with the level-3 trigger, silicon vertex detector, and the muon detection system. Completed in 1991. See FNAL-741 for published papers.

FNAL-776 (Aug 1986) Approved Jan 1987; Completed Feb 1988.

MEASUREMENT OF NUCLEAR CALIBRATION CROSS SECTIONS FOR PROTONS WITH ENERGIES > 400 GeV

FERMILAB – R A Allen, S I Baker (✓ Spokesperson), P Yurista
BROOKHAVEN – J B Cumming
CERN – V Agoritsas

Accelerator FNAL-TEV *Detector* Photon spectrometer

Reactions

p Cu $\to$ ^{24}Na X	30, 150, 400, 800 GeV (E_{lab})

Comments Extends studies of FNAL-631. Copper samples are exposed to the proton beam, and then a gamma ray from ^{24}Na (15-hour half life) is detected with a high-resolution Ge(Li) detector.

Papers PR C43 (1991) 2862.

FNAL-777 (Oct 1986) Approved Jan 1987; Completed May 1987.

NEUTRON FLUX MEASUREMENT IN THE TEVATRON TUNNEL

FERMILAB – J D Cossairt, A J Elwyn, W S Freeman, H Jostlein, C D Moore, P M Yurista
LBL – J B McCaslin (Spokesperson), R Sun, W P Swanson
SSC CENTRAL DESIGN GROUP – D E Groom

Accelerator FNAL-COLLIDER *Detector* Neutron spectrometer

Particles studied n

Comments Results of FNAL-766 indicate that the neutron flux associated with beam loss in the SSC may seriously degrade semiconductor components in the tunnel. This experiment aims at a better understanding of the situation, particularly of the correlation of neutron flux with the proton loss rate.

FNAL-778 (Oct 1986) Approved Dec 1986; Completed Jan 1991.

STUDY OF THE SSC MAGNET APERTURE CRITERION

CORNELL U - T Chen, R Talman (√ Spokesperson)
FERMILAB - D A Edwards, D A Finley, A Gerasimov, R E Gerig (√ Spokesperson), G Goderre, M A Harrison, R P Johnson, I Kourbanis, L Michelotti, S Peggs, S Pruss, S Saritepe, T Satogata, M Syphers
LBL - L C Schachinger
SSCL - A W Chao, B Cole, D E Johnson, S Peggs, J M Peterson, F Pilat, C Saltmarsh, C G Trahern
SLAC - C B Manz, N Merminga
NORTH TEXAS STATE U - G Tsironis

Accelerator FNAL-TEV *Detector* Other

Reactions

p 150 GeV (E_{lab})

Comments Tests assumptions made in the conceptual design of the SSC concerning the optimal magnet aperture. Studies (1) betatron oscillation amplitudes before and after introduction of nonlinear field components, (2) diffusive beam growth, yielding a phenomenological description, and (3) resonant detrapping of beam trapped in metastable states.

Papers PRL 61 (1988) 2752, PRL 68 (1992) 33, and PRL 68 (1992) 1838.

FNAL-781 (Mar 1987) Approved Oct 1988.

SEGMENTED LARGE-X BARYON SPECTROMETER (SELEX)

BEIJING, IHEP - L Chengze, W Dianrong, L Fengfei, T Fukun, Z Jiaquan, X Yigang, L Yunshan, L Zhigang
BRISTOL U - V J Smith
CARNEGIE MELLON U - R M Edelstein, D Gibaut, D M Potter, M Procario, J S Russ (Spokesperson), S Yang
RIO DE JANEIRO, CBPF - A M Freire Endler, M C Pommot Maia
FERMILAB - P S Cooper, J Lach. L G Stutte
IOWA U - K R Barger, U Mallik, E R Mccliment, C R Newsom, Y Onel
MOSCOW, ITEP - P A Goritchev, V D Khovansky, M A Kubantsev
ROCHESTER U - T Ferbel, M Zielinski
SAO PAULO U - O P Eboli, C O Escobar, P Gouffon
ST PETERSBURG, INP - A S Denisov, V L Golovtsov, V T Gratchev, A V Khanzadeev, A G Krivshich, N P Kuropatkin, V M Samsonov, V A Schegelsky, N N Smirnov, N K Terentiev, L N Uvarov, A P Vorobiev
TEL AVIV U - M Moinester
WASHINGTON U, SEATTLE - V Chaloupka, T Zhao

Accelerator FNAL-TEV *Detector* Spectrometer

Particles studied charmed-baryon

Comments Studies both charmed baryon production and decays. Trigger is based on impact parameter. The spectrometer deploys a number of existing detectors as well as the new silicon strip and pixel devices and a ring-imaging Čerenkov counter. Unscheduled (February 92).

FNAL-782 (Feb 1987) Approved Jul 1987; Completed Jul 1990.

A MUON EXPOSURE IN THE TOHOKU HIGH RESOLUTION BUBBLE CHAMBER

BEIJING, IHEP - F Bai, G Li, C Mao, H Ni, J Xi, S Xu, C Zhao
BROWN U - M M Aryal, M Widgoff
FERMILAB - G M Koizumi, C T Murphy
MIT - I A Pless
OAK RIDGE H O Cohn
SHINSHU U M Sasaki
SUGIYAMA JOGAKUEN U S Fukui
TENNESSEE U - W M Bugg, G T Condo, P Y-C Du, T Handler, E L Hart, R S Kroeger, C Shio
TOHOKU GAKUIN U - S Fujii, M Higuchi, Y Hoshi, H I Iso, S Okuno, M Sato, O Suzuki
TOHOKU U - T Kitagaki (Spokesperson), H Suzuki, R Takahashi, K Tamai, S Tanaka, A Yamaguchi

Accelerator FNAL-TEV *Detector* HLBC-1.4M-HYB

Reactions

muon nucleus → 300 GeV/c

Comments Uses the Tohoku high-resolution freon bubble chamber. Studies (1) production of vector mesons and strange and charm particles down to small Q^2, (2) the energy dependence of meson-baryon pair production in strange and charm channels, (3) the comparison of neutrino and muon interactions in the same 4π detector (see FNAL-745), (4) the structure function in the small Q^2 region, and (5) the EMC effect.

FNAL-784 (Mar 1987) Approved Jan 1989.

PROPOSAL FOR RESEARCH & DEVELOPMENT: VERTEXING, TRACKING AND DATA ACQUISITION FOR THE BOTTOM COLLIDER DETECTOR

UC, DAVIS - P M Yager
FERMILAB - E J Barsotti, M J Bowden, S R Childress, P L G Lebrun, J G Morfin, L Roberts, R J Stefanski, L G Stutte
FLORIDA U - P Avery
HOUSTON U - K H Lau
ILLINOIS TECH - R A Burnstein, H A Rubin
IOWA U - E R Mccliment, Y Onel
ANDES U, BOGOTA - H Castro, B Gomez, F Rivera, J Sanabria
NORTHEASTERN U - G O Alverson, W L Faissler, D A Garelick, M J Glaubman, D M Kaplan, I Leedom, S Reucroft
NORTHERN ILLINOIS U - S E Willis
OHIO STATE U - S G Frederiksen, N W Reay, R A Sidwell, N R Stanton
OKLAHOMA U - G R Kalbfleisch, P L Skubic, J M Snow
PENN U - R Van Berg, R E Hughes, N S Lockyer (Spokesperson)
PRAIRIE VIEW A AND M - D J Judd, D E Wagoner
PRINCETON U - D R Marlow, K T Mcdonald, M V Purohit
PUERTO RICO U, RIO PIEDRAS - A M Lopez
SAN FRANCISCO DE QUITO U - B Hoeneisen
YALE U - P E Karchin, W Ross, A J Slaughter, S Utku

Accelerator FNAL-COLLIDER *Detector* BCD

Particles studied bottom

Comments The Bottom Collider Detector is to be a small, nearly 4π magnetic detector optimized to identify prompt electrons and secondary vertices coming from bottom-quark decays. Aims are to study $B^0\overline{B}^0$ mixing and CP violation, observe b-to-u quark decays, measure B^+ and B^0 lifetimes, search for rare B decays, etc. Unscheduled (Feb 92).

FNAL-789 (Nov 1987) Approved Oct 1988; Started 1990.

MEASUREMENT OF THE PRODUCTION AND DECAY INTO TWO-BODY MODES OF b-QUARK MESONS AND BARYONS

ABILENE CHRISTIAN U - L D Isenhower, M E Sadler
TAIWAN, INST PHYS - Y Chen, G Kiang, P Teng
CHICAGO U - L M Lederman, M Schub
FERMILAB - C N Brown, W E Cooper, D Finley, H Glass, C Mishra
LBL - G Gidal, P Ho, M S Kowitt, K Luk, D Pripstein
LOS ALAMOS - T A Carey, D Jansen, M J Leitch, P L Mcgaughey, J M Moss, J Peng (√ Spokesperson)
NORTHERN ILLINOIS U - M Apolinski, D M Kaplan (√ Spokesperson), V Martin, R S Preston, V Tanikella
SOUTH CAROLINA U - R L Childers, C W Darden, J R Wilson

Accelerator FNAL-TEV *Detector* Spectrometer

Particles studied bottom, charm

Comments Studies low multiplicity decays of b- and c-quark hadrons. Essential to evaluating the suitability of dihadronic beauty decays for the study of CP violation in the B system. Sensitive also to dileptonic modes, allowing limits to be set on their branching ratios. Uses the existing FNAL-605/772 spectrometer with suitably upgraded trigger processor system. In progress (March 92).

FNAL-790 (Jun 1987) Approved Dec 1987; Completed Aug 1990.

CALORIMETER MODULE CALIBRATION FOR THE ZEUS DETECTOR

ARGONNE – J W Dawson, M Derrick, B Musgrave, J L Schlereth, R W Stanek, K Sugano, R Talaga
COLUMBIA U – A Caldwell, I Gialas, S M Ritz, F J Sciulli (✓ Spokesperson)
IOWA U – U Mallik
LOUISIANA STATE U – R L Imlay, H Kim, W Metcalf
OHIO STATE U – T Ling, S Park, T A Romanowski
PENN STATE U – B Y Oh, G A Smith, J J Whitmore
VIRGINIA TECH – J R Ficenec, B Lu, L W Mo
WISCONSIN U – U Camerini, C Foudas, T Kinnel, R J Loveless, D D Reeder, P Sandler, S Silverstein, W H Smith (✓ Spokesperson)

Accelerator FNAL-TEV *Detector* Calorimeter

Reactions

hadron	5–150 GeV/c
$e^{\pm}$	"
muon	"

Comments Testing of components and electronics of the HERA-ZEUS calorimeter by US members of the ZEUS collaboration. Principal goal is the precise resolution in the jet energy measurement.

FNAL-791 (Nov 1987) Approved Jun 1988; Completed Jan 1992.

HADROPRODUCTION OF HEAVY FLAVORS AT THE TAGGED PHOTON LABORATORY

RIO DE JANEIRO, CBPF – S F Amato, J Anjos, I Bediaga, I Costa, H Da Motta Filho, J M De Miranda, J De Mello Neto, A Reis, A F S Santoro, M H G Souza
UC, SANTA CRUZ – G Blaylock, P R Burchat, P Gagnon, K Sugano
CINCINNATI U – A D'Oliveira, A K Santha, M D Sokoloff
FERMILAB – J A Appel (✓ Spokesperson), S Banerjee, S Bracker, T G Carter, K Denisenko, A M Halling, C C James, S Kwan, B G Lundberg, K A Thorne
ILLINOIS TECH – R A Burnstein, P A Kasper, K C Peng, H A Rubin
MISSISSIPPI U – L M Cremaldi, K Gounder, A Rafatian, J J Reidy, D J Summers, D Yi
OHIO STATE U – D L Granite, A Nguyen, N W Reay, K Reibel, R A Sidwell, N R Stanton, N Witchey
PRINCETON U – M V Purohit (✓ Spokesperson), A Schwartz, J Wiener
RIO DE JANEIRO U – H Carvalho, F Marroquim, A J Ramalho
TEL AVIV U – D Ashery, S Garzon, J Lichtenstadt, S Tal-Beck, D Trumer
TUFTS U – R H Milburn, A Napier, J Schneps
WISCONSIN U – S Radeztsky, M C Sheaff
YALE U – C L Darling, R D Majka, J Sandweiss, A J Slaughter, S F Takach, E J Wolin

Accelerator FNAL-TEV *Detector* TPS

Reactions

π^- nucleus $\rightarrow$ charm X	500 GeV (E_{lab})
π^- nucleus $\rightarrow$ bottom X	"

Particles studied charm, bottom

Comments Continues studies of FNAL-769. Emphasizes charm physics and a first look at bottom hadroproduction. Some 20 billion events are collected – more than 100,000 fully reconstructed charm particles are anticipated. Data analysis in progress (March 92).

FNAL-792 (Jan 1988) Approved Jan 1988; Completed Feb 1988.

STUDY OF FRAGMENTATION PRODUCTS FROM THE REACTION $p\,^{197}$Au AT 800 GeV

UPPSALA U – K Aleklett (✓ Spokesperson), L Sihver (✓ Spokesperson)
OREGON STATE U – W D Loveland
LOS ALAMOS – P L McGaughey
HAHN-MEITNER INST – D H E Gross, H R Jaqaman

Accelerator FNAL-TEV *Detector* Photon spectrometer

Reactions

$p\,^{197}$Au	800 GeV (E_{lab})

Comments Measures angular distributions, target fragmentation cross sections, and range spectra.

Papers NP B (accepted). No other papers expected.

FNAL-793 (Nov 1987) Approved Sep 1988.

EMULSION EXPOSURE TO 1000 GeV, OR HIGHEST ENERGY PROTONS

KAZAKH STATE U – E V Kolomeets
WASHINGTON NATURAL PHILOSOPHY INST – P Kotzer
WASHINGTON U, SEATTLE – R Davisson, J J Lord (✓ Spokesperson)

Accelerator FNAL-TEV *Detector* Emulsion

Reactions

p Wt	1000 GeV (E_{lab})

Comments Exposes six stacks of emulsion with 10 μm tungsten targets and looks for evidence for the quark-gluon phase of matter. In preparation (March 92).

FNAL-799 (Jan 1989) Approved Jun 1989.

SEARCH FOR THE DECAY $K_L \rightarrow \pi^0 e^+ e^-$

UCLA – K Arisaka, J Quackenbush, D Roberts, W E Slater, M Weaver
CHICAGO U – A R Barker, R A Briere, E Chen, D Harris, G D Makoff, K Mcfarland, A Roodman, B Schwingenheuer, P Shawhan, S Somalwar, Y Wah (✓ Spokesperson), A Wilson, B D Winstein, R Winston
ELMHURST COLL – E C Swallow
FERMILAB – G J Bock, M Chrisler, R N Coleman, J Enagonio, Y B Hsiung, D Jensen, E J Ramberg, K C Stanfield, R S Tschirhart, T Yamanaka (✓ Spokesperson)
ILLINOIS U, URBANA – E Collins, G D Gollin
RUTGERS U – P M Haas, W P Hogan, S Kim, J N Matthews, S Myung, G Ping, S R Schnetzer, G B Thomson, Y Zou

Accelerator FNAL-TEV *Detector* Spectrometer, Calorimeter

Reactions

$K_L \rightarrow \pi^0 e^+ e^-$	50–150 GeV/c

Particles studied K_L

Comments Phase-I adds to the existing apparatus of FNAL-731 and -773 a transition radiation detector for better π/e rejection. Phase-II uses a new beam line and a new detector including a new CsI calorimeter to improve the rejection of $K_L \rightarrow e^+e^-\gamma\gamma$ background from the $K_L \rightarrow \pi^0 e^+ e^-$ signal. The sensitivity should approach the 10^{-11} level. Phase-I completed data taking in January 92. Phase-II in preparation (March 92).

FNAL-800 (Mar 1988) Approved Oct 1988; Completed Jan 1992.

MEASUREMENT OF THE MAGNETIC MOMENT OF THE Ω^- HYPERON

ARIZONA U – K A Johns (✓ Spokesperson)
FERMILAB – R A Rameika (✓ Spokesperson)
MICHIGAN U – Y Gao, M J Longo
MINNESOTA U – P M Border, D Ciampa, G M Guglielmo, K J Heller, N B Wallace, D M Woods

Accelerator FNAL-TEV *Detector* Spectrometer

Reactions

p Be $\rightarrow \Omega^-$ X	800 GeV/c
Λ Cu $\rightarrow \Omega^-$ X	300 500 GeV/c
Λ Cu $\rightarrow \Xi^-$ X	"
Ξ^0 Cu $\rightarrow \Omega^-$ X	"
Ξ^0 Cu $\rightarrow \Xi^-$ X	"

Particles studied Ω^-, Ξ^-

Comments An extension of FNAL-756. Uses two methods to produce polarized Ω's. The spin transfer method uses 800 GeV protons to produce a secondary neutral beam of polarized Λ's and Ξ^0's, which is then used to produce a tertiary beam of polarized Ω's at 0 mr. The neutral production method uses a secondary beam of unpolarized Λ's and Ξ^0's incident at a production angle to produce polarized Ω's. The spectrometer consists of a set of silicon strip detectors and a set of multiwire proportional chambers.

FNAL-802 (Dec 1988) Approved Feb 1989; Completed Dec 1991.

DEEP INELASTIC MUON INTERACTIONS WITH NUCLEAR TARGETS USING THE EMULSION TELESCOPE TECHNIQUE

FERMILAB C T Murphy
JADAVPUR U L Chatterjee (✓ Spokesperson), D Ghosh (✓ Spokesperson), J Roy

Accelerator FNAL-TEV *Detector* Emulsion

Reactions

muon nucleus $\rightarrow$	420 GeV (T_{lab})

Comments Studies deep inelastic scattering and the EMC effect. Exposes a stack of nuclear emulsion plates 10 cm long to a flux of 1.1×10^7 muons.

FNAL-819 Approved Aug 1991; Completed Oct 1991.

EMPACT MUON TELESCOPE EVALUATION AT FERMILAB

HOUSTON U K H Lau, B W Mayes, L Pinsky, R Weinstein
INDIANA U T R Marshall
MIT J I Friedman, E S Hafen, P Haridas, H W Kendall, L S Osborne (✓ Spokesperson), I A Pless, L Rosenson, R Verdier

Accelerator FNAL-TEV *Detector* Streamer chamber

Comments Tests a muon measuring subsystem envisaged for the EMPACT detector at SSC. Uses high energy real muons in the pair production region to study the accuracy and performance of the subsystem. The telescope is built of aluminum extrusion streamer chambers.

FNAL-823 Approved Jul 1991.

D0 DETECTOR UPGRADE

Accelerator FNAL-COLLIDER *Detector* D0

Comments The upgraded D0 experiment will continue the study of large-transverse-momentum, short-distance phenomena begun with the initial D0 program. Considerable stress will be made on making a combination of precision measurements (W mass, top-quark mass, forward-backward asymmetry of leptons from Z, *etc.*) to seek departures from the Standard Model. New opportunities for study of b-quark states include b production, mixing of B^0 mesons, rare decays of b hadrons, and a search for CP violation. See FNAL-740 for the list of participants and published papers. In preparation (March 92).

FNAL-830 Approved Jul 1991.

PROPOSAL FOR AN UPGRADED CDF DETECTOR

Accelerator FNAL-COLLIDER *Detector* CDF

Comments A major upgrade is proposed for the CDF detector in order to exploit fully the physics opportunities of high luminosity running at the Tevatron. The upgrade is planned for the 1993 run. For the list of participants, see FNAL-775. See also FNAL-741.

FNAL-843 Approved Jul 1991; Completed Jul 1991.

INTERACTIONS OF 50, 100, AND 490 GeV MUONS WITH EMULSION NUCLEI

CHONNAM NATIONAL U J Kim, I T Lim
KOREA U C O Kim (✓ Spokesperson)

Accelerator FNAL-TEV *Detector* Emulsion

Reactions

muon nucleus $\rightarrow$ muon nucleus	50, 100, 490 GeV (T_{lab})

Comments Studies the target diffractive excitation and the small-distance structure of nucleons and nuclei by exposing the C, N, O, Ag, and Br nuclei in nuclear emulsions to high energy muons.

FNAL-855 Approved Nov 1991; Completed Dec 1991.

TEST BEAM REQUEST TO DIRECTLY MEASURE dE/dx OF HIGH ENERGY MUONS FROM 150 TO 650 GeV/c IN THE MUON LABORATORY

OKLAHOMA U G R Kalbfleisch (✓ Spokesperson), D Lawrence
SSCL R J Stefanski

Accelerator FNAL-TEV *Detector* Counter

Reactions

muon	600 GeV (T_{lab})

Comments The aim is to measure the three components (ionization, direct pair, and direct photon) of energy loss of muons above 200 GeV. Uses a thin and a thick active detector of each of two different materials, plastic scintillator and sodium iodide. Data analysis in progress (March 92).

INS Experiments

INS-ES-111 Started Jan 1986; Completed Mar 1986.

MEASUREMENT OF TRIPLET PHOTOPRODUCTION BY POLARIZED γ's

HIROSHIMA U I Endo (✓ Spokesperson), M Harada, S Kasai, K Niki, Y Sumi, M Tobiyama
TOKYO U, INS M Mutou, H Tsujikawa, K Watanabe, K Yoshida
HIROSHIMA SHUDO U K Baba

Accelerator TOKYO *Detector* Counter

Reactions Polarized beam
$\gamma\, e^- \rightarrow e^+\, e^-\, e^-$ 120–400 MeV/c

Papers NIM A280 (1989) 144.

INS-ES-112 Started Jun 1986; Completed Jul 1986.

MEASUREMENT OF THE BACKWARD DIFFERENTIAL CROSS SECTION FOR $\gamma d \rightarrow \pi^0 d$

TOKYO U, INS M Koike, T Miyachi (Spokesperson), M Mutou, K Yoshida
TOKYO U OF AGRIC TECH T Emura, M Nishimura, O Nitoh, T Takahashi, J Yoshizawa
TOKYO METROPOLITAN U S Kitamura
HIROSHIMA U M Asai
HIROSHIMA SHUDO U K Baba

Accelerator TOKYO *Detector* Single-arm spectrometer

Reactions
γ deut $\rightarrow \pi^0$ deut 0.4–0.8 GeV (E_{lab})

Comments Uses a tagged γ beam. Measures over the c.m. angles 160 to 170°. See also INS-19-1 and INS-ES-103. Studied the effect of the single and double scattering terms. Fouifd no indication for dibaryon resonances.

INS-ES-113 Approved Jul 1985; Started Oct 1986; Completed Mar 1987.

STUDY OF DIBARYON RESONANCES USING γd INTERACTIONS

HIROSHIMA U S Asai, I Endo, M Harada, H Hasai, K Iwatani, S Kasai, K Niki, Y Sumi (✓ Spokesperson)
KITAKYUSHU, UNIV OCCUP ENVIR HEALTH T Maki
MEIJI COLL, PHARMACY Y Wada
SAGA U, JAPAN H Ito
SASKATCHEWAN U C Rangacharyulu
TOKYO INST TECH H Shimizu
TOKYO U, INS S Kato, K Maruyama, Y Murata, M Mutou, K Yoshida

Accelerator TOKYO *Detector* TAGX

Reactions
γ deut $\rightarrow p\, p\, \pi^-$ 0.35–1.1 GeV (E_{lab})
γ deut $\rightarrow p\, n\, \pi^+\, \pi^-$ "

Comments Uses a tagged γ beam with a large duty factor (> 10%), and a large-aperture magnetic spectrometer (TAGX), which consists of an analyzer magnet with a large gap (60 cm), two sets of scintillation counter hodoscopes, and central drift chambers. The geometrical acceptance is π sr.

Papers NP A478 (1988) 523c, and PR C42 (1990) 837.

INS-ES-116 (1986) Approved Jul 1986; Started Jun 1987; Completed Mar 1988.

STUDIES OF THE PHOTONUCLEAR PROCESS ON He

HIROSHIMA U I Endo, M Harada, S Kasai, K Niki, Y Sumi
SAGA U, JAPAN A Hisadomi, H Ito
SASKATCHEWAN U C Rangacharyulu (Spokesperson)
TOKYO U, INS S Kato (Spokesperson), K Maruyama, Y Murata, K Yoshida
KITAKYUSHU, UNIV OCCUP ENVIR HEALTH T Maki
AKITA U A Sasaki
TOKYO INST TECH H Shimizu
MEIJI COLL, PHARMACY Y Wada

Accelerator TOKYO *Detector* TAGX

Reactions
γ He $\rightarrow p\, n$ X 0.17–0.27 GeV/c

Papers NIM A276 (1989) 451.

INS-ES-117 (1986) Approved Jul 1986; Started Nov 1986; Completed May 1987.

FEASIBILITY STUDY OF MEASUREMENT OF ATOMIC FORM FACTORS BY MEANS OF COHERENT BREMSSTRAHLUNG

HIROSHIMA U I Endo (✓ Spokesperson), M Harada, K Kitamura, T Monaka, Y Sumi, M Tobiyama
TOKYO U, INS H Tsujikawa, K Watanabe, K Yoshida
TSUKUBA U T Ohba
HIROSHIMA SHUDO U K Baba
KURE, MARITIME SAFETY ACADEMY H Motegi

Accelerator TOKYO *Detector* Counter

Reactions
e^- crystal $\rightarrow e^-\, \gamma$ X 1.2 GeV (E_{lab})

Papers PRL 60 (1988) 2292.

INS-ES-118 (1987) Approved 1987.

RADIOCHEMICAL STUDY OF HIGH ENERGY PHOTONUCLEAR REACTIONS

TOKYO U, INS S Shibata (✓ Spokesperson)
KANAZAWA U K Kawaguchi, Y Ohura, T Okui, K Sakamoto
NAGOYA U M Furukawa
OTEMON GAKUIN U I Fujiwara

Accelerator TOKYO *Detector* Combination

Reactions
γ nucleus 0.25–1.05 GeV/c (P_{lab})

Comments Uses Ge and Si(Li) detectors.

Papers PR C35 (1987) 254, NP A501 (1989) 693, PR C42 (1990) 1545, RCHA 55 (1991) 113, and RCHA 55 (1991) 139.

INS-ES-119 (1988) Started Jul 1988; Completed Jan 1989.

DETERMINATION OF ATOMIC FORM FACTORS BY MEANS OF COHERENT BREMSSTRAHLUNG

HIROSHIMA U I Endo (✓ Spokesperson), T Kino, T Monaka, A Sakaguchi, Y Sumi, M Tobiyama
TOKYO U, INS K Watanabe, K Yoshida
TSUKUBA U T Ohba
HIROSHIMA SHUDO U K Baba
TOKYO U OF AGRIC TECH T Emura

Accelerator TOKYO *Detector* Counter

Reactions
e^- crystal $\rightarrow e^-\, \gamma$ X 1.2 GeV (E_{lab})

Comments Uses Si, Ni, Al, and Zn crystals.

Papers PL A146 (1990) 150.

INS-ES-120 Approved Feb 1989; Started Feb 1989; Completed Nov 1989.

MEASUREMENT OF SHORT RANGE N-N CORRELATIONS IN THE ^{4}He NUCLEUS

TAGX COLLABORATION

AKITA U A Sasaki
HIROSHIMA U I Endo, S Endo, K Niki, Y Sumi
TOKYO U, INS S Kato, M Koike, K Maruyama (✓ Spokesperson), Y Murata, K Yoshida
MEIJI COLL, PHARMACY Y Wada
KITAKYUSHU, UNIV OCCUP ENVIR HEALTH T Maki
SAGA U, JAPAN H Itoh, S Maruo
SASKATCHEWAN U C Rangacharyulu

TOHOKU U - K Maeda, T Suda
TOKYO U OF AGRIC TECH - T Emura

Accelerator TOKYO *Detector* TAGX

Reactions

γ He $\rightarrow p\ n$ X	130-450 MeV (E_{lab})
γ He $\rightarrow p\ n$ deut	"
γ He $\rightarrow p\ p\ n\ n$	"
γ He $\rightarrow p\ \pi^+$ X	"
γ He $\rightarrow p\ \pi^-$ X	"

Comments Uses tagged photons.

Papers PL B267 (1991) 460, NIM A290 (1990) 315, and NIM A294 (1990) 534.

INS-ES-121 Approved Feb 1989; Started May 1989; Completed Dec 1989.

RADIOCHEMICAL STUDIES OF HIGH ENERGY PHOTONUCLEAR REACTIONS

TOKYO U, INS - M Imamura, S Shibata (✓ Spokesperson)
KANAZAWA U - T Fukasawa, Y Hamajima, K Kawaguchi, Y Kuboto, A Kunugise, M Masatani, S Okizaki, M Ootani, Y Ooura, K Sakamoto, S R Sarkar, M Soto, M Yoshida
NAGOYA U - M Furukawa
OTEMON GAKUIN U - I Fujiwara

Accelerator TOKYO *Detector* Photon spectrometer

Reactions

γ nucleus	< 1 GeV (E_{lab})

Comments Uses Ge and Si detectors.

Papers NP A510 (1989) 693, and PR C42 (1990) 1545.

INS-ES-122 Approved Jan 1990; Started Apr 1990; Completed Jun 1990.

STUDY OF THE SINGULARITY IN THE BREMSSTRAHLUNG PROCESS BY HIGH ENERGY ELECTRONS IN A SINGLE CRYSTAL

HIROSHIMA U - I Endo (✓ Spokesperson), T Tanioka, M Tobiyama, H Uchida
TOKYO U, INS - M Mutou, K Watanabe, K Yoshida
TEIKYO U - T Ohba
HIROSHIMA SHUDO U - K Baba
TOKYO U OF AGRIC TECH - T Emura

Accelerator TOKYO *Detector* Counter

Reactions

e^- Si $\rightarrow \gamma$ X	1.2 GeV (E_{lab})

Comments Target is a silicon single crystal.

INS-ES-123 Approved Jan 1990; Started Jan 1991; Completed Apr 1991.

STUDY ON 2N-PHOTOABSORPTION IN THE γ^3He $\rightarrow$ *ppn* REACTION

TAGX COLLABORATION

AKITA U - A Sasaki
HIROSHIMA U - S Endo, Y Sumi
TOKYO U, INS - S Kato, M Koike, K Maruyama (✓ Spokesperson), K Niki
MEIJI COLL, PHARMACY - Y Wada
KITAKYUSHU, UNIV OCCUP ENVIR HEALTH - T Maki
REGINA U - G Huber, G J Lolos
SAGA U, JAPAN - H Itoh, R Naridomi, T Ogata
SASKATCHEWAN U - C Rangacharyulu
TOHOKU U - O Konno, K Maeda, T Suda, H Yamazaki
TOKYO U OF AGRIC TECH - T Emura, H Miyamoto

Accelerator TOKYO *Detector* TAGX

Reactions

$\gamma\ ^3$He $\rightarrow p\ n$ X	130-450 MeV (E_{lab})
$\gamma\ ^3$He $\rightarrow p\ p\ n$	"

Comments Uses tagged photons.

Papers NIM A307 (1991) 213.

INS-ES-124 Approved Jan 1990; Started Apr 1991; Completed Jun 1991.

SEARCH FOR ISOBAR COMPONENTS IN ^{3}He

TAGX COLLABORATION

AKITA U - A Sasaki
HIROSHIMA U - S Endo, Y Sumi
TOKYO U, INS - S Kato, M Koike, K Maruyama, K Niki
MEIJI COLL, PHARMACY - Y Wada
KITAKYUSHU, UNIV OCCUP ENVIR HEALTH - T Maki
REGINA U - G Huber, G J Lolos
SAGA U, JAPAN - H Itoh, R Naridomi, T Ogata
SASKATCHEWAN U - B Lasiuk, C Rangacharyulu (✓ Spokesperson)
TOHOKU U - O Konno, K Maeda, T Suda (✓ Spokesperson), H Yamazaki
TOKYO U OF AGRIC TECH - T Emura, H Miyamoto

Accelerator TOKYO *Detector* TAGX

Reactions

$\gamma\ ^3$He $\rightarrow \pi^-\ p$ X	380-700 MeV (E_{lab})
$\gamma\ ^3$He $\rightarrow \pi^+\ p$ X	"

Comments Uses tagged photons.

INS-ES-125 Approved Jan 1990; Started Sep 1991; Completed Oct 1991.

TEST EXPERIMENT ON THE C(γ, K^+) REACTION WITH THE TAGGED PHOTON BEAM

TAGX COLLABORATION

HIROSHIMA U - S Asano, I Endo, S Endo, H Ifuku, A Sakaguchi, Y Sumi, H Uchida
TOKYO U, INS - M Koike, K Maruyama, K Niki, H Okuno, K Yoshida
TOHOKU U - K Maeda (Spokesperson), T Sasaki, T Suda, H Yamazaki

Accelerator TOKYO *Detector* TAGX

Reactions

$\gamma\ ^{12}$C $\rightarrow K^+$ X	780-1100 MeV (E_{lab})

Comments Uses tagged photons.

INS-ES-126 Approved Jan 1991; Started Jul 1991; Completed Nov 1991.

RADIOCHEMICAL STUDIES OF HIGH ENERGY PHOTONUCLEAR REACTIONS

TOKYO U, INS - M Imamura, S Shibata (✓ Spokesperson)
KANAZAWA U - K Kawaguchi, M Ootani, Y Ooura, K Sakamoto, S R Sarkar
NAGOYA U - M Furukawa
OTEMON GAKUIN U - I Fujiwara

Accelerator TOKYO *Detector* Photon spectrometer

Reactions

γ nucleus	< 1 GeV (E_{lab})

Comments Uses Ge and Si detectors.

Papers RCHA 55 (1991) 113, and RCHA 55 (1991) 139.

INS-ES-127 Approved Jan 1991; Started Sep 1991; Completed Oct 1991.

A STUDY OF THE PHOTON ABSORPTION MECHANISM IN ^{6}Li PHOTODISINTEGRATION

TAGX COLLABORATION

TOKYO U OF AGRIC TECH - T Emura (Spokesperson), H Miyamoto, H Nagata
AKITA U - A Sasaki
TOHOKU U - O Konno, K Maeda, T Suda
TOKYO U, INS - S Kato, K Maruyama, K Niki
HIROSHIMA U - S Asano, Y Sumi
SASKATCHEWAN U - C Rangacharyulu

REGINA U – G Huber, G Lolos

Accelerator TOKYO *Detector* TAGX

Reactions

$\gamma\ ^6\mathrm{Li} \rightarrow p\ p\ \mathrm{X}$ 150–450 MeV (E_{lab})

$\gamma\ ^6\mathrm{Li} \rightarrow p\ p\ n\ \mathrm{X}$ "

Comments Uses tagged photons.

INS-ES-128 Approved Jan 1991; Started Nov 1991; Completed Dec 1991.

POLARIZATION MEASUREMENT OF COHERENT BREMSSTRAHLUNG FROM A SINGLE CRYSTAL

HIROSHIMA U – M Asai, I Endo, A Isobe, Y Iwata (✓ Spokesperson), T Kobayashi, T Nishizuru, M Tobiyama
TOKYO U, INS – M Mutou, K Yoshida
TOKYO U OF AGRIC TECH – T Emura, K Nagata, Y Nagata
HIROSHIMA SHUDO U – K Baba

Accelerator TOKYO *Detector* Counter

Reactions

$e^-\ \mathrm{Si} \rightarrow \gamma\ \mathrm{X}$ 1.2 GeV (E_{lab})

Comments Measures the angular distribution of recoil electrons in triplet photoproduction. Target is a single silicon crystal.

ITEP Experiments

ITEP-762 (1976) Approved 1976; Started 1977; Completed 1988.

MEASUREMENT OF $\pi^- d$ BACKWARD ELASTIC SCATTERING AT 1–3 GeV

MOSCOW, ITEP – V M Abramov, E A Ajrapetov, L S Bagdasaryan, S A Bulychev, I A Dukhovskoy, V S Fedorets, V V Kishkurno, L A Kondratyuk, Y S Krestnikov, A P Krutenkova, V V Kulikov (√ Spokesperson), M A Matsyuk, P A Murat, S V Proshin, I A Radkevich, U V Ralchenko, E N Turdakina, V P Yurov

Accelerator ITEP *Detector* MTS

Reactions

π^- deut → deut π^- 0.9–3.0 GeV/c

Papers NP A372 (1981) 301, PL B189 (1987) 295, YF 50 (1989) 1042 = SJNP 50 (1989) 650, and CZJP B39 (1989) 88. No other papers expected.

ITEP-771 (1977) Approved 1977; Started 1978; Completed 1986.

STUDY OF THE INCLUSIVE PROPERTIES OF DEEP INELASTIC NUCLEAR REACTIONS

MOSCOW, ITEP – Y D Bayukov, P V Degtyarenko, B L Druzhinin, Y F Efremenko, V B Fedorov, B A Fominykh, V B Gavrilov, N A Goryainov, Y G Grishuk, O B Gushchin, F M Khassanov, N L Kornienko, M V Kossov, S V Kuleshov, L N Kuleshova, S G Kuznetsov, G A Leksin (√ Spokesperson), S V Shevchenko, S M Shuvalov, B B Shvartsman, A V Smirnitsky, D A Suchkov, V P Surin, A V Vlassov, L S Vorobyev

Accelerator ITEP *Detector* Spectrometer

Reactions

p nucleus → p X	1–9 GeV/c
p nucleus → n X	"
p nucleus → deut X	"
p nucleus → trit X	"
p nucleus → ^{3}He X	"
p nucleus → π^+ X	"
p nucleus → π^- X	"
π^+ nucleus → p X	"
π^+ nucleus → n X	"
π^+ nucleus → deut X	"
π^+ nucleus → trit X	"
π^+ nucleus → ^{3}He X	"
π^+ nucleus → π^+ X	"
π^+ nucleus → π^- X	"
π^- nucleus → p X	"
π^- nucleus → n X	"
π^- nucleus → deut X	"
π^- nucleus → trit X	"
π^- nucleus → ^{3}He X	"
π^- nucleus → π^+ X	"
π^- nucleus → π^- X	"

Comments The targets are He, ^{6}Li, ^{7}Li, Be, ^{11}B, C, Al, Ti, Fe, ^{58}Ni, ^{64}Ni, Ni, Cu, Zn, Nb, Cd, In, ^{112}Sn, ^{124}Sn, Sn, Ta, Pb, and U.

Papers PTE 3 (1982) 25, YF 33 (1981) 183 = SJNP 33 (1981) 94, YF 34 (1981) 785 = SJNP 34 (1981) 437, YF 35 (1982) 960 = SJNP 35 (1982) 558, YF 37 (1983) 344 = SJNP 37 (1983) 206, YF 41 (1985) 158 = SJNP 41 (1985) 101, YF 41 (1985) 1541 = SJNP 41 (1985) 976, YF 42 (1985) 185 = SJNP 42 (1985) 116, YF 42 (1985) 377 = SJNP 42 (1985) 238, YF 42 (1985) 1415 = SJNP 42 (1985) 895, NIM A239 (1985) 527, PTE 3 (1986) 53, and ZETFP 49 (1989) 584 = JETPL 49 (1989) 670. No other papers expected.

ITEP-783 (1978) Approved 1975; Started 1978.

STUDY OF TRITIUM β DECAY TO MEASURE THE ν MASS

MOSCOW, ITEP – S D Boris, A I Golutvin, L P Laptin, V A Lyubimov (√ Spokesperson), V V Nagovitzin, E G Novikov, V Z Nozik, V A Soloshenko, I N Tikhomirov, E F Tretyakov

Accelerator NONE *Detector* Spectrometer

Reactions

trit → ^{3}He e^- $\bar{\nu}_e$ 0 GeV/c

Particles studied ν_e

Comments Uses a valine source. Inactive (March 92), but scheduled to run.

Papers PL B94 (1980) 266, ZETF 81 (1981) 1158 = JETP 54 (1981) 616, ZETFP 42 (1985) 107 = JETPL 42 (1985) 130, PL B159 (1985) 217, PRL 58 (1987) 2019, and ZETFP (1987) 267 = JETPL 45 (1987) 333.

ITEP-802 (1980) Approved 1980; Started 1981; Completed 1989.

STUDY OF K^+ INTERACTIONS WITH XENON

MOSCOW, ITEP – V V Barmin, V G Barylov, T A Chistyakova, G V Davidenko, V S Demidov, A G Dolgolenko, V E Luchmanov, A G Meshkovsky, G S Mirosidi, A N Nikitenko, V A Shebanov (√ Spokesperson), N N Shishov, N K Zombkovskaya

Accelerator ITEP *Detector* HLBC-2M

Reactions

K^+ Xe → K^+ X	0.79 GeV/c
K^+ Xe → K^0 X	"

Comments Study of cumulative effects in xenon. The detector (DIANA) is a 700-liter xenon bubble chamber.

ITEP-813 (1981) Approved 1981; Started 1982; Completed 1986.

STUDY OF CUMULATIVE PARTICLE CORRELATIONS

MOSCOW, ITEP – Y D Bayukov, P V Degtyarenko, E A Doroshkevich, Y V Efremenko, V B Fedorov, V B Gavrilov, N A Goryainov, Y G Grishuk, I A Klumov, M V Kossov, S V Kuleshov, L N Kuleshova, S G Kuznetsov, G A Leksin (√ Spokesperson), S M Shuvalov, B B Shvartsman, A V Smirnitsky, A V Stavinsky, D A Suchkov, A V Vlassov, L S Vorobyev, B V Zagreyev

Accelerator ITEP *Detector* Spectrometer

Reactions

p nucleus → 2nucleon X	3.0, 5.0, 7.5 GeV/c
p nucleus → deut p X	"
p nucleus → deut p X	7.5 GeV/c
p nucleus → 2deut X	"
p nucleus → 3p X	"
p nucleus → deut 2p X	"
p nucleus → 2deut p X	"
π^- nucleus → 2π^+ X	5.0 GeV/c
π^- nucleus → 2nucleon X	2.5, 3.0, 5.0 GeV/c

Comments The targets are Be, C, Al, Ti, Cu, Nb, Cd, Ta, Pb, and U.

Papers YF 39 (1984) 1482 = SJNP 39 (1984) 938, YF 44 (1986) 412 = SJNP 44 (1986) 263, PL B189 (1987) 291, YF 50 (1989) 712, YF 50 (1989) 719, YF 50 (1989) 1023 = SJNP 50 (1989) 638, YF 52 (1990) 480 = SJNP 52 (1990) 305, and YF 52 (1990) 489 = SJNP 52 (1990) 312. No other papers expected.

ITEP-814 (1981) Approved 1981; Started 1982; Completed 1990.

STUDY OF K^+ DECAYS

MOSCOW, ITEP – V V Barmin, V G Barylov, T A Chistyakova, G V Davidenko, V S Demidov, A G Dolgolenko,

A G Meshkovsky (✓ Spokesperson), G S Mirosidi, V A Shebanov (✓ Spokesperson), N N Shishov, N K Zombkovskaya

Accelerator ITEP *Detector* HLBC-1M

Reactions

K^+ Xe $\rightarrow K^+$ X	0.56–0.81 GeV/c
$K^+ \rightarrow \pi^0 e^+ \nu_e$	"
$K^+ \rightarrow 2\pi^+ \pi^-$	"
$K^+ \rightarrow \pi^0 e^+ \nu_e \gamma$	"
$K^+ \rightarrow 2\pi^+ \pi^- \gamma$	"
$K^+ \rightarrow 2\pi^0 e^+ \nu_e$	"
$K^+ \rightarrow \mu^+ \nu_e \gamma$	"

Particles studied K^+

Papers YF 45 (1987) 97 = SJNP 45 (1987) 62, YF 47 (1988) 1011 = SJNP 47 (1988) 643, YF 48 (1988) 1719 = SJNP 48 (1988) 1032, YF 50 (1989) 79, YF 52 (1990) 1595 = SJNP 52 (1990) 1006, and YF 53 (1991) 981 = SJNP 53 (1991) 606.

ITEP-822 (1982) Approved 1982; Started 1983; Completed 1986.

SEARCH FOR BOUND AND RESONANT STATES IN THE ΛΛ SYSTEM

MOSCOW, ITEP – V M Berezin, E T Bogdanov, V I Chistilin, N P Dobrovolskaya, N D Galanina, E T Gedvillo, N A Khaldeeva, A M Lipkin, V N Markisov, V V Memelov, A A Nedosekin, A Y Ostapchuk, V A Sadykov, E I Tarkovsky, M E Vishnevsky (✓ Spokesperson), M O Vlasova

Accelerator ITEP *Detector* Spectrometer

Reactions

n nucleus $\rightarrow 2\Lambda$ X	2.0–9.5 GeV/c
n nucleus $\rightarrow$ dibaryon($S = -2$) X	"

Particles studied dibaryon($S = -2$)

Papers YF 52 (1990) 1612 = SJNP 52 (1990) 1016. No other papers expected.

ITEP-824 (1982) Approved 1982; Started 1984; Completed 1986.

STUDY OF $K_L \rightarrow \pi e \nu \gamma$ AND $K_L \rightarrow 2\pi e \nu$ DECAYS

MOSCOW, ITEP – M Y Balats, V M Berezin, E T Bogdanov, V I Chistilin, N P Dobrovolskaya, G B Dzyubenko, N D Galanina, A D Kamensky, N A Khaldeeva, V S Lakaev, A M Lipkin, V N Markisov, V V Memelov, A A Nedosekin, A Y Ostapchuk, V A Sadykov, S F Semin, A I Sitnikov, E I Tarkovsky, M E Vishnevsky (✓ Spokesperson), V E Vishnyakov, M O Vlasova, S V Zhelnin

Accelerator ITEP *Detector* Spectrometer

Reactions

$K_L \rightarrow \pi^+ e^- \bar{\nu}_e \gamma$	1–8 GeV/c
$K_L \rightarrow \pi^- e^+ \nu_e \gamma$	"
$K_L \rightarrow \pi^+ \pi^0 e^- \bar{\nu}_e$	"
$K_L \rightarrow \pi^0 \pi^- e^+ \nu_e$	"

Particles studied K_L

ITEP-826 (1982) Approved 1982; Started 1983; Completed 1986.

IRREGULARITIES IN THE ANGULAR DISTRIBUTION OF CUMULATIVE PARTICLES AT 180° IN THE LAB — VAN HOVE'S DETONATION OF HOT NUCLEAR MATTER?

MOSCOW, ITEP – P V Degtyarenko, B L Druzhinin, Y V Efremenko, V B Fedorov, V B Gavrilov, N A Goryainov, Y G Grishuk, O B Gushchin, L N Kondratiev, G A Leksin (✓ Spokesperson), A D Rogal, B B Shvartsman, A V Smirnitsky, L S Vorobiev

Accelerator ITEP *Detector* NHS

Reactions

π^- C $\rightarrow p$ X	1.5–3.0, 5.0 GeV/c
π^- C $\rightarrow$ deut X	"
π^- C $\rightarrow$ pion X	"
π^- Pb $\rightarrow p$ X	"
π^- Pb $\rightarrow$ deut X	"
π^- Pb $\rightarrow$ pion X	"
p C $\rightarrow p$ X	4.5, 7.5 GeV/c
p C $\rightarrow$ deut X	"
p C $\rightarrow$ pion X	"
p Pb $\rightarrow p$ X	"
p Pb $\rightarrow$ deut X	"
p Pb $\rightarrow$ pion X	"

Papers YF 44 (1986) 1396 = SJNP 44 (1986) 908. No other papers expected.

ITEP-827 (1982) Approved 1982; Started 1982; Completed 1987.

STUDY OF $b_1(1235)^-$ MESONS PRODUCED IN THE REACTION $\pi^- p \rightarrow p b_1(1235)^-$ AT 4.5 GeV/c

MOSCOW, ITEP – Y D Aleshin (✓ Spokesperson), S Ya Nikitin, L A Prostova

Accelerator ITEP *Detector* HBC-2M

Reactions

$\pi^- p \rightarrow p \pi^+ \pi^0 2\pi^-$	4.5 GeV/c

Particles studied $b_1(1235)^-$

Papers YF 45 (1987) 1800.

ITEP-828 (1982) Approved 1982; Started 1982; Completed 1988.

STUDY OF HELICITY NONCONSERVATION IN THE DIFFRACTION PRODUCTION OF $b_1(1235)^-$ MESONS IN THE REACTION $\pi^- p \rightarrow b_1(1235)^- p$

MOSCOW, ITEP – Y D Aleshin (✓ Spokesperson), V M Guzhavin, L A Prostova

Accelerator ITEP *Detector* HBC-2M, HBC-50CM, HBC-50CM

Reactions

$\pi^- p \rightarrow p \pi^+ \pi^0 2\pi^-$	4.5 GeV/c

Particles studied $b_1(1235)^-$

Papers YF 48 (1988) 148 = SJNP 48 (1988) 92.

ITEP-829 (1982) Approved 1982; Started 1982; Completed 1987.

DETERMINATION OF THE PROTON POLARIZATION IN THE REACTION $\pi^- p \rightarrow p \pi^+ \pi^- \pi^-$ AT 4.35 AND 4.85 GeV/c

MOSCOW, ITEP – Y D Aleshin (✓ Spokesperson), S Ya Nikitin, L A Prostova

Accelerator ITEP *Detector* HBC-2M

Reactions

$\pi^- p \rightarrow p \pi^+ 2\pi^-$	4.35, 4.85 GeV/c

Papers YF 45 (1987) 1358.

ITEP-831 (1983) Approved 1983; Started 1984; Completed 1989.

MEASUREMENT OF π^-, π^+, K^+, K^-, p, $\bar{p}$, ^{2}H, ^{3}H, ^{3}He, AND ^{4}He INCLUSIVE CROSS SECTIONS IN PROTON INTERACTIONS WITH Be, Al, Cu, AND Ta NUCLEI IN THE ENERGY RANGE 3.7 TO 9.2 GeV

MOSCOW, ITEP – V A Ergakov, G A Safronov, N Smirnov, N V Stepanov, Y V Trebukhovsky (✓ Spokesperson), S V Voronin, I A Vorontsov

Accelerator ITEP *Detector* Spectrometer

Reactions

p nucleus $\rightarrow \pi^+$ X	3.7 9.2 GeV (T_{lab})
p nucleus $\rightarrow \pi^-$ X	"
p nucleus $\rightarrow K^+$ X	"
p nucleus $\rightarrow K^-$ X	"
p nucleus $\rightarrow p$ X	"
p nucleus $\rightarrow \bar{p}$ X	"
p nucleus $\rightarrow$ deut X	"
p nucleus $\rightarrow$ trit X	"
p nucleus $\rightarrow {}^3$He X	"
p nucleus $\rightarrow$ He X	"
p nucleus $\rightarrow {}^6$He X	10.0 GeV (T_{lab})

Papers CZJP B36 (1986) 985, YF 47 (1988) 1040 = SJNP 47 (1988) 662, YF 47 (1988) 1523 = SJNP 47 (1988) 966, YF 51 (1990) 1587 = SJNP 51 (1990) 1001, and YF 53 (1991) 191.

ITEP-832 (1983) Approved 1983; Started 1988.

A TRACKING EXPERIMENT FOR STUDY OF DOUBLE BETA DECAY IN ^{136}Xe

MOSCOW, ITEP - M Ajnutdinov, V Artemiev, E Brakhman, A Karelin, V Kirichenko, V Knyazev, O Kozodaeva, V Lyubimov (✓ Spokesperson), A Mitin, O Zeldovich, T Zvetkova

Accelerator NONE *Detector* Spectrometer

Reactions

^{136}Xe $\rightarrow {}^{136}$Ba $2e^-$	---
^{136}Xe $\rightarrow {}^{136}$Ba $2e^-$ $2\bar{\nu}_e$	---

Particles studied $\bar{\nu}_e$

Comments Uses a 10-kg ^{136}Xe target. The detector is a time projection chamber at atmospheric pressure. Taking data (March 92).

Papers NIM A303 (1991) 309, YF 54 (1991) 881, and YF 55 (1991) 15.

ITEP-833 (1983) Approved 1983; Started 1985; Completed 1988.

SEARCH FOR ^{136}Xe, ^{134}Xe, AND ^{124}Xe DOUBLE BETA DECAYS

MOSCOW, ITEP - A S Barabash (✓ Spokesperson)
MOSCOW, INR - V V Kuzminov, V M Lobashev, V M Novikov, B M Ovchinnikov, A A Romansky (✓ Spokesperson)

Accelerator NONE *Detector* Spectrometer

Reactions

^{136}Xe $\rightarrow {}^{136}$Ba $2e^-$	---
^{136}Xe $\rightarrow {}^{136}$Ba $2e^-$ $2\bar{\nu}_e$	---
^{136}Xe $\rightarrow {}^{136}$Ba $2e^-$ majoron	---
^{134}Xe $\rightarrow {}^{134}$Ba $2e^-$	---
^{134}Xe $\rightarrow {}^{134}$Ba $2e^-$ $2\bar{\nu}_e$	---
^{124}Xe $\rightarrow {}^{124}$Te $2e^+$	---
^{124}Xe $\rightarrow {}^{124}$Te $2e^+$ $2\nu_e$	---
^{124}Xe $\rightarrow {}^{124}$I e^+	---
^{124}Xe $\rightarrow {}^{124}$I e^+ $2\nu_e$	---

Particles studied majoron

Comments The above processes with the ^{124}Xe to ^{124}Te transition denote reactions in which Xe and Te *atoms* participate, and an electron from the xenon K-shell decays.

Papers PL B223 (1989) 273.

ITEP-841 (1984) Approved 1984; Started 1985; Completed 1986.

STRANGENESS AND POLARIZATION OF WARM NUCLEAR MATTER: DATA ON CUMULATIVE Λ AND K^0 PRODUCTION (II)

MOSCOW, ITEP - P V Degtyarenko, Y V Efremenko, V B Fedorov, V B Gavrilov, Y G Grishuk, F M Khassanov, M V Kossov, S V Kuleshov, S G Kuznetsov, G A Leksin (✓ Spokesperson), N A Pivnuk, S M Shuvalov, B B Shvartsman, A V Smirnitsky, L S Vorobiev, B V Zagreyev

Accelerator ITEP *Detector* NHS

Reactions

π^- C $\rightarrow \Lambda$ X	1.2, 3.0, 5.0 GeV/c
π^- Al $\rightarrow \Lambda$ X	"
π^- Cu $\rightarrow \Lambda$ X	"
π^- Cd $\rightarrow \Lambda$ X	"
π^- Pb $\rightarrow \Lambda$ X	"
π^+ C $\rightarrow \Lambda$ X	3.0 GeV/c
π^+ Pb $\rightarrow \Lambda$ X	"
p C $\rightarrow \Lambda$ X	3.0, 7.5 GeV/c
p Pb $\rightarrow \Lambda$ X	"

Papers YF 53 (1991) 732, and PTE 2 (1991) 49. No other papers expected.

ITEP-842 (1984) Approved 1984; Started 1984; Completed 1987.

STUDY OF HIGH ENERGY CUMULATIVE PARTICLE PRODUCTION IN PROTON NUCLEUS INTERACTIONS

MOSCOW, ITEP - S V Boyarinov, I I Evseev, S A Gerzon, Y T Kiselev (✓ Spokesperson), G A Leksin, A N Martemyanov, K R Mikhailov, V L Novikov, S V Semenov, V A Sheinkman, Y V Terekhov (✓ Spokesperson)

Accelerator ITEP *Detector* FHS-1

Reactions

p nucleus $\rightarrow p$ X	10 GeV (E_{lab})
p nucleus $\rightarrow \pi^+$ X	"
p nucleus $\rightarrow \pi^-$ X	"
p nucleus $\rightarrow K^+$ X	"
p nucleus $\rightarrow K^-$ X	"
p nucleus $\rightarrow$ deut X	"
p nucleus $\rightarrow$ trit X	"
p nucleus $\rightarrow \bar{p}$ X	"

Comments The detector is the Focusing Hadron Spectrometer. The nuclear targets are beryllium, aluminum, copper, and tantalum. Cumulative particles are measured at 119° θ_{lab}.

Papers YF 46 (1987) 1472 = SJNP 46 (1987) 871, YF 47 (1988) 942 = SJNP 47 (1988) 600, and YF 50 (1989) 1605 = SJNP 50 (1989) 996. No other papers expected.

ITEP-843 (1984) Approved 1984; Started 1985; Completed 1986.

SEARCH FOR EXOTIC BARYON RESONANCES IN THE BARYON EXCHANGE REACTION $\pi^+ p \rightarrow p\pi^+\pi^+\pi^-$ AT 4 GeV/c

MOSCOW, ITEP - B M Abramov, B L Druzhinin, I A Dukhovskoy, V S Fedorets, V M Guzhavin, V V Kishkurno, Y S Krestnikov, A P Krutenkova, V V Kulikov, V F Kuzichev, M A Matsyuk, P A Murat (✓ Spokesperson), A F Nilov, S V Proshin, I A Radkevich, F D Ratnikov, N G Tkach, E N Turdakina

Accelerator ITEP *Detector* MTS

Reactions

$\pi^+ p \rightarrow N^*_{5/2}(\text{unspec})^{+++} \pi^-$	4.0 GeV/c
$N^*_{5/2}(\text{unspec})^{+++} \rightarrow p\, 2\pi^+$	

Particles studied $N^*_{5/2}(\text{unspec})^{+++}$

Comments Uses a π^+ beam with intensity 10^5 pions per burst, and a liquid hydrogen target.

Papers YF 53 (1991) 179. No other papers expected.

SUMMARIES OF ITEP EXPERIMENTS

ITEP-851 (1981) Approved 1985; Started 1986; Completed 1988.

STUDY OF π^- NUCLEUS INTERACTIONS WITH SINGLE PHOTON EMISSION

MOSCOW, ITEP – V V Barmin, V G Barylov, T A Chistyakova, G V Davidenko, V S Demidov, A G Dolgolenko, V E Luchmanov, A G Meshkovsky (√ Spokesperson), G S Mirosidi, V A Shebanov, N N Shishov, N K Zombkovskaya

Accelerator ITEP *Detector* HLBC-1M

Reactions

π^- Xe → γ X	0.0, 0.4, 1.0 GeV/c

Papers YF 50 (1989) 3 = SJNP 50 (1989) 1.

ITEP-852 (1985) Approved 1985; Started 1986; Completed 1988.

SLOW PION PRODUCTION IN NUCLEUS-NUCLEUS INTERACTIONS

MOSCOW, ITEP – A I Dubinina, E D Kolganova, E A Pozharova, V A Smirnitsky (√ Spokesperson)

Accelerator JINR *Detector* Emulsion

Reactions

Ne Ag → pion X	4.1 GeV (E_{lab}/N)
Ne Br → pion X	"
Mg Ar → pion X	"
Mg Br → pion X	"

Papers ZETFP 48 (1988) 233 = JETPL 48 (1988) 251.

ITEP-853 (1985) Approved 1985; Started 1987; Completed 1991.

STUDY OF PIONIC NUCLEAR DEGREES OF FREEDOM IN (π, $\pi\pi$) REACTIONS

MOSCOW, ITEP – Y D Bayukov, Y V Efremenko, V B Fedorov, F M Khassanov, M V Kossov (√ Spokesperson), S V Kuleshov, G A Leksin (√ Spokesperson), N A Pivnyuk, S M Shuvalov, B B Shvartsman, A V Smirnitsky, D A Suchkov, L S Vorobyev

Accelerator ITEP *Detector* FOCUS

Reactions

π^- Ti → π^- $\pi^\pm$ X	1.4 GeV/c
π^+ Ti → π^+ $\pi^\pm$ X	"
π^- Fe → π^- $\pi^\pm$ X	"
π^+ Fe → π^+ $\pi^\pm$ X	"

Comments Studies pion condensation and selective, unnatural parity excitations of π-like levels in nuclei. FOCUS is a modification of the NHS detector.

ITEP-861 (1984) Approved 1984; Started 1987; Completed 1990.

SEARCH FOR ^{76}Ge DOUBLE BETA DECAY

MOSCOW, ITEP – I V Kirpichnikov (√ Spokesperson), V A Kuznetsov, A S Starostin, A A Vasenko
YEREVAN PHYS INST – A G Djanyan, V S Pogosov, L A Pogosyan, A G Tamanyan

Accelerator NONE *Detector* Spectrometer

Reactions

^{76}Ge → ^{76}Se $2e^-$	
^{76}Ge → ^{76}Se $2e^-$ $2\overline{\nu}_e$	
^{76}Ge → ^{76}Se $2e^-$ unspec	

Comments Uses the Ge semiconductor, 85% enriched ^{76}Ge. The detector is in a Yerevan salt mine.

ITEP-862 (1986) Approved 1986; Started 1986; Completed 1987.

MEASUREMENT OF THE POLARIZATION OF LAMBDAS PRODUCED BY NEUTRONS WITH MOMENTA FROM 4 TO 10 GEV/c ON NUCLEI

MOSCOW, ITEP – A N Alekseev, V M Berezin, E T Bogdanov, V I Chistilin, N P Dobrovolskaya, N D Galanina, S I Kartyshov, N A Khaldeeva, A M Lipkin, V N Markisov, V V Memelov, R A Menshchikov, A A Nedosekin, A Y Ostapchuk, V A Sadykov, M E Vishnevsky (√ Spokesperson), M O Vlasova

Accelerator ITEP *Detector* Spectrometer

Reactions

n C → Λ X	2–10 GeV/c
n Pb → Λ X	"

ITEP-863 (1986) Approved 1986; Started 1986; Completed 1988.

BACKWARD TWO-PION PRODUCTION IN PION-DEUTERIUM INTERACTIONS AT 0.9-2.0 GeV/c

MOSCOW, ITEP – B M Abramov, S A Bulychjov, B L Druzhinin, I A Dukhovskoy, V S Fedorets, V V Kishkurno, L A Kondratyuk, Y S Krestnikov, A P Krutenkova, V V Kulikov, I A Radkevich, N G Tkach, E N Turdakina (√ Spokesperson)

Accelerator ITEP *Detector* MTS

Reactions

π^- deut → deut π^0 π^-	0.9–2.0 GeV/c

Comments Uses a π^+ beam with intensity 7×10^5 pions per burst, and a liquid deuterium target.

Papers YF 54 (1991) 1013. No other papers expected.

ITEP-864 (1986) Approved 1986; Started 1987; Completed 1988.

PION-PROTON ELASTIC SCATTERING AT LARGE ANGLES

MOSCOW, ITEP – B M Abramov, S A Bulychjov, I A Dukhovskoy, V S Fedorets, V V Kishkurno, Y S Krestnikov, A P Krutenkova, V V Kulikov (√ Spokesperson), M A Matsyuk, P A Murat, S V Proshin, I A Radkevich, N G Tkach, E N Turdakina

Accelerator ITEP *Detector* MTS

Reactions

π^- p → p π^0 π^-	0.9–2.0 GeV/c

Comments Uses a π^+ beam with intensity 7×10^5 pions per burst, and a liquid hydrogen target.

Papers YF 54 (1991) 550. No other papers expected.

ITEP-865 (1986) Approved 1986; Started 1986.

ANTIPROTON-NUCLEI ANNIHILATION CROSS SECTIONS WITH Be, C, Al, Fe, Cu, AND Pb TARGETS AT 1.26, 1.53, AND 2.50 GeV/c

MOSCOW, ITEP – B F Kuzichev, Y B Lepikhin, V A Smirnitsky (√ Spokesperson)

Accelerator ITEP *Detector* Counter, Wire chamber

Reactions

$\overline{p}$ Be → X	1.26, 1.53, 1.76 GeV/c
$\overline{p}$ C → X	"
$\overline{p}$ Al → X	"
$\overline{p}$ Fe → X	"
$\overline{p}$ Cu → X	"
$\overline{p}$ Pb → X	"

Comments Taking data (March 92).

ITEP-871 (1987) Approved 1987; Started 1988; Completed 1990.

STUDY OF KAON-NUCLEUS INTERACTIONS WITH SINGLE PHOTON EMISSION

MOSCOW, ITEP – V V Barmin, V G Barylov, G V Davidenko, V S Demidov, A G Dolgolenko, V E Luchmanov, A G Meshkovsky (√ Spokesperson), G S Mirosidi, V A Shebanov, N N Shishov, A A Sibirtsev, N K Zombkovskaya

Accelerator ITEP *Detector* HLBC-1.5M

Reactions

K^+ Xe $\rightarrow \gamma$ X	0.8 GeV/c
K^- Xe $\rightarrow \gamma$ X	"

Comments The detector (DIANA) is a 700-liter xenon bubble chamber.

ITEP-872 (1987) Approved 1987; Started 1988; Completed 1989.

DETAILED STUDY OF BACKWARD PRODUCTION OF HADRONS IN π^- A INTERACTIONS

MOSCOW, ITEP Y V Efremenko, V B Fedorov, Y G Grishuk, F M Khassanov, M V Kossov, S V Kuleshov, G A Leksin (✓ Spokesperson), N A Pivnyuk, V S Serov, S M Shuvalov, B B Shvartsman, A V Smirnitsky, L S Vorobyev, B V Zagreev

Accelerator ITEP *Detector* NHS, Wire chamber

Reactions

π^- nucleus $\rightarrow$ pion X	5.0 GeV (E_{lab})
π^- nucleus $\rightarrow p$ X	"
π^- nucleus $\rightarrow$ deut X	"

Comments Studies the pion, proton, and deuteron backward production at 180° θ_{lab}. Nuclear targets are carbon, copper, and lead.

ITEP-873 (1987) Approved 1987; Started 1987; Completed 1991.

HIGH ENERGY CUMULATIVE PARTICLE PRODUCTION AT 10 GeV

MOSCOW, ITEP S V Bojarinov, I I Evseev, S A Gerson, Y T Kiselev (✓ Spokesperson), G A Leksin, A N Martemyanov, K R Mikhailov, V L Novikov, S A Pozdnyakov, V A Sheinkman, Y V Terekhov (✓ Spokesperson), V I Ushakov

Accelerator ITEP *Detector* FHS-2

Reactions

p nucleus $\rightarrow p$ X	1-10 GeV/c
p nucleus $\rightarrow$ deut X	"
p nucleus $\rightarrow$ trit X	"
p nucleus $\rightarrow \pi^+$ X	"
p nucleus $\rightarrow \pi^-$ X	"
p nucleus $\rightarrow K^+$ X	"
p nucleus $\rightarrow K^-$ X	"
p nucleus $\rightarrow \bar{p}$ X	"

Comments Nuclear targets are beryllium, aluminum, copper, and tantalum. The production is studied at $\theta_{lab} = 97°$.

Papers YF 54 (1991) 119.

ITEP-874 (1987) Approved 1987; Started 1987; Completed 1987.

MEASUREMENT OF THE TOTAL CROSS SECTION AT A PROTON MOMENTUM OF 2 GeV/c WITH ^{6}Li, ^{7}Li, AND ^{9}Li NUCLEI

MOSCOW, ITEP I A Dukhovskoy, Y S Krestnikov, V V Orlov, I A Radkevich, S F Sjemin, A N Starodumov, A I Sutormin (✓ Spokesperson), N G Tkach, V M Zaretsky

Accelerator ITEP *Detector* MTS

Reactions

$p\ ^6$Li $\rightarrow$ X	2.0 GeV/c
$p\ ^7$Li $\rightarrow$ X	"
p Be $\rightarrow$ X	"

Comments Uses a p beam with intensity 6×10^5 protons per burst, and solid nuclear targets.

Papers YF 47 (1988) 1816. No other papers expected.

ITEP-875 (1987) Approved 1987; Started 1987; Completed 1988.

PRODUCTION OF STRANGE PARTICLES IN BARYON EXCHANGE PROCESSES

MOSCOW, ITEP V M Abramov, I A Dukhovskoy, V S Fedorets, A I Khanov, V V Kishkurno, Y S Krestnikov, A P Krutenkova, M A Matsyuk, P A Murat, V V Orlov, S V Proshin, I A Radkevich, F D Ratnikov, A N Starodumov, A I Sutormin (✓ Spokesperson), N G Tkach

Accelerator ITEP *Detector* MTS

Reactions

$\pi^+ n \rightarrow \Lambda K^+$	2.0 GeV/c

Comments Uses an unseparated π^+ beam with intensity 10^5 pions per burst, and a liquid deuterium target. Detects backward kaons.

Papers YF 54 (1991) 550. No other papers expected.

ITEP-876 (1987) Approved 1987; Started 1987.

SEARCH FOR ^{94}Zr AND ^{96}Zr DOUBLE BETA DECAYS IN PHOTOGRAPHIC EMULSION

MOSCOW, ITEP A S Barabash (✓ Spokesperson), E D Kolganova, E A Pozharova, T Yu Skorodko, V A Smirnitsky
MOSCOW, INR A A Klimenko, A A Smolnikov

Accelerator NONE *Detector* Emulsion

Reactions

^{96}Zr $\rightarrow\ ^{96}$Mo $2e^-$
^{96}Zr $\rightarrow\ ^{96}$Mo $2e^-\ 2\bar{\nu}_e$
^{96}Zr $\rightarrow\ ^{96}$Mo $2e^-$ majoron
^{94}Zr $\rightarrow\ ^{94}$Mo $2e^-$
^{94}Zr $\rightarrow\ ^{94}$Mo $2e^-\ 2\bar{\nu}_e$
^{94}Zr $\rightarrow\ ^{94}$Mo $2e^-$ majoron

Particles studied majoron

Comments Taking data (March 92).

ITEP-891 (1989) Approved 1989; Started 1989; Completed 1990.

SEARCH FOR ^{100}Mo AND ^{116}Cd DOUBLE BETA DECAYS TO EXCITED ^{100}Ru AND ^{116}Sn STATES

MOSCOW, ITEP A S Barabash (✓ Spokesperson)
MOSCOW, INR V I Cherechovsky, A V Kopylov

Accelerator NONE *Detector* Spectrometer

Reactions

^{100}Mo $\rightarrow\ ^{100}$Ru $2e^-$
^{100}Mo $\rightarrow\ ^{100}$Ru $2e^-\ 2\bar{\nu}_e$
^{116}Cd $\rightarrow\ ^{116}$Sn $2e^-$
^{116}Cd $\rightarrow\ ^{116}$Sn $2e^-\ 2\bar{\nu}_e$

Papers PL B249 (1990) 186.

ITEP-892 (1989) Approved 1989; Started 1989; Completed 1989.

STUDY OF ^{4}He p INTERACTIONS

MOSCOW, ITEP S K Abdullin, A V Blinov, I V Chuvilo, V E Grechko, Y V Korolev, Y M Selektor (✓ Spokesperson), V N Shulyachenko, V V Solovyev, V F Turov, I A Vanyushin, S M Zombkovsky

Accelerator ITEP *Detector* HBC-2M

Reactions

He $p \rightarrow\ ^3$He $p\ n$	3 GeV/c
He $p \rightarrow$ trit $2p$	"
He $p \rightarrow$ deut $2p\ n$	"
He $p \rightarrow$ He p	5 GeV/c
He $p \rightarrow$ He $p\ \pi^0$	"
He $p \rightarrow$ He $n\ \pi^+$	"
He $p \rightarrow\ ^3$He $p\ n$	"
He $p \rightarrow\ ^3$He $2p\ \pi^-$	"

He $p \rightarrow$ trit $2p$	"
He $p \rightarrow$ trit $2p\ \pi^0$	"
He $p \rightarrow$ trit $p\ n\ \pi^+$	"
He $p \rightarrow$ deut $2p\ n$	"
He $p \rightarrow$ deut $3p\ \pi^-$	"
He $p \rightarrow 4p\ n\ \pi^-$	"

Comments A measurement of the total and differential cross sections, and a search for the momentum distribution of particles inside the ^{4}He nucleus.

ITEP-893 (1989) Approved 1989; Started 1989; Completed 1990.

STUDY OF $pp \rightarrow pp\pi^+\pi^-$ REACTION AT 0.91 GeV

MOSCOW, ITEP – B M Bobchenko, P V Dyagtyarenko, Y V Efremenko, V B Fedorov, Y G Grishuk, M V Kossov, S V Kuleshov, G A Leksin (√ Spokesperson), N A Pivnyuk (√ Spokesperson), S M Shuvalov, B B Shvartsman, A V Smirnitsky, L S Vorobyev (√ Spokesperson)

Accelerator ITEP *Detector* NHS

Reactions

$p\ p \rightarrow 2p\ \pi^+\ \pi^-$	1.6 GeV/c
$p\ p \rightarrow$ deut π^+	"
$p\ p \rightarrow$ deut $\pi^+\ \pi^0$	"
$p\ n \rightarrow 2p\ \pi^0\ \pi^-$	"
$p\ n \rightarrow$ deut $\pi^+\ \pi^-$	"

Particles studied dibaryon

Comments Uses the modified forward Nonmagnetic Hadron Spectrometer. Targets are C and CH_2.

ITEP-894 (1989) Approved 1989; Started 1990; Completed 1991.

QUASIPARTICLE VELOCITY MEASUREMENTS

MOSCOW, ITEP – E A Doroshkevich, Y V Efremenko, Y G Grishuk, S V Kuleshov, A A Kurzenkov, G A Leksin (√ Spokesperson), N A Pivnyuk, G A Safronov, A V Stavinsky, A V Vlassov (√ Spokesperson), L S Vorobyev

Accelerator ITEP *Detector* NHS

Reactions

p nucleus $\rightarrow 2p$ X	2.2, 7.5 GeV/c
p nucleus $\rightarrow$ deut p X	"
p nucleus $\rightarrow$ 2deut X	"
p nucleus $\rightarrow p$ pion X	"

Comments Targets are C and Pb. Polar angles of secondary particles are 10-20° in the lab.

ITEP-895 (1989) Approved 1989; Started 1991.

DETAILED STUDY OF SPECTRA OF Λ PARTICLES AND OF THE POLARIZATION IN THE NUCLEAR FRAGMENTATION REGION IN HADRON-NUCLEON INTERACTIONS

LAMBDA-III COLLABORATION

MOSCOW, ITEP – V I Chistilin, P V Dyagtyarenko, Y V Efremenko, V B Fyodorov, V B Gavrilov, N A Goryainov, Y G Grishuk, F M Hasanov, M M Katz, L N Kondratiev, I E Korolko, M V Kossov, S V Kuleshov, G A Leksin (√ Spokesperson), N A Pivnyuk, N N Pomelov, V Yu Rusinov, V A Sadykov, S M Shuvalov, B B Shwartsman, A V Smirnitsky (√ Spokesperson), L S Vorobyev, B V Zagreev

Accelerator ITEP *Detector* LAMBDAMETER

Reactions

p Al $\rightarrow$ Λ X	7.5 GeV/c
p Pb $\rightarrow$ Λ X	"

Comments The kinetic energy range of the detector is 10-300 MeV. Taking data (March 92).

ITEP-901 (1990) Approved 1990; Started 1990.

QUASIELASTIC (π^-, d) BACKWARD SCATTERING ON NUCLEI AT 0.7-1.3 GeV

MOSCOW, ITEP B M Abramov, I A Dukhovskoy, V S Fedorets, A I Khanov, V V Kishkurno, Y S Krestnikov, A P Krutenkova (√ Spokesperson), V V Kulikov, M A Matsyuk, P A Murat, V V Orlov, S V Proshin, I A Radkevich, A N Starodumov, A I Sutormin, N G Tkach, E N Turdakina

Accelerator ITEP *Detector* MTS

Reactions

π^- nucleus $\rightarrow$ deut π^- X	0.7 1.3 GeV/c

Comments Uses a π^- beam with intensity 5×10^5 pions per burst. Targets (^{6}Li, ^{7}Li, C, H_2O, D_2O, etc.) are placed inside the MTS magnet. Measures momenta of backward pions. Taking data (March 92).

KEK Experiments

KEK-PF-000 (1986) Approved Feb 1986; Started Jan 1986; Completed Jul 1986.

SEARCH FOR AXION-LIKE PARTICLES

KYOTO U – K Imai, H Kobayashi, A Konaka, A Masaike, K Miyake, N Nagamine, T Nakamura, N Sasao (✓ Spokesperson)
KEK – A Enomoto, Y Fukushima, E Kikutani, H Koiso, H Matsumoto, K Nakahara, S Ohsawa, I Sato, T Taniguchi, J Urakawa

Accelerator KEK-PF-LINAC *Detector* Wide-angle spectrometer

Reactions
e^- Wt → axion X 2.5 GeV (E_{lab})

Particles studied axion

Comments Looks for e^+e^- and $\gamma\gamma$ decay modes of the axion.

Papers PRL 57 (1986) 659.

KEK-TE-001 Approved Mar 1983; Started Nov 1986.

TRISTAN e^+e^- EXPERIMENTS BY THE VENUS COLLABORATION

TOHOKU U – K Abe, J MacNaughton
KEK – K Amako, Y Arai, M Fukawa, N Ishihara, N Kanematsu, J Kanzaki, T Kondo, T Matsui, S Odaka, K Ogawa (✓ Spokesperson), T Ohama, H Sakamoto, H Sakuda, N Sato, J Shirai, T Sumiyoshi, F Takasaki, T Tsuboyama, S Uehara, Y Unno, Y Watase, Y Yamada
TSUKUBA U – Y Asano, S Mori (✓ Spokesperson), I Nakano, S Shirakata, Y Takada, Y Yonezawa
TOKYO METROPOLITAN U – M Chiba, T Fukui, F Hinode, T Hirose, N Hosoda, T Oyama, M Utsumi, F Yabuki
HIROSHIMA U – Y Chiba, T Ohsugi
WAKAYAMA MEDICAL COLL – M Daigo
OSAKA U – J Haba, N Kanda, Y Nagashima, A Suzuki, H Takaki, M Takita
KYOTO U – Y Hemmi, R Kikuchi, H Kurashige, A Okamoto
TOHOKU GAKUIN U – M Higuchi, Y Hoshi, M Sato
KOBE U – Y Homma, A Ono
HELSINKI U – T T Korhonen
MIYAZAKI U – T Nakamura
TOHO U – H Shibuya
IBARAKI COLL TECH – M Shioden
OKAYAMA U – N Tamura
KOGAKUIN U – K Tobimatsu
NARUTO U OF EDUCATION – H Yoshida

Accelerator KEK-TRISTAN *Detector* VENUS

Reactions
$e^+ e^-$ < 70 GeV (E_{cm})

Comments In progress (April 92).

Papers NIM 217 (1983) 181, JJAP 23 (1984) 897, NIM A228 (1985) 309, NIM A238 (1985) 328, NIM A243 (1986) 58, NIM A253 (1986) 27, IEEE TNS 33 (1986) 73, JJAP 25 (1986) 1049, NIM A254 (1987) 35, NIM A254 (1987) 317, NIM A259 (1987) 430, NIM A259 (1987) 438, JJAP 26 (1987) 982, JPSJ 56 (1987) 3763, JPSJ 56 (1987) 3767, PL B198 (1987) 570, PRL 59 (1987) 2915, NIM A265 (1988) 457, NIM A269 (1988) 171, NIM A269 (1988) 522, NIM A270 (1988) 319, NIM A271 (1988) 432, NIM A272 (1988) 687, IEEE TNS 35 (1988) 300, PL B207 (1988) 355, PRL 61 (1988) 915, PL B213 (1988) 400, NIM A274 (1989) 183, NIM A281 (1989) 462, IEEE TNS 36 (1989) 665, IEEE TNS 36 (1989) 670, JJAP 28 (1989) 1981, PR D39 (1989) 3524, JPSJ 58 (1989) 3037, ZPHY C45 (1989) 175, PRL 63 (1989) 1776, PL B232 (1989) 425, PL B232 (1989) 431, ZPHY C48 (1990) 13, PL B234 (1990) 202, PL B234 (1990) 382, PL B240 (1990) 232, PL B246 (1990) 297, NIM A301 (1991) 497, NIM A303 (1991) 346, NIM A305 (1991) 71, PRL 66 (1991) 280, PL B264 (1991) 212, PL B266 (1991) 188, and PL B267 (1991) 309.

KEK-TE-002 Approved Mar 1983.

STUDY OF e^+e^- ANNIHILATION PHENOMENA BY A DETECTOR WITH PARTICLE IDENTIFICATION

TOPAZ COLLABORATION

TOKYO U – T Kamae, T Kishida, N Kusuki, A Shirabashi, T Takahashi, S S Yamamoto
TOKYO U, INS – A Imanishi, T Ishii, S Kato, K Maruyama, T Ohshima, H Okuno, K Ukai, M Yoshioka
NAGOYA U – I Adachi, J Fujimoto, R Kajikawa (Spokesperson), T Matsushita, A Sugiyama, S Suzuki, T Takahashi, H Takamure
NARA WOMENS U – N Fujiwara, H Hayashii, N Iida, Y Kayahara, K Muramatsu, S Noguchi, S Yamashita
OSAKA CITY U – Y Kato, A Maruyama, T Okusawa, A Shimonaka, T Takahashi
TOKYO U OF AGRIC TECH – K Iwashiro, O Nitoh, S Onodera, K Shimozawa, K Takahashi
TEZUKAYAMA U – F Ochiai
KOBE U – K Fujii, T Fujii, K Fujiwara
TOKYO INST TECH – Y Watanabe
PURDUE U – B Howell, D Koltick
KEK – M Doser, R Enomoto, H Fujii, K Fujii, H Ikeda, R Itoh, H Iwasaki, S Kawabata (Spokesperson), H Kichimi, M Kobayashi, A Miyamoto, R Sugahara, T Tauchi, T Tsukamoto, S Uno, M Yamauchi

Accelerator KEK-TRISTAN *Detector* TOPAZ

Reactions
$e^+ e^-$ < 70 GeV (E_{cm})

Comments Searches for new particles such as heavy quarks, heavy leptons, and various supersymmetric particles, and studies in detail electroweak as well as QCD phenomena. The detector has large solid angle coverage with very good particle identification and 3-dimensional tracking capabilities.

Papers NIM 225 (1984) 23, NIM A236 (1985) 55, NIM A252 (1986) 423, NIM A256 (1987) 449, NIM A269 (1988) 507, NIM A269 (1988) 513, NIM A270 (1988) 11, NIM A271 (1988) 404, PRL 60 (1988) 97, PL B200 (1988) 391, PL B208 (1988) 319, PR D37 (1988) 1339, PL B218 (1989) 105, PL B227 (1989) 495, PL B228 (1989) 553, PL B229 (1989) 427, NIM A297 (1990) 148, PL B234 (1990) 185, PL B234 (1990) 197, PL B234 (1990) 525, PL B240 (1990) 513, PL B244 (1990) 352, PL B249 (1990) 336, NIM A300 (1991) 575, PL B255 (1991) 613, PL B268 (1991) 457, and NIM A312 (1992) 440.

KEK-TE-003 (1983) Approved Nov 1983.

AMY — A HIGH RESOLUTION LEPTON DETECTOR FOR TRISTAN

AMY COLLABORATION

ROCHESTER U – A Bodek, H Budd, A Fry, H Harada, S Kanda, B J Kim, T Kumita, Y K Li, S L Olsen (✓ Spokesperson), A Sill, E H Thorndike, K Ueno, C Velisarris, R Walker
LOUISIANA STATE U – P Kirk, R McNeil
OHIO STATE U – M Frautschi, H A Kagan, R D Kass
VIRGINIA TECH – A Abashian, K Gotow, K P Hu, A Z Lai, M Mattson, L Pillonen, K Sterner
MINNESOTA U – R Poling, T Thomas
UC, DAVIS – R E Breedon, W Ko, R Lander, J Rowe, J Smith, D Stuart
SOUTH CAROLINA U – S Lusin, C Rosenfeld, A Wang, S Wilson
RUTGERS U – S K Kim, F Sannes, S Schnetzer, B Stone, J Vinson
NIIGATA U – Y Ishi, K Miyano, H Miyata, T Sasaki
SAITAMA U – T Ishizuka, K Ohta
SAGA U, JAPAN – S Kobayashi, A Murakami
KONAN U – F Kajimo
NIHON DENTAL COLL – Y Yamashita
KOREA U – J S Kang, M H Lee
PHILIPPINES U, QUEZON CITY – A Bacala, J Canete
KYUNGPOOK NATIONAL U – S K Choi, D Son
BEIJING, IHEP – W G Yan, M H Ye, Z P Zheng
CHUO U, TOKYO – S Matsumoto, R Tanaka
KEK – A Abe, Y Fujii, Y Higashi, Y Kurihara, F Liu, A Maki (✓ Spokesperson), T Nozaki, T Omori, H Sagawa, Y Sakai, Y Sugimoto, Y Takaiwa, S Terada

Accelerator KEK-TRISTAN *Detector* AMY

Reactions
$e^+ e^-$ < 70 GeV (E_{cm})

Papers IEEE TNS 23 (1987) 520, NIM A260 (1987) 361, NIM A265 (1988) 141, PRL 60 (1988) 93, PRL 60 (1988) 2359, PRL 61 (1988) 911, NIM A274 (1989) 95, NIM A283 (1989) 665, PL B218 (1989) 112, PL B218 (1989) 499, PL B223 (1989) 476, PL B228 (1989) 548, PRL 62 (1989) 1713, PRL 63 (1989) 1342, PRL 63 (1989) 1772, PRL 63 (1989) 1910, PRL 63 (1989) 2341, PR D41 (1990) 2675, PR D42 (1990) 737, PR D42 (1990) 949, PR D42 (1990) 1339, PL B234 (1990) 434, PL B240 (1990) 243, PL B244 (1990) 573, PL B252 (1990) 491, PRL 64 (1990) 984, and IJMP A6 (1991) 2583.

KEK-TE-004 (Nov 1984) Approved Apr 1985.

NIKKO-MARU EXPERIMENT—A SEARCH FOR HIGHLY IONIZING PARTICLES

SHIP COLLABORATION

HARVARD U – K Kinoshita (✓ Spokesperson)
TOKYO, INST FOR SPACE AND ASTRONAUTICAL SCIENCE – M Fujii
UC, BERKELEY – P B Price
GIFU U – S Tasaka
KEK – K Nakajima

Accelerator KEK-TRISTAN *Detector* SHIP

Reactions

$e^+ e^-$ 50–60.8 GeV (E_{cm})

Particles studied monopole

Papers PRL 60 (1988) 1610, and PL B228 (1989) 543.

KEK-125 (Sep 1983) Approved Feb 1984; Started Jan 1986; Completed Mar 1986.

STUDIES OF *dd* INTERACTIONS IN THE RANGE 2–4 GeV/*c*

TOKYO U – K Ishikawa, T Kishida, M Kuze, F Sai, S S Yamamoto (✓ Spokesperson)
TSUKUBA U – I Arai, A Manabe, H Nunokawa
KITAKYUSHU, UNIV OCCUP ENVIR HEALTH – T Maki
KEK – H Koiso, T Tsuboyama

Accelerator KEK-PS *Detector* Counter, Wire chamber

Reactions

deut deut → X 1.5–4 GeV/*c*
deut Al → X "
deut C → X "

Comments Measured the total cross sections.

Papers JJAP 26 (1987) 1348, NIM A270 (1988) 6, JJAP 28 (1989) 495, and PR C41 (1990) 180.

KEK-131 Approved Oct 1984; Completed Mar 1986.

CONFIRMATION OF THE NARROW STATE $X(1935)$ IN THE REACTION $\bar{p}p \to K^+K^-$ AND $\pi^+\pi^-$

KOGAKUIN U – T Fujii (✓ Spokesperson)
TOKYO U, INS – S Homma, M Sudou
KEK – Y Fujii, S Ishimoto, K Nakamura, K H Tanaka, T Tanimori
KYOTO U – Y Sugimoto
HIROSHIMA U – S Kohno, Y Morita, Y Sumi

Accelerator KEK-PS *Detector* Wire chamber, Drift chamber

Reactions

$\bar{p}\,p \to K^+\,K^-$ 360–760 MeV/*c* (P_{lab})
$\bar{p}\,p \to \pi^+\,\pi^-$ "

Particles studied $X(1935)$

Papers PR D37 (1988) 583, and PR D41 (1990) 744.

KEK-132 (Oct 1984) Approved Apr 1985; Started Jun 1986; Completed Dec 1986.

A STUDY OF CUMULATIVE Λ PRODUCTION IN HIGH ENERGY HADRON-NUCLEUS REACTIONS

TSUKUBA U – I Arai (✓ Spokesperson), A Manabe, M Ninomiya, H Nunokawa, M Tanaka, K Tomizawa, K Yagi
TOKYO U – T Nagae, H Sano, S Sasaki, K Tokushuku
KEK – J Chiba, T Kobayashi

Accelerator KEK-PS *Detector* FANCY

Reactions

$\pi^+\,{}^{12}C \to \Lambda\,X$ 4 GeV/*c*
$\pi^-\,{}^{12}C \to \Lambda\,X$ "
$p\,{}^{12}C \to \Lambda\,X$ "

Comments Measures inclusive cross sections and polarizations, and studies multi-nucleon correlations in nuclei.

Papers PRL 63 (1989) 490.

KEK-135 (Sep 1984) Approved Feb 1985; Started Jan 1986; Completed Jul 1986.

MESON SPECTROSCOPY BY CHARGE-EXCHANGE REACTIONS

NAGOYA U – N Horikawa, T Iwata, T Kinashi, M Kurashina, I Maeda, T Matsuda, T Nakanishi, C Ohmori
KEK – S Inaba, T Inagaki, K Ohmi, T Sato, K Takamatsu, T Tsuru (✓ Spokesperson), Y Yasu
KYOTO U – Y Inagaki, T Nakamura
MIYAZAKI U – Y Ishizaki
KYOTO U OF EDUCATION – R Takashima
NAGOYA UNIV COLL MEDICAL TECH – K Mori
SUGIYAMA JOGAKUEN U – S Fukui

Accelerator KEK-PS *Detector* SUPERBENKEI

Reactions

$\pi^-\,p \to \eta\,\pi^+\,\pi^-\,n$ 8.95 GeV/*c*
$\pi^-\,p \to \pi^+\,\pi^-\,4\gamma\,n$ "

Particles studied $f_0(1590)$, $X(1700)$, $f_2(1720)$

Papers PL B202 (1988) 441, PL B257 (1991) 241, and PL B267 (1991) 293.

KEK-136 (Jan 1985) Approved Feb 1985; Completed 1986.

SEARCH FOR LONG-LIVED HADRONS WITH CHARGE TWO

KYOTO U – K Imai, H Kobayashi, A Konaka, A Masaike, K Miyake, T Nagamine, T Nakamura, N Sasao (✓ Spokesperson), Y Yamada
TOKYO, METROPOLITAN COLL TECH – I Yamauchi

Accelerator KEK-PS *Detector* Wire chamber, Counter

Reactions

p nucleus → hadron X 12 GeV (E_{lab})

Particles studied longlived

Comments Searches for *R*-hadrons, containing one gluino, in the mass range 1.2 to 1.5 GeV/c^2. Sensitive also to exotic hadrons with the charge of -5/2 and mass less than 2 GeV/c^2.

Papers PR D39 (1989) 1261.

KEK-137 Approved Oct 1985; Started Dec 1987; Completed May 1990.

STUDY OF THE RARE DECAY $K_L \to \mu e$

KEK – T Inagaki (✓ Spokesperson), M Kobayashi, T Sato, T Shinkawa, F Suekane, K Takamatsu, Y Yoshimura
TOKYO U – R Fukuhisa, K Ishikawa, T Kishida, T K Komatsubara, M Kuze, F Sai, J Toyoura, S S Yamamoto
KYOTO U – Y Hemmi
TOHOKU U – T Akagi

Accelerator KEK-PS *Detector* Double-arm spectrometer

Reactions

K_L → muon muon 2–8 GeV/*c*
$K_L \to \mu^+\,e^-$ "
$K_L \to \mu^-\,e^+$ "
$K_L \to e^+\,e^-$ "

Particles studied K_L

Comments K_L beam is produced at 0 to 2° from a primary proton beam. The decay products are identified by a gas Čerenkov counter, an electromagnetic shower counter, and a muon identifier.

Papers PR D40 (1989) 1712, PRL 67 (1991) 2614, and PRL 67 (1991) 2618.

KEK-150 (Feb 1986) Approved Feb 1986; Started Jun 1986; Completed Mar 1988.

STUDY OF Λ HYPERNUCLEI VIA THE (π^+, K^+) REACTION

KYOTO SANGYO U - F Takeuchi
KYUSHU U - K Kimura
KEK - J Chiba, M Nomachi, O Sasaki, K H Tanaka
LOS ALAMOS - J F Amann, J A McGill, H A Thiessen
OSAKA U - M Akei, H Ejiri, M Fukuda, A Higashi, T Irie, Y Iseki, A Kashitani, T Kishimoto, H Nagasawa, H Noumi, H Ohsumi, K Okuda, H Sano, Y Umeda
TOHOKU U - K Maeda
TOKYO U & TOKYO U, INS - T Fukuda, O Hashimoto (√ Spokesperson), S Homma, Y Matsuyama, T Nagae, C Nagoshi, K Omata, T Shibata (√ Spokesperson), F Soga, S Toyama, Y Yamanoi, N Yoshikawa
YAMAGATA U - S Kato

Accelerator KEK-PS *Detector* Spectrometer

Reactions

π^+ nucleus → K^+ X 1.0-1.2 GeV/c

Comments Uses the PIK spectrometer consisting of a beam analyzer, equipped with four high-rate drift chambers, and a wide solid angle, large momentum acceptance kaon spectrometer.

Papers NIM A283 (1989) 46, NC 102A (1989) 457, and NP A534 (1991) 478.

KEK-157 (1986) Approved Jun 1987; Started Dec 1987; Completed Feb 1988.

STUDY OF THE PION-INDUCED DOUBLE CHARGE EXCHANGE REACTION AND DOUBLE PION PRODUCTION USING A LARGE SOLID ANGLE SPECTROMETER

KEK - J Chiba, T Kobayashi (Spokesperson), K Nakai
TOKYO U - T Nagae, H Sano, S Sasaki, K Tokushuku
TSUKUBA U - I Arai, M Kurokawa, A Manabe, M Ninomiya, M Tanaka
TOKYO INST TECH - H Yokota

Accelerator KEK-PS *Detector* FANCY

Reactions

π^+ nucleus → π^- p p X 0.5-1.5 GeV/c
π^+ nucleus → π^+ π^+ X "

KEK-159 (1987) Approved Feb 1987; Started May 1987; Completed Oct 1987.

MEASUREMENT OF THE ANALYSING POWER (A_y) IN $\vec{p}$ d → pd SCATTERING AT 3.5 GeV

NAGOYA U - N Horikawa (√ Spokesperson), T Iwata, T Kinashi, I Maeda, T Matsuda, T Nakanishi, C Ohmori, M Okumi, T Toyama
NAGOYA UNIV COLL MEDICAL TECH - K Mori
TOKYO U, INS - T Hasegawa
HIROSHIMA U - H Hasai, K Iwatani, F Nishiyama
TOHOKU U - Y Kobayashi, T Nakagawa
KEK - S Hiramatsu, S Ishimoto, Y Mori, H Sato, T Tsuru
KYUSHU U - A Ueno
TEXAS A AND M - J A Holt

Accelerator KEK-PS *Detector* Single-arm spectrometer

Reactions Polarized beam

p deut → p deut 3.5 GeV (E_{lab})
p C → p p X "
p Cu → p p X "

Comments Measures the analyzing power for the elastic scattering of protons by deuterons, and for several quasi-elastic processes. The beam polarization is 31%.

Papers NIM A278 (1989) 705, PL B230 (1989) 27, and PL B243 (1990) 29.

KEK-160 (Feb 1987) Approved Mar 1989; Started Nov 1989; Completed Dec 1990.

POLARIZATION OF WEAK DECAYS OF HYPERNUCLEI

OSAKA U - H Ejiri (√ Spokesperson), A Higashi, Y Iseki, T Kishimoto, H Noumi, H Ohsumi, H Sano
TOKYO U, INS - T Fukuda, O Hashimoto, T Nagae, T Shibata
TOHOKU U - K Maeda
KYUSHU U - K Kimura

Accelerator KEK-PS *Detector* Wide-angle spectrometer

Reactions

π^+ ^{12}C → K^+ hypernuc 1.05 GeV/c

Comments The polarization of the hypernucleus is measured by the asymmetry of the weak decay.

Papers NIM A283 (1989) 46, PL B225 (1989) 35, and PL B232 (1989) 24.

KEK-162 (1987) Approved Oct 1987.

MEASUREMENT OF THE CP-VIOLATING DIRECT AMPLITUDE IN K_L^0 → $\pi^0 e^+ e^-$ DECAY

KYOTO U - H Kobayashi, A Konaka, K Miyake (Spokesperson), T Nakamura, N Sasao
KEK - M Noumachi, O Sasaki, T Taniguchi

Accelerator KEK-PS *Detector* TOKIWA

Reactions

K_L → π^0 e^+ e^- —

Particles studied K_L

Comments The apparatus consists of large drift chambers, a UV-sensitive Čerenkov counter for detection of electrons, and an electromagnetic CsI calorimeter with a good energy resolution. The drift chambers use argon and CF_4 gas. Sensitive to branching ratios smaller than 10^{-10}. Scheduled to begin running in the 1991/92 FY.

Papers NIM A270 (1988) 106, and NIM A283 (1989) 709.

KEK-166 (1987) Approved Feb 1987; Started May 1987; Completed Oct 1987.

SYSTEMATIC STUDY OF P-SHELL Σ HYPERNUCLEAR STATES USING THE STOPPED K^- METHOD

TOKYO U - R S Hayano, T Ishikawa, M Iwasaki, H Outa, E Takada (Spokesperson), H Tamura
TOKYO U, INS - T Yamazaki
KEK - K H Tanaka
HEIDELBERG, MAX PLANCK INST - W Bruchner, H Doebbeling, S Paul, B Povth, A Sakaguchi

Accelerator KEK-PS *Detector* Double-arm spectrometer

Reactions

K^- nucleus → π^+ X 650 MeV/c
K^- nucleus → π^- X "

Papers NP A479 (1988) 137c, NP A479 (1988) 161c, PR C40 (1989) 479, PR C40 (1989) 483, and NC 102A (1989) 572.

KEK-167B (1988) Approved Feb 1988; Started May 1988; Completed Feb 1989.

SEARCH FOR A Σ HYPERNUCLEAR GROUND STATE BY KAON ABSORPTION ON ^{4}He

TOKYO U - R S Hayano (Spokesperson), T Ishikawa, M Iwasaki, H Outa, H Sakurai, E Takada

TOKYO U, INS – H Tamura, T Yamazaki
HEIDELBERG, MAX PLANCK INST – A Sakaguchi

Accelerator KEK-PS *Detector* Double-arm spectrometer

Reactions

K^- nucleus $\rightarrow \pi^-$ X

Papers NC 102A (1989) 437, PL B231 (1989) 355, and PRL 63 (1989) 1590.

KEK-173 (1987) Approved Oct 1987; Started Oct 1988; Completed Mar 1989.

STUDY OF Δ PRODUCTION IN NUCLEI USING (p, n) REACTIONS

KEK – J Chiba (✓ Spokesperson), T Kobayashi
TOKYO U, INS – T Nagae
TOKYO U – H Sano
TSUKUBA U – I Arai, A Manabe, M Ninomiya, M Tanaka, K Tomizawa
OSAKA U, RES CTR NUCL PHYS – H Sakai

Accelerator KEK-PS *Detector* FANCY

Reactions

p nucleus $\rightarrow n$ X	1.5 GeV/c
p nucleus $\rightarrow \Delta$(unspec) X	"
p nucleus $\rightarrow \Delta(1232\, P_{33})^{++}$ X	"

Papers PRL 67 (1991) 1982.

KEK-174 (1987) Approved Jun 1987; Started May 1988; Completed Dec 1988.

$A_y(E, \theta)$ MEASUREMENTS FOR NN REACTIONS

TEXAS A AND M – G Glass, J Hiebert, J A Holt, R Kenefick, S Nath, L C Northcliffe (✓ Spokesperson)
TEXAS U & ARGONNE – P Riley, H Spinka
KYOTO U – K Imai, M Iwaki, O Kamigaito
TOKYO INST TECH – H Ohnuma, H Shimizu (✓ Spokesperson)
TOHOKU U – K Maeda
KEK – S Hiramatsu, H Sato
NAGOYA U – T Tomiya

Accelerator KEK-PS *Detector* Wire chamber, Counter

Reactions Polarized beam

$p\,p \rightarrow p\,p$	1–3.5 GeV (E_{lab})
$p\,p \rightarrow \pi^+$ deut	"
$p\,n \rightarrow p\,n$	"

Comments The momentum dependence of the analyzing power is measured in various reactions using an internal target.

Papers PR C42 (1990) 483.

KEK-175 (1987) Approved Jun 1987; Started Nov 1987; Completed Nov 1987.

SURVEY OF Λ DECAY LIFETIME IN HEAVY NUCLEI

TOKYO U – R S Hayano, T Ishikawa (Spokesperson), M Iwasaki, H Outa, E Takada
TOKYO U, INS – H Tamura, T Yamazaki
HEIDELBERG, MAX PLANCK INST – A Sakaguchi

Accelerator KEK-PS *Detector* Wire chamber

Reactions

K^- nucleus 650 MeV/c

KEK-176 (1987) Approved Jun 1987; Started May 1988; Completed Mar 1989.

SEARCH FOR ΛΛ HYPERNUCLEI AND/OR THE H PARTICLE

KYOTO U – T Iijima, K Imai (✓ Spokesperson), A Masaike, T Nakano, H Togawa
NAGOYA U – S Aoki, K Hoshino, K Kodama, M Miyanishi, M Nakamura, S Nakanishi, K Niu, K Niwa, H Tajima
KOBE U – T Hara
OSAKA CITY U – M Teranaka
GIFU U – K Nakazawa, S Tasaka
TOHO U – M Kazuno, H Shibuya
AICHI U OF EDUCATION – N Ushida
YOKOHAMA NATIONAL U – Y Maeda
UTSUNOMIYA U – Y Sato
OSAKA PREFECTURE U, SCI EDUC INST – J Yokota
KEK – K H Tanaka
KYOTO SANGYO U – F Takeuchi

Accelerator KEK-PS *Detector* Spectrometer, Counter

Reactions

K^- nucleus 1.65 GeV/c

Comments Uses an emulsion target, an emulsion-counter hybrid method, and a K^+-spectrometer.

Papers PRL 65 (1990) 1729, PTP 85 (1991) 951, and PTP 85 (1991) 1287.

KEK-179 (1987) Approved Feb 1988; Started Nov 1988; Completed May 1990.

STUDY OF $\eta\pi^\pm$ RESONANCES — SEARCH FOR EXOTIC PARTICLES WITH $I = 1$, $J^{PC} = 1^{-+}$

KEK – S Inaba, S Ishimoto, K Ohmi, K Takamatsu, M Takasaki, T Tsuru (✓ Spokesperson), Y Yasu
TOKYO INST TECH – H Shimizu
NAGOYA U – N Hayashi, N Horikawa, T Iwata, T Kinashi, T Matsuda, S Nakagawa, S Nakamura, T Nakanishi, M Okumi, C Omori, T Samoto, K Tsuchiya, A Wakai
NAGOYA UNIV COLL MEDICAL TECH – K Mori
TOHOKU U – K Kobayashi, T Nakagawa
MIYAZAKI U – T Hasegawa, T Nakamura
SUGIYAMA JOGAKUEN U – S Fukui
SAGA U, JAPAN – S Kobayashi, T Tsubaki
CHIBA U – H Kawai
TOKYO U, INS – Y Ishizaki

Accelerator KEK-PS *Detector* BENKEI

Reactions

$\pi^+\, p \rightarrow \eta\, \pi^+\, p$	6 GeV/c
$\pi^-\, p \rightarrow \eta\, \pi^-\, p$	"

KEK-187 (1988) Approved Jul 1988; Started Jun 1989.

STUDY OF BACKWARD Λ PRODUCTION IN HIGH ENERGY HADRON-NUCLEUS REACTIONS

TSUKUBA U – I Arai (✓ Spokesperson), N Kato, H Kitayama, Y Nagasaka, M Tanaka, K Tomisawa, K Yagi
KEK – J Chiba, T Kobayashi, A Manabe
TOKYO U, INS – T Nagae, M Sekimoto
WAKO, RIKEN – I Nomura
MOSCOW, INR – V S Pantuev

Accelerator KEK-PS *Detector* FANCY

Reactions

$\pi^-\, {}^6\mathrm{Li} \rightarrow \Lambda$ X	4 GeV/c
$\pi^-\, {}^6\mathrm{Li} \rightarrow \Lambda\, K^0$ X	"

Comments Measures inclusive and semi-inclusive cross sections and studies multi-nucleon corrections in nuclei.

Papers COLL PHYS C6 (1990) 591.

KEK-195 (1988) Approved Jul 1988; Started Apr 1989; Completed Jul 1989.

PRECISE MEASUREMENT OF μ^+ LONGITUDINAL POLARIZATION IN THE DECAY $K^+ \rightarrow \mu^+\nu$

KEK – J Imazato (✓ Spokesperson), M Takasaki, K H Tanaka
TOKYO U – R S Hayano, M Iwasaki, H Tamura
TOKYO U, INS – M Aoki, H Outa, T Yamazaki
WAKO, RIKEN – Y Kawashima
TOKYO, NAT INST RADIOLOGICAL SCI – E Takada

Accelerator KEK-PS *Detector* Spectrometer

Particles studied K^+, μ^+

Comments Uses a beam line spectrometer in the $\pi\mu$ channel.

KEK-215 Approved Nov 1989; Started Dec 1990; Completed Feb 1991.

STUDY OF META-STABLE STATES OF THE $\bar{p}$ ATOM IN LIQUID HELIUM

TOKYO U - R S Hayano (✓ Spokesperson), T Ishikawa, M Iwasaki, S N Nakamura, K Shigaki, Y Shimizu, H Tamura
TOKYO, NAT INST RADIOLOGICAL SCI - E Takada
TOKYO U, INS - M Aoki, P Kitching, H Outa, E Widmann, T Yamazaki

Accelerator KEK-PS *Detector* Counter

Reactions
$\bar{p}$ He → pion X 519 MeV/c (P_{lab})

Papers PRL 67 (1991) 1246

KEK-217 Approved Nov 1989; Started Apr 1990; Completed Nov 1990.

STUDY OF ABSORPTION OF 1 GeV/c PIONS

TOKYO U, INS - T Fukuda, M Miyachi, T Nagae (✓ Spokesperson), M Sekimoto
WAKO, RIKEN - I Nomura
TSUKUBA U - I Arai, H Kitayama, Y Nagasaka, K Tomizawa, S Ueno, K Waki
TOHOKU U - S Itoh, K Maeda, H Matsuyama, T Suda, T Terasawa
ALBERTA U - P Kitching
MOSCOW, INR - M A Prokhvatilov, V I Razin
MIT - D C Rowntree
KEK - T Kobayashi

Accelerator KEK-PS *Detector* Counter

Reactions
π^+ He → p p X 1.0 GeV/c (P_{lab})
π^+ He → p n X "
π^+ ^{12}C → p p X "
π^+ ^{12}C → p n X "

Comments Uses a neutron hodoscope.

KEK-218 Approved Mar 1990.

STUDY OF THE FORMATION OF $^4_\Lambda$H BY USING $\pi\pi$ COINCIDENCE

TOKYO U - H Tamura (Spokesperson), et al.

Accelerator KEK-PS *Detector* Spectrometer

Comments Measures the momentum of π^- emitted during the hyperon production stage in coincidence with the π^- emitted during the $^4_\Lambda$H decay stage. Uses a superconducting toroidal spectrometer. Approved for 50 shifts.

KEK-224 Approved Mar 1990; Started Mar 1991; Completed Jan 1992.

SEARCH FOR THE H-DIBARYON WITH A SCINTILLATING FIBER TRACK DETECTOR

KYOTO U - H En'yo, H Funahashi, Y Goto, T Iinuma, K Imai (✓ Spokesperson), Y Itow, S Makino, A Masaike, N Saito, S Yamashita, S Yokkaichi, K Yoshida, M Yoshida
KYOTO U OF EDUCATION - R Takashima
KYOTO SANGYO U - F Takeutchi
KEK - M Ieiri
KOBE U - S Aoki
TOKYO U, INS - T Fukuda, A Higashi, T Nagoshi, M Sekimoto, P Tlusty
OSAKA CITY U - T Yoshida
TOKYO, INST PHYS CHEM RES - I Nomura
SASKATCHEWAN U - Y M Shin, S Wiebe
KOREA U - J K Ahn, M S Chung, I S Park, K S Sim
YONSEI U - K S Chung, J M Lee

Accelerator KEK-PS *Detector* KURAMA

Reactions
K^- nucleus → K^+ X 1.65 GeV/c (P_{lab})

Comments Uses KURAMA, a wide-angle spectrometer with a scintillating fiber track detector. Approved for 120 shifts.

KEK-231 Approved Jul 1990.

STUDY OF VIOLATION OF TIME REVERSAL INVARIANCE IN NEUTRON REACTIONS

KEK - T Adachi, M Doi, Y Masuda (✓ Spokesperson), H Sato
TOHOKU U - K Sakai, S Tanaka, A Yamaguchi

Accelerator KEK-PS *Detector* Counter

Reactions Polarized beam and target
n ^{139}La → n X
n ^{81}Br → n X

Comments Approved conditionally.

Papers NIM A264 (1987) 169, and NP A504 (1989) 269.

KEK-235 Approved Nov 1990.

DIFFERENTIAL CROSS SECTION FOR $p(n,\gamma)d$

HIROSHIMA U - Y Mizuno
KENTUCKY U - T P Gorringe, M A Kovash (✓ Spokesperson), M A Pickar
KYOTO U - S Sawada
MIYAZAKI U - T Hasegawa
NAGOYA U - N Horikawa
TOKYO U, INS - T Shibata

Accelerator KEK-PS *Detector* Wire chamber

Reactions
n p → γ deut 1.0 - 3.0 GeV (E_{lab})

Comments The angular distribution of the cross section is measured over a large range of energies and angles for the purpose of testing QCD-inspired models of this exclusive photonuclear reaction. The deuteron is detected with a MWDC and a dipole magnet, gammas with a converter, MWDC, and Pb-glass. Data taking scheduled for April 93.

KEK-246 Approved Jul 1991.

SEARCH FOR T-VIOLATING MUON POLARIZATION IN $K^+ \to \pi^0\mu^+\nu$ DECAY USING STOPPED KAONS

KEK - J Imazato (Spokesperson), Y Kuno, H H Tanaka
TOKYO U, INS - M Aoki, H Outa, S Sugimoto, T Yamazaki
TOKYO U - R S Hayano, T Ishikawa, M Iwasaki, A Kawachi, S N Nakamura, K Shigaki, Y Shimizu, H Tamura, T Yokoi
MOSCOW, INR - A P Ivashikin, M M Khabibullin, Y G Kudenko, V M Lobashev, O V Mineeev, V Popov
TSUKUBA U - Y Asano
TOKYO INST TECH - S Shimizu
SASKATCHEWAN U - Y M Shin
YONSEI U - J M Lee
KOREA U - I S Park
KYUNGSUNG U - K S Choi, Y M Park

Accelerator KEK-PS *Detector* Spectrometer

Reactions
$K^+ \to \pi^0$ μ^+ ν 0 GeV/c (P_{lab})

Comments Uses a superconducting toroidal spectrometer. Approved for 450 shifts.

KEK-248 Approved Jul 1991.

SEARCH FOR H PARTICLES IN THE $pp \to K^+K^+$ REACTION

CHIBA U - H Kawai (✓ Spokesperson)
HAMAMATSU U - K Matsuda
KEK - S Inaba, S Ishimoto, K Takamatsu, T Tsuru, Y Yasu
MIYAZAKI U - T Hasegawa, Z Kai, H Nakayama
NAGOYA U - H Horikawa, J Iizuka, T Iwata, G Kato, T Kinashi, T Matsuda, K Mori, T Nakanishi, A Ogawa, T Sasaki, A Wakai
SUGIYAMA JOGAKUEN U - S Fukui
TOHOKU U - T Nakagawa, A Narita
TOKYO, METROPOLITAN COLL TECH - I Yamauchi
TOKYO INST TECH - Y Tajima

YAMAGATA U - K Fukunaga, S Kato, H Shimizu, H Y Yoshida

Accelerator KEK-PS *Detector* SUPERBENKEI

Reactions

$p\,p \rightarrow K^+\,K^+\,X$ 12 GeV (E_{lab})

Comments Approved for 160 shifts.

KEK-251 Approved Jul 1991; Started Feb 1992.

HYPERON–NUCLEON SCATTERING EXPERIMENT I: $\Sigma^+ p$ SCATTERING

KEK - M Ieiri (✓ Spokesperson), Y M Shin
KYOTO U - M S Chung, H En'yo, H Funahashi, Y Goto, T Iinuma, K Imai, Y Itow, A Masakike, Y Matsuda, S Mihara, N Saito, S Yamashita, S Yokkaichi, M Yoshida
TOKYO U, INS - T Fukuda, A Higashi, T Nagae, P Tlusty
KYOTO U OF EDUCATION - R Takashima
KYOTO SANGYO U - K Okada, F Takeutchi
YONSEI U - W M Chung, J M Lee
PUSAN NATIONAL U - G D Kim
KYUNGSUNG U - I S Park, Y M Park

Accelerator KEK-PS *Detector* Single-arm spectrometer

Reactions

$\Sigma^+\,p \rightarrow \Sigma^+\,p$ 0.2 - 0.6 GeV/c (P_{lab})

Comments Uses a three-dimensional plastic scintillating fiber detector. Approved for 60 shifts.

KEK-257 Approved Dec 1991; Started Apr 1992.

SUBTHRESHOLD ANTIPROTON PRODUCTION IN dA REACTIONS

KEK - J Chiba (✓ Spokesperson), K H Tanaka, Y Yoshimura
TOKYO U, INS - M Koike, T Nagae, M Sekimoto
KYOTO U - H Ito, T Murakami, Y Nakai, S Sawada
TOKYO, INST PHYS CHEM RES - T Kobayashi, T Suzuki
NIIGATA U - K Miyano

Accelerator KEK-PS *Detector* ?

Reactions

p nucleus $\rightarrow \bar{p}\,X$	3.5 - 5.0 GeV/c
p nucleus $\rightarrow K^-\,X$	"
p nucleus $\rightarrow \pi^-\,X$	"
deut nucleus $\rightarrow \bar{p}\,X$	3.5 - 5.0 GeV/N (P_{lab})
deut nucleus $\rightarrow K^-\,X$	"
deut nucleus $\rightarrow \pi^-\,X$	"

Comments This is a beam line experiment. Approved for 40 shifts.

LAMPF Experiments

LAMPF-225 (Feb 1975) Started Sep 1983; Completed Dec 1986.

A STUDY OF NEUTRINO-ELECTRON SCATTERING

UC, IRVINE – R C Allen, H H Chen, P J Doe, R Hausammann, W P Lee, X Q Lu, H J Mahler, M E Potter, K C Wang
LOS ALAMOS – T J Bowles, R L Burman (✓ Spokesperson), R D Carlini, D R F Cochran, J S Frank, E Piasetzky, V D Sandberg
MARYLAND U – D A Krakauer, R L Talaga

Accelerator LAMPF *Detector* Counter

Reactions

$\nu_e\ e^- \rightarrow \nu_e\ e^-$	20–53 MeV (T_{lab})
$\nu_e\ {}^{12}C \rightarrow e^-\ {}^{12}N$	"
$\nu_e\ {}^{12}C \rightarrow e^-\ X$	"

Comments A 15-ton detector system giving 234±35 elastic events in three years. Measures cross sections. Subsidiary results would be a test of multiplicative lepton-number conservation in μ^+ decay, a search for $\overline{\nu}_\mu \rightarrow \overline{\nu}_e$ oscillations, a measurement of the inverse beta cross section in ^{12}C, and a search for anomalous neutrino events. Data analysis in progress (May 92).

Papers PRL 55 (1985) 2401, PRL 64 (1990) 1330, PRL 64 (1990) 1871, PL B252 (1990) 177, PR D43 (1991) 1, PR D44 (1991) 6, PL B263 (1991) 534, PR D45 (1992) 975, and PR C45 (1992) 2450.

LAMPF-455 (Nov 1978) Started Jul 1981; Completed Sep 1986.

HIGH-PRECISION STUDY OF THE μ^+ DECAY SPECTRUM

LOS ALAMOS – H L Anderson (✓ Spokesperson), J D Bowman, C M Hoffman, W W Kinnison (✓ Spokesperson), H S Matis, R J McKee, D E Nagle
CHICAGO U – M Yang
NATIONAL RESEARCH COUNCIL, OTTAWA – C K Hargrove, H Mes

Accelerator LAMPF *Detector* Spectrometer

Reactions Polarized beam

$\mu^+ \rightarrow e^+\ \nu_e\ \overline{\nu}_\mu$	0 MeV/c

Particles studied μ^+

Comments By measuring the asymmetry of the e^+ over the energy range, the decay parameters ρ, η, ξ, and δ are determined better than before. Tests $V-A$ theory accuracy.

Papers NIM A270 (1988) 126.

LAMPF-583 (Jun 1980) Started Aug 1983; Completed 1987.

MEASUREMENT OF C_{LL} IN THE COULOMB INTERFERENCE REGION

UCLA – B Aas, G J Igo, J B McClelland, G Pauletta (Spokesperson), C A Whitten
ARGONNE – K Imai, H Spinka
MINNESOTA U – M M Gazzaly
LOS ALAMOS – J J Jarmer

Accelerator LAMPF *Detector* LAHRS

Reactions Polarized beam and target

$p\ p \rightarrow p\ p$	650, 800 MeV (T_{lab})

Comments Measures C_{LL} in the coulomb interference region, 3–30° c.m.

Papers PRL 58 (1987) 1084.

LAMPF-589 (Jun 1980) Completed 1986.

FREE-FORWARD np ELASTIC-SCATTERING ANALYZING POWER MEASUREMENTS AT 800 MeV

TEXAS A AND M – T S Bhatia, G C Glass (✓ Spokesperson), J C Hiebert, R A Kenefick, S Nath, L C Northcliffe (✓ Spokesperson)
WASHINGTON STATE U – G E Tripard
IOWA U – C R Newsom
ARGONNE – K F Johnson, H Spinka, R Stanek
NEW MEXICO STATE U – J A Faucett, M W Rawool
MONTANA U – R H Jeppesen

Accelerator LAMPF *Detector* Counter

Reactions Polarized beam

$n\ p \rightarrow n\ p$	800 MeV (T_{lab})

Comments Measures the forward-angle neutron analyzing power. Ran for 343 hours.

Papers PR C41 (1990) 2732.

LAMPF-645 (Nov 1980) Started Jun 1987; Completed Sep 1989.

A SEARCH FOR NEUTRINO OSCILLATIONS AT LAMPF

OHIO STATE U – L S Durkin, R Harper, T Y Ling (✓ Spokesperson), J Mitchell, T A Romanowski (✓ Spokesperson), E Smith, M Timko
ARGONNE – S Freedman, J Napolitano
LOUISIANA STATE U – W C Choi, A Fazeley, R Imlay, W J Metcalf
CAL TECH – B Fujikawa, R B McKeown
LOS ALAMOS – R D Carlini, J Donahue, G T Garvey, V D Sandberg
LBL – K Lesko

Accelerator LAMPF *Detector* Combination

Reactions

$\nu_e \rightarrow \nu_e$	0–53 MeV (T_{lab})
$\overline{\nu}_\mu \rightarrow \overline{\nu}_e$	"
$\nu_\mu \rightarrow \nu_\mu$	"
$\overline{\nu}_e\ p \rightarrow e^+\ n$	"

Comments A search for neutrino oscillations in the first three reactions. The fourth reaction is the signature for the second reaction. Ran for 9000 hours. Data analysis in progress (March 92).

Papers PRL 61 (1988) 1811.

LAMPF-665 (Jun 1981) Completed 1986.

MEASUREMENT OF THE INITIAL-STATE SPIN CORRELATION PARAMETERS C_{LL} AND C_{SL} IN np ELASTIC SCATTERING AT 500, 650, AND 800 MeV

NEW MEXICO STATE U – G R Burleson (✓ Spokesperson), J A Faucett, C Fontenla, R Garnett, M W Rawool
ARGONNE – W R Ditzler, D Hill, J Hoftiezer, K F Johnson, D Lopiano, T Shima, H Shimizu, H Spinka, R Stanek, D Underwood, R Wagner (✓ Spokesperson), A Yokosawa
LOS ALAMOS – R Damjanovich, J J Jarmer
TEXAS A AND M – T S Bhatia, G Glass, J C Hiebert, R A Kenefick, S Nath, L C Northcliffe
MONTANA U – R Jeppesen
WASHINGTON STATE U – G Trippard

Accelerator LAMPF *Detector* Wide-angle spectrometer

Reactions Polarized beam and target

$n\ p \rightarrow n\ p$	500, 650, 800 MeV (T_{lab})
$n\ p \rightarrow$ deut pion	"

Comments Ran for 2019 hours. Data analysis in progress (March 92).

Papers PRL 59 (1987) 1645, and NIM A270 (1988) 361.

LAMPF-685 (Jun 1981) Completed 1986.

SPIN CORRELATIONS IN THE REACTION $d(p,p)d$ AT 500 MeV

UCLA – B Aas, A Azizi, E Bleszynski, M Bleszynski (✓ Spokesperson), J Geaga, M Hajisaeid, G J Igo

(✓ Spokesperson), F Irom, G Pauletta, A Rahbar, J Wagner, A T M Wang, G Weston
MINNESOTA U M M Gazzaly

Accelerator LAMPF *Detector* Counter

Reactions Polarized beam and target
deut $p \rightarrow p$ deut 500 MeV (T_{lab})

Comments Continued as LAMPF-818. Data analysis in progress (March 92).

LAMPF-709 (Nov 1981, Jun 1987) Started Aug 1983; Completed.

MEASUREMENTS OF A_{NN}, A_{SS}, AND A_{SL} IN THE COULOMB INTERFERENCE REGION AT 650 AND 800 MeV

MINNESOTA U M Gazzaly
UCLA B Aas, G J Igo, G Pauletta (Spokesperson), C A Whitten
ARGONNE K Imai, H Spinka
LOS ALAMOS J Amann, O B van Dyck, J J Jarmer, J B McClelland, N Tanaka

Accelerator LAMPF *Detector* LAHRS

Reactions Polarized beam and target
$p\,p \rightarrow p\,p$ 650, 800 MeV (T_{lab})

Comments Measures in the coulomb interference region, 3-30° c.m.

Papers PRL 58 (1987) 1084, and PL B211 (1988) 19.

LAMPF-764 (Nov 1982) Approved Jan 1983; Started Aug 1984; Completed Jul 1986.

SEARCH FOR NEUTRINO OSCILLATIONS AND MEASUREMENTS OF NUCLEAR CROSS SECTIONS USING A LIQUID SCINTILLATOR DETECTOR IN A ν_μ BEAM AT LAMPF

LOS ALAMOS T J Bowles, R L Burman, D Clark, S Clearwater, D R F Cochran, T W Dombeck (✓ Spokesperson), H Kruse (✓ Spokesperson), D Lee, V D Sandberg
NEW MEXICO U B Bassalleck, B D Dieterle, J Kang, K Leavitt
UCLA B Aas, G Igo
UC, RIVERSIDE G Van Dalen, S Y Fung, B Gorn
TEMPLE U L B Auerbach, S Datta, V L Highland, D Huang
VALPARAISO U R Fisk, D Koetke, R Manweiller

Accelerator LAMPF *Detector* Counter

Reactions
$\nu_\mu \rightarrow \nu_e$ 0-300 MeV/c
$\nu_\mu\ {}^{12}C \rightarrow \mu^-\ X$ "
$\nu_\mu\ Al \rightarrow \mu^-\ X$ "
$\nu_\mu\ {}^{12}C \rightarrow \mu^-\ {}^{12}N$ "

Particles studied ν_μ

Comments Neutrino oscillations are first looked for in the appearance mode ($\nu_\mu \rightarrow \nu_e$) and later in the disappearance mode. Expected sensitivity for 80 running days is $\delta m^2 < 0.1$ eV^2 and $\sin^2(2\theta) < 0.001$. Neutrinos are produced in decays of π^+'s with momenta < 400 MeV/c.

Papers PL B194 (1987) 591.

LAMPF-767 (Oct 1982) Approved Jan 1983; Completed 1986.

$\pi^\pm d$ ELASTIC SCATTERING AT THREE ENERGIES BETWEEN 30 AND 80 MeV

VIRGINIA TECH M Blecher, K Gotow (✓ Spokesperson)
OAK RIDGE F E Bertrand, E E Gross, F E Obenshain, T P Sjoreen
SOUTH CAROLINA U G S Blanpied, B M Preedom, B G Ritchie, C S Whisnant (✓ Spokesperson)
LOS ALAMOS R L Burman, M V Hynes, E Piasetzky
MARYLAND U N S Chant, P G Roos

Accelerator LAMPF *Detector* Spectrometer

Reactions
π^+ deut $\rightarrow \pi^+$ deut 30-80 MeV (T_{lab})
π^- deut $\rightarrow \pi^-$ deut "

Comments Angular dependence at < 40° and > 120° covers the coulomb interference region. The aim is a critical comparison of experimental results with 3-body calculations of the πd system. Ran for 217 hours.

Papers No journal papers expected.

LAMPF-770 (Nov 1982) Approved Jan 1983; Completed Dec 1985.

THE MEASUREMENT OF np ELASTIC-SCATTERING SPIN-CORRELATION PARAMETERS WITH L- AND S-TYPE POLARIZED BEAM AND TARGET BETWEEN 500 AND 800 MeV

ARGONNE V Carlson, W R Ditzler, D Hill, K F Johnson, D Lopiano, Y Ohashi, T Shima, H Shimizu, H Spinka (✓ Spokesperson), R Stanek, D Underwood, R Wagner, A Yokosawa
NEW MEXICO STATE U M Beddo, G R Burleson (✓ Spokesperson), J A Faucett, C Fontenla, R Garnett, G Kyle, C Luchini, M Rawool
LOS ALAMOS J J Jarmer
TEXAS A AND M T S Bhatia, G C Glass, J C Hiebert, S Nath, L C Northcliffe
MONTANA U R H Jeppesen
WASHINGTON STATE U G E Trippard

Accelerator LAMPF *Detector* Wide-angle spectrometer

Reactions Polarized beam and target
$n\,p \rightarrow n\,p$ 500-800 MeV (T_{lab})
$n\,p \rightarrow$ deut pion 500-650 MeV (T_{lab})

Comments Measures the initial-spin correlation parameters C_{SS}, C_{LS}, and C_{LL} from 35 to 172° c.m. Complementary to LAMPF-665. Ran for 3691 hours. Data analysis in progress (March 92).

Papers NIM A270 (1988) 361, and PR D40 (1989) 1708.

LAMPF-790 (Nov 1982) Approved Jan 1983.

$I = 1$ NN INELASTIC CROSS SECTIONS AND FIRST MEASUREMENTS OF T_{20} FOR THE $pp \rightarrow d\pi^+$ REACTION AT 800 AND 650 MeV

UCLA B Aas, G J Igo, K Jones, G Pauletta (Spokesperson), F Sperisen, C A Whitten
MINNESOTA U M M Gazzaly, N M Hintz
LOS ALAMOS J F Amann, B E Bonner, J J Jarmer, J B McClelland, N Tanaka
TEXAS A AND M G C Glass
NEW MEXICO STATE U S J Greene
TEXAS U B Hostad
ARGONNE H Spinka

Accelerator LAMPF *Detector* LAHRS

Reactions Polarized beam and target
$p\,p \rightarrow$ deut π^+ 650, 800 MeV (T_{lab})

Comments Measures A_{LL}, A_{SL}, A_{SS}, and A_{NN} at forward and backward angles, and A_{SS} at 13° lab. The tensor polarization T_{20} of the deuteron will be deduced. Uses same polarized target as LAMPF-583 and -709. Approved for 80 hours.

LAMPF-795 (Nov 1983) Approved Jan 1983.

A PRECISION TEST OF CHARGE INDEPENDENCE

NORTHWESTERN U M Artuso, D Barlow, L Casey, C Magno, A Saha, K K Seth (Spokesperson)

Accelerator LAMPF *Detector* LAHRS

Reactions Polarized beam
p deut $\rightarrow$ trit π^+ 800 MeV (T_{lab})
p deut $\rightarrow {}^3He\ \pi^0$ "

Comments Measures the difference in analyzing powers $A_{Y0}(\theta)$ for the two reactions to a precision of ≤ 0.002 or 0.4%. Probes a

possible charge-dependent np spin-orbit force. Approved for 200 hours.

LAMPF-806 (Nov 1982) Approved Jan 1983; Completed 1986.

MEASUREMENT OF SPIN-ROTATION PARAMETERS A AND R IN $\pi^+p \to \pi^+p$ AND $\pi^-p \to \pi^-p$

UCLA - D B Barlow, R S Kessler, G Kim, B M K Nefkens (✓ Spokesperson), C Pillai, J W Price, J A Wightman
GEORGE WASHINGTON U - S D Adrian, W J Briscoe (✓ Spokesperson), L H Kramer, A Mokhtari, A M Petrov, C J Seftor, M F Taragin
ABILENE CHRISTIAN U - S Hall, D W Lane, S R Loe, L K Morton, M E Sadler (✓ Spokesperson)
LOS ALAMOS - J F Davis
BOSKOVIC INST, ZAGREB - I Supek

Accelerator LAMPF *Detector* Wide-angle spectrometer

Reactions Polarized target

$\pi^+ p \to \pi^+ p$	471-625 MeV/c
$\pi^- p \to \pi^- p$	"

Comments Completes a set of five πN experiments at identical energies designed to provide a complete set of scattering amplitudes. Ran for 1604 hours.

Papers PRL 62 (1989) 1009.

LAMPF-808 (Jan 1983) Approved Jan 1983; Started Nov 1983; Completed Mar 1986.

0° EXCITATION FUNCTION FOR $\pi^-p \to \pi^0n$

LOS ALAMOS - H W Baer, J D Bowman, M D Cooper (✓ Spokesperson), D H Fitzgerald (✓ Spokesperson), F Irom, N S P King, M J Leitnch, E Piasetzky
GEORGE WASHINGTON U - W J Briscoe
ABILENE CHRISTIAN U - M E Sadler, K J Smith
ARIZONA STATE U - J N Knudson

Accelerator LAMPF *Detector* Photon spectrometer

Reactions

$\pi^- p \to \pi^0 n$	100-150 MeV/c

Comments Established the depth of the πN destructive interference minimum between the S and P waves. Ran for 71 hours.

Papers PR C34 (1986) 619. No other papers expected.

LAMPF-818 (Nov 1983) Approved Jan 1984; Started Dec 1986; Completed Sep 1987.

pd ELASTIC SCATTERING AT 800 MeV: TWO- AND THREE-SPIN OBSERVABLES

UCLA - D Adams, E Gulmez, G J Igo (✓ Spokesperson), A Ling, M Moshe
MINNESOTA U - M M Gazzaly
LOS ALAMOS - M McNaughton
TEXAS U - K H McNaughton, P Riley

Accelerator LAMPF *Detector* JANUS

Reactions Polarized beam and target

p deut $\to p$ deut	800 MeV (T_{lab})

Comments Extends results of LAMPF-685 to larger momentum transfers.

Papers PR C45 (1992) 22.

LAMPF-828 (Nov 1983) Approved Jan 1985; Completed.

TOTAL AND DIFFERENTIAL CROSS SECTIONS FOR $\pi^+d \to pp$ BELOW 20 MeV

VIRGINIA TECH - M Blecher, B I Fick, K Gotow (✓ Spokesperson), D Wright
VIRGINIA U - G Das, R C Minehart (✓ Spokesperson)
MARYLAND U - N S Chant, B G Ritchie (✓ Spokesperson), P G Roos
SOUTH CAROLINA U - G S Adams, G S Blanpied, B M Preedom, C S Whisnant

Accelerator LAMPF *Detector* Counter

Reactions

π^+ deut $\to p\,p$	5, 10, 15 MeV (T_{lab})

Comments The aim is to determine the S-wave π absorption amplitude. The expected errors for the total cross section are about 4%. Ran for 258 hours. Extended through LAMPF-1085.

LAMPF-849 (Nov 1983) Approved Jan 1984; Completed 1988.

A MEASUREMENT OF THE DIFFERENTIAL CROSS SECTION FOR $\pi^-p \to \pi^0n$ AT 0 AND 180° IN THE MOMENTUM REGION 471-687 MeV/c

LOS ALAMOS - H W Baer, J D Bowman, M D Cooper, N S P King, J C Peng, E Piasetzky, N Stein
GEORGE WASHINGTON U - W J Briscoe (Spokesperson), M F Taragin
ABILENE CHRISTIAN U - M E Sadler (Spokesperson)
CATHOLIC U - D I Sober
TEL AVIV U - M A Moinester

Accelerator LAMPF *Detector* Spectrometer

Reactions

$\pi^- p \to \pi^0 n$	471-687 MeV/c
$\pi^- p \to \pi^- p$	"
$\pi^+ p \to \pi^+ p$	"

Comments The charge-exchange reaction is measured from 0 to 40° and 150 to 180°, the elastic scattering reactions at 180°. Ran for 594 hours.

LAMPF-853 (Nov 1983) Approved Jan 1984; Completed 1986.

MEASUREMENT OF WOLFENSTEIN PARAMETERS AT 650 AND $d\sigma/d\Omega$ AT 500, 650, AND 800 MeV FOR $pd \to pd$ ELASTIC SCATTERING

UCLA - B Aas, D Adams, A Azizi, E Bleszynski, M Bleszynski, G J Igo (✓ Spokesperson), D Lopiano, F Sperisen, A T M Wang, C A Whitten

Accelerator LAMPF *Detector* LAHRS

Reactions Polarized beam

p deut $\to p$ deut	500, 650, 800 MeV (T_{lab})

Comments The angular range is 3-36° in the lab. Measures the differential cross section and D_{SS}, D_{SL}, D_{LL}, and A_Y. Ran for 404 hours. Data analysis in progress (March 92).

LAMPF-869 (Nov 1983) Approved Jan 1984; Completed 1988.

HIGHER PRECISION MEASUREMENT OF THE LAMB SHIFT IN MUONIUM

YALE U - A Badertscher (✓ Spokesperson), S Dhawan, V W Hughes (✓ Spokesperson), D C Lu, M Ritter, K Woodle
HEIDELBERG U, PHYS INST - M W Gladisch (✓ Spokesperson), H Orth, G zu Putlitz
WILLIAM AND MARY COLL - M Eckhause, J Kane
MISSISSIPPI U - J Reidy
LOS ALAMOS - F G Mariam

Accelerator LAMPF *Detector* ?

Reactions

$\mu^+ e^- \to$ muonium	5 MeV/c

Comments An extension of LAMPF-724. Measures the Lamb shift to 0.1% and the hfs interval in the $2^2P_{1/2}$ state to 1%. Uses a microchannel plate and UV sensitive PM's. Ran for 2046 hours.

Papers PRL 52 (1984) 914.

LAMPF-876 (May 1984) Approved Aug 1984.

SPIN TRANSFER MEASUREMENTS FOR np ELASTIC SCATTERING

LOS ALAMOS - K Koch, M W McNaughton (✓ Spokesperson), I Supek, N Tanaka

TEXAS U - D A Ambrose, J D Johnson, K H McNaughton, P J Riley, A Smith
TEXAS A AND M - G Glass, J C Hiebert, L C Northcliffe, A J Simon
RICE U - D L Adams
RUTGERS U - D B Clayton, R D Ransome
ARGONNE - H M Spinka
MONTANA U - R H Jeppesen
WASHINGTON STATE U - G E Tripard

Accelerator LAMPF *Detector* Spectrometer, JANUS

Reactions Polarized beam

$n\,p \rightarrow n\,p$ 647, 800 MeV (T_{lab})

Comments Measures the np spin-transfer parameters K_{NN}, K_{SS}, K_{LL}, and K_{LS} from 50 to 180° c.m. Requires an intense polarized source. Ran 1254 hours as of February 92. Scheduled for completion July 92.

Papers PR C44 (1991) 2267.

LAMPF-898 (Jul 1984) Approved Aug 1984; Started Apr 1985; Completed 1986.

PION ELASTIC SCATTERING FROM ^{4}He — A TEST OF CHARGE SYMMETRY

LOS ALAMOS - C L Morris (Spokesperson)
MINNESOTA U - C L Blilie, D Dehnhard, S K Nanda, S J Seestrom-Morris
TEXAS U - M Bryan, C F Moore

Accelerator LAMPF *Detector* EPICS

Reactions

π^+ He $\rightarrow \pi^+$ He 140, 260 MeV (T_{lab})
π^- He $\rightarrow \pi^-$ He "

Comments Tests charge symmetry by estimating the mass splitting between charge states of the $\Delta(1232)$. Ran for 125 hours.

LAMPF-960 (Jul 1985) Approved Aug 1985; Started 1987; Completed 1988.

MEASUREMENT OF $\Delta\sigma_L$ IN FREE np SCATTERING BETWEEN 300 AND 800 MeV

ARGONNE - R Garnett, D Grosnick, D Hill, K F Johnson (✓ Spokesperson), D Lopiano, Y Ohashi, T Shima, H Spinka, R Stanek, D Underwood, A Yokosawa
LOS ALAMOS - J J Jarmer, S Penttila
NEW MEXICO STATE U - M Beddo, G R Burleson (✓ Spokesperson), J Faucett, S Gardiner, G Kyle
TEXAS A AND M - G Glass, R A Kenefick, S Nath, L C Northcliffe (✓ Spokesperson)
MONTANA U - R Jeppesen
WASHINGTON STATE U - G E Tripard

Accelerator LAMPF *Detector* Counter

Reactions Polarized beam and target

$n\,p \rightarrow n\,p$ 300-800 MeV (T_{lab})

Comments Measures at seven energies. A new beam buncher allows time-of-flight neutron energy measurements. Ran for 2217 hours.

Papers PL B258 (1991) 24.

LAMPF-961 (Jul 1985) Approved Aug 1985; Completed Oct 1986.

MEASUREMENT OF THE SPIN-CORRELATION PARAMETER $A_{NN}(\theta)$ FOR np ELASTIC SCATTERING AT 800 MeV

TEXAS A AND M - G Glass, J C Hiebert, J A Holt, R A Kenefick, S Nath, L C Northcliffe (Spokesperson)
LOS ALAMOS - T S Bhatia, J J Jarmer
NEW MEXICO STATE U - J A Faucett, G Kyle
MONTANA U - R H Jeppesen
WASHINGTON STATE U - G E Tripard
ARGONNE - D P Grosnick, D Lopiano, I Ohashi, T Shima, H Spinka, R Stanek
TEXAS U - P J Riley, S Sen

Accelerator LAMPF *Detector* Wire chamber

Reactions Polarized beam and target

$n\,p \rightarrow n\,p$ 790 MeV (T_{lab})

Comments Measures A_{NN} from 48 to 149°. Ran for 986 hours.

Papers PR D39 (1989) 3520.

LAMPF-969 (Jul 1985) Approved Aug 1985.

MEGA — SEARCH FOR THE RARE DECAY $\mu^+ \rightarrow e^+\gamma$

UCLA - D Barlow, B M K Nefkens, B Tippens
CHICAGO U - J Crocker, S C Wright
FERMILAB - P S Cooper
HOUSTON U - M Dzemidzic, J Flick, E V Hungerford, K Johnston, K Lan, B W Mayes, R Phelps, L Pinsky, W von Witsch
LOS ALAMOS - J F Amann, K Black, R D Bolton, S Carius, M D Cooper (✓ Spokesperson), W Foreman, C M Hoffman, G E Hogan, T Kozlowski, M Kroupa, R E Mischke, F J Naivar, M A Oothoudt, C Pillai, R D Werbeck, D Whitehouse, C Wilkinson
QUEENS U, KINGSTON - A Hallin
STANFORD U - E B Hughes, C Jui, J N Otis, M W Ritter
TEXAS A AND M - L Van Ausdeln, C Gagliardi, G Kim, F Liu, R E Tribble, X Tu, X Zhou
VALPARAISO U, INDIANA - R Fisk, D D Koetke, R W Manweiler, S Stanislaus
VIRGINIA U - R Marshall, B Wright, K O H Ziock
HAMPTON U - K Baker, L Tang
INDIANA U - J Knott, K M Stantz, J Szymanski
VIRGINIA TECH - L E Piilonen, Y Zhang
WYOMING U - A R Kunselman
YALE U - J Markey

Accelerator LAMPF *Detector* MEGA

Reactions Polarized beam

$\mu^+ \rightarrow e^+\,\gamma$ 0 MeV/c
$\mu^+ \rightarrow e^+\,\gamma\,\gamma$ "
$\mu^+ \rightarrow e^+\,\gamma\,\nu\,\nu$ "

Particles studied μ^+

Comments Also searches for a $V+A$ contribution to radiative decay. Approved for 4000 hours. Looks for $\mu^+ \rightarrow e^+\gamma$ at a level of 2×10^{-13}, a factor of 250 better than the Crystal Box detector. Data taking scheduled for June 92.

Papers NIM A303 (1991) 298.

LAMPF-973 (Jul 1985) Approved Aug 1985; Started Oct 1985.

SEARCH FOR NARROW RESONANCES IN THE $B = 2$ MISSING-MASS SPECTRUM FROM p He REACTIONS AND IN THE EXCITATION FUNCTIONS OF THE $pp\pi$ PRODUCTION

TEXAS U - M Barlett, D Ciskowski, G Hoffmann, G Pauletta (Spokesperson), M Purcell
UDINE U - R Garfagnini, L Santi
MINNESOTA U - M Gazzaly
LOS ALAMOS - K Jones, C Morris, S Seestrom-Morris, N Tanaka
VIRGINIA U - L C Smith, R Whitney

Accelerator LAMPF *Detector* LAHRS

Reactions Polarized beam

$p\,^3$He $\rightarrow$ deut X 370, 630, 730, 800 MeV (T_{lab})
p He $\rightarrow$ trit X "
p He $\rightarrow\,^3$He X "

Particles studied dibaryon

Comments Ran for 72 hours in 1985, and additional 462 hours in 1990.

Papers PR C38 (1988) 2466.

SUMMARIES OF LOS ALAMOS EXPERIMENTS

LAMPF-979 (Nov 1985) Approved Aug 1985; Completed Oct 1987.

A SEARCH FOR $T = 2$ DIBARYON PRODUCTION IN THE $d(\pi^+, \pi^-)X$ REACTION

RUTGERS U — C Glashausser
LOS ALAMOS — K W Jones, J A McGill (Spokesperson), C L Morris (Spokesperson)
TEXAS U — G W Hoffmann, C F Moore, G Pauletta
MINNESOTA U — M Gazzaly, S J Seestrom-Morris

Accelerator LAMPF *Detector* Spectrometer

Reactions
π^+ deut $\rightarrow \pi^-$ X — 200–300 MeV (T_{lab})

Particles studied dibaryon

Comments Uses the clamshell spectrometer. Ran for 837 hours.

LAMPF-981 (Jul 1985) Approved Aug 1985; Completed Oct 1988.

DO BOUND STATES OF REAL PIONS EXIST?

NORTHWESTERN U — M Artuso, G Garino, B Parker, K K Seth (Spokesperson), M Sethi, R Soundra

Accelerator LAMPF *Detector* Spectrometer

Reactions
π^- deut $\rightarrow \pi^+ \; n \; n \; \pi^-$ — 292 MeV (T_{lab})

Particles studied dibaryon

Comments Searches for an $nn\pi^-$ bound state. Ran for 534 hours.

LAMPF-985 (Nov 1985) Approved Feb 1985; Completed 1986.

SEARCH FOR MUONIUM-TO-ANTIMUONIUM SPONTANEOUS CONVERSION

HEIDELBERG U, PHYS INST — M Gladisch, G zu Putlitz
LOS ALAMOS — M Cooper, C Hoffman, G Hogan, F Mariam, R Mischke, L Piilonen, V Sandberg
WILLIAM AND MARY COLL — M Eckhause, P Guss, J R Kane (✓ Spokesperson)
YALE U — K P Arnold, F Chmely, V W Hughes (✓ Spokesperson), S Kettell, Y Kuang, J Markey, B Matthias, B Ni, H Orth (✓ Spokesperson), R Schaefer, K Woodle
MISSISSIPPI U — J J Reidy

Accelerator LAMPF *Detector* CRYSTAL-BOX

Reactions
muonium $\rightarrow \overline{\text{muonium}}$

Comments A search at a level of sensitivity of about 7.5 G_F for the conversion coupling constant (compared to a best so far of less than 42 G_F). Ran for 564 hours.

Papers PRL 59 (1987) 2716, and NP A478 (1988) 757.

LAMPF-998 (Nov 1985) Approved Feb 1986; Completed Aug 1986.

THE ^{4}He$(\pi, \pi p)^3$H REACTION — A TEST OF CHARGE SYMMETRY

MINNESOTA U — D Dehnhard (✓ Spokesperson), S K Nanda, S J Seestrom-Morris
LOS ALAMOS — C L Morris (✓ Spokesperson)
TEXAS U — M Bryan, C F Moore
PENN U — J D Zumbro

Accelerator LAMPF *Detector* EPICS, Counter

Reactions
π^+ He $\rightarrow$ trit $p \; \pi^+$ — 180 MeV (T_{lab})
π^- He $\rightarrow$ trit $p \; \pi^-$ — "

Comments A test of charge symmetry by measuring the ratio of the cross sections. Ran for 180 hours.

Papers PR C42 (1990) 807, PR C (submitted).

LAMPF-1027 Approved Aug 1986; Started Jun 1987; Completed Aug 1987.

DEVELOPMENT OF A HIGH ENERGY POLARIMETER BASED ON COULOMB-NUCLEAR INTERFERENCE AND MEASUREMENT OF THE SPIN-AVERAGED SLOPE PARAMETER FOR pp ELASTIC SCATTERING BETWEEN 1.1 AND 1.5 GeV/c

TEXAS U — M Barlett, D Ciskowski, G Hoffman, G Pauletta (Spokesperson), M Purcell
UDINE U — R Garfagnini, L Santi
MINNESOTA U — M Gazzaly, N Hintz, S Nanda
ANNECY — K Kuroda, A Michalowicz
TRIESTE U — A Penzo
LOS ALAMOS — N Tanaka

Accelerator LAMPF *Detector* LAHRS, Counter

Reactions Polarized beam
$p \; p \rightarrow p \; p$ — 1.1–1.5 GeV/c

Comments Measures the differential cross section and analyzing power from 3 to 15° θ_{lab} at eight energies. Ran for 272 hours.

LAMPF-1035 (Nov 1986) Started Aug 1987; Completed Dec 1987.

TWO- AND THREE-SPIN MEASUREMENTS IN $pp \rightarrow pp$

LOS ALAMOS — M W McNaughton (✓ Spokesperson), S Penttila
TEXAS U — K H McNaughton, P J Riley
UCLA — D L Adams, J Bystricky, E Gulmez, A G Ling

Accelerator LAMPF *Detector* Spectrometer, JANUS

Reactions Polarized beam and target
$p \; p \rightarrow p \; p$ — 733 MeV (T_{lab})

Comments Covers between 35 and 76° c.m. Measures P, A_{LV}, A_{SV}, D_{NN}, D_{LV}, D_{SV}, K_{VS}, K_{VL}, (NV, SO), (NV, LO), (SV, NO), and (LV, NO), where V is the target polarization, oriented between L and S, perpendicular to the recoil proton in the lab frame. The addition of the differential cross section makes this a complete set.

Papers PR C41 (1990) 2809. No other papers expected.

LAMPF-1054 (Dec 1986) Approved Feb 1987; Started 1991.

ULTRAHIGH PRECISION MEASUREMENTS ON THE MUONIUM GROUND STATE: HYPERFINE STRUCTURE AND MUON MAGNETIC MOMENT

LOS ALAMOS — D Ciskowski
HEIDELBERG U, PHYS INST — K Jungmann, B Matthias, G zu Putlitz (✓ Spokesperson)
SYRACUSE U — P A Souder (✓ Spokesperson)
WILLIAM AND MARY COLL — M Eckhause, P Guss, J Kane
YALE U — S Dhawan, V W Hughes (✓ Spokesperson)

Accelerator LAMPF *Detector* Other

Particles studied muon, muonium

Comments An ultrahigh precision measurement of the muonium hyperfine structure interval $\Delta\nu$ and of the microwave magnetic moment ratio μ_μ/μ_p with the goal of determining $\Delta\nu$ to 5 ppb and μ_μ/μ_p to 50 ppb. Uses the microwave magnetic resonance spectroscopy method, with an intense and pure subsurface μ^+ beam, a large superconducting homogeneous solenoid, and a line-narrowing method involving a chopped μ^+ beam. Approved for 1200 hours. Expected to run till 1995.

LAMPF-1072 (Jun 1987) Approved Aug 1987; Started Jun 1988; Completed Sep 1988.

THE pp ELASTIC ABSOLUTE CROSS SECTION

UCLA — E Gulmez, A G Ling, C A Whitten
LOS ALAMOS — J F Amann, M W McNaughton (✓ Spokesperson), T Noro
RICE U — D L Adams
RUTGERS U — V R Cupps, R D Ransome
TEXAS A AND M — G Glass, A J Simon
TEXAS U — K H McNaughton, P J Riley

Accelerator LAMPF *Detector* Wire chamber, Counter

Reactions

$p\,p \rightarrow p\,p$ 500–800 MeV (T_{lab})

Comments Measures the pp differential elastic cross section from 15–90° c.m. to an absolute accuracy of 1%. Ran for 732 hours. Data analysis in progress (March 92).

Papers NIM A297 (1990) 7.

LAMPF-1073 (Jun 1987) Approved Aug 1987; Started Jun 1988.

MEASUREMENT OF MUONIUM TO ANTIMUONIUM CONVERSION WITH IMPROVED SENSITIVITY

WILLIAM AND MARY COLL – M Eckhause, J Kane
HEIDELBERG U, PHYS INST – H J Mundinger, G zu Putlitz, H J Rosnekranz
MISSISSIPPI U – J Reidy
YALE U – H Ahn, V W Hughes (Spokesperson), S Kettell, Y Kuang, B Matthias, B Ni, H R Schaefer (Spokesperson)

Accelerator LAMPF *Detector* Spectrometer, Wire chamber

Reactions

muonium → $\overline{\text{muonium}}$

Particles studied muonium

Comments The proposed sensitivity is $G_{M\overline{M}} \approx 10^{-2}\,G_F$, an improvement by a factor 100 over previous experiments. Ran for 1590 hours.

LAMPF-1085 (Jul 1987) Approved Aug 1987; Started Aug 1988; Completed Oct 1988.

TOTAL AND DIFFERENTIAL CROSS SECTIONS FOR $\pi^+ d \rightarrow pp$ BELOW 20 MeV

VIRGINIA U – K Giovanetti, R C Minehart (✓ Spokesperson), L C Smith
ARIZONA STATE U – T D Averett, B G Ritchie (✓ Spokesperson), D Rothenberger, J R Tinsley
SOUTH CAROLINA U – G S Blanpied, B M Preedom

Accelerator LAMPF *Detector* Counter

Reactions

π^+ deut → $p\,p$ 3.7, 5.0, 9.6, 15.2, 20.5 MeV (T_{lab})

Comments Ran for 613 hours.

Papers PRL 66 (1991) 568.

LAMPF-1096 (Dec 1987) Approved Jan 1988; Started Jun 1988; Completed Jul 1988.

STUDY OF THE $(\pi NN)_{T=2}$ BOUND SYSTEM BY $d(\pi^\pm, \pi^\mp)$ REACTIONS

LOS ALAMOS – C L Morris (Spokesperson), J D Zumbro
TEL AVIV U – D Ashery (Spokesperson), J Lichtenstadt, E Piasetzky
ARGONNE – R Gilman
NEW MEXICO STATE U – M W Rawool
TEXAS U – B Boyer, A Fuentes, K Johnson, J McDonald, C F Moore, S Mordechai, M J Smithson, A Williams, S H Yoo

Accelerator LAMPF *Detector* Spectrometer, Counter

Reactions

π^+ deut → $p\,p\,\pi^+\,\pi^-$ 220–300 MeV (T_{lab})
π^- deut → $n\,n\,\pi^-\,\pi^+$ "

Comments Measures the angular distribution of pions at 256 MeV lab kinetic energy in 5 or 10° steps and excitation functions at fixed angle and fixed momentum transfer at 220 and 300 MeV. The presumed $pp\pi^+$ and $nn\pi^-$ bound states decay only weakly in these charge states, so resonances should be narrow. Ran for 396 hours.

Papers PL B215 (1988) 41.

LAMPF-1119 (Jun 1988) Approved Aug 1988; Started Aug 1988; Completed Oct 1988.

UNPOLARIZED DIFFERENTIAL CROSS SECTIONS FOR pd ELASTIC SCATTERING AT INTERMEDIATE ENERGIES

TEXAS A AND M – A J Simon
LOS ALAMOS – M W McNaughton, J R Santana
TEXAS U – M L Barlett, K H McNaughton, P J Riley
UCLA – S Beedoe, E Gulmez (✓ Spokesperson), T Jaroszewicz, A G Ling, C A Whitten
RUTGERS U – V R Cupps
RICE U – D L Adams

Accelerator LAMPF *Detector* Wire chamber, Counter

Reactions

p deut → p deut 650, 800 MeV (T_{lab})

Comments Measures the absolute pd elastic scattering cross sections from 35 to 115° c.m. at 650 MeV and from 35 to 140° c.m. at 800 MeV with a typical accuracy of 2 or 3%. Uses MWPC's. Ran for 170 hours.

Papers NIM A297 (1990) 7, NIM A297 (1990) 17, and PR C43 (1991) 2067.

LAMPF-1135 (Jul 1988) Approved Aug 1988; Started Oct 1988; Completed Oct 1988.

FEASIBILITY STUDY OF TAGGED η MESON PRODUCTION IN $p\,^3\text{H} \rightarrow {}^4\text{He}\,\eta$

UCLA – D B Barlow (✓ Spokesperson), B M K Nefkens, C Pillai (✓ Spokesperson), J W Price, M J Wang, J A Wightman
LOS ALAMOS – K W Jones, M J Leitch, C S Mishra (✓ Spokesperson), C L Morris, J Peng
BOSKOVIC INST, ZAGREB – I Šlaus
TAIWAN, INST PHYS – P K Teng
ARIZONA STATE U – J M Tinsley

Accelerator LAMPF *Detector* LAHRS

Reactions Polarized beam

p trit → He η 756.5, 785, 800 MeV (T_{lab})

Comments Aimed to obtain η's tagged by ^{4}He detectors for use in investigating rare and weak η decays. Problems with tritium targets prevented this study. Instead, the beam time was used to collect data on some of the background reactions. Ran for 92 hours.

Papers PR C45 (1992) 293. No other papers expected.

LAMPF-1173 (Jul 1989) Approved Jan 1990.

SEARCH FOR $\bar{\nu}_\mu \rightarrow \nu_e$ OSCILLATIONS WITH HIGH SENSITIVITY

LSND COLLABORATION
UC, IRVINE – G Yodh
UC, RIVERSIDE – J H Kang, W Strossman, G J VanDalen
UC, SANTA BARBARA – D Bauer, D Borden, D Caldwell, A Lu, S Yellin
EMBRY-RIDDLE AERONAUTICAL U – D Smith
UCHRPA, SLAC – A Eisner, M Sullivan, W Vernon, Y Wang
LINFIELD COLL, OREGON – I Cohen, D Schnitzler
LOS ALAMOS – R D Bolton, R Burman, J Donahue, F Federspiel, W Foreman, G T Garvey, T Kozlowski, W C Louis (✓ Spokesperson), J Margulies, V Sandberg, M Schillaci, D H White, D Whitehouse, D Wilkinson
LOUISIANA STATE U – A Fazely, R Imlay, C Lyndon, W Metcalf, G Singha
NEW MEXICO U – B B Dieterle, C P Leavitt, R Reeder, F Schaefer
PENN U – M Albert, A K Mann
TEMPLE U – C Athanassopoulos, L B Auerbach, P Hermida, V Highland, D Works, Y Xiao
VALPARAISO U, INDIANA – D D Koetke, R Manweiler

Accelerator LAMPF *Detector* SCINT

Reactions

$\bar{\nu}_\mu \rightarrow \bar{\nu}_e$ < 200 MeV (T_{lab})
$\nu_\mu \rightarrow \nu_e$ "

ν_e C $\rightarrow e^-$ nucleon "
ν_μ C $\rightarrow \mu^-$ nucleon "
ν C $\rightarrow \nu$ C* "
ν_μ $p \rightarrow \nu_\mu$ p "

Comments A search for neutrino oscillations to the level $\sin^2\theta = 3 \times 10^{-4}$, where θ represents the mixing angle if there was two-generation mixing. Uses neutrinos produced by both at-rest and in-flight decaying pions. The detector consists of a tank with 200 t of liquid scintillator and with 1224 photomultiplier tubes mounted on the inside tank surface. Other physics goals include a search for rare decays $\pi^0 \rightarrow \nu\nu$ and $\eta \rightarrow \nu\bar{\nu}$, and the measurement of $\nu_\mu p$ elastic scattering. Scheduled to run May 93.

LAMPF-1178 (Jul 1989) Approved Aug 1989.

POLARIZATION ASYMMETRY MEASUREMENTS FOR ^{1}H(π^-, π^0)n BETWEEN 45 AND 100 MeV

ARIZONA STATE U R Alarcon, C Allgower, J R Comfort (✓ Spokesperson), J Goergen, C Mertz
NEW MEXICO STATE U G Burleson (✓ Spokesperson), G Kyle
LOS ALAMOS J Jarmer, J O'Donnell, S Penttila, M Rawool-Sullivan
MINNESOTA U D Dehnhard, J Langenbrunner, M Palarczyk, C M Riedel
OLD DOMINION U A Klein
COLORADO U S Hoibraten, J Peterson
MARYLAND U N Chant, P Roos
TEXAS U G Hoffmann
TRIUMF G Smith

Accelerator LAMPF *Detector* Spectrometer

Reactions Polarized target
$\pi^- p \rightarrow \pi^0 n$ 45 – 100 MeV (T_{lab})

Comments Measures the analyzing powers from 15 to 115° c.m. This is the first measurement at such low energies. Expected to run in 1994.

LAMPF-1179 (Jul 1989) Approved Aug 1989; Started Oct 1990.

REACTION $\pi^+ p \rightarrow \pi^+ \pi^0 p$ NEAR THRESHOLD

VIRGINIA U K A Assamagan, J P Chen, D Day, E Frlež, K J Keeter, R M Marshall, J S McCarthy, R C Minehart, D Počanić (✓ Spokesperson), L C Smith
STANFORD U W J Cummings, G E Dodge, S S Hanna, B H King, S E Kuhn
LOS ALAMOS J D Bowman, J N Knudson

Accelerator LAMPF *Detector* Spectrometer, Plastic

Reactions
$\pi^+ p \rightarrow \pi^+ \pi^0 p$ 265 – 375 MeV/c (P_{lab})

Comments Measures inclusive and exclusive cross sections for π^0 production near threshold in order to obtain a new constraint on the $I = 2$, s-wave $\pi\pi$ scattering length. Uses a π^0 spectrometer and a plastic scintillator counter array. Ran for 520 hours. Next run scheduled for June 92.

LAMPF-1182 (Jul 1989) Approved Aug 1989.

MEASURING THE NEUTRON-NEUTRON SCATTERING LENGTH AND EFFECTIVE RANGE USING THE $^2H(\pi^-, 2n)\gamma$ REACTION

LOS ALAMOS C L Morris
MINNESOTA U M M Gazzaly
TEXAS U C F Moore, G Pauletta
ALBERTA U H W Fielding, L G Greeniaus, F C Khanna, G C Nielson
KING FAHD UNIV A H Hussein (Spokesperson)

Accelerator LAMPF *Detector* SCINT

Reactions
π^- deut $\rightarrow n\ n\ \gamma$ > 30 MeV (T_{lab})

Comments Measures low energy nn scattering parameters. The reaction products are detected in triple coincidence.

LAMPF-1188 Started Oct 1987.

SEARCH FOR TIME REVERSAL SYMMETRY VIOLATION AND PARITY VIOLATION AT THE PROTON STORAGE RING

LOS ALAMOS C D Bowman, J D Bowman (✓ Spokesperson), J J Szymanski, V Yuan
PRINCETON U D Benton, G Cates, K P Coulter, A B McDonald
HARVARD U T E Chupp
CHALK RIVER, AECL E D Earle

Accelerator LAMPF *Detector* Counter

Reactions Polarized beam and target
n nucleus

Comments Searches for time-reversal and parity violation in low-lying nuclear states. Preliminary results have detected parity violation in states of ^{139}La, ^{165}Ho, ^{232}Th, ^{235}U, and ^{238}U. The neutron beam is 57% polarized from 1 ev to 20 keV. Continues taking data (February 92).

Papers PR C39 (1989) 1721, PRL 65 (1990) 1192, PRL 67 (1991) 564, and PR C44 (1991) 2187.

LAMPF-1190 (Jul 1990) Approved Aug 1990; Started Aug 1991.

PION-PROTON INTEGRAL CROSS SECTION MEASUREMENTS

COLORADO U S Hoibraten, M Kohler, J J Kraushaar, B Kriss, D S Oakley, R J Peterson, R A Ristinen (✓ Spokesperson), W R Smythe
LOS ALAMOS C L Morris
TRIUMF J T Brack, G R Smith

Accelerator LAMPF *Detector* SCINT

Reactions
$\pi^+ p \rightarrow \pi^+ p$ 50 – 250 MeV (T_{lab})

Comments Measures the integral cross section at 15 energies. Uses a liquid hydrogen target. Tests the currently accepted phase shift predictions, and provides new data on πp elastic scattering. Ran in August 91. Next run scheduled for June 92.

LAMPF-1208 (Nov 1990) Approved Jan 1991; Started Jun 1991.

NEUTRON-PROTON BREMSSTRAHLUNG

LOS ALAMOS J Koster, R O Nelson, M E Schillaci, S A Wender (✓ Spokesperson)
UC, DAVIS F P Brady
LIVERMORE M Blann, V R Brown, D Krofcheck
GRENOBLE U D Lebrun, H Nifenecker, J Pinston
SASKATCHEWAN U D Skopik

Accelerator LAMPF *Detector* SCINT

Reactions
$n\ p \rightarrow n\ p\ \gamma$ 50 – 400 MeV (T_{lab})

Comments Measurements include γ detection, γ-p coincidence, and possibly triple γ-p-n coincidence. In progress (March 92).

LAMPF-1213 (Nov 1990) Approved Jan 1991.

MEASUREMENT OF THE NEUTRINO CAPTURE CROSS SECTION IN ^{37}Cl AND ^{127}I WITH μ^+ DECAY NEUTRINOS

LOS ALAMOS R L Burman, B T Cleveland
PENN U T Daily, R Davis, J Distel, K Lande (Spokesperson), C K Lee, A Weinberger, P Wildenhain
WASHINGTON U, SEATTLE W C Haxton
HERBERT LEHMAN COLL J Ullman

Accelerator LAMPF *Detector* Other

Reactions
ν_e ^{37}Cl $\rightarrow e^-$ ^{37}Ar

$\nu_e\ ^{127}\mathrm{I} \rightarrow e^-\ ^{127}\mathrm{Xe}$

Particles studied ν

Comments Measures neutrino capture cross sections for complex nuclei used in solar neutrino experiments. Checks the calibration of the Homestake chlorine solar neutrino detector. Uses neutrinos from μ^+ decay at the LAMPF beam stop, and radiochemical methods of detection.

LAMPF-1234 (Nov 1990) Approved Jan 1991; Started Aug 1991; Completed Sep 1991.

K_{LL} AND P FOR np ELASTIC SCATTERING

LOS ALAMOS K Koch, M W McNaughton (√ Spokesperson), I Supek
TEXAS U D A Ambrose, P Coffey, K Johnston, K H McNaughton, P J Riley
TEXAS A AND M G Glass, J C Hiebert, L C Northcliffe, A J Simon
COLORADO U D J Mercer
RICE U D L Adams
ARGONNE H Spinka
MONTANA U R H Jeppesen
WASHINGTON STATE U G E Tripard
CENTRAL ARKANSAS U H Woolverton

Accelerator LAMPF *Detector* JANUS, Spectrometer

Reactions

$n\ p \rightarrow n\ p$ 500, 580, 650, 730 MeV (T_{lab})

Comments Measures spin-transfer K_{LL} and asymmetry A_n in two independent ways. Uses a liquid deuterium target, and the Scylla spectrometer. Clarifies a normalization discrepancy affecting older np data at LAMPF.

Papers PR C (submitted).

LAMPF-1240 (Jul 1991) Approved Aug 1991.

MEASUREMENT OF THE MICHEL PARAMETER ρ WITH THE MEGA POSITRON SPECTROMETER

UCLA D Barlow, B M K Nefkens, B Tippens
CHICAGO U J Crocker, S C Wright
FERMILAB P S Cooper
HOUSTON U M Dzemidzic, J Flick, E V Hungerford, K Johnston, K Lan, B W Mayes, R Phelps, L Pinsky, W von Witsch
LOS ALAMOS J F Amann, K Black, R D Bolton, S Carius, M D Cooper (√ Spokesperson), W Foreman, C M Hoffman, G E Hogan, T Kozlowski, M Kroupa, R E Mischke, F J Naivar, M A Oothoudt, C Pillai, R D Werbeck, D Whitehouse, C Wilkinson
QUEENS U, KINGSTON A Hallin
STANFORD U E B Hughes, C Jui, J N Otis, M W Ritter
TEXAS A AND M L Van Ausdeln, C Gagliardi, G Kim, F Liu, R E Tribble, X Tu, X Zhou
VALPARAISO U, INDIANA R Fisk, D D Koetke, R W Manweiler, S Stanislaus
VIRGINIA U R Marshall, B Wright, K O H Ziock
HAMPTON U K Baker, L Tang
INDIANA U J Knott, K M Stantz, J Szymanski
VIRGINIA TECH L E Piilonen (√ Spokesperson), Y Zhang
WYOMING U A R Kunselman
YALE U J Markey

Accelerator LAMPF *Detector* MEGA

Reactions Polarized beam

$\mu^+ \rightarrow e^+\ \nu_e\ \bar{\nu}_\mu$ 28 MeV/c

Comments An improved measurement of the Michel parameter ρ. A precision of $\delta\rho/\rho = 0.001$ is expected. Approved for 336 hours. Scheduled to run September 92.

LAMPF-1256 (Dec 1991) Approved Jan 1992.

$\pi^{\pm}p$ ANALYZING POWERS AT 45 AND 67 MeV

ARIZONA STATE U R Alarcon, C Allgower, J R Comfort (√ Spokesperson), J Gorgen, C Mertz
NEW MEXICO STATE U G Burleson (√ Spokesperson), G Kyle
LOS ALAMOS S Greene, J Jarmer, C Morris, J O'Donnell, S Penttila, M Rawool-Sullivan
MINNESOTA U D Dehnhard, J Langenbrunner, M Palarczyk, C M Riedel
ABILENE CHRISTIAN U D Isenhower, M Sadler
BOSKOVIC INST, ZAGREB I Supek
OLD DOMINION U A Klein
TEXAS U G Hoffmann
WYOMING U G Rebka

Accelerator LAMPF *Detector* Spectrometer

Reactions

$\pi^+\ p \rightarrow \pi^+\ p$ 45, 67 MeV (T_{lab})
$\pi^-\ p \rightarrow \pi^-\ p$ "

Comments Measures the analyzing powers from 30 to 160° c.m. This is the first measurement at such low energies. Approved for 500 hours. Expected to run in 1993.

NOVOSIBIRSK Experiments

NOVOSIBIRSK-CMD-2 (1984) Approved 1985; Started 1991.

THE CRYOGENIC MAGNETIC EXPERIMENT AT VEPP-2M

NOVOSIBIRSK, IYF - R R Akhmetshin, G A Aksenov, E V Anashkin, V M Aulchenko, B O Baibusinov, V S Banzarov, L M Barkov (Spokesperson), S E Baru, N S Bashtovoi, G A Blinov, .. E Bondar, S I Eidelman, V E Fedorenko, G V Fedotovitch, A A Grebeniuk, D N Grigoriev, P M Ivanov, B I Khazin, A S Kuzmin, I A Loop, A V Maksimov, Y I Merzlyakov, A B Nomerotsky, V S Okhapkin, S G Pivovarov, T A Purlats, S I Redin, N M Ryskulov, Y M Shatunov, A I Shekhtman, M A Shubin, B A Shwartz, V A Sidorov, A N Skrinsky, V P Smakhtin, I G Snopkov, E P Solodov, V M Titov, I B Vasserman, Y V Yudin, V G Zavarzin, I V Zhuravkov
BOSTON U - D H Brown, L B Roberts, W Worstell
PITTSBURGH U - J A Thompson, C H Yang
YALE U - S K Dhawan, V W Hughes

Accelerator NOVO-VEPP-2M *Detector* CMD-2

Reactions

$e^+ e^- \to$ charged$^+$ charged$^-$ (chargeds) (neutrals)	0.36-1.4 GeV (E_{cm})

Particles studied ρ, ω, ϕ

Comments Measures the hadronic part of the anomalous magnetic moment of the muon. Studies the dynamics of multihadron production, and rare decays of vector mesons. The magnetic detector consists of a 1.5-T superconducting solenoid, drift chamber, Z-chamber, muon identification system, CsI barrel calorimeter, and BGO endcap calorimeter.

Papers NIM A252 (1986) 299, and NIM A283 (1989) 752.

NOVOSIBIRSK-ND (1978) Approved 1979; Started 1982; Completed 1987.

THE NEUTRAL-SPECTROMETER EXPERIMENT AT VEPP-2M

NOVOSIBIRSK, IYF - S I Dolinsky, V P Druzhinin, M S Dubrovin, S I Eidelman, V B Golubev, V N Ivanchenko, E V Pakhtusova, A N Peryshkin, S I Serednyakov (✓ Spokesperson), Y M Shatunov, V A Sidorov, A N Skrinsky

Accelerator NOVO-VEPP-2M *Detector* NEUTSPEC

Reactions

$e^+ e^- \to \pi^0 \gamma$	<1.4 GeV (E_{cm})
$e^+ e^- \to \eta \gamma$	"
$e^+ e^- \to \omega \pi^0$	"
$e^+ e^- \to \eta \pi^+ \pi^-$	"
$e^+ e^- \to$ 2pion	"
$e^+ e^- \to 4\gamma$	"
$e^+ e^- \to$ 3pion	"
$e^+ e^- \to$ 4pion	"
$e^+ e^- \to$ 2pion γ	"
$e^+ e^- \to e^- e^+ 2\gamma$	"
$e^+ e^- \to 2e^- 2e^+$	"

Particles studied ρ, ω, ϕ

Comments Studies radiative and rare decays of vector mesons, and nonresonant hadronic production. Tests quantum electrodynamics. The neutral detector consisted of 168 NaI(Tl) counters. The detector is now dismantled.

Papers NIM 227 (1984) 467, PL B144 (1984) 136, YF 41 (1985) 1176 = SJNP 41 (1985) 752, YF 41 (1985) 1183 = SJNP 41 (1985) 756, PL B174 (1986) 115, PL B174 (1986) 453, YF 44 (1986) 633 = SJNP 44 (1986) 409, ZETPF 43 (1986) 457 = JETPL 43 (1986) 588, ZETFP 44 (1986) 493 = JETPL 44 (1986) 634, PL B186 (1987) 432, ZPHY C37 (1987) 1, ZETFP 45 (1987) 118 = JETPL 45 (1987) 145, YF 45 (1987) 1004 = SJNP 45 (1987) 622, YF 47 (1988) 1635 = SJNP 47 (1988) 1035, YF 48 (1988) 436 = SJNP 48 (1988) 273, YF 48 (1988) 442 = SJNP 48 (1988) 277, YF 48 (1988) 753 = SJNP (1988) 480, ZPHY C42 (1989) 511, YF 50 (1989) 999 = SJNP 50 (1989) 621, and PRPL 202 (1991) 99.

NOVOSIBIRSK-SND (1986) Approved 1987.

THE NEUTRAL-SPECTROMETER EXPERIMENT AT VEPP-2M

NOVOSIBIRSK, IYF - V M Aulchenko, T V Baier, A D Bukin, S I Dolinsky, V P Druzhinin, M S Dubrovin, I A Gaponenko, V B Golubev, V N Ivanchenko, M D Minakov, E V Pakhtusova, A N Peryshkin, A A Salnikov, S I Serednyakov (✓ Spokesperson), Y M Shatunov, V A Sidorov, Z K Silagadze, A N Skrinsky, Y V Usov

Accelerator NOVO-VEPP-2M *Detector* SND

Reactions

$e^+ e^- \to \pi^0 \gamma$	<1.4 GeV (E_{cm})
$e^+ e^- \to \eta \gamma$	"
$e^+ e^- \to \omega \pi^0$	"
$e^+ e^- \to \eta \pi^+ \pi^-$	"
$e^+ e^- \to 4\gamma$	"
$e^+ e^- \to e^- e^+ 2\gamma$	"
$e^+ e^- \to 2e^- 2e^+$	"
$e^+ e^- \to$ 2pion	"
$e^+ e^- \to$ 3pion	"
$e^+ e^- \to$ 4pion	"
$e^+ e^- \to$ 2pion γ	"

Particles studied K^0, ρ, ω, ϕ

Comments Studies radiative and rare decays of vector mesons, nonresonant hadronic production, and neutral kaon decays. Tests quantum electrodynamics. The Spherical Neutral Detector (SND) consists of 1680 NaI(Tl) counters. Scheduled to run in 1992.

PSI/SIN Experiments

SIN-R-72-02 (Nov 1972) Approved 1973; Started 1976; Completed May 1988.

EXPERIMENTS WITH NEUTRON BEAMS

FREIBURG U – R Buechle, J Franz, V Grundies, A Klett, P Koncz, M Krauth, R Peschina, E Roessle (√ Spokesperson), H Schmitt (√ Spokesperson), L Schmitt

Accelerator PSI *Detector* Spectrometer

Reactions

$n\ p \rightarrow n\ p$	0.6–1.2 GeV/c
$n\ p \rightarrow X$	"
n deut $\rightarrow n$ deut	"
n deut $\rightarrow X$	"

Comments Measures energy spectra and differential cross sections.

Papers PL B90 (1980) 367, PL B91 (1980) 214, PL B93 (1980) 384, ZPHY A298 (1980) 253, NIM 192 (1982) 407, PL B141 (1984) 170, ZPHY A316 (1984) 43, PL B153 (1985) 382, PL B158 (1985) 15, NP A472 (1987) 733, PL B213 (1988) 125, NP A490 (1988) 667, NP A510 (1990) 774, and NP A515 (1990) 541.

SIN-R-80-10 (Dec 1980) Approved Jan 1981; Started 1981.

MEASUREMENT OF INCLUSIVE SPECTRA FROM REACTIONS INDUCED BY PROTONS AND NEUTRONS

FREIBURG U – J Franz, E Roessle, C Sauerwein, H Schmitt, H L Woolverton
BUDAPEST, CRIP – J Eroe (Spokesperson), Z Fodor, J Kecskemeti, P Koncz, Z Seres

Accelerator SIN *Detector* Counter

Reactions

n nucleus $\rightarrow$ pion X	0.8–1.2 GeV/c
n nucleus $\rightarrow p$ X	"
n nucleus $\rightarrow$ deut X	"
n nucleus $\rightarrow$ trit X	"

Comments The nuclear targets are carbon, copper, and bismuth. Measures energy spectra of π^+, π^-, p, d, and t from 51 to 165°.

Papers PL B153 (1985) 382, NP A472 (1987) 733, PL B213 (1988) 125, NP A510 (1990) 774, and NP A515 (1990) 541.

SIN-R-80-11 (Dec 1980) Approved Jan 1981; Started Feb 1982; Completed.

SEARCH FOR ADMIXTURE OF HEAVY NEUTRINOS IN $\pi^+ \rightarrow \mu^+ \nu_\mu$ DECAY

VIRGINIA U – R C Minehart (√ Spokesperson), K O H Ziock (√ Spokesperson)
PSI, VILLIGEN – M Daum, P R Kettle
ZURICH, ETH – B Jost

Accelerator PSI *Detector* Counter

Reactions

$\pi^+ \rightarrow \mu^+\ \nu_\mu$	90 MeV/c

Particles studied hvy-ν_μ

Comments The muon energy resolution is better than 6 keV FWHM.

Papers PRL 52 (1984) 804, and PR D36 (1987) 2624.

SIN-R-81-02 (Aug 1981) Approved Sep 1981; Started 1984; Completed 1987.

STUDY OF THE FORMATION OF MUONIC ATOMS IN LOW Z GASEOUS MATERIALS IN A CYCLOTRON TRAP

KERNFORSCHUNGSZENTRUM, KARLSRUHE & KARLSRUHE U – P Bluem, E Borie, D Gotta, H Koch, W Kunold, M Schneider, L M Simons (Spokesperson)
PSI, VILLIGEN – R Abela

Accelerator SIN *Detector* Counter

Reactions

μ^- nucleus	0 MeV/c

Comments Ran for 800 hours.

Papers PR A38 (1988) 4395, PS T22 (1988) 90, and PR A39 (1989) 1610.

SIN-R-82-04 (Apr 1983) Approved May 1983; Started 1985; Completed Sep 1988.

PRECISE DETERMINATION OF THE BRANCHING RATIO $R = (\pi \rightarrow e\nu + e\nu\gamma)/(\pi \rightarrow \mu\nu + \mu\nu\gamma)$

BERN U – G Czapek, D Frei, M Hess, C Hug, E Hugentobler, W Krebs, U Moser (√ Spokesperson), D Muster, G Stucki
PSI, VILLIGEN – R Abela, D Renker, E Steiner

Accelerator PSI *Detector* Counter, Calorimeter

Reactions

$\pi^+ \rightarrow e^+\ \nu_e$	85 MeV/c

Particles studied π^+

Comments The detector includes a 4π BGO calorimeter with an average thickness of 18 radiation lengths. The resolution for 100 MeV electrons is 4% FWHM. Publication in preparation (December 92).

SIN-R-83-20-2 (Nov 1983) Approved Jan 1984; Started Jun 1984; Completed Nov 1989.

MEASUREMENT OF THE 2S-2P ENERGY DIFFERENCE IN MUONIC ^{4}He AT LOW GAS DENSITY

ZURICH, ETH – H P von Arb, P Hauser, H Hofer, F Kottmann (Spokesperson), C Luechinger, R Schaeren

Accelerator SIN *Detector* Counter

Comments Measures the 2S-2P energy difference in muonic ^{4}He ions by means of laser spectroscopy. The He gas pressure is low enough (0.04 atm) to prevent collisional quenching of the metastable 2S state. Publication in preparation.

SIN-R-83-29 (Dec 1983) Approved Jan 1984; Started Dec 1985; Completed 1988.

MEASUREMENT OF THE ξ PARAMETER IN μ DECAY

ZURICH, ETH – H Burkard, R von Dincklage, W Fetscher (√ Spokesperson), H Gerber, K Goering, K F Johnson
PSI, VILLIGEN – M Salzmann
MAINZ U, INST KERNPHYS – F Scheck

Accelerator PSI *Detector* Wire chamber

Reactions

$\mu^+ \rightarrow e^+\ \nu_e\ \bar{\nu}_\mu$	150 MeV/c

Particles studied μ^+

Comments Ran for 600 hours.

Papers HPA 60 (1987) 1, and PL B194 (1987) 326

PSI-Z-84-02 (Dec 1984) Approved Jan 1985; Started May 1986; Completed Jul 1988.

HIGH PRECISION ANALYZING POWER MEASUREMENTS OF PROTON-PROTON SCATTERING AT ENERGIES AROUND E_p = 25 MeV

ERLANGEN U – M Haller, W Kretschmer (Spokesperson), H Loeh, F Post, A Rauscher, R Schmitt, W Schuster, D Voetisch
ZURICH, ETH – M Bittcher, C Forstner, W Grueebler (Spokesperson), V Koenig, P A Schmelzbach, D Singy, J Ulbricht, B Vuaridel

Accelerator PSI *Detector* Counter

Reactions Polarized beam

$p\,p \to p\,p$ 221, 272 MeV/c

PSI-Z-85-06 (Nov 1985) Approved Nov 1985; Started 1986; Completed 1987.

PARITY VIOLATION IN PROTON-DEUTERON SCATTERING

ZURICH, ETH S Kystrin, J Lang, J Leichti, T Maier, R Mueller, M Simonius (✓ Spokesperson), J Smirsky
WISCONSIN U W Haeberli

Accelerator PSI *Detector* Wire chamber

Reactions Polarized beam

p deut $\to p$ X 300 MeV/c

Comments The parity-violating longitudinal analyzing power obtained is $A_Z = (0.39 \pm 0.74) \times 10^{-7}$.

Papers PL B219 (1989) 58. No other papers expected.

SIN-R-85-10 (Jan 1985) Approved Mar 1985; Started Aug 1984; Completed Aug 1985.

PRECISION MEASUREMENT OF THE π^0-π^- MASS DIFFERENCE

PSI, VILLIGEN J F Crawford, M Daum (✓ Spokesperson), R Frosch (✓ Spokesperson), B Jost, P Kettle
VIRGINIA U R M Marshall, B K Wright, K O H Ziock

Accelerator PSI *Detector* Counter

Reactions

$\pi^- p \to \pi^0 n$ 0.0 MeV/c
$\pi^- p \to \gamma n$ "

Particles studied π^0

Comments Studies the π^0-π^- mass difference. The kinetic energy distribution of the $\pi^- p$ atoms in liquid hydrogen at the time of charge exchange has a component extending up to about 1 eV, and a tail up to about 70 eV.

Papers PRL 56 (1986) 1043, PL B213 (1988) 391, and PR D43 (1991) 46. No other papers expected.

SIN-R-85-11 (1985) Approved 1985; Started 1986.

PION ABSORPTION ON TRITIUM

BASEL U G Backenstoss (Spokesperson), R Powers, P Salvisberg, M Steinacher, H J Weyer
KERNFORSCHUNGSZENTRUM, KARLSRUHE & KARLSRUHE U A Hoffart, H Ullrich (Spokesperson)
ZAGREB U M Furić, T Petković

Accelerator SIN *Detector* Counter

Reactions

π^- trit $\to n\,n\,n$ 50–220 MeV (T_{lab})
π^+ trit $\to p\,p\,n$ "
π^+ He "
π^- He "

Comments The ^{4}He reactions are for quasifree $2N$ absorption and exclusive $3N$ absorption.

Papers NP A501 (1989) 765, and NP A517 (1990) 413.

PSI-R-85-13-3 (Jan 1989) Approved Jan 1989; Started May 1989.

MEASUREMENT OF ELASTIC $\pi^\pm p$ SCATTERING BELOW 100 MeV

KARLSRUHE U C Joram, W Kluge (✓ Spokesperson), R Wieser
TUBINGEN U R Bilger, H Clement (✓ Spokesperson), K Foehl, K Heitlinger, G J Wagner
PSI, VILLIGEN D Renker

Accelerator PSI *Detector* Spectrometer

Reactions

$\pi^+ p \to \pi^+ p$ 30–100 MeV (T_{lab})
$\pi^- p \to \pi^- p$ "

Comments Angular distribution of cross sections between 10 and 125° in the laboratory system and the analyzing power are measured to determine with high accuracy the s and p wave phase shifts below 100 MeV pion energy. The goal is a test of the chiral perturbation theory of QCD as outlined in a series of papers by Gasser and Leutwyler *et al.* The size of the σ term evaluated from experimental data by means of forward dispersion relations is here the crucial number.

Papers PR D40 (1989) 3568, NIM A297 (1990) 444, and RPP 54 (1991) 1251.

SIN-R-85-14 (Feb 1985) Approved Mar 1985; Started Oct 1985; Completed 1987.

MEASUREMENT OF THE $\pi^0 \to e^+ e^-$ BRANCHING RATIO WITH SINDRUM

ZURICH U S Egli, R Engfer, M Grossmann-Handschin, E A Hermes, F Muheim, H S Pruys, A van der Schaaf (✓ Spokesperson), D Vermeulen
ZURICH, ETH R Eichler, L Felawka, T Kozłowski, C Niebuhr (✓ Spokesperson), S M Playfer, H K Walter
PSI, VILLIGEN W Bertl, N Lordong
SACLAY J Martino
AACHEN, TECH HOCHSCH, III PHYS INST U Bellgard
BRITISH COLUMBIA U R Meijer-Drees, C E Waltham

Accelerator PSI *Detector* SINDRUM

Reactions

$\pi^- p \to \pi^0 n$ 0.0 MeV/c
$\pi^- p \to \pi^0$ X "
$\pi^- p \to e^+ e^- n$ "
$\pi^0 \to e^+ e^-$
$\pi^0 \to$ X γ
$\pi^0 \to e^+ e^- \gamma$

Particles studied π^0

Comments Another paper in preparation.

Papers PR D40 (1989) 2796, and PR D (accepted).

SIN-R-86-02 (Dec 1985) Approved Jan 1986; Started Sep 1986; Completed Dec 1989.

STUDY OF THE REACTION $\pi^- p \to \pi^+ \pi^- n$ IN THE REGION OF Δ DOMINANCE

ERLANGEN U R Baran, U Bohnert, M Dillig, P Helbig, G Herrmann, A Hofmann (✓ Spokesperson), O Jaekel, H Krueger, D Malz, W Menzel, R Mueller, H Ortner (✓ Spokesperson), L Schweinzer, S Wirth
KERNFORSCHUNGSZENTRUM, KARLSRUHE W Kluge, H Matthaey

Accelerator PSI *Detector* Spectrometer

Reactions

$\pi^- p \to \pi^+ \pi^- n$ 350–450 MeV/c

Comments Data were collected in a reasonable part of the phase space, in- and out-of-plane. Good statistics permit determination of the triple differential cross section.

Papers PRL 64 (1990) 2759, and NP A511 (1990) 733.

PSI-R-86-05 (Jun 1987) Approved Jun 1987; Started Nov 1988.

CRYSTAL DIFFRACTION OF PIONIC HYDROGEN AND DEUTERIUM X-RAYS

NEUCHATEL U E D Bovet, D Chatellard, J Egger (✓ Spokesperson), G Fiorucci, E Jeannet
ZURICH, ETH A Badertscher (✓ Spokesperson), W Beer, J Gilot, P F A Goudsmit, A J Rusi El Hassani H J Leisi, D Sigg, S Thomann, W Volken, Z G Zhao
PSI, VILLIGEN E C Aschenauer, K Gabathuler, J Missimer, L M Simons

Accelerator PSI *Detector* Photon spectrometer

Reactions

$\pi^- p \to \pi^- p X$ 0 MeV/c

π^- deut $\to \pi^-$ deut X "

Comments Uses a bent crystal spectrometer with CCD's as 3 keV X-ray detectors. Ran for 12 weeks. Next data taking is scheduled for May/June 92.

Papers PL B261 (1991) 16.

PSI-R-86-14 (Apr 1986) Approved Apr 1986; Started Apr 1986; Completed Mar 1988.

EXPERIMENTS WITH POLARIZED NEUTRONS IN nE1: SPIN CORRELATIONS AND TOTAL CROSS SECTIONS

FREIBURG U - R Binz, J Franz, N Hamann, R Peschina-Klett, E Roessle, H Schmitt (✓ Spokesperson)
GENEVA U - P Demierre, G Gaillard, R Hess (✓ Spokesperson), C Leluc-Lechanoine, D Rapin
PSI, VILLIGEN - B Van den Brandt, M Daum, J Jaccard, J A Konter, S Mango
SACLAY - F Lehar

Accelerator PSI *Detector* Wire chamber, Counter

Reactions Polarized beam and target

$n p \to p n$ 0.55–1.2 GeV/c

Comments Ran for 800 hours. Measured $\Delta\sigma_L$ and $\Delta\sigma_T$. The parameters A_{00NN}, *etc.*, are being analyzed.

Papers PL B231 (1989) 323, NP A508 (1990) 267c, and NP A533 (1991) 601.

PSI-R-87-01 (Nov 1986) Approved Jan 1987; Started Dec 1988.

PRECISION MEASUREMENT OF THE MUON MOMENTUM IN PION DECAY AT REST

PSI, VILLIGEN - M Daum, R Frosch (✓ Spokesperson), D Herter, R Horisberger, M Janousch, P Kettle, C Wigger
ZURICH, ETH - H Forrer
ZURICH U - C Broennimann, T Spirig

Accelerator PSI *Detector* Spectrometer

Reactions

$\pi^+ \to \mu^+ \nu_\mu$ 0 MeV/c

Particles studied ν_μ, π^+

Comments The muon momentum is measured to about 10 ppm. The experiment is continued with a surface muon channel.

Papers PL B265 (1991) 425.

PSI-R-87-03 (Nov 1986) Approved Jan 1987; Started 1989.

SEARCH FOR $\mu \to e$ CONVERSION WITH SINDRUM II

AACHEN, TECH HOCHSCH, III PHYS INST - C Dohmen, K Groth, B Heer, W Honecker, D Junker, G Otter, B Steinruecken, P Wintz
ZURICH, ETH - J Hofmann
PSI, VILLIGEN - W Bertl, J Egger, M Grossmann-Handschin, W D Herold, B Krause, D Renker, O Szavits, H K Walter
SWIERK, INST ATOMIC ENERGY - T Kozlowski
TBILISI STATE U - J Bagaturia, W Dzhordzhadze, D Mzavia
ZURICH U - S Eggli, R Engfer, C Findeisen, E A Hermes, C B Niebuhr, H S Pruys, A van der Schaaf (✓ Spokesperson)

Accelerator PSI *Detector* SINDRUM-II

Reactions

μ^- nucleus $\to e^-$ nucleus 90 MeV/c

Particles studied μ^-

Comments First ran in Fall 1989. Beam allocated for 20 weeks in 1991/92. Final run in 1994. The 1989 data will be submitted for publication in 1992.

PSI-R-87-08 (Dec 1986) Approved Jan 1987; Started May 1987; Completed 1990

DIFFUSION OF MUONIC HYDROGEN ATOMS

WILLIAM AND MARY COLL - G Chen, A Hancock, J Kraiman, R Siegel (✓ Spokesperson), W Vulcan, R Welsh
PSI, VILLIGEN - C Petitjean, A Zehnder
VIENNA, OAW - W Breunlich, P Kammel (✓ Spokesperson), J Marton, J Zmeskal
MISSISSIPPI U - J Reidy (✓ Spokesperson), H Wolverton
MUNICH, TECH U - F Hartmann

Accelerator PSI *Detector* Counter

Reactions

μ^- 34 MeV/c

Comments Measures initial velocity distribution and scattering cross sections for $(\mu^- p)$ and $(\mu^- d)$ atoms in ^{2}H and ^{2}D.

Papers PRL 63 (1989) 1942. Other publications to follow.

PSI-R-87-12 (May 1987) Approved Jun 1987.

$n\,p$ ELASTIC SCATTERING: AN EXPERIMENT WITH POLARIZED NEUTRONS

FREIBURG U - J Arnold, J Franz, V Grundies, N Hamann, E Roessle, H Schmitt (✓ Spokesperson), H Urban
GENEVA U - P Demierre, N Goujon, E Heer, R Hess (✓ Spokesperson), C Leluc-Lechanoine, D Rapin, B Vuaridel
PSI, VILLIGEN - B van den Brandt, M Daum, A Konter, S Mango, P A Schmelzbach

Accelerator PSI *Detector* Wire chamber, Counter, Drift chamber

Reactions Polarized target

$n p \to p n$ 0.5–1.2 GeV/c

Comments Measures the 2-spin and 3-spin transfer parameters K_{0PQ0}, D_{0P0R}, and N_{0PQR}. Uses drift and multiwire proportional chambers, and a polarimeter. Scheduled to run March 92.

PSI-R-89-01 (Jan 1989, May 1991) Approved Jan 1992.

A PRECISE MEASUREMENT OF THE $\pi^+ \to \pi^0 e^+ \nu$ DECAY RATE

VIRGINIA U - K A Assamagan, J P Chen, D Day, E Frlež, K J Keeter, R M Marshall, J S McCarthy, R C Minehart, J H Mitchell, B E Norum, D Počanić (✓ Spokesperson), O A Rondon-Aramayo, L C Smith, W A Stephens, B K Wright, K O H Ziock
PSI, VILLIGEN - M Daum, R Frosch, D Renker, C Wigger
SOLTAN INST, SWIERK - T Kozlowski
ARIZONA STATE U - B G Ritchie
DUBNA - V A Baranov, S Jakovlev, I V Kisel, A S Korenchenko, S M Korenchenko, D B Kozaikin, N P Kravchuk, N A Kuchinsky, A Moiseenko, K G Nekrasov
TBILISI STATE U - Y Bagaturia, W Djordjadze, G Melitauri, D Mzavia, T Sachelashvili
BOSKOVIC INST, ZAGREB & ZAGREB U - T Petković, I Supek
ZURICH U - C Broennimann, R Engfer, H Pruys

Accelerator PSI *Detector* Calorimeter, Wire chamber, Counter

Reactions

$\pi^+ \to \pi^0 e^+ \nu$ 0 MeV/c

$\pi^+ \to e^+ \nu$ "

Particles studied π^+, π^0

Comments The aim is to determine the branching ratio for the $\pi^+ \to \pi^0 e^+ \nu$ decay to about 0.5% accuracy. Uses a 4π CsI calorimeter, MWPC's, and counters. Development runs scheduled for 1992. Data taking expected in 1993.

PSI-Z-89-02 (Dec 1988) Approved Jan 1989; Started Sep 1989; Completed Jun 1991.

NEUTRON MAGNETIC FORM FACTOR

BASEL U - J Jourdan (✓ Spokesperson), G Masson, I Sick
UTRECHT U - T S Bauer, E Joosse
NIKHEF, AMSTERDAM - P K A deWitt-Huberts, J Mitchell
VIRGINIA U - D Day, J Lichtenstadt

Accelerator PSI *Detector* Plastic, Counter

Reactions

e^- deut

Comments Measures the ratio of cross sections $d(e, e'n)$ and $d(e, e'p)$. The neutron detector is calibrated with the $H(n, n'p)$ reaction. The goal is a measurement of the form factor with an accuracy better than 5% at momentum transfers of 1.4 and 1.7 fm^{-1}. Uses two plastic neutron detectors preceeded by 3 ΔE plastic veto counters. Ran also at NIKHEF.

PSI-R-89-06 (Mar 1990) Approved Apr 1990; Started Apr 1990.

SEARCH FOR SPONTANEOUS CONVERSION OF MUONIUM TO ANTIMUONIUM

HEIDELBERG U, PHYS INST - B Braun, H Geerds, K Jungmann (✓ Spokesperson), F Maas, B E Matthias, G zu Putlitz, I Reinhard, W Schwarz, M Springer, L Willmann, L Zhang
ZURICH U - R Engfer, E A Hermes, R Menz, H S Pruys
PSI, VILLIGEN - R Abela, W Bertl (✓ Spokesperson), D Renker, H K Walter
AACHEN, TECH HOCHSCH, III PHYS INST - D Kampmann, G Otter, R Seeliger
SOLTAN INST, SWIERK - T Kozlowski
DUBNA - S Korentschenko, N Kuchinsky, K Nekrasov, N Zhuravlev
TBILISI STATE U - J Bagaturia, W Dzhordzhadze, A Mtchedlishvili, D Mzavia
YALE U - D Ciskowski, V W Hughes

Accelerator PSI *Detector* SINDRUM

Reactions

$\mu^+ e^- \rightarrow \mu^- e^+$ 20 MeV/c (P_{lab})

Particles studied μ^-, muonium

Comments Studies lepton number violation. The μ^- is detected by its decay electron, the atomic e^+ is directly detected after acceleration by 10 kV. The reaction $\mu^+ \rightarrow e^+e^-e^+\nu\nu$ is also studied. First data expected in Spring 1992.

PSI-Z-89-06 (Dec 1988) Approved 1989; Started 1990; Completed 1991.

SPIN DEPENDENT TOTAL CROSS SECTION $\Delta\sigma_L$ IN np SCATTERING

BASEL U - J Goetz, C Gysin, P Haffter (Spokesperson), M Hammans, R Henneck, J Jourdan, S Robinson, I Sick
PSI, VILLIGEN - B van den Brandt, J A Konter, S Mango

Accelerator PSI *Detector* Counter

Reactions Polarized beam and target

$n\ p$ 60 MeV (T_{lab})

Comments The transverse polarized proton beam is converted to a longitudinally polarized neutron beam. Paper is in preparation.

SIN-R-89-07 (Jan 1989) Approved Jan 1989; Started Jun 1989.

$\vec{n}p$ RADIATIVE CAPTURE

BASEL U - P Haffter, M Hammans, R Henneck, J Jourdan, G S Masson (Spokesperson), S Robinson, I Sick

Accelerator PSI *Detector* Counter

Reactions Polarized beam

$n\ p \rightarrow$ deut γ 68 MeV (T_{lab})

Comments Studies analyzing power over a large angular range. NaI detectors measure the asymmetry of gammas observed in coincidence with deuterons.

PSI-Z-90-07 (Dec 1989) Approved Jan 1990; Started Jul 1991.

SEARCH FOR EXTENSIONS OF THE STANDARD MODEL BY A RELATIVE BETA POLARIZATION MEASUREMENT FROM POLARIZED NUCLEI

ZURICH, ETH - M Allet, K Bodek, M Ferro-Luzzi, W Hajdas, J Lang, R Mueller, S Navert, O Naviliat-Cuncic (✓ Spokesperson), G Spiekerman, J Sromicki, J Zejma
LOUVAIN U - J Camps, J Deutsch, F Gimeno-Nogues, I Pepe, R Prieels, N Severijns, E Thomas
WISCONSIN U - P A Quin

Accelerator PSI *Detector* Spectrometer

Reactions Polarized beam

$p\ ^{12}C \rightarrow n\ ^{12}N$ 70 MeV/c

Comments Measures the relative longitudinal polarization of positrons emitted from polarized $^{12}\vec{N}$ nuclei produced in the reaction $^{12}C(\vec{p}, n)^{12}\vec{N}$. A new single-arm polarimeter has been designed and built.

PSI-Z-90-12 (Jun 1990) Approved Jun 1990.

DEVELOPMENT OF A SUPERCONDUCTING NEUTRINO AND DARK MATTER DETECTOR

BERN U - C Berger, K Borer, G Czapek, U Diggelmann, I Flammer, M Furlan, S Janos, U Moser, K Pretzl (✓ Spokesperson), K Schmiemann
ANNECY - D Perret-Gallix
PSI, VILLIGEN - B van den Brandt, J A Konter, S Mango

Accelerator PSI *Detector* Other

Comments Uses 70 MeV neutrons to test a new detection method based on superheated superconducting granules. Taking data (Dec 91).

Papers NIM A306 (1991) 572.

PSI-Z-91-02 (Dec 1990) Approved Dec 1990; Started Mar 1991.

MEASUREMENT OF THE NEUTRON-PROTON SPIN CORRELATION PARAMETER AT FORWARD ANGLES

BASEL U - D Fritschi, J Goetz, P Haffter, M Hammans, R Henneck, J Jourdan, G Masson, M L Qin, S Robinson, I Sick, A Trzcinski, M Tuccillo, B Zihlmann (✓ Spokesperson)
PSI, VILLIGEN - B van den Brandt, J A Konter, S Mango

Accelerator PSI *Detector* Counter

Reactions Polarized beam and target

$p\ n \rightarrow p\ n$ 72 MeV (T_{lab})

Comments Measures the spin correlation parameter A_{zz} in elastic $\vec{p}\vec{n}$ scattering over a wide range of forward angles. Uses plastic scintillator.

PSI-R-91-08 (Jun 1991) Approved Jul 1991.

MEASUREMENT OF THE STOPPING POWER FOR MUONS (μ^-, μ^+) AT ENERGIES BETWEEN 2 AND 40 keV

MUNICH, TECH U - P Baumann, H Daniel, F J Hartmann (✓ Spokesperson), M Muehlbauer, W Schott, P Wojciechowski
PSI, VILLIGEN - A Fuchs, K Lou, C Petitjean, D Taqqu (✓ Spokesperson)
ZURICH, ETH - P Hauser, F Kottmann

Accelerator PSI *Detector* Combination

Reactions

μ^+ C 0.6 3.0 MeV/c
μ^- C "

Comments Muon detection via PPAC and secondary electron emission from thin foils. Uses carbon and other various targets. Scheduled to run Spring 1992.

SACLAY Experiments

SACLAY-038-2 (Nov 1984) Approved Mar 1985; Started Jul 1985; Completed Mar 1986.

dp ELASTIC SCATTERING AS A SOURCE OF INFORMATION ABOUT THE DEUTERON D-WAVE AND THE SPIN STRUCTURE OF THE NN AMPLITUDES

UCLA – B Aas, D Adams, M Bleszynski, J Bystricky, V Ghazikhanian, G J Igo (✓ Spokesperson), C A Whitten
SACLAY – J Ball, P Chaumette, J Deregel, J Fabre, F Lehar, A de Lesquen, F Perrot, L van Rossum

Accelerator SATURNE-II *Detector* Combination

Reactions Polarized beam and target
deut $p \rightarrow$ deut p 1.6 GeV (T_{lab})

Particles studied deut

Comments See also SACLAY-216 and -217.

Papers PR C43 (1991) 1532.

SACLAY-052-2 (Nov 1981) Approved Nov 1981; Started Feb 1982; Completed Feb 1983.

MEASUREMENT OF pp ELASTIC SCATTERING IN THE COULOMB-NUCLEAR INTERFERENCE REGION USING THE POLARIZED PROTON BEAM FROM SATURNE II

ANNECY – H Azaiez, K Kuroda, A Michalowicz (✓ Spokesperson)
TRIESTE U – R Birsa, F Bradamante, S DallaTorre-Colautti, M Giorgi, L Lanceri, A Martin, A Penzo, P Shiavon, A Villari

Accelerator SATURNE-II *Detector* Combination

Reactions Polarized beam
$p\,p \rightarrow p\,p$ 0.94–2.44 GeV/c

Comments Uses a scintillating target.

Papers NP A505 (1989) 581.

SACLAY-104 (Feb 1983) Approved Jun 1983; Started Dec 1984; Completed Nov 1985.

MEASUREMENT OF WOLFENSTEIN PARAMETERS IN pp SCATTERING BETWEEN 600 MeV AND 3 GeV

SACLAY – M Arignon, J Ball, J Bystricky, P Chaumette, J Deregel, J Fabre, J M Fontaine (✓ Spokesperson), F Lehar (✓ Spokesperson), A de Lesquen, F Perrot, F Petit, L van Rossum
ANNECY – H Azaiez, A Michalowicz
INFN, TRIESTE – S DallaTorre-Colautti, A Penzo, A Villari
GENEVA U – W R Leo, Y Onel
UCLA – V Ghazikhanian, C A Whitten

Accelerator SATURNE-II *Detector* Combination

Reactions Polarized beam and target
$p\,p \rightarrow p\,p$ 1.2–3.8 GeV/c

Comments A 'complete' experiment. Measures 11 to 13 independent observables over the angular range 20 to 100° at 11 incident kinetic energies from 840 to 2700 MeV. See also SACLAY-225.

Papers NIM A239 (1985) 131, NIM A262 (1987) 207, EPL 3 (1987) 1175, JdeP 48 (1987) 199, JdeP 48 (1987) 1273, JdeP 48 (1987) 1901, NP B294 (1987) 1001, NP B294 (1987) 1013, NP B296 (1988) 527, NP B296 (1988) 535, NP B297 (1988) 653, NP B315 (1989) 269, NP B315 (1989) 284, NP B321 (1989) 299, JdeP 51 (1990) 2689, and JdeP 51 (1990) 2747.

SACLAY-105 (Feb 1983) Approved Nov 1983; Started Jan 1984.

TEST OF CHARGE SYMMETRY IN THE REACTION $dd \rightarrow {}^4\mathrm{He}\ \pi^0$

SACLAY – J Banaigs, J Berger, M Boivin, A Boudard, L Goldzahl, C Kerboul, F Plouin (Spokesperson), B Silverman, J Yonnet
FRASCATI – F L Fabbri, L Satta
UCLA – J Carroll, G Igo
ECOLE POLYTECHNIQUE – P Fleury

Accelerator SATURNE-II *Detector* SPES-IV

Reactions
deut deut $\rightarrow$ He π^0 0.8–1.35 GeV (T_{lab})

Comments Tests charge symmetry violation at the level of 1 pb/sr.

Papers PRL 58 (1987) 1922.

SACLAY-106 (Feb 1983) Approved Mar 1983; Started Jul 1983.

SIMULTANEOUS MEASUREMENT OF THE ASYMMETRIES $\epsilon(pp)$ AND $\epsilon(np)$

SACLAY – J Arvieux, J Ball, J Bystricky, J Deregel, J M Fontaine, T Hasegawa, F Lehar (✓ Spokesperson), A de Lesquen, C R Newsom, F Perrot, C Raymond, L van Rossum
ANNECY – H Azaiez, A Michalowicz
INFN, TRIESTE – A Penzo
GENEVA U – Y Onel

Accelerator SATURNE-II *Detector* Counter

Reactions Polarized beam
$p\,p \rightarrow p\,p$ 1.0–2.0 GeV/c
$n\,p \rightarrow n\,p$ "

Comments Uses a nucleon-nucleon polarimeter with neutron counters.

Papers NP A444 (1985) 597, NP B286 (1987) 635, and NP B304 (1988) 673.

SACLAY-113 (Feb 1983) Approved Mar 1984; Completed.

SEARCH FOR MULTIBARYONIC RESONANCES BY A STUDY OF MISSING MASS SPECTRA IN THE REACTIONS $pp \rightarrow \pi^- X$ AND $pd \rightarrow \pi^- X$

ORSAY, IPN – M P Combes, R Frascaria, B Tatischeff, N Willis (✓ Spokesperson)
SACLAY & ORSAY, IPN – M Boivin, Y Le Bornec
SACLAY & TOKYO U – F Soga
STRASBOURG, CRN – E Aslanides, D Benabdelouahed, A M Bergdolt, G Bergdolt, O Bing, P Fassnacht (✓ Spokesperson), F Hibou, C Kerboul

Accelerator SATURNE-II *Detector* SPES-III

Reactions
$p\,p \rightarrow \pi^-$ X
p deut $\rightarrow \pi^-$ X

Papers PL B229 (1989) 33, PR C43 (1991) 973, and NP A528 (1991) 608.

SACLAY-115 (Jan 1984) Approved Mar 1984; Started Oct 1984.

THE (d, ^{2}He) REACTION

LUND U – I Bergquist, A Brockstedt, L Carlen, P Ekstrom
COPENHAGEN U – C Ellegaard, C Gaarde (Spokesperson), J Syrak-Larsen
INDIANA U – C Goodman
LYON, IPN – M Bedjidian, D Contardo, J Y Grossiord, A Guichard, R Haroutunian, J R Pizzi
ORSAY, IPN – D Bachelier, J L Boyard, T Hennino, M Roy-Stephan
SACLAY – M Boivin, P Radvanyi

Accelerator SATURNE-II *Detector* SPES-IV

Reactions Polarized beam
deut $p \rightarrow {}^2$He n 1.6–3.6 GeV/c
deut $p \rightarrow {}^2$He $\Delta(1232\,P_{33})^0$ "
deut nucleus $\rightarrow {}^2$He nucleus "

Comments The $(d, {}^2\mathrm{He})$ reaction is a charge-exchange spin-transfer reaction like the (n, p) reaction. Measures the tensor analyzing power.

Papers PRL 59 (1987) 974.

SACLAY-117 (Nov 1985) Approved Nov 1985; Started 1986; Completed.

MEASUREMENT OF T_{20} AT 0 AND 180° AND OF DIFFERENTIAL CROSS SECTIONS FOR THE REACTION $\vec{d}p \rightarrow {}^3\mathrm{He}\ \pi^0$ FROM 500 TO 2200 MeV

SACLAY - L Antonuk, J Arvieux, J Berger, R Bertini, M Boivin, A Boudard (✓ Spokesperson), J M Durand, C Kerboul, B Mayer, A Stetz, J Tinsley, J Yonnet
GRENOBLE U - N Van Sen, Y Yanlin
ALBERTA U - J Cameron, C Lapointe, D M Sheppard
NEUCHATEL U - J F Germond
UNIVERSITY COLL, LONDON - C Wilkin

Accelerator SATURNE-II *Detector* SPES-IV

Reactions Polarized beam
deut $p \rightarrow {}^3\mathrm{He}\ \pi^0$ 0.5–2.2 GeV (T_{lab})

Papers PL B181 (1986) 28, and PL B214 (1988) 6.

SACLAY-121 (Sep 1984) Approved Nov 1984; Started 1985; Completed 1991.

SEARCH FOR DIBARYONS OF STRANGENESS $S = -1$ BETWEEN THE ΛN AND ΣN THRESHOLDS

ORSAY, IPN - J P Didelez (✓ Spokesperson), R Frascaria (✓ Spokesperson), E Warde
SOUTH CAROLINA U - G Adams, G Blanpied, G Pignault, B Preedom (✓ Spokesperson)
NEUCHATEL U - E Bovet, J P Egger
GRENOBLE U - C Perrin
CAEN U - J Yonnet
SACLAY - M Boivin, B Saghai
BONN U - J Ernst, T Mayer Kuckuck, R Siebert

Accelerator SATURNE-II *Detector* SPES-IV, Counter

Reactions
$p\ p \rightarrow K^+\ X$ —

Particles studied dibaryon($S = -1$)

Papers NC 102A (1989) 561, and NP A479 (1988) 389c.

SACLAY-123 (Oct 1985) Approved Nov 1985; Started 1986; Completed.

STUDY OF NARROW STRUCTURES IN THE INVARIANT MASSES OF TWO BARYONS

SACLAY - J Arvieux, R Beurtey, B Bonin, A Boudard, J C Duchazeaubeneix, J C Faivre, M Garcon, R Rouger, J Saudinos (Spokesperson), Y Terrien

Accelerator SATURNE-II *Detector* Combination

Reactions
$p\ p \rightarrow$ deut π^+ 336, 344, 350 MeV (T_{lab})

Particles studied dibaryon

Comments Studies dibaryon resonances around 350 MeV.

SACLAY-125 (Oct 1985) Completed.

COMPARISON OF COHERENT AND INCOHERENT PRODUCTION OF π^0 AND η ON NUCLEI

INFN, TURIN & TURIN U - E Chiavassa, G Dellacasa, F Ferrero, M Gallio, N De Marco, A Musso, A Piccotti, E Vercellin
SACLAY - R Bertini (✓ Spokesperson), J M Durand
STRASBOURG, CRN - F Brochard

Accelerator SATURNE-II *Detector* PINOT

Comments PINOT is a high-resolution π^0 and η detector.

SACLAY-128 (Mar 1985) Started Aug 1986; Completed.

FULL CALIBRATION OF THE SPES-I POLARIMETER FOR DEUTERONS BETWEEN 150 AND 400 MeV

SACLAY - L Antonuk (✓ Spokesperson), J Arvieux, R Bertini, B Bonin, A Boudard, J M Durand, B Silverman, J Tinsley, J Yonnet
ALBERTA U - J Cameron, G Roy, D Sheppard
TRIUMF & ALBERTA U - D Hutcheon (✓ Spokesperson)

Accelerator SATURNE-II *Detector* SPES-I, POMME

Reactions Polarized beam
deut 150, 200, 250, 300, 350, 400 MeV (T_{lab})

Comments Uses POMME, a medium energy deuteron polarimeter based on semi-inclusive deuteron-carbon scattering.

Papers NIM A288 (1990) 379, and NIM A288 (1990) 389.

SACLAY-129 (Nov 1985) Started 1985; Completed.

EXCITATION FUNCTION OF THE REACTION $pp \rightarrow$ DIBARYON(2124) $\rightarrow \pi^0 pp$ AT 0°

ORSAY, IPN - J Didelez, M A Duval, R Frascaria (✓ Spokesperson), G Rappenecker, T Reposeur, R Siebert, E Warde
SOUTH CAROLINA U - G Blanpied, B Preedom, M Rigney
NEUCHATEL U - E Bovet, J Egger (✓ Spokesperson)
FRASCATI - G Battistoni, C Bloise, L Satta
SACLAY - J Laget, B Saghai
BONN U - F Hinterger

Accelerator SATURNE-II *Detector* SPES-0

Reactions
$p\ p \rightarrow p\ p\ \pi^0$ 480–560 MeV (T_{lab})

Particles studied dibaryon, π^0

Papers NP A535 (1991) 445.

SACLAY-132 (Nov 1985) Approved Nov 1985; Started May 1986; Completed.

STUDY OF REACTIONS $pp \rightarrow pn\pi^+$ AND $pp \rightarrow pp\pi^+\pi^-$ WITH POLARIZED PROTONS FROM 0.8 TO 2.5 GeV

SACLAY - G Audit, R Babinet, G Bruge, J M Durand, Z Fodor, G Fournier, J Gosset (✓ Spokesperson), D L'Hote, M C Lemaire, B Mayer, J Poitou, B Saghai (✓ Spokesperson), O Valette, J Yonnet
CLERMONT-FERRAND U - J Augerat, J Berthot, P Y Bertin, H Fonvieille
STRASBOURG, CRN - F Brochard

Accelerator SATURNE-II *Detector* DIOGENE

Reactions Polarized beam
$p\ p \rightarrow p\ n\ \pi^+$ 1.46, 3.31 GeV/c
$p\ p \rightarrow p\ p\ \pi^0$ "
$p\ p \rightarrow p\ p\ \pi^+\ \pi^-$ 3.31 GeV/c

Comments Uses a liquid hydrogen target.

SACLAY-133 (Oct 1985) Approved Nov 1985; Started Jun 1986; Completed.

DEPENDENCE ON A OF PION PRODUCTION IN THE REACTION p NUCLEUS $\rightarrow \pi X$

STRASBOURG, CRN - D Benabdelouahed, G Bergdolt, O Bing, P Fassnacht, F Hibou (✓ Spokesperson)
ORSAY, IPN - Y Le Bornec (✓ Spokesperson), M P Comets, R Frascaria, B Tatischeff, N Willis

Accelerator SATURNE-II *Detector* SPES-III

Reactions
p nucleus $\rightarrow$ pion X 2.1, 2.7 GeV (T_{lab})

Comments Studies pion production as a function of A.

SACLAY-134 (Oct 1985) Approved Nov 1985; Started Mar 1986; Completed.

STUDY OF DEUTERON BREAKUP IN THE REACTION d NUCLEUS $\rightarrow pX$ AT 2.5 AND 3.72 GeV/c

ORSAY, IPN - J P Didelez, R Frascaria, E Warde
SACLAY - R Beurtey, M Boivin, F Plouin, J Yonnet (√ Spokesperson)
WILLIAM AND MARY COLL - C Lyndon, C F Perdrisat (√ Spokesperson), V Punjabi, P Ulmer
VIRGINIA U - P C Gugelot

Accelerator SATURNE-II *Detector* SPES-IV

Reactions Polarized beam
deut nucleus → p X 3.72 GeV/c

Comments Targets are H, He, and C. Measures the cross section and analyzing power T_{20} at 0°.

Papers PRL 59 (1987) 2840, and PR C39 (1989) 608. No other papers expected.

SACLAY-137 (Oct 1985) Approved Jun 1986; Completed.

FULL CALIBRATION OF THE "AHEAD" (ALBERTA HIGH EFFICIENCY ANALYZER FOR DEUTERONS) POLARIMETER FOR DEUTERONS BETWEEN 100 AND 260 MeV

SACLAY & ALBERTA U - L Antonuk (√ Spokesperson), G Roy
SACLAY - J Arvieux, B Bonin, A Boudard, J M Durand, M Garcon, J Tinsley, Y Yonnet
ORSAY, IPN - D Bachelier
ALBERTA U - E B Cairns, J Cameron (√ Spokesperson), H W Fielding, C Lapointe, W J McDonald, G C Neilson, D M Sheppard, J Soukup, K Starko

Accelerator SATURNE-II *Detector* SPES-I

Reactions Polarized beam
deut p → deut p 100-260 MeV (T_{lab})
deut p → $p\ p\ n$ "

Papers NIM A305 (1991) 257.

SACLAY-138 (Oct 1985) Approved Nov 1985; Started Jul 1986.

TEST OF CHARGE SYMMETRY BY COMPARISON OF ANALYZING POWERS T_{20} IN REACTIONS $dp \to {}^3\mathrm{He}\ \pi^0$ AND $dp \to {}^3\mathrm{H}\ \pi^+$

SACLAY - J Banaigs, J Berger, M Boivin, A Boudard, L Goldzahl (√ Spokesperson), F Plouin, J Yonnet
ALBERTA U - G Roy
FRASCATI - F Fabbri, G Picozza, L Satta (√ Spokesperson)
UCLA - V Ghazikhanian, J Gordon

Accelerator SATURNE-II *Detector* SPES-IV

Reactions
deut p → ^{3}He π^0 600, 900, 1100 MeV (T_{lab})
deut p → trit π^+ "

SACLAY-140 (Oct 1985) Approved Nov 1985; Started Jul 1986; Completed.

FIRST MEASUREMENT OF DIFFERENTIAL CROSS SECTIONS AND ANALYZING POWERS FOR THE REACTIONS $np \to pp\pi^-$ AND $np \to d\pi^+\pi^-$

SACLAY - R Beurtey, B Bonin, A Boudard, G Bruge, P Couvert, J Duchazeaubeneix, J Faivre, J Lugol, B Mayer, M Rouger, J Saudinos, B Silverman, Y Terrien (√ Spokesperson), F Wellers

Accelerator SATURNE-II *Detector* Combination

Reactions Polarized beam
$n\ p \to p\ p\ \pi^-$ 650-1000 MeV (T_{lab})
$n\ p \to$ deut $\pi^+\ \pi^-$ "

SACLAY-144 (Oct 1985) Approved Nov 1985; Started Dec 1985; Completed Dec 1990.

NUCLEON-NUCLEON PROGRAM (PART II): np SCATTERING UP TO 1.2 GeV

SACLAY - J Ball, J M Fontaine, C D Lac, F Lehar (√ Spokesperson), A de Lesquen, M de Mali, F Perrot (√ Spokesperson), L van Rossum
GENEVA U - J Bach, G Gaillard, R Hess (√ Spokesperson), D Rapin, P Sormani
FREIBURG U - R Binz, A Klett, R Peschina, E Rossle, H Schmitt
DUBNA - L Barabash, B Khachaturov, Y Usov
PRAGUE, TECH U - Z Janout
ARGONNE - D Lopiano, H Spinka

Accelerator SATURNE-II *Detector* Combination

Reactions Polarized beam and target
$n\ p \to n\ p$ 0.312-1.10 GeV (T_{lab})
$p\ p \to p\ p$ "

Comments Measures $np \to np$ and $pp \to pp$ using a polarized deuteron beam, and also $np \to np$ using a free polarized neutron beam (the polarized neutrons come from polarized deuteron breakup). Measures $\Delta\sigma_L$, $\Delta\sigma_T$, the correlation parameter, Wolfenstein parameters, and 3-spin index parameters. Compares results for free and quasi-free scattering. Data analysis continues.

Papers PL B169 (1986) 241, JdeP 48 (1987) 985, NP B286 (1987) 635, PL B189 (1987) 241, NP B304 (1988) 673, ZPHY C40 (1988) 193, and NP B358 (1991) 297.

SACLAY-145 (Jun 1987) Approved Nov 1987, Oct 1988.

MEASUREMENTS OF A_{ZZ} AND P_Z FOR THE REACTION $\vec{d}p \to \vec{p}pn$ IN COMPLETE KINEMATICS

ST PETERSBURG, INP - S L Belostotsky (Spokesperson), G A Korolev, O V Miklukho, M G Strikman, A A Vorobyov
BUDAPEST, CRIP - J Eroe
SACLAY - A Boudard, V N Nikulin

Accelerator SATURNE-II *Detector* SPES-IV

Reactions Polarized beam
deut p → $p\ p\ n$ 2 GeV (T_{lab})

Comments A complete kinematics experiment to study the behavior of the S and D waves in the deuteron.

SACLAY-155 (Nov 1986) Approved Jun 1987.

ABNORMAL PRODUCTION OF LOW-ENERGY NEUTRAL PIONS IN THE REACTION $pA \to \pi^0 X$ BETWEEN 300 AND 420 MeV BEAM KINETIC ENERGY

SACLAY - D Bachelier, C Cerruti, J M Hisleur, J Julien (Spokesperson), B Saghai
GRENOBLE U - D Lebrun, V S Nguyen
KERNFORSCHUNGSANLAGE, JULICH - K Kilian
UPPSALA U - T Johansson
MOSCOW, INR - A Kurepin

Accelerator SATURNE-II *Detector* Counter

Reactions
p nucleus → π^0 X 300-420 MeV (T_{lab})

SACLAY-157 (Dec 1986) Approved Jun 1987; Started Jun 1987.

MEASUREMENT OF THE MASS OF THE ETA AND CALIBRATION OF THE SATURNE BEAM ENERGY

SACLAY - J Banaigs, J Berger, R Beurtey (Spokesperson), A Boudard, L Goldzahl, A Nakach, F Plouin (Spokesperson), G Simonneau, C Whitten
ECOLE POLYTECHNIQUE - P Fleury
FRASCATI - L Satta

Accelerator SATURNE-II *Detector* SPES-IV

Reactions Polarized beam and target
deut p → ^{3}He π^0 0.65, 1.3, 1.6, 2.1, 2.4, 3.2 GeV/c
deut p → trit π^+ "
deut p → ^{3}He η "
deut p → ^{3}He ω "
deut p → ^{3}He η' "

Particles studied η, ω, η'

Papers PRL 61 (1988) 919.

SACLAY-166 (Feb 1988) Approved Jun 1988; Started Sep 1988; Completed 1991.

REACTION $H(d,2p)n$ WITH POLARIZED DEUTERONS AT 200 MeV

GRENOBLE U - J P Bocquet, J Carbonell, L Ghedira, S Kox (✓ Spokesperson), F Merchez, C Perrin, D Rebreyend
SACLAY - J Arvieux, A Boudard, M Garcon, J Yonnet
GENEVA U - G Gaillard
STRASBOURG, CRN - G Guillaume
RIKKYO U - T Motobayashi
UNIVERSITY COLL, LONDON - C Wilkin

Accelerator SATURNE-II *Detector* EMRIC

Reactions Polarized beam
deut $p \rightarrow p\ p\ n$ 200, 350 MeV (T_{lab})

Comments One of the aims is to demonstrate that the reaction $^1H(d,2p)n$ can be used to develop a new deuteron tensor polarimeter at intermediate energies. Measures the cross section and A_y, A_{xx}, and A_{yy}, with an upgraded EMRIC detector. The detector is composed of an array of 25 CsI crystals working in conjunction with two MWPC's.

Papers PL B233 (1989) 69, and PL B266 (1991) 264.

SACLAY-173 (Oct 1987) Approved Jun 1987; Started Nov 1987.

ASYMMETRY IN pp SCATTERING IN SMALL STEPS OF ENERGY BETWEEN 130 AND 260 MeV

SACLAY - J Arvieux, R Beurtey (Spokesperson), J M Durand, B Mayer, G Milleret, J Saudinos, Y Terrien

Accelerator SATURNE-II *Detector* Spectrometer

Reactions Polarized beam
$p\ p \rightarrow p\ p$ 130-260 MeV (T_{lab})

Comments Uses the beam polarimeter of the SD2 SATURNE extraction. The detector is a high energy scintillator with a good angular resolution.

SACLAY-174 (1987) Approved Oct 1987; Started May 1988.

PRODUCTION OF LIGHT MESONS X IN $pp \rightarrow ppX$ AT THRESHOLD AND IN NUCLEAR MATTER

STRASBOURG, CRN - A M Bergdolt, G Bergdolt, O Bing (✓ Spokesperson), A Bouchakour, F Brochard, R Ernwein, F Hibou
ORSAY, IPN - Y Le Bornec, M P Comets, P Courtat, B Tatischeff, N Willis
SACLAY - M Boivin, B Nefkens, F Plouin
BEN GURION U - A Moalem

Accelerator SATURNE-II *Detector* SPES-III

Reactions

$p\ p \rightarrow p\ p\ \eta$	1256, 1258, 1260, 1265, 1300, 1350, 1450, 1550 MeV (T_{lab})
$p\ ^{12}C \rightarrow p\ p\ ^{11}B$	1260, 1450, 1550 MeV (T_{lab})
p deut $\rightarrow p$ deut X	905, 908 MeV (T_{lab})
$p\ p \rightarrow p\ p\ \eta'$	2420 MeV (T_{lab})

Comments In the first phase of the experiment (1989), the eta production near threshold in $pp \rightarrow pp\eta$ and bound states of the η in $p\ ^{12}C \rightarrow pp(\eta\ ^{11}B)$ were studied. The missing mass spectrum was reconstructed by detecting two photons in coincidence and at 0°. In 1990, the $\eta'(958)$ meson was analyzed.

SACLAY-177 (Oct 1988) Approved Jun 1988; Completed Oct 1989.

DEUTERON VECTOR POLARIZATION AND POLARIZATION TRANSFER COEFFICIENTS IN THE REACTION $pp \rightarrow d\pi^+$

SACLAY - M Boivin, B Bonin, A Boudard, G Bruge, P Couvert, J M Durand, M Garcon, C Kerboul, B Mayer (✓ Spokesperson), Y Terrien, J Yonnet
ALBERTA U - R Abegg, L G Greeniaus, D A Hutcheon (✓ Spokesperson), W J McDonald, G A Moss

Accelerator SATURNE-II *Detector* SPES-IV, POMME

Reactions Polarized beam
$p\ p \rightarrow$ deut π^+ 1.2 2.9 GeV (T_{lab})

SACLAY-190 (Mar 1988) Approved Dec 1988; Completed May 1991.

SPIN STRUCTURE OF THE Δ EXCITATION

ORSAY - D Bachelier, J C Jourdain
COPENHAGEN U - C Gaarde (✓ Spokesperson)
SACLAY - P Zupranski (✓ Spokesperson)

Accelerator SATURNE-II *Detector* SPES-IV

Reactions Polarized beam
deut $p \rightarrow\ ^2He\ \Delta(1232\ P_{33})^C$

Comments Measures T_{20} and T_{22}. A continuation of SACLAY-115. The analysis is in progress (February 92).

SACLAY-192 (Mar 1988) Approved Jun 1988; Started Jul 1988; Completed Sep 1988.

STUDY OF p NUCLEUS INTERACTIONS AT 0.8 AND 1.6 GeV

SACLAY - J Gosset, D L'Hote, M C Lemaire (✓ Spokesperson), B Lucas, J Poitou, O Valette
STRASBOURG, CRN - P Gorodetzky (✓ Spokesperson)
CLERMONT-FERRAND U - J P Alard, J Augerat, N Bastid, P Charmensat, P Dupieux, J Marroncle, G Montarou (✓ Spokesperson), M J Parizet, D Quassoud, A Rahmani
ORSAY, IPN - D Bachelier, J L Boyard, B Faure, T Hennino, J C Jourdain, P Radvanyi, M Roy-Stephan
HEIDELBERG U, IHEP - D Pelte, M Trzaska

Accelerator SATURNE-II *Detector* Drift chamber

Reactions
p nucleus 0.8, 1.6 GeV (T_{lab})

Comments Charged pions and light nuclei have been measured in the interaction of proton beams with C, Nb, and Pb targets. A pictorial drift chamber of the DIOGENE large solid-angle detector has been used.

Papers PR C43 (1991) 2711.

SACLAY-197 (Mar 1988) Approved Jun 1988; Started Nov 1988.

STUDY OF $pd \rightarrow\ ^3He\ X$ AT THRESHOLD FOR $X = \omega$ OR η' AND FOR m_X = 1-1.5 GeV

SACLAY - R Beurtey, M Boivin, W Briscoe, P Fleury, J Martino, B Mayer, A Moalem, F Plouin (Spokesperson)
ORSAY, IPN - D Bachelier, J L Boyard, T Hennino
UCLA - R Kessler, B M K Nefkens, J Price

Accelerator SATURNE-II *Detector* ?

Reactions
p deut $\rightarrow\ ^3He$ X

Particles studied ω, η', ϕ

Comments A continuation of SACLAY-157.

SACLAY-198 (Mar 1988) Approved Dec 1988; Started Nov 1990; Completed.

MEASUREMENTS OF SOME RARE DECAY MODES OF THE η

SACLAY - A Baldisseri, A Boudard, B Fabbro, M Garcon, W Jacobs, C Kerboul, B Mayer (✓ Spokesperson), J Poitou, J Saudinos, E Tomasi, S Vigdor, F Wellers
UCLA - R Kessler, B M K Nefkens (✓ Spokesperson), B Tippens, M Wang
ZURICH U - E A Hermes, C Niebuhr, A van der Schaaf
GEORGE WASHINGTON U - W Briscoe, A Petrov
TRIUMF - R Abegg, W van Oers

DUBNA – L Lytkin

Accelerator SATURNE-II *Detector* SPES-II

Reactions

p deut $\rightarrow$ ^{3}He η > 896 MeV (T_{lab})

Particles studied η

Comments Measures the η branching ratio to $\mu^+\mu^-$ with 12% accuracy. The muons are detected by a two-range telescope. Events are identified by using constraints like coplanarity, angular correlation, total energy conservation, and the invariant mass of the two muons. Data analysis in progress (January 92).

SACLAY-202 (Oct 1988) Approved 1988; Started 1989; Completed.

STUDY OF THE PROTON POLARIZATION IN $\vec{d}A \rightarrow \vec{p}X$ REACTION AT 0° AND 2.1 GeV

WILLIAM AND MARY COLL – E Cheung, C F Perdrisat (✓ Spokesperson)
NORFOLK STATE U – V Punjabi
SACLAY – R Beurtey, M Boivin, F Plouin, J Yonnet (✓ Spokesperson)
TRIUMF – R Abegg
VIRGINIA U – P C Gugelot
INDIANA U – W W Jacobs

Accelerator SATURNE-II *Detector* SPES-IV, POMME

Reactions Polarized beam

deut nucleus $\rightarrow$ p X 2.1 GeV (T_{lab})

Particles studied p

Comments Measures the proton polarization and studies the D state of the deuteron. Results are submitted for publication (January 92).

SACLAY-206 (Nov 1988) Approved Dec 1988.

MEASUREMENT OF THE CROSS SECTION NEAR THRESHOLD FOR ^{6}Li $p \rightarrow$ ^{7}Be η

SACLAY – M Boivin, H Catz, P Couvert, B Mayer, A Moalem, B Nefkens (✓ Spokesperson), E Tomasi, F Wellers
UCLA – D Barlow, R Kessler, C Pillai
ORSAY, IPN – D Bachelier, J L Boyard
GEORGE WASHINGTON U – W Briscoe
TRIUMF – R Abegg

Accelerator SATURNE-II *Detector* SPES-IV

Reactions

^{6}Li $p \rightarrow$ ^{7}Be η 3944–4500 MeV (T_{lab})

Comments Running awaits the availability of a ^{6}Li beam. In preparation (January 92).

SACLAY-209 (Mar 1989) Approved 1989; Started 1990; Completed Nov 1991.

CROSS SECTION FOR THE REACTION $pp \rightarrow pp\pi^0$

BONN U – G Anton, J Arends, M Breuer, K Buchler, G Noeldeke
SOUTH CAROLINA U – G Blanpied (✓ Spokesperson), C Djalali, M A Duval, B Preedom, M Rigney
ORSAY, IPN – G Berrier-Ronsin, J P Didelez (✓ Spokesperson), A Elayi, R Frascaria, E Hourani (✓ Spokesperson), G Rappenecker, L Rosier, R Siebert, E Warde
FRASCATI – G Battistoni, C Bloise, L Satta
NEUCHATEL U – J P Egger
SACLAY – B Saghai

Accelerator SATURNE-II *Detector* SPES-0

Reactions

$p\ p \rightarrow p\ p\ \pi^0$ 325–1000 MeV (T_{lab})

Particles studied π^0

Comments Measures the differential cross section and asymmetries for the reaction, from threshold to 1000 MeV. Uses the SPES0 2π detector.

SACLAY-212 (Feb 1989) Approved 1989; Started 1989.

STUDY OF REACTIONS $\vec{p}p \rightarrow \Delta n$, AND $\vec{p}p \rightarrow \Delta\Delta$ AT 1500, 1800, AND 2100 MeV

ORSAY, IPN – Y Le Bornec, M P Comets (✓ Spokesperson), P Courtat, R Gacougnolle, E Loireleux, F Reide (✓ Spokesperson), B Tatischeff, N Willis
SACLAY – M Boivin

Accelerator SATURNE-II *Detector* SPES-III

Reactions Polarized beam

$p\ p \rightarrow \Delta(1232\ P_{33})^{++}\ n$ 1.5, 1.8, 2.1 GeV (T_{lab})

$p\ p \rightarrow \Delta(1232\ P_{33})^{++}\ \Delta(1232\ P_{33})^0$ "

Particles studied $\Delta(1232\ P_{33})^{++}$

Comments The Δ^{++} is detected by its decay products, p and π^+.

SACLAY-213 (Feb 1989) Approved Jan 1989, Jan 1991.

MEASUREMENT OF SPIN OBSERVABLES IN THE REACTION $pp \rightarrow pK^+Y^*$

TURIN U & INFN, TURIN – F Balestra, S Bossolasco, M P Bussa, L Fava, L Ferrero, R Garfagnini, A Grasso, A Maggiora, D Panzieri, G Piragino, F Tosello, G Zosi
INDIANA U – L C Bland, W W Jacobs, S E Vigdor
SACLAY – J Arvieux, Y Bedfer, R Bertini (✓ Spokesperson), F Brochard
DUBNA – I V Falomkin, V I Lyascenko, G B Pontecorvo, V Serdyuk, V I Travkin, B Zalikhanov

Accelerator SATURNE-II *Detector* Combination

Reactions Polarized beam

$p\ p \rightarrow p\ K^+\ \Lambda$ 3.8 GeV/c

$p\ p \rightarrow p\ K^+\ \Sigma$ "

$p\ p \rightarrow p\ K^+\ Y^*$(unspec) "

Particles studied strange

Comments The experiment will measure differential cross sections, spin observables, A_{y0}, D_{yy}, P_Λ, and P_Σ at highest energies available at SATURNE-II. Expected to run in 1994. The detector, a magnet with chambers and counters, is under construction (February 92).

SACLAY-216 (Mar 1989, Nov 1991)

MEASUREMENT OF SPIN CORRELATION OBSERVABLES IN THE REACTION $\vec{d}\vec{p} \rightarrow d\vec{p}$ AT 1.6 GeV USING SCINTILLATING FIBER TRACKING DETECTORS

UCLA – M Bleszynski, A Boutefnouchet, J Carroll, V Ghazikhanian, G J Igo (✓ Spokesperson), T Jaroszewicz, M Perdekamp, S Trentalange, C Whitten
SACLAY – J Arvieux, J Ball, A Boudard, J Bystricky, F Plouin, J Yonnet

Accelerator SATURNE-II *Detector* Counter

Reactions Polarized beam and target

deut $p \rightarrow$ deut p 1.6 GeV (T_{lab})

Particles studied deut

Comments Continuation of the SACLAY-038-2 experiment. Uses a scintillating fiber hodoscope array.

SACLAY-217 (Mar 1989)

MEASUREMENT OF THE THIRD ORDER (SPIN TRANSFER) VECTOR AND TENSOR SPIN OBSERVABLES IN THE REACTION $\vec{d}\vec{p} \rightarrow d\vec{p}$ AT 1.6 GeV DEUTERON BEAM ENERGY

UCLA – J Carroll, Z Cherdoud, V Ghazikhanian, E Gulmez, G J Igo (✓ Spokesperson), T Jaroszewicz, S Trentalange, C Whitten
SACLAY – J Arvieux, J Ball, A Boudard, J Bystricky, J M Fontaine, F Plouin, J Yonnet

Accelerator SATURNE-II *Detector* Combination

Reactions Polarized beam and target

deut $p \rightarrow$ deut p 1.6 GeV (T_{lab})

Particles studied deut

Comments The elastic dp scattering is studied with both N-type and L-type polarized proton targets. The spin-transfer observables are measured with considerably improved statistical accuracy. See also SACLAY-038-2.

SACLAY-222 (Nov 1989) Approved 1989; Started 1990.

MESON PRODUCTION NEAR THRESHOLD FROM THE ϕ TO THE $f_1(1285)$

ORSAY, IPN – J P Didelez, M A Duval, R Frascaria, M Morlet, R Siebert (Spokesperson), E Warde
SACLAY – J Arvieux, F Plouin
BONN U – J Bisplinghoff, J Ernst, F Hinterberger, R Jahn (Spokesperson), R Joosten, U Lahr, C Lippert, A Marx, R Wurzinger

Accelerator SATURNE-II *Detector* SPES-IV

Reactions

p deut $\rightarrow$ ^{3}He X

Particles studied ϕ, $f_1(1285)$

Comments Extends and refines existing measurements of the threshold excitation curve of meson production. An increasing degree of exclusivity is achieved by adding scintillator arrays to the SPES-IV detector. In the second phase, planned for March 1992, the regions around the K^+K^0 threshold, and above 1.9 GeV, will be explored in 100 MeV steps.

SACLAY-225 (Dec 1989) Approved Jun 1991; Started Nov 1991.

DETERMINATION OF THE NUCLEON-NUCLEON SCATTERING AMPLITUDES IN THE ENERGY REGION FROM 1.1 TO 2.7 GeV AND A SEARCH FOR A STRUCTURE AROUND $T_{kin} \sim 2.1$ GeV

SACLAY – J Ball (✓ Spokesperson), J Bystricky, P Chesny, M Combet, J M Fontaine (✓ Spokesperson), R Kunne, F Lehar, M C Lemaire, A de Lesquen, M de Mali, J L Sans
GENEVA U – P Demierre, R Hess (✓ Spokesperson), D Rapin, B Vuaridel
ARGONNE – M Beddo, D Grosnick, D Hill, T Kasprzyk, D Lopiano, H Spinka (✓ Spokesperson), D Underwood, A Yokosawa
DUBNA – L S Barabash, E I Bunyatova, M Finger, V N Frolov, V A Kalinnikov, Y M Kazarinov, B A Khachaturov (✓ Spokesperson), E S Kuzmin, V N Mataphonov, I L Pisarev, A A Popov, Y A Usov
PRAGUE, TECH U – Z Janout

Accelerator SATURNE-II *Detector* Combination

Reactions Polarized beam and target

$p\,p \rightarrow p\,p$ 1.1 – 2.7 GeV (T_{lab})
$p\,n \rightarrow p\,n$ "

Comments Uses a polarized proton beam, and polarized proton and deuteron targets. Measures various spin observables at 15 energies between 1.96 and 2.24 GeV, and spin dependent observables in pn quasielastic scattering at 8 energies between 1.1 and 2.7 GeV. The detector consists of a two-arm spectrometer, a polarimeter, and a large neutron counter hodoscope.

SACLAY-233 (Nov 1990) Approved 1991.

IN-FLIGHT BREAKUP OF THE POLARIZED ^{6}Li

WILLIAM AND MARY COLL – E Cheung, C F Perdrisat (✓ Spokesperson), R Pourang
SACLAY – M Boivin, E Tomasi-Gustafsson, J Yonnet (✓ Spokesperson)
NORFOLK STATE U – V Punjabi
ORSAY, IPN – R Frascaria, R Siebert, E Warde
ST PETERSBURG, INP – S Belostotsky, O Miklukho, V Nikulin
TRIUMF – R Abegg
GEORGE WASHINGTON U – D Lehman

Accelerator SATURNE-II *Detector* SPES-IV, POMME

Particles studied p, deut, ^{3}He, He

Comments Analyzes the breakup of polarized ^{6}Li at 750 MeV/A, and compares results for (Li,d), (Li,α), (Li,^{3}He), and (Li,^{3}H) processes. Determines the D-state wave function in dd and ^{3}H^{3}He projections of the ^{6}Li ground state. More data taking scheduled for fall 1992.

SACLAY-235 (Jan 1991) Approved Jan 1991, Dec 1991; Started Jul 1991.

CALIBRATION OF POLDER, A NEW DEUTERON TENSOR POLARIMETER AT INTERMEDIATE ENERGIES

GRENOBLE U – J P Bocquet, C Furget, S Kox (✓ Spokesperson), C Perrin, J S Real, D Rebreyend, E Voutier
SACLAY – M Garcon, E Tomasi-Gustafsson
ORSAY – L Bimbot, C Djalali, M Morlet, L Rosier, A Willis
RUTGERS U – G Edwards, C Glasshauser
SOUTH CAROLINA U – B Johnson

Accelerator SATURNE-II *Detector* POLDER

Reactions Polarized beam

deut $p \rightarrow p\,p\,n$ 200 – 400 MeV (T_{lab})

Comments Dedicated to the calibration of a new tensor polarimeter based on the H(d, 2p)n reaction. The polarimeter is to be operated in the deuteron energy range between 200 and 400 MeV. POLDER is particularly well designed for the t_{20} measurement of the recoiling deuteron in ed scattering at large momentum transfers. In progress (April 92).

SACLAY-237 (Nov 1990) Approved Jan 1991; Started Jul 1991.

STUDY OF THE $pp \rightarrow pp\eta$ AND (p,η) REACTIONS ON NUCLEI AT $T_p \geq 1.26$ GeV

TURIN U & INFN, TURIN – E Chiavassa, G Dellacasa, F Ferrero, M Gallio, P Guaita, N De Marco (✓ Spokesperson), A Musso, A Piccotti, E Scomparin, E Vercellin (✓ Spokesperson)
MOSCOW, INR – S N Filippov, J K Gavrilov, V A Krasnov, A B Kurepin, A I Reshetin
SACLAY – J M Durand

Accelerator SATURNE-II *Detector* PINOT

Reactions

$p\,p \rightarrow p\,p\,\eta$
p nucleus $\rightarrow \eta$ X
p deut $\rightarrow \eta$ X

Comments The aim is to study the first two reactions near threshold by detecting η mesons with the two-arm neutral meson spectrometer, PINOT. For the first reaction the total and doubly differential cross section $d^2\sigma/d\Omega dT$ is measured. The (p,η) reaction on nuclei is studied at the same incident energies measuring the η kinetic energy distributions for η's emitted forward in the laboratory. Also investigates the $pd \rightarrow \eta X$ reaction in order to extract information on the $pn \rightarrow \eta X$ elementary process, by comparing pd and pp induced reactions.

SACLAY-244 (Apr 1991) Approved Jun 1991; Started 1991; Completed Sep 1991.

STUDY OF THE REACTION $\vec{p}p \rightarrow \pi^-\pi^-X$

ORSAY, IPN – L Bimbot, Y Le Bornec, M P Comets, P Courtat, R Gacougnolle, T Kirchner, F Reide, B Tatischeff (✓ Spokesperson), N Willis
SACLAY – M Boivin, J Yonnet
STRASBOURG, CRN – A M Bergdolt, G Bergdolt, O Bing, F Hibou, A Taleb

Accelerator SATURNE-II *Detector* SPES-III

Reactions Polarized beam

$p\,p \rightarrow \pi^-\,\pi^-$ X 2.7 GeV (T_{lab})

Particles studied dibaryon

Comments Studies the two-pion invariant mass, and production of high isospin dibaryons, particularly exploiting the mass region around 2.156 GeV/c^2. Analysis in progress (February 92).

SACLAY-246 (May 1991) Approved Jun 1991.

π^0 PRODUCTION IN THE REACTION $dp \rightarrow {}^3He\ \pi^0$ NEAR THRESHOLD

SACLAY - A Baldisseri, A Boudard, B Fabbro, M Garcon, B Mayer (✓ Spokesperson), F Plouin, J Poitou, J Saudinos, E Tomasi
UCLA - B M K Nefkens (✓ Spokesperson), B Tippens, M Wang
DUBNA - L Lytkin
ZURICH U - C Niebuhr, A van der Schaaf
GEORGE WASHINGTON U - W Briscoe
TRIUMF - R Abegg, W van Oers

Accelerator SATURNE-II *Detector* SPES-II

Reactions Polarized beam
deut $p \rightarrow {}^3$He π^0 0.4 GeV (T_{lab})

Particles studied π^0

Comments Scheduled to run July 92.

SERPUKHOV Experiments

SERPUKHOV-UNK-001 (1988) Approved Apr 1988.

STUDY OF SPIN EFFECTS AT 400 TO 3000 GeV USING AN INTERNAL JET TARGET AT UNK

SERPUKHOV – G A Alekseev, V D Apokin, Y I Arestov, N I Belikov, V V Borog, O V Buyanov, B V Chujko, V V Churakov, V S Datsko, A A Derevshchikov, A M Gorin, O A Grachev, V N Grishin, V A Kachanov, Y V Kharlov, V Y Khodyrev, V G Lapshin, V M Leontiev, I V Manujlov, Y A Matulenko, V A Medvedev, Y M Melnik, A P Meschanin, N G Minaev, V V Mochalov, A A Morozov, V K Myalitsyn, A I Mysnik, S B Nurushev, D I Patalakha, V A Polyakov, A F Prudkoglyad, A I Ronzhin, V I Rykalin, V V Rykalin, V L Rykov, L F Soloviev, V L Solovjanov (√ Spokesperson), S M Troshin, M N Ukhanov, A N Vasiliev, A E Yakutin, S V Yerin, A A Zajchenko, G V Zholobov

DUBNA – L S Barabash, S I Bilenkaya, N S Borisov, V A Budilov, V V Fimushkin, M Finger, N V Gorbunov, N L Gorshkova, V A Kalinnikov, A G Karev, Y M Kazarinov, B A Khachaturov, V S Kiselev, B Z Kopeliovich, M I Kulikov, R H Kutuev, E A Ladygin, A B Levkovich, M Y Liburg, V G Luppov, V N Matafonov, A B Neganov, V A Nikitin, P V Nomokonov, V P Obudkovsky, Y K Pilipenko, I L Pisarev, Y A Pliss, A A Popov, I K Potashnikova, M G Shafranova, V V Shutov, V I Snyatkov, Y A Usov, A I Valevich, V P Yershov, N K Zhydkov, I V Zhygulin, R Y Zulkarneev

TBILISI STATE U – N S Amaglobeli, Y S Bagaturia, B G Chiladze, G A Dzhambazishvili, L N Glonty, G G Macharashvili, A I Ocherashvili, R M Sakandelidze, T M Sakhelashvili

MOSCOW STATE U – L I Belzer, A I Demianov, A M Gribushkin, N A Kruglov, A S Proskuryakov, L I Sarycheva, N B Sinev, A A Yershov

MICHIGAN U – V A Anferov, R Baiod, J A Bywater, C M Chu, D G Crabb, D B Crandell, Y S Derbenev, W A Kaufman, A D Krisch (√ Spokesperson), A M T Lin, D C Peaslee, R A Phelps, R S Raymond, D S Shoumkin, D P Stewart, J A Stewart, V K Wong

BROOKHAVEN – L G Ratner

MIT – G R Court, D Kleppner, A Yu

Accelerator SERPUKHOV-UNK *Detector* NEPTUN

Reactions Polarized target

$p\,p \to p\,p$	400–3000 GeV/c
$p\,p \to \gamma$ X	"
$p\,p \to e^-\,e^+$ X	"
$p\,p \to \mu^-\,\mu^+$ X	"
$p\,p \to$ pion X	"
$p\,p \to K^\pm$ X	"
$p\,p \to \eta$ X	"
$p\,p \to \eta'$ X	"
$p\,p \to \omega$ X	"
$p\,p \to f_2(1270)$ X	"
$p\,p \to$ jet X	"
$p\,p \to \gamma$ jet X	"
$p\,p \to \Lambda$ X	"
$p\,p \to \overline{\Lambda}$ X	"
$p\,p \to p$ X	"
$p\,p \to \overline{p}$ X	"
$p\,p \to$ hyperon X	"
$p\,p \to \Sigma^+$ X	"
$p\,p \to \Sigma^-$ X	"
$p\,p \to \Xi^-$ X	"
$p\,p \to \Lambda_c^+$ X	"
p nucleus $\to \gamma$ X	"
p nucleus $\to e^-\,e^+$ X	"
p nucleus $\to \mu^-\,\mu^+$ X	"
p nucleus $\to$ pion X	"
p nucleus $\to K^\pm$ X	"
p nucleus $\to \eta$ X	"
p nucleus $\to \eta'$ X	"
p nucleus $\to \omega$ X	"
p nucleus $\to f_2(1270)$ X	"
p nucleus $\to$ jet X	"
p nucleus $\to \gamma$ jet X	"
p nucleus $\to \Lambda$ X	"
p nucleus $\to \overline{\Lambda}$ X	"
p nucleus $\to p$ X	"
p nucleus $\to \overline{p}$ X	"
p nucleus $\to$ hyperon X	"
p nucleus $\to \Sigma^+$ X	"
p nucleus $\to \Xi^-$ X	"
p nucleus $\to \Lambda_c^+$ X	"

Comments Studies spin effects when the 400 GeV and then 3 TeV protons in the UNK rings collide with a spin-polarized ultra-cold atomic-hydrogen internal jet target. Five different spectrometers will observe spin phenomena in various hadron-hadron reactions at small, medium, and large transverse momenta.

Papers PTE 3 (1991) 52, and PTE 4 (1991) 57.

SERPUKHOV-UNK-002 (1988) Approved Apr 1988.

EXPERIMENTAL STUDY OF GLUON INTERACTIONS AND GLUEBALL PRODUCTION IN CENTRAL HADRON COLLISIONS IN THE ENERGY RANGE 500 GeV TO 3000 GeV AT UNK

SERPUKHOV – S A Akimenko, V T Belousov, A M Blick, V S Datsko, A V Dolgopolov, S V Donskov, A M Gorin, A V Inyakin, V P Kartashev, G V Khaustov, V N Kolosov, A K Konoplyannikov, A V Kulik, V M Kutjin, V G Lapshin, A A Lednev, I V Manuylov, Y M Melnik, A I Pavlinov, S A Polovnikov, V A Polyakov, Y D Prokoshkin (√ Spokesperson), V B Rakhmatova, V I Rykalin, S A Sadovsky, V D Samoylenko, P M Shagin, A V Shtannikov, A V Singovsky, A S Soloviev, V P Sugonyaev, V G Vasilchenko, A E Yakutin, A A Zaichenko

DUBNA – V V Karpukhin, V I Komarov, V V Kruglov, A V Kuptsov, L L Nemenov

MOSCOW STATE U – L G Afanasyev, O E Gorchakov, A V Kulikov, V P Kurochkin, S V Trusov

KURCHATOV INST, MOSCOW – I I Gurevich, Y A Kozlov, V P Martemyanov, E P Solodov, G S Vidyakin, V N Vyrodov

NOVOSIBIRSK, IYF – L M Barkov, B I Khazin, P K Lebedev

MOSCOW, ITEP – V K Grigoryev, A P Grishin, V N Nozdrachev, V V Sokolovsky, V V Vladimirsky

TBILISI, INST PHYS – A K Djavrishvili, D B Kapanadze, I Z Khalvashi, T A Lomtadze, G G Sekhneaidze

TBILISI STATE U – N S Amaglobeli, B G Chiladze, M D Tabidze

MOSCOW PHYS ENG INST – A M Baranov, A N Kalinovsky, Z Khorguashvili, S Y Smirnov

YEREVAN PHYS INST – A S Aleksanyan, A O Gasparyan

BRUSSELS U, IISN – F G Binon, J P Stroot

LOS ALAMOS – D B Alde, E A Knapp

ANNECY – J P Peigneux, M Poulet

KEK – S Inaba, M Kobayashi, K Takamatsu, T Tsuru

PISA U & INFN, PISA – R Bellazzini

Accelerator SERPUKHOV-UNK *Detector* GLUON

Reactions

p nucleon $\to p$ nucleon glueball	500–3000 GeV/c
p nucleon $\to p$ nucleon meson^0	"
π^- nucleon $\to$ nucleon π^- glueball	500–2500 GeV/c
π^- nucleon $\to$ nucleon π^- meson^0	"
K^+ nucleon $\to$ nucleon K^+ glueball	200–2000 GeV/c
K^+ nucleon $\to$ nucleon K^+ meson^0	"

p nucleon $\rightarrow J/\psi(1S)$ X	1000–3000 GeV/c
p nucleon $\rightarrow \psi$(unspec) X	"
p nucleon $\rightarrow \eta_c(1S)$ X	"
p nucleon $\rightarrow \chi_c$(unspec) X	"
p nucleon $\rightarrow \Upsilon$(unspec) X	"
p nucleon $\rightarrow \eta_b$ X	"
p nucleon $\rightarrow \chi_b$(unspec) X	"
π^- nucleon $\rightarrow J/\psi(1S)$ X	500–2500 GeV/c
π^- nucleon $\rightarrow \psi$(unspec) X	"
π^- nucleon $\rightarrow \eta_c(1S)$ X	"
π^- nucleon $\rightarrow \chi_c$(unspec) π^- X	"
π^- nucleon $\rightarrow \Upsilon$(unspec) X	"
π^- nucleon $\rightarrow \eta_b$ X	"
π^- nucleon $\rightarrow \chi_b$(unspec) X	"
$\pi^- p \rightarrow n \pi^0$	200–2400 GeV/c
$\pi^- p \rightarrow n \eta$	"
$\pi^- p \rightarrow n \eta'$	"
$\pi^- p \rightarrow n \omega$	"
$K^- p \rightarrow n \overline{K}^0$	"
$\overline{p} p \rightarrow n \overline{n}$	"

Particles studied glueball, meson^0

Papers NIM A302 (1991) 443.

SERPUKHOV-UNK-003 (1988) Approved Apr 1988.

THE MULTIPARTICLE SPECTROMETER

SERPUKHOV – S I Bityukov, G V Borisov, R I Dzhelyadin, V I Garkusha, Y P Gouz, V P Kartashov, A N Karyukhin, Y A Khokhlov, G A Klyuchnikov, V F Konstantinov, M E Kostrikov, V I Kotov, M A Kulagin, V V Lapin, V D Matveev, F N Novoskoltsev, V F Obraztsov, A P Ostankov, V K Semenov, N K Vishnevsky, E V Vlasov, A M Zaitsev (✓ Spokesperson)
DUBNA – A G Asmolov, G S Bitsadze, Y A Budagov, I E Chirikov-Zorin, Y I Davydov, V P Dzhelepov, A V Efremov, A A Feshchenko, V B Flyagin, N N Govorun, V G Ivanov, Y N Kharzheev, B Z Kopeliovich, Y F Lomakin, L K Lytkin, E I Maltsev, V N Pervushin, N A Rusakovich, A A Semenov, S V Sergeev, V V Vinogradov, A G Volodko
MOSCOW, INR – A I Berlev, V N Bolotov, E N Gushchin, V V Isakov, O V Karavichev, Y M Klubakov, V A Lebedev, V N Marin, E A Monich, Y V Musienko, A A Poblaguev, V E Postoev
TBILISI, INST PHYS – V V Beladidze, D I Hubua, V V Koshtoev, T A Lomtadze, I A Minashvili, R G Salukvadze, E G Tskhadadze
YEREVAN PHYS INST – A G Oganesyan
MINSK, INST PHYS – A A Bogush, Y A Kulchitsky
BAKU, INST PHYS – O B Abdinov, V M Maniev
KOSICE, IEF – E Kladiva, L Shandor, I Shpalek
BRATISLAVA, INST PHYS – P Povinec, E Sitar, P Strmen
SOFIYA U – A B Iordanov, R V Tsenov

Accelerator SERPUKHOV-UNK *Detector* MPS

Reactions

$p\,p \rightarrow$ charm X	3000 GeV/c
$p\,p \rightarrow \overline{\text{charm}}$ X	"
$p\,p \rightarrow$ bottom X	"
$p\,p \rightarrow \overline{\text{bottom}}$ X	"
$\gamma\,p \rightarrow$ charm X	<1500 GeV/c
$\gamma\,p \rightarrow \overline{\text{charm}}$ X	"
$\gamma\,p \rightarrow$ bottom X	"
$\gamma\,p \rightarrow \overline{\text{bottom}}$ X	"

Particles studied charm, bottom, B^+, B^-, B^0, $\overline{B}^0$, B_s, $\overline{B}_s$

SERPUKHOV-UNK-004 (1988) Approved Apr 1988.

THE UNIVERSAL CALORIMETRICAL DETECTOR FACILITY FOR COLLIDING BEAM EXPERIMENTS AT UNK

SERPUKHOV – S I Alekhin, V B Anikeev, Y M Antipov, E N Ardashev, I L Azhgirej, V V Babintsev, A V Batunin, S V Belikov, Y A Belokopytov, Y S Bodrov, W Y Bogolyubsky, G V Borisov, N K Bulgakov, V A Bumazhnov, A F Buzulutskov, S V Chekulaev, E V Chernyaev, P V Chliapnikov, N A Datsko, D S Denisov, S P Denisov (✓ Spokesperson), G V Djikia, A Y Dushkin, A O Efimov, V V Ermakov, S Y Ershov, V V Ezhela, Y V Fisyak, S S Gershtein, V Y Glebov, S N Gurdzhiev, V V Gusev, V F Kechkin, V A Khmelnikov, A G Kholodenko, A E Kiryunin, E P Kistenev, V I Klejmenov, S V Klimenko, V I Klyukhin, V I Kochetkov, I V Kotov, A I Kotova, E A Kozlovsky, A A Lebedev, A Y Levin, M S Levitsky, A K Likhoded, A G Liparteliani, V K Malyaev, M A Maslov, V Y Medved, V S Mikhailov, Y V Mikhailov, A M Minaenko, G Y Mitrofanov, V A Mizenko, A M Moiseev, N V Mokhov, E A Parshin, I M Perevozchikov, V A Petrov, Y F Pirogov, Y M Pishchalnikov, A V Pleskach, V M Podstavkov, K R Rudakov, V N Ryadovikov, R A Rzaev, A V Samarin, G I Selivanov, V A Senko, V A Sergeev, A N Shelkovenko, R S Shuvalov, V V Siksin, S R Slabospitsky, A A Sokolov, A P Soldatov, V N Solomko, E A Starchenko, D A Stoyanova, R M Sulyaev, N P Tkachenko, M N Ukhanov, V A Uvarov, A V Uzunyan, I A Vishnyakov, G G Volkov, A P Vorobiev, O P Yushchenko, A Y Zotov
DUBNA – D Adam, G D Alekseev, N S Amelin, P Antonov, L S Azhgirej, A M Baldin, O Balea, D Y Bardin, B V Batyunya, S N Bazylev, Y Bem, K Beshliu, M S Bilenky, Y Biri, I V Boguslavsky, Y E Bonyushkin, S V Borodin, V A Butenko, S Cellar, S P Chernenko, P Chizhek, I N Churin, Y Cvah, D Damish, V K Dodokhov, V A Drozdov, L G Efimov, A V Efremov, L Ehn, I I Evsikov, B Fialkowski, N A Filatova, M Finger, I Formanek, P Geogiev, K Gladil, S V Goloskokov, V M Golovatyuk, O M Golubitsky, I A Golutvin, N V Gorbunov, Y D Gornushkin, N N Govorun, I M Gramenitsky, V G Grebenyuk, T S Grigalashvili, Y V Gusakov, Z Guzik, L Hajduk, S Hajduk, C S Hek, O Horvat, P Horvat, M A Ignatenko, I Ioan, I M Ivanchenko, A B Ivanov, V V Ivanov, S G Kadanzeev, R B Kadyrov, M N Kapishin, N N Karpenko, V Y Karzhavin, V S Khabarov, D M Khazins, B A Khomenko, N N Khovansky, P Khristova, Y T Kiryushin, D Kish, D Kisilewska, M Klein, K Koka, B Z Kopeliovich, B E Korneev, A V Korytov, B F Kostenko, V M Kotov, D Kovach, Y A Kozhevnikov, R Krasovski, A P Kretov, Z V Krumshtejn, P A Kulinich, A F Kuzmin, A S Kuznetsov, R Lednicky, R Leitner, F V Levchanovsky, M Lokajcek, V Lomann, P Malinski, E I Maltsev, M Maly, P K Maniakov, P K Markov, M Mateev, E A Matyushevsky, E Y Mazepa, K S Medved, A L Menshikov, Y P Merekov, V A Meshcheryakov, G V Mitselmakher, P V Mojsenz, V P Moshkin, S A Movchan, E Nad, A Navrot, S Nedev, S Nemechek, T Nemes, A A Nikolina, P Nomokonov, G D Nowak, H Nowak, M Nowak, A A Nozdrin, I Odler, A G Olshevsky, L Ondrish, V V Palchik, A N Parfenov, I Patocka, V N Pervushin, V D Peshekhonov, K Piska, V V Polyakov, D Pose, V N Pozdnyakov, D B Prikhodko, A Prokes, A V Radyushkin, P Raimer, S V Razin, K Rybicki, V N Ryzhov, Y Rzidki, B M Sabirov, L Sabo, A B Sadovsky, K Safarik, A Sandacz, L Sandor, Y Sedlak, Y V Sedykh, A V Selikov, A E Senner, N E Sergeeva, M D Shafranov, G A Shelkov, S S Shimansky, V P Shirikov, A A Shirokov, S Y Shmakov, V G Sidorov, V Simak, P Simechek, A N Sinaev, N E Slavin, B Slovinski, V A Smirnov, D A Smolin, R Sosnowski, C Spasov, G D Stoletov, J Strachota, V Streit, V Streitova, M Suk, A Svind, V A Sviridov, E Taryan, P Temnikov, V G Timofeev, L G Tkachev, V Tlachala, V V Tokmelin, N V Toledo, R Toledo, V A Trofimov, V V Trofimov, E N Tsyganov, M Turala, I Turso, I A Tyapkin, M Uzhoki, K Vala, T Vamosh, A T Vasilenko, L S Vertogradov, A V Vishnevsky, A S Vodopianov, G Vojkulesku, V Vrba, S Vyskochil, I K Vzorov, I Wojtkowska, A Wrublevski, V Yanchur, Y A Yatsunenko, J Zacek, J Zafar, N S Zaikin, N I Zamyatin, Y V Zanevsky, S A Zaporozhets, A V Zarubin, V F Zavialov, V I Zayachki, Y D Zernin, V N Zhmyrov, N I Zimin, A I Zinchenko, V G Zinov, V Zita, B Zitova, I Zlatev, P V Zrelov
MOSCOW PHYS ENG INST – V D Ashitkov, V K Chernyatin, B A Dolgoshein, A N Kalinovsky, R P Kokoulin, A V Nikitin, A A Petrukhin
MOSCOW STATE U – G L Bashindzhagyan, S F Berezhnev, M S Bitkov, G G Ermakov, P F Ermolov, V G Gavryushchev,

Y A Golubkov, Y V Grishkevich, V V Kozlov, A K Leflat, A N Marichev, V S Murzin, S M Puzin, V P Rukovichkin, N B Sarycheva, A N Shkurenkov, L N Smirnova, V Y Volkov, A G Voronin, S A Zotkin

LEBEDEV INST E P Kuznetsov, S I Nikolsky, V P Pavlyuchenko, V A Tsarev, P S Vasiliev

ST PETERSBURG, INP V A Khose, M G Ryskin, N N Smirnov, N K Terentiev, A A Vorobiev

TBILISI STATE U N S Amaglobeli, D E Bakhtadze, V G Davitashvili, G R Dzibuti, S M Esakiya, G D Gogoladze, V G Kartvelishvili, G O Kuratashvili, A I Mgedlishvili, G G Senkhniaidze, Y S Stolyarov, V F Tchunikhin, F G Tkebuchava, T P Topuriya

ALMA ATA, PHYS INST E G Boos, B O Zhautykov

NOVOSIBIRSK, IYF V V Anashin, E V Anashkin, V M Aulchenko, L M Barkov, A G Chilingarov, N S Dikansky, G V Fedotovich, B I Khazin, S G Klimenko, P K Lebedev, A P Onuchin, V S Panin, V V Parkhomchuk, Y I Pril, V A Sidorov, A N Skrinsky, V P Smakhtin, E P Solodov, Y I Tikhonov

PAVIA U J Liberali, V R Maloberti, P F Manfredi, D Marioli, V Speciale

MILAN U A M Kassata, J Lobianko, K De Martinis, F Palombo, A Sala-Grabar

INFN, BOLOGNA & BOLOGNA U P L Frabetti, L Stagni

Accelerator SERPUKHOV-UNK *Detector* UKD

Reactions

$p\,p \to X$	6000 GeV (E_{cm})
$p\,p \to$ inelastic	"
$p\,p \to p\,p$	"
$p\,p \to p\,X$	"
$p\,p \to 2p\,X$	"
$p\,p \to$ charm X	"
$p\,p \to$ bottom X	"
$p\,p \to$ top X	"
$p\,p \to$ (jets) jet X	"
$p\,p \to \gamma$ (jets) jet X	"
$p\,p \to \mu^-\,\mu^+\,X$	"
$p\,p \to$ quark X	"
$p\,p \to W^\pm$ (jets) X	"
$p\,p \to W^\pm$ 2hadron (hadrons)	"
$p\,p \to Z$ (jets) X	"
$p\,p \to Z$ 2hadron (hadrons)	"
$p\,p \to W^-\,W^+\,X$	"
$p\,p \to$ higgs X	"
$p\,p \to W'^\pm\,X$	"
$p\,p \to$ X centauro	"
$p\,p \to Z'\,X$	"
$p\,p \to$ s-particle X	"
$p\,p \to q^*\,X$	"
$p\,p \to e^{*\pm}\,X$	"
$\bar{p}\,p \to X$	"
$\bar{p}\,p \to$ inelastic	"
$\bar{p}\,p \to \bar{p}\,p$	"
$\bar{p}\,p \to \bar{p}\,X$	"
$\bar{p}\,p \to$ charm X	"
$\bar{p}\,p \to$ bottom X	"
$\bar{p}\,p \to$ top X	"
$\bar{p}\,p \to$ (jets) jet X	"
$\bar{p}\,p \to \gamma$ (jets) jet X	"
$\bar{p}\,p \to \mu^-\,\mu^+\,X$	"
$\bar{p}\,p \to$ quark X	"
$\bar{p}\,p \to W^\pm$ (jets) X	"
$\bar{p}\,p \to W^\pm$ 2hadron (hadrons)	"
$\bar{p}\,p \to Z$ (jets) X	"
$\bar{p}\,p \to Z$ 2hadron (hadrons)	"
$\bar{p}\,p \to W^-\,W^+\,X$	"
$\bar{p}\,p \to$ higgs X	"
$\bar{p}\,p \to W'^\pm\,X$	"
$\bar{p}\,p \to$ X centauro	"
$\bar{p}\,p \to Z'\,X$	"
$\bar{p}\,p \to$ s-particle X	"
$\bar{p}\,p \to q^*\,X$	"
$\bar{p}\,p \to e^{*\pm}\,X$	"

Particles studied W^+, W^-, Z, centauro, top, s-particle, q^*, $\bar{q}^*$, higgs, $e^{*\pm}$, hvy-lepton, gluino, higgsino, photino, s-lepton, s-quark, $W'^\pm$, Z'

Comments Also studies exclusive decays of heavy quarks, Higgs bosons, W and Z bosons, and various supersymmetric particles.

SERPUKHOV-UNK-005 (1988) Approved Apr 1988.

STUDY OF HADRONIC INTERACTIONS AT UNK ENERGIES WITH THE STREAMER DETECTOR SYSTEM

TBILISI INST PHYS L D Chikovani, L L Gabunia, Y U Gromov, E S Ioramishvili, A B Ivanova, A I Kharchilava, T V Khuskivadze, E G Korinteli, E S Kotlyarevsky, E S Majlyan, I Z Mandzhavidze, V A Mikhailov, R V Pirtskhalava, B K Rapava, L A Razdolskaya, N N Roinishvili, V N Roinishvili (✓ Spokesperson), L V Shalamberidze, G T Shergelashvili, G Z Shtemanetyan, A Y Staerman, A N Vysich

SERPUKHOV I V Ajinenko, P V Chliapnikov, L N Gerdyukov, Y M Nosochkov, L P Petrovich, A M Rybin, O G Tchikilev

TBILISI STATE U N S Amaglobeli, E S Garuchava, R Kvatadze, T G Makharadze, S S Shoshiashvili, A G Tomaradze

MOSCOW PHYS ENG INST E M Gushchin, A N Lebedev, V P Protasov, V A Ryabov, S V Somov, G I Tipografshchik

Accelerator SERPUKHOV-UNK *Detector* TSD

Reactions

$p\,p \to 2p$	6000 GeV (E_{cm})
$p\,p \to X$	"
$p\,p \to$ nucleus X	"
$p\,p \to$ X centauro	"
$p\,p \to$ charged X	"
$p\,p \to$ vee (vees) X	"
$p\,p \to K^0\,X$	"
$p\,p \to \Lambda\,X + \bar{\Lambda}\,X$	"
$p\,p \to$ mult[charged] X	"
$p\,p \to$ (jets) jet X	"
$p\,p \to$ quark X	"
$\bar{p}\,p \to p\,\bar{p}$	"
$\bar{p}\,p \to X$	"
$\bar{p}\,p \to$ nucleus X	"
$\bar{p}\,p \to$ X centauro	"
$\bar{p}\,p \to$ charged X	"
$\bar{p}\,p \to$ vee (vees) X	"
$\bar{p}\,p \to K^0\,X$	"
$\bar{p}\,p \to \Lambda\,X + \bar{\Lambda}\,X$	"
$\bar{p}\,p \to$ mult[charged] X	"
$\bar{p}\,p \to$ (jets) jet X	"
$\bar{p}\,p \to$ quark X	"

Particles studied centauro, quark

SERPUKHOV-UNK-008 (1990) Approved 1990.

STUDY OF MULTIMUON EVENTS IN 0.4 ÷ 3.0 TeV pp COLLISIONS WITH THE MULTIMUON SPECTROMETER (MMS)

SERPUKHOV V V Abramov, I V Ajinenko, Y M Antipov (✓ Spokesperson), V I Balbekov, B Yu Baldin, V A Bezzubov, A F Buzulutskov, D S Denisov, A S Dyshkant, A O Efimov, O V Eroshin, V N Evdokimov, A B Fenyuk, L N Gerdyukov, S S Gershtein, V Yu Glebov, Y P Gorin, G G Gurov, A N Gurzhiev, V G Kartasheva, A K Konoplyannikov, Y P Kornecv, I V Kotov, A N Krinitsyn, V I Kryshkin,

A K Likhoded, I V Mandrichenko, K P Myznikov, Y M Nosochkov, L P Petrovykh, A I Petrukhin, V M Podstavkov, S R Slabospitsky, D A Stoyanova, R M Sulyaev, O G Tchikilev, L K Turchanovich, A A Volkov
TBILISI INST PHYS - K Ahobadze, L Chikovani, L Gabunia, G Gogiberidze, T Houskivadze, A V Ivanova, A Kharchilava, E Loramishvili, E S Mailyan, I Mandgavidze, V A Mikhailov, R Pirtzkhalava, B Rapava, N Roinishvili, V Roinishvili (√ Spokesperson), A Yu Shtaerman, V N Sokolov
TBILISI STATE U - E Garuchava, V Kartvelishvili, R Kvatadze, T Maharadze, Z Metreveli, S Shoshiashvili, E Toivtoiadze, A Tomaradze
MOSCOW PHYS ENG INST - E M Gushin, A N Lebedev, S V Somov, M K Timopheev, G I Tipografchik

Accelerator SERPUKHOV-UNK *Detector* MMS-UNK

Reactions

$p\,p \to \overline{\text{top}}$ top X	2190 GeV (E_{cm})
$p\,p \to W^-\,W^+$ X	"
$p\,p \to Z\,W^+$ X	"
$p\,p \to Z\,Z$ X	"
$p\,p \to W^\pm$ X	"
$p\,p \to Z$ X	"
$p\,p \to W'^\pm$ X	"
$p\,p \to Z'$ X	"
$p\,p \to$ bottom X	"
$p\,p \to \overline{\text{bottom}}$ X	"

Particles studied top, $W'^\pm$, Z', W^+, W^-, Z, bottom, $\overline{\text{bottom}}$

Comments Studies the production and leptonic decays of the W, Z, W' and Z', and decays of the top, bottom, and charm quarks. MMS-UNK is a multimuon spectrometer for the 0.4 × 3.0 TeV collider experiment at UNK.

SERPUKHOV-107 Approved 1976; Started Feb 1976; Completed 1987.

STUDY OF NEUTRINO AND ANTINEUTRINO INTERACTIONS WITH NUCLEI

SERPUKHOV - V V Ammosov (√ Spokesperson), D S Baranov, N A Chabrov, V I Ermolaev, V S Fillipov, A A Ivanilov, V I Khleborad, B T Konyushko, V M Korablev, V A Korotkov, V A Krupnov, V V Makeev, A G Myagkov, N A Netyaga, A Y Polyarush, Y G Ryabov, A A Sokolov, G G Volkov
LEBEDEV INST - E P Kuznetsov
BERLIN-ZEUTHEN ADW - H J Grabosh, H H Kaufmann, R Nahnhauer, S Nowak, H E Roloff, S Schlenstedt

Accelerator SERPUKHOV *Detector* HLBC-SKAT

Reactions

ν_μ nucleus $\to \nu_\mu$ X	3 30 GeV/c
ν_μ nucleus $\to \mu^-$ hadron X	"
ν_μ nucleus $\to \mu^-\,\gamma$ X	"
ν_μ nucleus $\to \mu^-\,\pi^0$ X	"
ν_μ nucleus $\to \mu^-\,\pi^+$ nucleus	"
ν_μ nucleus $\to \nu_\mu\,\pi^0$ nucleus	"
ν_μ nucleus $\to \mu^-\,e^+$ X	"
ν_μ nucleus $\to \mu^-\,e^-$ X	"
ν_μ nucleus $\to \mu^-$ charm X	"
ν_μ nucleus $\to \rho^0\,\mu^-$ X	"
$\bar{\nu}_\mu$ nucleus $\to \bar{\nu}_\mu$ X	"
$\bar{\nu}_\mu$ nucleus $\to \mu^+$ hadron X	"
$\bar{\nu}_\mu$ nucleus $\to \mu^+\,\gamma$ X	"
$\bar{\nu}_\mu$ nucleus $\to \mu^+\,\pi^0$ X	"
ν_e nucleus $\to e^-$ X	"
$\nu_\mu\,n \to \mu^-\,p$	"
$\nu_\mu\,p \to \Delta(1232\,P_{33})^{++}\,\mu^-$	"
$\bar{\nu}_\mu\,p \to n\,\mu^+$	"

Particles studied charm

Comments Studies neutral current processes, neutrino-electron scattering, charm decays, and dilepton production. Some 500,000 pictures (2×10^{18} protons on target) were obtained in a ν_μ wide-band beam, and about 300,000 (1.5×10^{18} protons on target) in a $\bar{\nu}_\mu$ wide-band beam.

Papers YF 16 (1972) 546 = SJNP 16 (1972) 304, YF 17 (1973) 807 = SJNP 17 (1973) 420, YF 26 (1977) 110 = SJNP 26 (1977) 57, PL B70 (1977) 269, PL B76 (1978) 336, YF 27 (1978) 1608 = SJNP 27 (1978) 846, YF 29 (1979) 1203 = SJNP 29 (1979) 620, YF 29 (1979) 1206 = SJNP 29 (1979) 622, YF 30 (1979) 146 = SJNP 30 (1979) 75, ZETFP 30 (1979) 390 = JETPL 30 (1979) 362, ZETFP 30 (1979) 627 = JETPL 30 (1979) 590, PL B81 (1979) 255, PL B81 (1979) 258, PL B81 (1979) 261, PL B93 (1980) 191, ZETFP 31 (1980) 772 = JETPL 31 (1980) 728, ZETFP 34 (1981) 418, ZPHY C21 (1984) 189, ZPHY C21 (1984) 197, YF 40 (1984) 1454 = SJNP 40 (1984) 923, YF 41 (1985) 1520 = SJNP 41 (1985) 963, YF 43 (1986) 1186 = SJNP 43 (1986) 759, ZPHY C30 (1986) 175, ZPHY C30 (1986) 183, ZPHY C30 (1986) 569, ZPHY C31 (1986) 203, ZPHY C35 (1987) 329, YF 45 (1987) 1662 = SJNP 45 (1987) 1029, YF 46 (1987) 130 = SJNP 46 (1987) 80, YF 46 (1987) 1673 = SJNP 46 (1987) 998, PL B189 (1987) 245, YF 47 (1988) 113 = SJNP 47 (1988) 73, YF 47 (1988) 1630, ZPHY C40 (1988) 487, ZPHY C40 (1988) 493, YF 50 (1989) 106 = SJNP 50 (1989) 67, ZPHY C41 (1989) 527, ZPHY C42 (1989) 361, ZPHY C45 (1990) 551, YF 53 (1991) 986, and YF 53 (1991) 999.

SERPUKHOV-112 (Jan 1976) Approved Jun 1976; Started Apr 1979; Completed 1989.

POLARIZATION MEASUREMENT IN CHARGE-EXCHANGE REACTIONS AT 40 GeV/c

SERPUKHOV - V D Apokin, B N Chuyko, A A Derevshchikov, V A Krendelev, Y A Matulenko, A P Meschanin, A I Misnic, S B Nurushev (√ Spokesperson), V I Rykalin, V G Rykov, L F Soloviev, V L Solovyanov, A N Vasiliev
DUBNA - N S Borisov, E I Bunyotova, Y M Kazarinov (√ Spokesperson), B A Khachaturov, R K Kutuev, M Y Liburg, A B Neganov, B S Neganov, I K Potashnikova, Y A Usov, R Y Zulkarneev

Accelerator SERPUKHOV *Detector* PROZA

Reactions Polarized target

$\pi^-\,p \to n\,\pi^0$	40 GeV/c
$\pi^-\,p \to n\,2\pi^0$	"
$\pi^-\,p \to n\,\eta$	"
$\pi^-\,p \to n\,\eta'$	"
$\pi^-\,p \to n\,\omega$	"
$\pi^-\,p \to n\,f_2(1270)$	"
$K^-\,p \to n\,K_L$	"
π^- nucleus $\to$ nucleus π^0	"
K^- nucleus $\to$ nucleus π^0	"

Comments Ran for 4968 hours.

Papers YF 35 (1982) 382 = SJNP 35 (1982) 219, YF 35 (1982) 1465 = SJNP 35 (1982) 857, ZPHY C15 (1982) 293, YF 36 (1982) 1191 = SJNP 36 (1982) 694, YF 41 (1985) 116 = SJNP 41 (1985) 74, NP B255 (1985) 253, YF 42 (1985) 1146 = SJNP 42 (1985) 725, YF 42 (1985) 1152 = SJNP 42 (1985) 729, PTE 5 (1987) 46, ZPHY C35 (1987) 173, YF 45 (1987) 1355 = SJNP 45 (1987) 840, YF 46 (1987) 1108, YF 46 (1987) 1482, YF 47 (1988) 727 = SJNP 47 (1988) 465, YF 47 (1988) 1644 = SJNP 47 (1988) 1041, and YF 49 (1989) 445 = SJNP 49 (1989) 278.

SERPUKHOV-115 (Nov 1975) Approved Jan 1976; Started 1982; Completed 1986.

STUDY OF CHARGED PARTICLE RARE DECAYS

MOSCOW, INR - V N Bolotov (Spokesperson), R M Dzhilkibaev, S N Grinenko, V V Isakov, Y M Klubakov, V D Laptev, V M Lobashov, V I Marin, A A Poblagrev, V E Postoev, A N Toropin

Accelerator SERPUKHOV *Detector* Counter

Reactions

$\pi^- \to e^-\,\bar{\nu}_e\,\gamma$

$K^- \to \pi^- \pi^0 \gamma$
$K^- \to \pi^- \pi^0 \pi^0 (\gamma)$
$K^- \to \pi^0 e^- \bar{\nu}_e (\gamma)$
$K^- \to \pi^0 \pi^0 e^- \bar{\nu}_e \gamma$

Particles studied π^-, K^-

Papers ZETFP 42 (1985) 390 = JETPL 42 (1985) 481, ZETFP 43 (1986) 405 = JETPL 43 (1986) 520, YF 44 (1986) 108 = SJNP 44 (1986) 68, YF 44 (1986) 117 = SJNP 44 (1986) 73, YF 45 (1987) 1652 = SJNP 45 (1986) 1023, and ZETFP 47 (1988) 8 = JETPL 47 (1988) 7. No other papers expected.

SERPUKHOV-119 (Dec 1976) Approved Jul 1977; Started May 1981.

RELATIVISTIC POSITRONIUM PHYSICS

DUBNA L G Afanasyev, G D Alekseev, V V Karpukhin, D M Khazins, V V Kruglov, A V Kuptsov, L L Nemenov (√ Spokesperson), M V Nikitin
SERPUKHOV K I Gubrienko, V I Kotor
MOSCOW STATE U O E Gorchakov, A V Kulikov, S V Trusov

Accelerator SERPUKHOV *Detector* Combination

Reactions

$p\, n \to \pi^0$ X	< 70 GeV/c
$p\, n \to$ positronium X	"

Particles studied positronium

Comments A test of special relativity. Studies $\pi^0 \to \gamma +$ positronium decay, positronium oscillations, and interactions of relativistic positronium with matter. Ran for 800 hours.

Papers YF 40 (1984) 139 = SJNP 40 (1984) 87, PL B236 (1990) 116, and YF 51 (1990) 1040. For the theory see YF 15 (1972) 1047 = SJNP 15 (1972) 582.

SERPUKHOV-120 (1977) Approved Jul 1977; Started 1985; Completed 1990.

EXPERIMENTS WITH HYPERON BEAMS

SERPUKHOV Y B Bushnin, A F Dunaitsev, R I Dzhelyadin, S V Golovkin, A K Konoplyannikov, V F Konstantinov, V P Kubarovsky, L G Landsberg (√ Spokesperson), V M Leontiev, V A Mukhin, T I Petrunina, N S Pokrovsky, V G Rybakov, V A Senko, V A Sergeev, Y N Simonov, A N Sytin, A M Zaitsev
MOSCOW, ITEP M V Gritsuk, V M Guzhavin, B L Ioffe, G K Kliger, V Z Kolganov, V L Krylov, V F Kuzichev, V L Laponov, A V Lebedev, G S Lomkatsi, A F Nilov, O I Pogorelko, N V Rabin, V T Smolyankin (√ Spokesperson), D D Tokarev, A V Turbiner, G N Tyapkina, I A Vetlitsky

Accelerator SERPUKHOV *Detector* SFINKS

Reactions

p nucleus $\to \Lambda$ X	70 GeV (E_{lab})
p nucleus $\to \Sigma^-$ X	"
p nucleus $\to \Sigma^+$ X	"
p nucleus $\to \Sigma^0$ X	"
p nucleus $\to \Xi^0$ X	"
p nucleus $\to \Xi^-$ X	"
p nucleus $\to \Omega^-$ X	"
$\Lambda\, p \to$ X	30–60 GeV/c
$\Lambda\, p \to p\, \Lambda$(unspec)	"
$\Sigma^-\, p \to$ X	"
$\Sigma^-\, p \to p\, \Sigma(\text{unspec})^-$	"
$\Sigma^+\, p \to$ X	"
$\Sigma^+\, p \to p\, \Sigma(\text{unspec})^+$	"
$\Xi^0\, p \to$ X	"
$\Xi^0\, p \to p\, \Xi(\text{unspec})^0$	"
$\Xi^-\, p \to$ X	"
$\Xi^-\, p \to p\, \Xi(\text{unspec})^-$	"
$\Omega^-\, p \to$ X	"
$\Omega^-\, p \to p\, \Omega^*(\text{unspec})^-$	"
Λ deut $\to$ X	"
Σ^- deut $\to$ X	"
Σ^+ deut $\to$ X	"
Ξ^0 deut $\to$ X	"
Ξ^- deut $\to$ X	"
Ω^- deut $\to$ X	"

Particles studied Ω^-, Σ^-, Σ^+, Ξ^-, Ξ^0, Λ, $\Sigma(\text{unspec})^+$, $\Sigma(\text{unspec})^-$, $\Xi(\text{unspec})^-$, $\Xi(\text{unspec})^0$, $\Omega^*(\text{unspec})^-$, Λ(unspec), charm

Comments This experiment is replaced by SERPUKHOV-169.

Papers YF 52 (1990) 494.

SERPUKHOV-128 (1977) Approved 1984; Started 1987.

SEARCH FOR NEW SHORT-LIVED PARTICLES IN NEUTRINO INTERACTIONS

SERPUKHOV V V Ammosov, V I Baranov, A A Ivanilov, P V Ivenov, V M Korablev, V A Korotkov, V V Makeev, A G Myagkov, P V Pitukhin, A Y Polyarush, A A Sokolov
MOSCOW PHYS ENG INST E Gushchin, A I Lebedev, S V Somov (√ Spokesperson), G I Tipografshchik
MOSCOW, ITEP Y A Aleshin, O K Egorov, E D Kolganova, A N Maksimov, I A Melnichenko, E A Pozharova, V I Silaev, V A Smirnitsky, V A Smotryaev, I S Trostin
LEBEDEV INST S I Kotelnikov, E P Kuznetsov, B I Lomonosov, L I Pervov, V A Ryabov, P S Vasiliev
MOSCOW STATE U P F Ermolov, V S Murzin, S I Sivoklokov
DUBNA Y A Batusov, S A Bunyatov, O M Kuznetsov, V V Lyukov, V I Tretyak

Accelerator SERPUKHOV *Detector* Combination

Reactions

ν_μ nucleon $\to \mu^-$ charm X	3–30 GeV/c
ν_μ nucleon $\to \Lambda_c^+\, \mu^-$ X	"
ν_μ nucleon $\to \Sigma_c(2455)^+\, \mu^-$ X	"
ν_μ nucleon $\to \Sigma_c(2455)^{++}\, \mu^-$ X	"
ν_μ nucleon $\to \mu^-$ charmed-meson X	"
ν_μ nucleon $\to D_s^\pm\, \mu^-$ X	"

Particles studied charm

Comments The detector is a wide-angle spectrometer with a streamer chamber and emulsions. 2×10^{18} protons on target were taken. Running (March 92).

SERPUKHOV-136 (1978) Approved Apr 1978; Started 1988.

NEUTRINO DETECTOR

SERPUKHOV A A Borisov, N I Bozhko, S K Chernichenko, G L Chukin, V N Goryachev, M M Kirsanov, A S Kozhin, V I Kravtsov, A V Kulikov, A I Mukhin, V N Rychenkov, Y I Salomatin, K E Shestermanov, V V Sytnik, V A Tumakov, A S Vovenko (√ Spokesperson), Y A Zudin
DUBNA L S Barabash, S A Baranov, Y A Batusov, S A Bunjatov (√ Spokesperson), O Y Denisov, M Y Kazarinov, O L Klimov, V V Lyukov, S N Prakhov, V I Snyatkov

Accelerator SERPUKHOV *Detector* Calorimeter

Reactions

p nucleon $\to$ charm X	70 GeV/c
p nucleon $\to e^\pm$ X	"
ν_μ nucleon $\to \mu^-$ X	5–30 GeV/c
ν_μ nucleon $\to \mu^+\, \mu^-$ X	"
ν_μ nucleon $\to$ charm X	"
$\bar{\nu}_\mu$ nucleon $\to \mu^+$ X	"
$\bar{\nu}_\mu$ nucleon $\to \mu^+\, \mu^-$ X	"
$\bar{\nu}_\mu$ nucleon $\to$ charm X	"
ν_e nucleon $\to e^\pm$ X	"
$\bar{\nu}_e$ nucleon $\to e^\pm$ X	"
charm $\to \mu^+$ X	
charm $\to e^\pm$ X	

Particles studied charm

Comments This experiment includes the design and construction of a new neutrino detector. Running (March 92).

Papers YF 30 (1979) 702 = SJNP 30 (1979) 362, YF 33 (1981) 715 = SJNP 33 (1981) 371, YF 40 (1984) 739 = SJNP 40 (1984) 475, YF 49 (1989) 172, and ZPHY C51 (1991) 341.

SERPUKHOV-140 (Dec 1976) Approved Jul 1977; Started Apr 1980; Completed Sep 1987.

STUDY OF CHARGE-EXCHANGE REACTIONS AND SEARCH FOR NEW PARTICLES

SERPUKHOV – S V Donskov, A V Inyakin, V A Kachanov, D B Kakauridze, G V Khaustov, A V Kulik, A A Lednev, Y M Melnik, Y V Mikhailov, Y D Prokoshkin (✓ Spokesperson), S A Sadovsky, V D Samoylenko, P M Shagin, A V Shtannikov, A V Singovsky, A V Startsev, V P Sugonyaev

BRUSSELS U, IISN – F Binon, C Bricman, P Duteil, T Mouthuy, J P Stroot

LOS ALAMOS – D Alde, E A Knapp, T Lopez

ANNECY – J Dufournaud, M Gouanere, J P Peigneux, M Poulet, M Spighel

TBILISI STATE U – M D Tabidze

CERN – A Possoz

Accelerator SERPUKHOV *Detector* GAMS-2000

Reactions

$\pi^- p \to n\, 2\gamma$	38 GeV/c
$\pi^- p \to n\, \gamma$'s	"
$\pi^- p \to n\, \pi^0$	"
$\pi^- p \to n\, \eta$	"
$\pi^- p \to n\, b_1(1235)^0$	"
$\pi^- p \to n\, f_2(1270)$	"
$\pi^- p \to n\, \omega$	"
$\pi^- p \to n\, f_4(2050)$	"
$\pi^- p \to n\, f_0(1590)$	"
$\pi^- p \to n\, f_4(2220)$	"
$\pi^- p \to n$ meson^0	"
$\pi^- p \to J/\psi(1S)\, \gamma\, X$	"
$\pi^- p \to \chi_{c1}(1P)\, X$	"
$\pi^- p \to \chi_{c2}(1P)\, X$	"
$\pi^0 \to 2\gamma$	—
$\omega \to \pi^0\, \gamma$	—
$\chi_{c1}(1P) \to J/\psi(1S)\, \gamma$	—
$\chi_{c2}(1P) \to J/\psi(1S)\, \gamma$	—

Particles studied meson

Comments Studies charge-exchange production of the $b_1(1235)^0$, $f_2(1270)$, $f_0(1590)$, $f_4(2220)$, and other mesons, and decays of these mesons. Ran for 6100 hours.

Papers YF 33 (1981) 1534 = SJNP 33 (1981) 825, LNC 32 (1981) 45, YF 36 (1982) 670 = SJNP 36 (1982) 391, NC 71A (1982) 497, YF 38 (1983) 934 = SJNP 38 (1983) 561, YF 38 (1983) 1199 = SJNP 38 (1983) 723, NC 78A (1983) 313, NIM 206 (1983) 373, NIM 214 (1983) 269, NIM 215 (1983) 103, PL B140 (1984) 264, YF 39 (1984) 640 = SJNP 39 (1984) 405, YF 39 (1984) 831 = SJNP 39 (1984) 526, YF 39 (1984) 1429 = SJNP 39 (1984) 903, LNC 39 (1984) 41, NP B239 (1984) 311, NC 80A (1984) 363, ZPHY C25 (1984) 225, YF 40 (1984) 1447 = SJNP 40 (1984) 918, NIM A240 (1985) 343, PTE 3 (1986) 70, NIM A248 (1986) 86, PL B177 (1986) 115, PL B177 (1986) 120, PL B182 (1986) 105, ZETFP 44 (1986) 441 = JETPL 44 (1986) 567, EPL 3 (1987) 553, ECHAYA 18 (1987) 210, ZPHY C36 (1987) 603, YF 45 (1987) 117 = SJNP 45 (1987) 75, YF 45 (1987) 405 = SJNP 45 (1987) 255, YF 45 (1987) 1341 = SJNP 45 (1987) 830, NIM A268 (1988) 112, YF 47 (1988) 385 = SJNP 47 (1988) 243, YF 48 (1988) 1724 = SJNP 48 (1988) 1035, YF 49 (1989) 1021 = SJNP 49 (1988) 636, PL B216 (1989) 447, PL B216 (1989) 451, PL B241 (1990) 600, YF 52 (1990) 779, YF 54 (1991) 751, YF 54 (1991) 754, and YF 54 (1991) 1311.

SERPUKHOV-145 (1981) Approved 1984; Started 1987.

STUDY OF THE PRODUCTION AND DECAY PROPERTIES OF THE CHARMED BARYONS IN NEUTRINO INTERACTIONS WITH THE BUBBLE CHAMBER SKAT

SERPUKHOV – G M Alexandrov, V V Ammosov (✓ Spokesperson), E N Ardashev, Y V Bardin, A P Bugorsky, N A Chabrov, V I Ermolaev, V S Fillipov, A A Ivanilov, V I Khleborad, V I Konyushko, V M Korablev, V A Korotkov, V V Makeev, G Y Mitrofanov, A G Myagkov, N A Netyaga, A Y Polyarush, A A Sokolov

Accelerator SERPUKHOV *Detector* HLBC-SKAT

Reactions

$\nu_\mu\, p \to \Sigma_c(2455)^{++}\, \mu^-$	5–20 GeV/c
$\nu_\mu\, n \to \Lambda_c^+\, \mu^-$	"

Particles studied $\Sigma_c(2455)^{++}$, Λ_c^+

Comments The chamber fill is a light freon-propane mix. 4×10^{18} protons on target were taken. Running (March 92).

SERPUKHOV-146 (Dec 1980) Approved Feb 1981; Started 1981; Completed 1986.

SEARCH FOR NARROW BARYON RESONANCES IN HIGH ENERGY NEUTRON DIFFRACTIVE SCATTERING

DUBNA – A N Aleev, V A Arefiev, V P Balandin, V K Birulev, E A Chudakov, A S Chvyrov, T S Grigalashvili, B N Guskov, I M Ivanchenko, N N Karpenko, D A Kirillov, I G Kosarev, V G Krivokhizhin, V V Kukhtin, B A Kulakov, M F Likhachev (✓ Spokesperson), A L Lubimov, A N Maksimov, A N Morozov, K Novak, V D Novak, A E Senner, L V Silvestrov, V E Simonov, L A Slepets, G G Takhtamyshev, P T Todorov, R K Trayanov

BERLIN-ZEUTHEN ADW – K Hiller, Z Novak, A V Pose, K E Risek

LEBEDEV INST – A S Belousov, E D Molodtsov, S V Rusakov, P N Shareiko

SOFIYA, INST CHEM TECH – Y Gladki, S Nemechek, M Novak, A Prokesh, V I Zayachki

SOFIYA, INST NUCL RES – D T Burilkov, V I Genchev, I M Geshkov, P K Markov, G G Sultanov

TBILISI STATE U – V P Dzhordzhadze, V D Kekelidze, G I Nikobadze

Accelerator SERPUKHOV *Detector* BIS-2

Reactions

n nucleus $\to \Lambda\, K^0\, X$	40–60 GeV/c
n nucleus $\to \Lambda\, K^+\, \pi^-\, X$	"
n nucleus $\to \Lambda\, \pi^+\, \pi^0\, \pi^-\, X$	"
n nucleus $\to \Lambda\, K^+\, K^0\, K^-\, X$	"
n nucleus $\to p\, \bar{p}\, \Lambda\, K^0\, X$	"
n nucleus $\to n\, \Lambda\, \bar{\Lambda}\, X$	"
n nucleus $\to p\, \pi^+\, \pi^-\, X$	"
n nucleus $\to p\, K^+\, K^-\, X$	"
n nucleus $\to 2p\, \bar{p}\, X$	"
n nucleus $\to p\, K^0\, K^-\, X$	"

Comments Approved for 3300 hours.

Papers YF 36 (1982) 1420 = SJNP 36 (1982) 825, ZPHY C23 (1984) 333, ZPHY C25 (1984) 205, YF 43 (1986) 619 = SJNP 43 (1986) 395, YF 44 (1986) 1010 = SJNP 44 (1986) 652, CZJP B36 (1986) 1303, BJP 15 (1987) 3, ZPHY C36 (1987) 27, ZPHY C37 (1988) 243, ZPHY C47 (1990) 533, CZJP 40 (1990) 1293, and CZJP 41 (1991) 297.

SERPUKHOV-147 (1982) Approved Mar 1982; Started 1984.

STUDY OF REACTIONS WITH STRANGE PARTICLE PRODUCTION IN THE π^- AND K^- MESON BEAM OF THE IHEP ACCELERATOR

MOSCOW, ITEP – B P Barkov, B V Bolonkin, I A Erofeev, O N Erofeeva, V K Grigoriev, A P Grishin, Y V Katinov, I Y Korolkov, V N Luzin, V V Miller, V N Nozdrachev,

Y P Shkurenko, V V Sokolovsky (✓ Spokesperson), A I Sutormin, G D Tikhomirov, V V Vladimirsky

Accelerator SERPUKHOV *Detector* MIS

Reactions

$\pi^- p \to n \Lambda \bar{\Lambda}$	40 GeV/c
$\pi^- p \to n \Lambda \bar{\Lambda} \pi^0$	"
$\pi^- p \to p \Lambda \bar{\Lambda} \pi^-$	"
$\pi^- p \to n\, 2K_S$	"
$\pi^- p \to n K_S K_L$	"
$\pi^- p \to n\, 2K_S \pi^0$	"
$\pi^- p \to n K_S K_L \pi^0$	"
$\pi^- p \to p\, 2K_S \pi^-$	"
$\pi^- p \to p K_S K_L \pi^-$	"
$\pi^- p \to n \Sigma^0 \bar{\Sigma}^0$	"
$\pi^- p \to$ glueball X	"
$\pi^- p \to f_2(1720)$ X	"
$\pi^- p \to$ X $C(1480)^-$	"
$K^- p \to \Lambda \bar{\Lambda} Y^*$(unspec)	"
$K^- p \to K_S K_L Y^*$(unspec)	"
glueball $\to 2K_S$	---
$f_2(1720) \to 2K_S$	---
$C(1480)^- \to K_S K_L \pi^-$	---

Particles studied $f_0(975)$, $a_0(980)^0$, $f_2(1720)$, glueball, $C(1480)^-$, Y^*(unspec)

Comments Requested 2400-3000 hours. Running (March 92).

Papers YF 43 (1986) 1211, YF 43 (1986) 1487 = SJNP 43 (1986) 959, YF 46 (1987) 799, NP B309 (1988) 426, and YF 48 (1988) 1213 = SJNP 48 (1988) 770.

SERPUKHOV-148 (Feb 1982) Approved Mar 1982; Started 1984; Completed 1990.

STUDY OF EXCLUSIVE RESONANCE PRODUCTION IN RARE PROCESSES IN SIGMA-M

SERPUKHOV – Y M Antipov (✓ Spokesperson), V A Batarin, V A Bezzubov, N P Budanov, D S Denisov, Y P Gorin, V G Kartasheva, I V Kotov, Y M Melnik, A I Petrukhin, S A Polovnikov, D A Stoyanova
TBILISI STATE U – R B Pirtskhalava, V N Roinishvili
DUBNA – I A Golutvin, V S Habarov, D M Hazins, V Y Karzhavin, Y T Kiryushin, P A Kulinich, R Leitner, G V Mitselmakher, A A Nozdrin, A G Olshevsky, V A Sviridov, V I Travkin, A V Vishnevsky
INFN, BOLOGNA – P L Frabetti
INFN, MILAN – F Palombo

Accelerator SERPUKHOV *Detector* SIGMA-AYAKS

Reactions

$\pi^- p \to \pi^- p$	40–50 GeV/c
$\pi^- p \to p n \bar{p}$	"
$K^- p \to K^- p$	"
$\bar{p} p \to \bar{p} p$	"
π^- nucleus $\to \pi^- \mu^- \mu^+$ X	"
π^- nucleus $\to p p$ X	"
π^- nucleus $\to p p \pi^-$ X	"
π^- nucleus $\to$ dibaryon X	"
π^- nucleus $\to$ deut π^- X	"
π^- nucleus $\to$ deut π^+ X	"
π^- nucleus $\to \pi^-$ X	40 GeV/c
π^- nucleus $\to K^-$ X	"
π^- nucleus $\to p$ X	"
K^- nucleus $\to p p$ X	40–50 GeV/c
K^- nucleus $\to \pi^-$ X	40 GeV/c
K^- nucleus $\to K^-$ X	"
K^- nucleus $\to p$ X	"
$\bar{p}$ nucleus $\to p p$ X	40–50 GeV/c
$\bar{p}$ nucleus $\to \pi^-$ X	40 GeV/c
$\bar{p}$ nucleus $\to K^-$ X	"
$\bar{p}$ nucleus $\to p$ X	"
$\rho^0 \to \mu^+ \mu^-$	
$a_1(1260)^- \to \pi^- \mu^- \mu^+$	
$\pi_2(1670)^- \to \pi^- \mu^- \mu^+$	
meson$^- \to \pi^- \mu^- \mu^+$	

Particles studied ρ^0, $f_0(1300)$, $f_2(1270)$, $a_1(1260)^-$, $\pi_2(1670)^-$, meson$^-$, dibaryon

Comments The nuclear targets are Be, C, Al, Cu, and Pb. Exclusive dibaryon decays are also studied. Ran for 1500 hours. SIGMA-AYAKS is the new name for the modified spectrometers SIGMA and SIGMA-M.

Papers YF 37 (1983) 113 = SJNP 37 (1983) 63, ZETFP 48 (1988) 519 = JETPL 48 (1988) 561, YF 48 (1988) 138 = SJNP 48 (1988) 85, YF 48 (1988) 471 = SJNP 48 (1988) 297, YF 48 (1988) 1041, ZPHY C42 (1989) 185, EPL 11 (1990) 725, YF 51 (1990) 705, YF 53 (1991) 439, YF 53 (1991) 1314, and YF 53 (1991) 1324.

SERPUKHOV-149 (1982) Approved 1984; Started 1986.

STUDY OF ASYMMETRY IN INCLUSIVE REACTIONS $\pi^- p \to \pi^{\pm 0} X$ AND $\pi^- p \to K_L X$ AT 40 GeV/c, AND $pp \to \pi^0 X$ AT 70 GeV/c

SERPUKHOV – V D Apokin, Y I Arestov, N I Belikov, B N Chuyko, A A Derevshchikov, G V Dzholobov, O A Grachev, V Y Khodyrev, Y A Matulenko, A P Meshchanin, N G Minaev, A I Misnic, V V Mochalov, A A Morozov, V G Myalitsin, S B Nurushev (✓ Spokesperson), D I Patalakha, A F Prudkoglyad, V I Rykalin, V L Rykov, L F Soloviev, V L Solovyanov, A N Vasiliev
DUBNA – N S Borisov, E I Bunyatova, Y M Kazarinov (✓ Spokesperson), B A Khachaturov, R K Kutuev, M Y Liburg, V N Matafonov, A B Neganov, Y A Usov, R Y Zulkarneev
TBILISI STATE U – N S Amaglobeli, Y S Bagaturiya, B G Chiladze, L N Glonti, G G Macharashvili, A Ocharashvili, R M Sakandelidze, T M Sakhelashvili
MICHIGAN U – C M Chu, R S Raymond, J A Stewart

Accelerator SERPUKHOV *Detector* PROZA-M

Reactions Polarized target

$\pi^- p \to \pi^-$ X	40 GeV/c
$\pi^- p \to \pi^0$ X	"
$\pi^- p \to \eta$ X	"
$\pi^- p \to \pi^+$ X	"
$\pi^- p \to K_L$ X	"
π^- deut $\to \pi^0$ X	"
π^- deut $\to \eta$ X	"
$K^- p \to \pi^0$ X	"
$\pi^- p \to \eta$ X	"
K^- deut $\to \pi^0$ X	"
$p p \to \pi^-$ X	70 GeV/c
$p p \to \pi^0$ X	"
$p p \to \eta$ X	"
$p p \to \pi^+$ X	"
$p p \to K_L$ X	"
$p p \to \eta$ X	"
p deut $\to \pi^0$ X	"
p deut $\to \eta$ X	"

Comments Requested time is 2000 hours. Running (March 92).

Papers PTE 5 (1987) 46, YF 45 (1987) 1355 = SJNP 45 (1987) 840, YF 46 (1987) 1108 = SJNP 46 (1987) 644, YF 46 (1987) 1482 = SJNP 46 (1987) 877, ZPHY C35 (1987) 173, YF 47 (1988) 727, YF 49 (1989) 156 = SJNP 49 (1989) 97, YF 49 (1989) 165 = SJNP 49 (1989) 103, YF 49 (1989) 445, YF 50 (1989) 695, PL B243 (1990) 461, PL B261 (1991) 197, PL B261 (1991) 201, and PL B264 (1991) 462.

SERPUKHOV-152 (1983) Approved Aug 1984.

NEUTRINO EXPERIMENT USING A TAGGED NEUTRINO BEAM

SERPUKHOV - V V Ammosov, V B Anykeyev, A A Bel'kov, S V Belikov, A P Bugorsky, A Chesnokov, A G Denisov, S P Denisov (√ Spokesperson), A Yu Dushkin, N N Fedyakin, A N Galyaev, N A Galyaev, S S Gershtein, Y V Gilitsky, S N Gurzhiev, V I Kochetkov, T K Koroleva, I V Kotov, V I Kotov, A V Kozelov, V P Kryuchkov, V I Kurbakov, A A Lebedev, V N Lebedev, V V Lipajev, I Z Mandjavidze, A Y Maslov, S A Medved, V N Mikhailin, Y V Mikhailov, N V Mokhov, S A Mukhin, V A Onuchin, Y M Pishchalnikov, E A Razuraev, A V Schukin, I V Shein, A P Soldatov, A A Spiridonov, A P Starkov, D A Stoyanova, A V Uzunyan, A V Vasilyev, V P Zhigunov

INFN, PISA - C Cerri, G Gennaro, F Sergiampietri, G Spandre

INFN, FLORENCE - G Conforto, A Marchionni

BERLIN-ZEUTHEN ADW - J Baehr, G Bohm, R Nahnhauer, S Nowak, A Schwind

DUBNA - J Cvach, V K Dodokhov, N G Fadeev, V Genchev, I A Golutvin, J Hladky, V G Kadykov, V Y Karzhavin, V S Khabarov, Y T Kiryushin, V G Krivokhizhin, V V Kukhtin, V N Lysyakov, P K Markov, S Nemecek, A A Popov, D Pose, A Prokes, P Reimer, S Riman, I A Savin, G I Smirnov, D A Smolin, J Strachota, G Sultanov, L V Svetov, V A Sviridov, P Todorov, M Vinde, J Zacek, N I Zamyatin

Accelerator SERPUKHOV *Detector* Combination

Reactions

$\nu_e\ e^- \to e^-\ \nu_e$	< 70 GeV (E_{lab})
$\nu_\mu\ e^- \to e^-\ \nu_\mu$	"
ν_e nucleon $\to e^-$ X	"
ν_e nucleon $\to \nu_e$ X	"
ν_e nucleon $\to \tau^-$ X	"
ν_e nucleon $\to e^-\ \mu^+$ X	"
ν_μ nucleon $\to \mu^-$ X	"
ν_μ nucleon $\to \nu_\mu$ X	"
ν_μ nucleon $\to \mu^+\ \mu^-$ X	"
charmed-meson $\to \mu^+$ X	

Particles studied ν_e, ν_μ, τ^-, charmed-meson

Comments Studies ν_e-ν_μ universality, $\nu_e \to \nu_\mu \to \nu_\tau$ oscillations, the ratio of charged to neutral currents, etc.

Papers YF 52 (1990) 1040.

SERPUKHOV-153 (1983) Approved Dec 1983; Started 1983; Completed 1986.

STUDY OF CUMULATIVE HADRON PRODUCTION IN PROTON-NUCLEUS INTERACTIONS AT ENERGIES FROM 15 TO 65 GeV

DUBNA - O P Gavrishuk, N S Moroz, V F Peresedov, P A Rukojatkin, A Y Sukhanov, N V Vlasov, P I Zarubin, L S Zolin (√ Spokesperson)

MOSCOW, ITEP - I M Belyaev, S V Frolov

Accelerator SERPUKHOV *Detector* Spectrometer

Reactions

p nucleus $\to$ hadrons X	15-65 GeV (E_{lab})

Comments Uses the Cumulative Hadron Detector.

Papers PL B255 (1991) 321, and NP A523 (1991) 589.

SERPUKHOV-155 (1983) Approved 1985; Started 1987.

SINGLE AND PAIR HADRON PRODUCTION WITH LARGE MOMENTUM TRANSFER IN PROTON AND π^- MESON BEAMS

SERPUKHOV - V V Abramov, B Yu Baldin, A F Buzulutskov, A S Dyshkant, A O Efimov, V N Evdokimov, V Yu Glebov, A N Gurzhiev, Y P Korneev, A V Kostritski, A N Krinitsyn, V I Kryshkin, Y M Melnik, V M Podstavkov, A I Ronzhin, R M Sulyaev (√ Spokesperson), L K Turchanovich

Accelerator SERPUKHOV *Detector* FODS

Reactions

$p\ p \to$ hadron(s) X	70 GeV/c
p nucleus $\to$ hadron(s) X	"
$\pi^-\ p \to$ hadron(s) X	40 GeV/c
π^- nucleus $\to$ hadron(s) X	"

Comments Running (March 92).

Papers YF 45 (1987) 1362.

SERPUKHOV-157 (1983) Approved Mar 1983; Started 1986.

NEW RESONANCES SEARCH IN DIFFRACTIVE PROCESSES ON NUCLEI WITH THE MIS-2 DETECTOR

DUBNA - V V Antipov, L P Chernenko, N D Dikusar, A A Efendiev, A G Galperin, Y I Ivanshin, V I Komarov, L K Lytkin, E I Maltsev, V A Moiseenko, V I Moroz, V I Nikanorov, V A Petrov, I L Pisarev, S Y Sychkov, A A Tyapkin (Spokesperson), I M Vasilevsky, V V Vishnyakov, O A Zaymidoroga, V P Zrelov

MOSCOW STATE U - K P Vishnevskaya

CRACOW - M Sheptitska, R Sosnovsky

BRATISLAVA, INST PHYS - S Usachev, R Yanik

MILAN U - P L Frabetti, P F Manfredi, F Palombo

Accelerator SERPUKHOV *Detector* MIS-2

Reactions

π^- Si $\to$ 3pion X	40 GeV/c
K^- Si $\to$ kaon 2pion X	"

Particles studied meson

Comments Uses the modified spectrometer MIS, with additional spark chamber. Looking for new radial excitations of π, A_1, A_2, A_3, and K mesons. Requested 4720 hours. Running (March 92).

Papers YF 43 (1986) 917 = SJNP 43 (1986) 585.

SERPUKHOV-159 (1983) Approved May 1986; Started 1992.

SEARCH FOR EXOTIC STATES WITH STRANGE QUARKS AND STUDY OF PRODUCTION AND DECAYS OF PARTICLES CONTAINING HEAVY QUARKS

DUBNA - A N Aleev, V A Arefiev, V P Balandin, V K Birulev, I I Evsikov, B N Gus'kov, I M Ivanchenko, M N Kapishin, N N Karpenko, V D Kekelidze (√ Spokesperson), D A Kirillov, I G Kosarev, N A Kuz'min, M F Likhachev, A L Lyubimov, A N Maksimov, P V Moisenz, A N Morozov, V V Pal'chik, A V Pose, T G Progulova, A Prokes, V V Rybakov, L A Slepets, V N Spaskov, A I Zinchenko

LEBEDEV INST - A S Belousov, M V Belov, E G Devitsin, A M Fomenko, A A Komar, V A Kozlov, S Yu Potashev, S V Rusakov, L N Shtarkov, P A Smirnov, Y V Soloviev, Y A Vazdyk, M V Zavertyaev

ALMA ATA, PHYS INST - G A Aralbaeva, A A Loktionov

BRATISLAVA, INST PHYS - C Koka, T Ponta, A Roshka

SERPUKHOV - S S Gershtein, A A Likhoded

MOSCOW, ITEP - A B Kaidalov

MOSCOW STATE U - E A Chudakov

SOFIYA, INST NUCL RES - I M Geshkov, P Khristov, P K Markov, P Todorov

SOFIYA, INST CHEM TECH - V Zayachki

PRAGUE, INST PHYS - J Hladky, M Novak, M Smizanska, M Vecko

TBILISI STATE U - N S Amaglobeli, R A Kvatadze, G A Kvirikashvili, N L Lomidze, M D Mosidze, A K Odishvili, T G Pitskhelelauri, R G Shanidze, G T Tatishvili

Accelerator SERPUKHOV *Detector* EXCHARM

Reactions

n nucleus $\to X(3100)$ X	< 70 GeV (E_{lab})
n nucleus $\to X(3250)$ X	"
n nucleus $\to N\phi(1950)$ X	"
n nucleus $\to D^0$ X	"

n nucleus $\rightarrow \Sigma_c(2455)^{++}$ X	"
n nucleus $\rightarrow \Sigma_c(2455)^{0}$ X	"
n nucleus $\rightarrow \Lambda_c^+$ X	"
n nucleus $\rightarrow \Xi_c^+$ X	"
n nucleus $\rightarrow \Xi_c^0$ X	"

Particles studied $X(3100)$, $X(3250)$, $N\phi(1950)$, $\bar{D}^0$, Λ_c^+, $\Sigma_c(2455)^{++}$, $\Sigma_c(2455)^0$, Ξ_c^+, Ξ_c^0

Comments Uses the new EXCHARM detector, a major upgrade of the older BIS-2M.

Papers YF 46 (1987) 1127 = SJNP 46 (1987) 657, and ZPHY C37 (1988) 243.

SERPUKHOV-161 (1983) Approved 1985; Started 1991.

STUDY OF CHARMED PARTICLE PRODUCTION AT IHEP ACCELERATOR ENERGIES

SERPUKHOV - E A Ardashev, M Y Bogolyubsky, S V Chekulaev, N A Galyaev, V A Khmelnikov, A E Kiryunin, A I Kotova, L L Kurchaninov, M S Levitsky, V V Maksimov, A A Minaenko, G Y Mitrofanov, A M Moiseev (√ Spokesperson), E A Parshin, A V Pleskach, S R Slabospitsky, V N Zapolsky
MOSCOW STATE U - S G Basiladze, P F Ermolov (√ Spokesperson), Y V Grishkevich, A N Larichev, A K Leflat, S N Orfanitsky, S A Riazanov, V P Rukovichkin, S M Ruzin, A M Vishnevskaja, V Yu Volkov
DUBNA - I V Boguslavsky, I M Gramenitsky (√ Spokesperson), A I Grigoriev, Y V Khrenov, V D Kravtsov, A Ya Kutov, K S Medved, M D Shafranov, V T Tolmachev
TBILISI, INST PHYS - N S Amaglobeli, V A Davitashvili, V F Tchunikhin, T P Topuria

Accelerator SERPUKHOV *Detector* Combination

Reactions

$\pi^+ p \rightarrow D^+ D^-$ X	60-70 GeV/c
$\pi^+ p \rightarrow$ charmed-baryon D^- X	"
$\pi^- p \rightarrow D^+ D^-$ X	"
$\pi^- p \rightarrow$ charmed-baryon D^- X	"
$p\, p \rightarrow D^+ D^-$ X	"
$p\, p \rightarrow$ charmed-baryon D^- X	"

Particles studied Λ_c^+, $\Sigma_c(2455)^0$, $\Sigma_c(2455)^+$, $\Sigma_c(2455)^{++}$

Comments Studies all charmed mesons and Λ and Σ charmed baryons.

SERPUKHOV-163 (1985) Approved 1985; Started 1985: Completed Dec 1988.

STUDY OF EXCLUSIVE GLUEBALL PRODUCTION IN THE CENTRAL REGION OF HADRON COLLISIONS

SERPUKHOV - S V Donskov, A V Inyakin, V A Kachanov, G V Khaustov, A V Kulik, V G Lapshin, A A Lednev, Y D Prokoshkin (√ Spokesperson), V I Rykalin, S A Sadovsky, V D Samoylenko, P M Shagin, A V Shtannikov, A V Singovsky, V P Sugonyaev
LOS ALAMOS - D Alde, E A Knapp, T Lopez
BRUSSELS U, IISN & CERN - F Binon, C Bricman, D Michotte, J P Stroot
ANNECY - M Gouanere, J P Peigneux

Accelerator SERPUKHOV *Detector* GAMS-2000, Calorimeter

Reactions

π^- nucleon $\rightarrow$ nucleon $\eta\, \eta\, \pi^-$	40 GeV/c
π^- nucleon $\rightarrow$ nucleon $\eta\, \pi^-$	"
π^- nucleon $\rightarrow$ nucleon $\eta\, \pi^0\, \pi^-$	"
π^- nucleon $\rightarrow$ nucleon $\pi^0\, \pi^-$	"
π^- nucleon $\rightarrow$ nucleon $2\pi^0\, \pi^-$	"
glueball $\rightarrow 2\eta$	

Particles studied glueball

Comments Looks for glueballs, particularly in final states with $\eta\eta$. Ran for 1300 hours.

Papers ECHAYA 16 (1985) 584, NIM A256 (1987) 444, NIM A268 (1988) 112, and NIM A269 (1988) 101.

SERPUKHOV-164 (1980) Approved May 1986; Started 1988.

INVESTIGATIONS OF THE $\pi^- p \rightarrow n\pi^+\pi^-\pi^+\pi^-(\gamma$'s) REACTION AT 40 GeV/$c$ USING THE VERTEX SPECTROMETER

SERPUKHOV - S I Bityukov, G V Borisov, R I Dzhelyadin, Y P Gouz, Y M Ivanyushenkov, I A Kachaev, A N Karyukhin, Y A Khokhlov, G A Klyuchnikov, V F Konstantinov, M E Kostrikov, V V Kostyukhin, A A Kriushin, M A Kulagin, V V Lapin, V D Matveev, V F Obraztsov, A P Ostankov, D I Ryabchikov, V K Semenov, E A Starchenko, N K Vishnevsky, E A Vlasov, A M Zaitsev (√ Spokesperson)
TBILISI INST PHYS - G Beladidze, T A Lomtadze, E G Tskhadadze

Accelerator SERPUKHOV *Detector* Photon spectrometer, Counter

Reactions

$\pi^- p \rightarrow n\, 2\pi^+\, 2\pi^-$ (γ's)	37 GeV/c
$\pi^- p \rightarrow n\, 2\pi^+\, 2\pi^-$	"
$\pi^- p \rightarrow n\, 2\rho^0$	"
$\pi^- p \rightarrow n\, f_2(1270)$	"
$\pi^- p \rightarrow n\, \rho_3(1690)^0$	"
$\pi^- p \rightarrow n\, f_4(2050)$	"
$\pi^- p \rightarrow n\, f_4(2220)$	"
$\pi^- p \rightarrow n\, \rho^0\, \eta$	"
$\pi^- p \rightarrow n\, f_2(1270)\, \eta$	"
$\pi^- p \rightarrow n\, \rho_3(1690)^0\, \eta$	"
$\pi^- p \rightarrow n\, 2\eta$	"
$\pi^- p \rightarrow n\, \eta'\, \rho^0$	"
$\pi^- p \rightarrow n\, f_2(1270)\, \eta'$	"
$\pi^- p \rightarrow n\, \rho_3(1690)^0\, \eta'$	"
$\pi^- p \rightarrow n\, 2\eta'$	"
$\pi^- p \rightarrow n\, f_1(1285)$	"
$\pi^- p \rightarrow n\, \eta'\, \eta$	"
$\pi^- p \rightarrow n\, \omega\, \eta$	"
$\pi^- p \rightarrow n$ meson	"

Particles studied ρ^0, η, η', ω, $f_2(1270)$, $\rho_3(1690)^0$, glueball, meson

Comments Uses Čerenkov counters together with a wide aperture magnetic spectrometer - VES. In addition to the reactions listed above, studies decays of the mesons produced in these reactions. Running (March 92).

Papers PL B268 (1991) 137.

SERPUKHOV-166 (1987) Approved 1987; Started 1987.

STUDY OF ELEMENTARY-PARTICLE RARE DECAYS IN THE DETECTOR ISTRA-M

MOSCOW, INR - V N Bolotov (√ Spokesperson), E N Gushchin, V V Isakov, O V Karavichev, Y M Klubakov, V A Lebedev, V N Marin, E A Monich, Y V Musienko, A A Poblaguev, V E Postoev, G N Semenuk, S A Volkov
SERPUKHOV - V F Konstantinov
DUBNA - G Kalmar, A Z Kitikyan, E V Komissarov, V S Kurbatov, V Z Serdyuk, V V Sidorov, A D Volkov, B Z Zalikhanov

Accelerator SERPUKHOV *Detector* ISTRA-M

Reactions

$K^- \rightarrow \pi^-\, \nu_e\, \bar{\nu}_e$	25 GeV/c
$K^- \rightarrow \pi^-\, \nu_\mu\, \bar{\nu}_\mu$	"
$K^- \rightarrow e^-\, \bar{\nu}_e\, \gamma$	"
$K^- \rightarrow \pi^-\, e^-\, e^+$	"
$K^- \rightarrow \pi^-\, \mu^-\, \mu^+$	"

Particles studied π^-, K^-

Comments Running (March 92).

SERPUKHOV-167 (1975) Approved 1987; Started 1987; Completed 1991.

STUDY OF RARE KAON DECAYS

SERPUKHOV - S A Akimenko, A A Belkov, V I Belousov, A M Blick, V N Kolosov, V M Kutjin (✓ Spokesperson), A I Pavlinov, V I Romanovsky, A S Soloviev
DUBNA - A M Artykov, A G Asmolov, G S Bitsadze, Y A Budagov (✓ Spokesperson), I E Chirikov-Zorin, Y I Davydov, V P Dzhelepov, A A Feshchenko, V B Flyagin, V V Glagolev, Y N Kharzheev, Y F Lomakin, L G Lytkin, S N Malyukov, V N Pervushin, N A Rusakovich, N L Rusakovich, A A Semenov, S V Sergeev, V B Vinogradov, A G Volodko
TBILISI STATE U - I Minashvili
SOFIYA U - A B Jordanov, L Litov, G V Velev
KOSICE, IEF - E Kladiva, L Shandor, I Shpalek
BRATISLAVA, INST PHYS - B Sitar, P Strmen, S Tokar
MINSK, INST PHYS - Y A Kulchitsky, A S Kurilin

Accelerator SERPUKHOV *Detector* HYPERON-II

Reactions

$K^+ \to \pi^+ 2\pi^0$	10 GeV/c
$K^+ \to \pi^+ \pi^0 \gamma$	"
$K^+ \to \pi^+ 2\gamma$	"
$K^+ \to \pi^+ e^- e^+$	"

Particles studied K^+

Papers PL B259 (1991) 225.

SERPUKHOV-168 (1987) Approved Jun 1987; Started 1990; Completed 1990.

K^- MASS MEASUREMENT WITH HADRONIC ATOMS USING THE CRYSTAL-DIFFRACTION METHOD

ST PETERSBURG, INP - A S Denisov, O L Fedin, M P Guriyev, Y M Ivanov, L P Lapina, P M Levchenko, V D Malakhov, A A Petrunin, Y P Platonov, A G Sergeev, V V Skorobogatov, A A Smirnov (✓ Spokesperson), G P Solodov, V M Suvorov, S N Taranets, A V Zhelamkov
SERPUKHOV - I S Baishev, S N Lapitsky, N V Mokhov, R A Rzaev, V P Sakharov, V S Seleznev, S I Striganov, V I Terekhov

Accelerator SERPUKHOV *Detector* QUARTZ

Reactions

p C $\to K^-$ X	70 GeV/c
p Mg $\to K^-$ X	"
p Cu $\to K^-$ X	"

Particles studied K^-

Comments QUARTZ is a crystal diffraction spectrometer for X rays with semiconductor detectors.

Papers ZETFP 54 (1991) 557.

SERPUKHOV-169 (1977) Approved Jul 1977; Started 1985.

INVESTIGATIONS OF HADRONIC SPECTROSCOPY WITH THE DETECTOR SFINKS

SERPUKHOV - V A Dorofeev, S V Golovkin, A S Konstantinov, A P Kozhevnikov, V P Kubarovsky, N Y Kulman, A I Kulyavtsev, V F Kurshetsov, A E Kushnerenko, L G Landsberg (✓ Spokesperson), V V Molchanov, V A Mukhin, V I Solyanik, V A Viktorov
MOSCOW, ITEP - I M Belwaev, M V Gritsuk, V M Guzhavin, G K Kliger, V Z Kolganov, A A Lebedev, G S Lomkatsi, A F Nilov, V T Smolyankin (✓ Spokesperson)

Accelerator SERPUKHOV *Detector* SFINKS

Reactions

p nucleon $\to$ nucleon baryon	70 GeV (E_{lab})
p nucleon $\to$ nucleon hyperon K^+	"
p nucleon $\to$ nucleon $N\phi(1950)$	"
p nucleon $\to X(3100)^+$ X	"
p nucleon $\to X(3100)^0$ X	"
p nucleon $\to X(3100)^-$ X	"
p nucleon $\to$ meson^0 X	"
p nucleon $\to$ meson$^+$ X	"
p nucleon $\to$ meson$^-$ X	"
p nucleon $\to \Lambda_c^+$ X	"
$\pi^- p \to$ nucleon meson	32 GeV/c
$\pi^- p \to$ nucleon $C(1480)$	"
$\pi^- p \to$ nucleon $C(1480)^+$	"
$\pi^- p \to$ nucleon $C(1480)^-$	"
$\pi^- p \to$ nucleon $X(3100)^+$	"
$\pi^- p \to$ nucleon $X(3100)^0$	"
$\pi^- p \to$ nucleon $X(3100)^-$	"

Particles studied baryon, meson, $X(3100)^+$, $X(3100)^0$, $X(3100)^-$, $C(1480)$, $C(1480)^+$, $C(1480)^-$

Comments Looks for new or not completely established baryons and mesons such as the $C(1480)$ and $X(3100)$ in various hadronic modes. Studies exclusive decays of such baryons and mesons. Running (March 92).

SERPUKHOV-170 (1985) Approved 1985; Started 1985; Completed 1989.

THE CASCADE MAGNETIC SPECTROMETER

NOVOSIBIRSK, IYF - V N Bajer
KHARKOV, FTI - V B Ganenko, L Y Kolesnikov, A L Rubashkin
SERPUKHOV - V I Maisheev, V N Zapolsky
LEBEDEV INST - V A Baskov, P A Cherenkov, B B Govorkov, V A Khablo, V V Kim, V I Sergienko (✓ Spokesperson)
MOSCOW PHYS ENG INST - B I Luchkov, V Y Tugaenko

Accelerator SERPUKHOV *Detector* KASKAD

Reactions

e^- nucleus $\to$ nucleus $e^- \gamma$ (γ's)	30 GeV (E_{lab})
γ nucleus $\to$ nucleus $e^- e^+$	5-25 GeV (E_{lab})
γ nucleus $\to$ nucleus $e^- e^+ \gamma$ (γ's)	"

Comments A study of electromagnetic interactions, including γ elastic and inelastic scattering on nucleons and nuclei. The detector consists of a single crystal target, a goniometer and a magnetic spectrometer.

Papers ZETFP 49 (1989) 533, ZETFP 50 (1989) 395, ZETFP 52 (1990) 740, NIM A297 (1990) 329, PTE 6 (1990) 69, and PTE 6 (1990) 73.

SERPUKHOV-171 (1987) Approved 1987; Started 1987.

DETERMINATION OF ENERGY DEPOSITION IN THICK TARGETS FROM CONSTRUCTION MATERIALS EXPOSED TO PROTONS WITH KINETIC ENERGIES OF 0.8-1.2 GeV/c

MOSCOW, ITEP - V I Belyakov-Bodin (✓ Spokesperson)

Accelerator SERPUKHOV *Detector* Calorimeter

Reactions

p nucleus $\to$ shower X	0.8-1.2 GeV (T_{lab})

Comments Running (March 92).

Papers NIM A295 (1990) 140, and AEU 70 (1991) 70.

SERPUKHOV-172 (1988) Approved May 1988.

STUDY OF MESONS WITH AN ENHANCED GLUON COMPONENT (GLUEBALLS INCLUDED) AND MESONS WITH HIGH SPINS USING THE MULTIPHOTON 4π SPECTROMETER

SERPUKHOV - S V Donskov, A V Inyakin, G V Khaustov, A K Konoplyannikov, A V Kulik, G L Landsberg, V G Lapshin, A A Lednev, Y M Melnik, V K Myalitsin, S A Polovnikov, V A Polyakov, Y D Prokoshkin (✓ Spokesperson), V B Rakhmatova, V I Rykalin, S A Sadovsky, V D Samoylenko, P M Shagin, A V Shtannikov, A V Singovsky, V P Sugonyaev
MOSCOW PHYS ENG INST - A M Baranov, A N Kalinovsky, Z Khorguashvili, S Y Smirnov
TBILISI STATE U - N S Amaglobeli, M D Tabidze

TBILISI, INST PHYS A K Djavrishvili, D B Kapanadze, I Z Khalvashi, T A Lomtadze, G G Sekhneaidze
LOS ALAMOS - D Alde, E A Knapp, T Lopez
BRUSSELS U, IISN - F Binon, J P Stroot
ANNECY - J P Peigneux, M Poulet
KEK - S Inaba, M Kobayashi, K Takamatsu, T Tsuru
CERN - M Boutemeur
MIYAZAKI U - T Nakamura

Accelerator SERPUKHOV *Detector* GAMS-4PI

Reactions

$\pi^- p \to n\ 2\pi^0$	32 GeV/c
$\pi^- p \to n\ 2\eta$	"
$\pi^- p \to n\ \eta'\ \eta$	"
$\pi^- p \to n\ \eta\ \pi^0$	"
$\pi^- p \to n\ \eta\ 2\pi^0$	"
$\pi^- p \to n\ 2\omega$	"
$\pi^- p \to n\ K^0\ \overline{K}^0$	"
$\pi^- p \to n$ 2meson^0	"
$\pi^- p \to$ meson^0 X	"
$\pi^- p \to$ glueball X	"
$\pi^- p \to J/\psi(1S)$ X	"
$\pi^- p \to \psi(2S)$ X	"
$\pi^- p \to \eta_c(1S)$ X	"
$\pi^- p \to \chi_c$(unspec) X	"
$K^- p \to$ meson^0 X	"

Particles studied glueball, meson^0

Comments Running (March 92).

Papers NIM A268 (1988) 112, NIM A276 (1989) 652, PTE 1 (1990) 68, PTE 2 (1990) 90, and PTE 5 (1991) 55.

SERPUKHOV-173 (1991) Approved 1992; Started 1992.

STUDY OF STRANGE PARTICLE RESONANT STATES USING HADRON BEAMS WITH MOMENTA OF 40-70 GeV/c AT THE IHEP ACCELERATOR

MOSCOW, ITEP - B P Barkov, B V Bolonkin, I A Erofeev, O N Erofeeva, V K Grigoriev, A P Grishin, Y V Katinov, I Y Korolkov, V I Lisin, V N Luzin, V V Miller, V N Nozdrachev, Y P Shkurenko, V V Sokolovsky (✓ Spokesperson), G D Tikhomirov, V V Vladimirsky

Accelerator SERPUKHOV *Detector* MIS

Reactions

$\pi^- p \to n\ 2K_S$	40 GeV/c
$\pi^- p \to n\ 2K_S\ \pi^0$	"
$\pi^- p \to n\ K_S\ K_L\ \pi^+\ \pi^-$	"
$\pi^- p \to n\ K_S\ K_L\ \pi^0$	"
$\pi^- p \to K_S\ \pi^+\ \pi^-\ Y^*$(unspec)	"
$\pi^- p \to p\ K_S\ K_L\ \pi^-$	"
$\pi^- p \to n\ \Lambda\ \overline{\Lambda}$	"
$K^- p \to 2K_S\ Y^*$(unspec)	"
$K^- p \to n\ K_S\ \pi^+\ \pi^-$	"
$K^- p \to \Lambda\ \overline{\Lambda}\ Y^*$(unspec)	"

Particles studied $C(1480)^+$, $C(1480)^-$, $C(1480)^0$, $X(3100)$, $\phi(1680)$, $\phi_3(1850)$, $f_2(1720)$, $f_2(1810)$, $f_2(2010)$, $f_4(2050)$, $f_4(2220)$

Comments Extends an earlier $K_S K_S$ and $\Lambda\overline{\Lambda}$ finite states study (SERPUKHOV-147) to the range of masses between 1.8 and 2.5 GeV. Investigates the $K_S K_L$ system using π^- and K^- beams with a momentum of 40 GeV/c. Studies baryon-antibaryon and $\phi\phi$ states. Searches for $C(1480)$ mesons decaying into $\phi\pi$. Uses two charge particle triggers. Requested 2100 hours.

SERPUKHOV-174 (1986) Approved Apr 1986; Started May 1986.

PHYSICS OF RELATIVISTIC DIMESON ATOMS

DUBNA - L G Afanasyev, A S Chvyrov, M A Ivanov, V V Karpukhin, A V Kolomyichenko, V I Komarov, V V Kruglov, A V Kuptsov, L L Nemenov (✓ Spokesperson), M V Nikitin, Z P Pustylnik
SERPUKHOV A P Kurov
MOSCOW STATE U O E Gorchakov, A V Kulikov, S V Trusov, V V Yazkov

Accelerator SERPUKHOV *Detector* Combination

Reactions

$p\ n \to$ X	< 70 GeV/c

Comments Searches for the (π^+, π^-) atom in inclusive processes. Studies the lifetime of such atoms. Measures pion scattering lengths. Running (March 92).

Papers YF 52 (1990) 1046, and PL B255 (1991) 146.

SLAC Experiments

SLAC-E-140 (1984) Approved Dec 1984; Started Nov 1985; Completed Jan 1986.

MEASUREMENT OF THE x, Q^2, AND NUCLEAR DEPENDENCE OF $R = \sigma_L/\sigma_T$ AND F_2

AMERICAN U - L Andivahis, R G Arnold, D Benton, P E Bosted, G de Chambrier, A Lung, S E Rock (✓ Spokesperson), Z M Szalata
CAL TECH - B W Filippone, J Jourdan, R D McKeown, R G Milner, D Potterveld, R Walker
FERMILAB - A Para
LIVERMORE - K van Bibber, F Dietrich
MASSACHUSETTS U, AMHERST - J Button-Shafer, B Debebe, R Hicks
ROCHESTER U - P De Barbaro, A Bodek (✓ Spokesperson), S Dasu, H Hirada, M W Krasny, K Lang, E M Riordan
SLAC - R A Gearhart
STANFORD U - L Whitlow
TEL AVIV U - J Alster

Accelerator SLAC *Detector* Spectrometer

Reactions

e^- p	3-21 GeV/c
e^- deut	"
e^- Fe	"
e^- Au	"

Comments Measures the ratio $R = \sigma_L/\sigma_T$ and F_2 in the range $0.2 < x < 0.5$ and $1 < Q^2 < 10$ (GeV/c)^2. Compares R with the QCD prediction, and studies the nuclear dependence of the ratio of structure functions, W_1/W_2, for various nuclear targets (EMC effect). Beams from the full linac and the Nuclear Physics Injector were used.

Papers PRL 60 (1988) 2591, PRL 61 (1988) 1061, PL B224 (1989) 353, PL B240 (1990) 522, and PL B (accepted).

SLAC-E-140X (1988) Approved Jul 1988; Started Aug 1991; Completed Sep 1991.

MEASUREMENT OF THE x, Q^2, AND HYDROGEN-DEUTERIUM DEPENDENCE OF $R = \sigma_L/\sigma_T$

AMERICAN U - L Andivahis, R G Arnold, P E Bosted, J Dunne, C E Keppel, A Lung, S E Rock (✓ Spokesperson), M Spengos, Z M Szalata, L Tao, J White
CEBAF - J Gomez
LIVERMORE - P L Anthony, K van Bibber, F Dietrich, L Stuart
MASSACHUSETTS U, AMHERST - J Button-Shafer, R Hicks, G A Peterson, K Wang
PENN U - A Banerjee, K A Griffioen
ROCHESTER U - P De Barbaro, A Bodek (✓ Spokesperson), R Walker
SLAC - S Dasu, R A Gearhart, G M Petratos, E M Riordan, S H Rokni
WASHINGTON U, SEATTLE - M Frodyma, C Hyde-Wright

Accelerator SLAC *Detector* Spectrometer

Reactions

e^- p	3-10 GeV/c
e^- deut	"

Comments Measures the ratio $R = \sigma_L/\sigma_T$ and F_2 in the range $0.2 < x < 0.7$ and $0.5 < Q^2 < 7.0$ (GeV/c)^2. Looks for higher twist contributions beyond the next-to-leading order in QCD and target mass effects. Beam from the Nuclear Physics Injector in SLED and normal mode was used.

SLAC-E-141 (1986) Approved May 1986; Started Jun 1986; Completed Jun 1986.

SEARCH FOR SHORT-LIVED NEUTRAL BOSONS FROM A BEAM DUMP

AMERICAN U - P Bosted, L Clougher, A Lung, S E Rock, Z M Szalata
CAL TECH - B W Filippone
CRACOW - M W Krasny
FERMILAB - M Crisler, A Para, R Walker
GEORGETOWN U - J M Lambert
MASSACHUSETTS U, AMHERST - J Button-Shafer, G A Peterson
PENN U - D Benton
ROCHESTER U - P De Barbaro, A Bodek, N Varelas
SLAC - J Bjorken, S Dasu, R A Gearhart, E M Riordan (✓ Spokesperson)
TEXAS U - K Lang
WASHINGTON U, SEATTLE - M Frodyma

Accelerator SLAC *Detector* Spectrometer

Particles studied axion

Comments An electron beam dump search for possible pseudoscalar particles with masses in the range 1-10 MeV and lifetimes of order 10^{-14} to 10^{-12} seconds, with dominant decay modes into e^+e^- or $\gamma\gamma$ pairs. Electron beams of 9 and 18 GeV are stopped in copper/tungsten dumps ranging in length from 10-100 cm. A signal searched for is a high energy positron or photon downstream of the dump. An 8 GeV spectrometer set at 0° is used to detect positrons.

Papers PRL 59 (1987) 755. No other papers expected.

SLAC-E-142 (Oct 1989) Approved May 1990.

MEASUREMENT OF THE NEUTRON SPIN DEPENDENT STRUCTURE FUNCTION

AMERICAN U - R G Arnold, P E Bosted, J Dunne, C E Keppel, S E Rock, M Spengos, Z M Szalata, J L White
BONN U - W Meyer
CLERMONT-FERRAND U - V Breton, H Fonvieille
HARVARD U - A K Thompson
LBL - G Shapiro
LIVERMORE - P L Anthony, K van Bibber, F Dietrich
MICHIGAN U - T E Chupp
PRINCETON U - G Cates, H L Middleton, N Newbury
SACLAY - H Borel, R Lombard-Nelsen, J Marroncle, J Morgenstern, F M Staley, Y D Terrien
SLAC - R A Gearhart, E W Hughes (✓ Spokesperson), T Maruyama, G M Petratos, R Pitthan, L S Rochester, S H Rokni, M B Woods, C C Young
STANFORD U - D M Kawall, S Kuhn, Z Meziani
SYRACUSE U - R Holmes, P A Souder, J Xu
WISCONSIN U - H Band, J R Johnson, R A Mair, R Prepost, G H Zapalac

Accelerator SLAC *Detector* Double-arm spectrometer

Reactions Polarized beam and target

e^- ^{3}He	22.66 GeV/c (P_{lab})

Particles studied n

Comments Studies a polarized electron beam scattering off a polarized ^{3}He gas target. The scattered electrons are detected by a two-arm fixed spectrometer. Tests the Bjorken polarization sum rule and nucleon spin models. Scheduled to run November 92.

SLAC-E-143 (Nov 1991) Approved Dec 1991.

MEASUREMENTS OF THE NUCLEON SPIN STRUCTURE AT SLAC IN END STATION A

AMERICAN U - R G Arnold (✓ Spokesperson), P E Bosted, J Dunne, S E Rock, M Spengos, Z M Szalata, J L White
BASEL U - D Fritschi, J Jourdan, G Masson, S Robinson, I Sick
BONN U - W Meyer
CEBAF - J Gomez, J Mougey, S Nanda
CLERMONT-FERRAND U - V Breton, H Fonvieille
FERMILAB - R Walker
HARVARD U - A K Thompson
LIVERMORE - P L Anthony, K van Bibber, F Dietrich, M Mugge
MASSACHUSETTS U, AMHERST - J Button-Shafer
MICHIGAN U - T E Chupp
OHIO U - K Hicks
PENN U - D Benton, K A Griffioen
ROCHESTER U - P De Barbaro, A Bodek, W K Sakumoto, R Walker

SACLAY – H Borel, R Lombard-Nelsen, J Marroncle, J Morgenstern, F M Staley, Y D Terrien
SLAC – W B Atwood, J Clendenin, T H Fieguth, R A Gearhart, E W Hughes, S J St Lorant, T Maruyama, K C Moffeit, A C Odian, G M Petratos, C Prescott, E M Riordan, L S Rochester, T Usher, M B Woods, C C Young
STANFORD U – D M Kawall, S Kuhn, Z Meziani
TEL AVIV U – J Lichtenstadt
TOHOKU U – F Suekane, H Yuta
VIRGINIA U – H Baghaei, J Chen, D G Crabb, D B Day, K J Keeter, R A Lindgren, R Lourie, R M Marshall, J S McCarthy (✓ Spokesperson), R C Minehart, J H Mitchell, B Norum, D Počanić, O A Rondon, L C Smith, S Van Verst
WISCONSIN U – H Band, J R Johnson, R Prepost, G H Zapalac

Accelerator SLAC *Detector* Spectrometer

Reactions Polarized beam and target

e^- deut	22.66 GeV (E_{lab})
e^- p	"

Particles studied p, n

Comments Uses high energy polarized electron beams and a set of ammonia based polarized proton and deuteron targets. Studies the proton and neutron spin structure over the range $0.03 \leq x \leq 1$ at momentum transfers greater than 1 $(\mathrm{GeV}/c)^2$. In preparation. Scheduled to run Fall 1993.

SLAC-E-144 (Oct 1991) Approved Dec 1991.

STUDY OF QED AT CRITICAL FIELD STRENGTH IN INTENSE LASER-HIGH ENERGY ELECTRON COLLISIONS AT SLAC

PRINCETON U – J G Heinrich, C Lu, K T McDonald (Spokesperson)
ROCHESTER U – C Bamber, A C Melissinos (Spokesperson), D Meyerhofer, Y Semertzidis
SLAC – T L Barklow, D L Burke (Spokesperson), P Chen, R C Field, A C Odian, J E Spencer
SLAC & BROOKHAVEN – R B Palmer

Accelerator SLAC *Detector* ?

Comments Studies interactions of electrons and photons in collisions between focused picosecond pulses of UV light and a 50-GeV electron beam. The accessible phenomena include nonlinear Compton scattering, trident production, and Breit-Wheeler pair production. Measures the invariant-mass spectrum of e^+e^- pairs to clarify whether the positron peaks seen at Darmstadt in heavy-ion collisions are a strong-field QED effect. In preparation.

SLAC-NE-01 (1984) Approved May 1984; Started Feb 1986; Completed Mar 1986.

ELECTROPRODUCTION OF THE Δ ISOBAR IN NUCLEI

ARGONNE – D F Geesaman, M C Green, R J Holt, H E Jackson (Spokesperson), W E Kleppinger, R S Kowalczyk, T S H Lee, J P Schiffer, B Zeidman

Accelerator SLAC *Detector* Spectrometer

Reactions

e^- deut	0.575, 0.650, 1.0, 2.0 GeV (E_{lab})
e^- ^{12}C	"
e^- ^{56}Fe	"

Particles studied $\Delta(1232\ P_{33})$

Comments Measures electroproduction of the Δ isobar in a variety of nuclear targets and over a range of kinematics. The aim is to study the location, size, and width of the isobar peak and to separate the longitudinal and transverse virtual photon cross sections. Uses the 1.6 GeV/c and 8 GeV/c spectrometers.

Papers PRL 61 (1988) 2530.

SLAC-NE-03 (1984) Approved May 1984, Sep 1985; Started Jan 1985; Completed Jan 1986.

INCLUSIVE ELECTRON SCATTERING FROM NUCLEI

VIRGINIA U – R Altemus, D Day (Spokesperson), J S McCarthy, R Minehart, B Norum, R York
BASEL U – I Sick

Accelerator SLAC *Detector* Spectrometer

Reactions

e^- He	3.6, 9.0 GeV (E_{lab})
e^- ^{12}C	"
e^- ^{27}Al	"
e^- ^{56}Fe	"
e^- ^{197}Au	"

Comments Measures inclusive electron scattering from a series of nuclei in the kinematic domain spanning the energy loss region from inelastic threshold down to the quasi-elastic peak. The aim is to study high momentum components of nuclear wave functions. Uses the 8 GeV/c spectrometer.

SLAC-NE-04 (1984) Approved May 1984, Sep 1985; Started Jun 1985; Completed Jun 1986.

ELECTRON SCATTERING FROM DEUTERIUM AT LARGE MOMENTUM TRANSFER AT 180°

AMERICAN U – R G Arnold, D Benton, P E Bosted (✓ Spokesperson), G de Chambrier, L Clogher, A T Katramatou, J M Lambert, A Lung, G Petratos, A Rahbar, S Rock, Z M Szalata
LIVERMORE – K van Bibber, F Dietrich
MASSACHUSETTS U, AMHERST – B Debebe, M Frodyma, R Hicks, A Hotta, G Peterson
SLAC – R Gearhart
TEL AVIV U – J Alster, J Lichtenstadt

Accelerator SLAC *Detector* Double-arm spectrometer

Reactions

e^- p	0.73–1.28 GeV (E_{lab})
e^- deut	"

Comments Measures the elastic and inelastic electron scattering from the deuteron at scattering angles around 180°, and elastic electron scattering from the proton. A double-arm spectrometer is assembled to detect scattered electrons and recoil deuterons. Ran for 426 hours.

Papers PRL 58 (1987) 1723, NIM A267 (1988) 448, PRL 61 (1988) 806, PR C42 (1990) 1, and PR C42 (1990) 38.

SLAC-NE-05 (1984) Approved May 1984; Started Feb 1986; Completed Mar 1986.

ELECTROEXCITATION OF Δ IN NUCLEI

VIRGINIA U – D Day, R Khalil, Z E Meziani, R Minehart, R Sealock, S Thornton (Spokesperson), R York
FLORIDA STATE U – L Dennis, K Kemper

Accelerator SLAC *Detector* Spectrometer

Reactions

e^- He	1.0, 1.5 GeV (E_{lab})
e^- ^{12}C	"
e^- ^{27}Al	"
e^- ^{56}Fe	"
e^- ^{120}Sn	"
e^- ^{197}Au	"

Particles studied $\Delta(1232\ P_{33})$

Comments Studies the variation of position and width of the (3,3) Δ resonance by electroexcitation for a range of nuclei and momentum transfers. Uses the 1.6 GeV/c spectrometer.

SLAC-NE-08 (1986) Approved Jun 1986; Started Dec 1987; Completed Dec 1987.

TWO-BODY PHOTODISINTEGRATION OF THE DEUTERON BETWEEN 0.6 AND 1.8 GeV

ARGONNE – S J Freedman, D F Geesaman, R Gilman, M C Green, R J Holt (✓ Spokesperson), H E Jackson, R Kowalczyk, C Marchand, J Napolitano, J Nelson, B Zeidman

CAL TECH - D Beck, G Boyd, D Collins, B W Filippone, J Jourdan, R D McKeown, R G Milner, D Potterveld, R Walker, C Woodward
NORTHWESTERN U - R E Segel, T Tung
AMERICAN U - P E Bosted
MIT - E R Kinney
STANFORD U - Z Meziani
VIRGINIA U - R C Minehart

Accelerator SLAC *Detector* Spectrometer

Reactions

γ deut $\rightarrow p\ n$ 0.8 - 1.8 GeV (E_{lab})

Particles studied deut

Comments Studies the short range part of the deuteron wave function. Uses the 1.6 GeV/c spectrometer instrumented to detect protons.

Papers PRL 61 (1988) 2530.

SLAC-NE-09 (1985) Approved Sep 1985, Jun 1986; Started Oct 1987; Completed Nov 1987.

A PROPOSAL TO MEASURE THE TRANSVERSE AND LONGITUDINAL RESPONSE FUNCTIONS FOR SEVERAL NUCLEI AT MOMENTUM TRANSFERS NEAR $Q^2 = 1$ (GeV/c)^2

VIRGINIA U - D Day, K Giovanetti, J S McCarthy, Z E Meziani (Spokesperson), R Minehart, O Rondon-Aramayo, R Sealock, S Thornton
FLORIDA STATE U - L Dennis, K Kemper

Accelerator SLAC *Detector* Spectrometer

Reactions

e^- ^{3}He	0.9 - 4.3 GeV (E_{lab})
e^- He	"
e^- ^{27}Al	"
e^- ^{56}Fe	"

Comments Measures inclusive electron scattering cross sections at various scattering angles for several nuclei. Studies the Q^2 and A dependence of the longitudinal and transverse response functions in the quasielastic region. Uses the 8 GeV/c spectrometer.

SLAC-NE-11 (1987) Approved Apr 1987; Started Jan 1989; Completed Feb 1989.

A PROPOSAL TO SEPARATE THE CHARGE AND MAGNETIC FORM-FACTORS OF THE NEUTRON AND PROTON AT LARGE MOMENTUM TRANSFER

AMERICAN U - L Andivahis, R G Arnold, D Benton, P E Bosted (✓ Spokesperson), C E Keppel, A Lung, S E Rock, M Spengos, Z M Szalata, L Tao
CEBAF - J Gomez
UC, DAVIS - L Stuart
LIVERMORE - K van Bibber, F Dietrich
MARYLAND U - G C C Chang
MASSACHUSETTS U, AMHERST - R Hicks, R Miskimen, G A Peterson, S Rokni
NIST, WASH, DC - W R Dodge
PENN U - K A Griffioen
ROCHESTER U - G M Petratos, W Sakumoto
SLAC - R Gearhart
STANFORD U - S Kuhn
TEL AVIV U - J Alster, J Lichtenstadt
WASHINGTON U, SEATTLE - C E Hyde-Wright, K Swartz

Accelerator SLAC *Detector* Spectrometer

Reactions

e^- p	1.5 - 10 GeV (E_{lab})
e^- deut	"
e^- Al	"

Particles studied p, n

Comments Measures elastic and inelastic scattering from the proton and quasielastic and inelastic scattering from deuteron and aluminum. The principal aim is to separate the charge and magnetic form factors of proton and neutron at momentum transfers from 1.75 to 7 (GeV/c)^2. Uses the 8 GeV/c spectrometer to detect electrons at forward angles, and the 1.6 GeV/c spectrometer for electrons scattered at 90°. Ran for six weeks. Several publications in preparation (April 92).

SLAC-NE-17 (1989) Approved Jun 1991; Started Aug 1991; Completed Oct 1991.

TWO-BODY PHOTODISINTEGRATION OF THE DEUTERON AT FORWARD ANGLES BETWEEN 1.0 AND 3.0 GeV

ARGONNE - K P Coulter, D F Geesaman, R J Holt (✓ Spokesperson), H E Jackson, D H Potterveld, B Zeidman
AMERICAN U - R G Arnold, P E Bosted, C E Keppel, A Lung, S E Rock, M Spengos, Z M Szalata, L Tao, J White
CAL TECH - J Arrington, E Beise, E Belz, B W Filippone, H Gao, W Lorenzon, R D McKeown, B Mueller, T O'Neill
CAL STATE, LA - M Epstein, D Margaziotis
COLORADO U - E R Kinney
CEBAF - J Napolitano
ILLINOIS U, URBANA - D Beck
LIVERMORE - P Anthony, K van Bibber, F Dietrich
MIT, LNS - M Chapman, R Ent, O Hansen, K Lee, N Makins, R G Milner, J Nelson
NORTHWESTERN U - R E Segel
STANFORD U - S Kuhn, Z E Meziani
SLAC - G M Petratos
WISCONSIN U - J van den Brand, H Bulten, C Jones

Accelerator SLAC *Detector* Spectrometer

Reactions

γ deut $\rightarrow p\ n$ 1.0 - 3.0 GeV (E_{lab})

Particles studied deut

Comments An extension of the SLAC-NE-08 experiment at higher momentum transfers. Makes use of bremsstrahlung photons produced from the SLAC electron beam. Uses the 8 GeV/c spectrometer instrumented to detect protons.

SLAC-NE-18 (1989) Approved Feb 1990; Started Aug 1991; Completed Oct 1991.

MEASUREMENT OF THE NUCLEAR DEPENDENCE AND MOMENTUM TRANSFER DEPENDENCE OF QUASIELASTIC ($e, e'p$) SCATTERING AT LARGE MOMENTUM TRANSFER

MIT, LNS - M Chapman, R Ent, O Hansen, K Lee, N Makins, R G Milner (✓ Spokesperson), J Nelson
CAL TECH - E Beise, J E Belz, B W Filippone (✓ Spokesperson), W Lorenzon, R D McKeown, T O'Neill, C Woodward
ARGONNE - K P Coulter, D F Geesaman, R J Holt, H E Jackson
AMERICAN U - R G Arnold, P E Bosted, C E Keppel, S E Rock, M Spengos, Z M Szalata, L Tao, J White
CAL STATE, LA - M Epstein, D Margaziotis
COLORADO U - E R Kinney
STANFORD U - S Kuhn
SLAC - G M Petratos
WISCONSIN U - J van den Brand, H Bulten, C Jones

Accelerator SLAC *Detector* Spectrometer

Reactions

e^- nucleon 1.9 - 5.1 GeV (E_{lab})

Comments Makes coincidence measurements of the quasielastic ($e, e'p$) cross-section on several nuclei, from carbon to gold in the Q^2 range of 1 to 7 (GeV/c)^2. One of the aims is to look for evidence of color transparency. Uses the 1.6 GeV/c spectrometer for detection of electrons, and the 8 GeV/c spectrometer for recoil proton detection.

SLAC-PEP-04-09 (Dec 1976) Approved Jan 1977; Started Oct 1982; Completed Oct 1990.

THE TIME PROJECTION CHAMBER AND 2-GAMMA DETECTOR AT PEP

LBL - A R Clark, O Dahl, D Lambert, G Lynch, R Madaras, N A Nicol, D R Nygren, M Pripstein, M Ronan

(✓ Spokesperson), R R Ross, G Shapiro, M L Stevenson, W A Wenzel

UC, BERKELEY - H H Bingham, J Lys, G P Yost

UC, DAVIS - D Pellett

UC INTERCAMPUS INST - A M Eisner, M K Sullivan, Y Wang

UC, SAN DIEGO - G Masek, W Vernon

UC, SANTA BARBARA - D A Bauer, D O Caldwell, A Lu, S Yellin

UCLA - R Berg, C D Buchanan, S Chun, S Khacheryan, Y Oyang, H Yamamoto

AMES LAB - J M Hauptman

HEIDELBERG, MAX PLANCK INST - W Hofmann, K T Knopfle, M F Spahn

MASSACHUSETTS U, AMHERST - R Belcinski, R R Kofler (✓ Spokesperson), M G Strauss

SLAC - E Bloom, K Ecklund, K H Fairfield, G L Godfrey, R Holtzapple, H Marsiske, G H Zapalac

Accelerator SLAC-PEP *Detector* TPC, 2-GAMMA

Reactions

$e^+ e^-$	29 GeV (E_{cm})

Comments Physics objectives include the study of (1) hadronization of quarks into jets of hadrons, (2) particle composition of jets, (3) correlations in meson and baryon production, (4) properties of τ lepton decays, and (5) two-photon processes. The detection apparatus consists of a time projection chamber (TPC), superconducting solenoid magnet, electromagnetic calorimeter, muon detector, and a forward detector for the 2-γ studies.

Papers IEEE TNS 30 (1983) 63, IEEE TNS 30 (1983) 67, IEEE TNS 30 (1983) 76, IEEE TNS 30 (1983) 117, IEEE TNS 30 (1983) 153, IEEE TNS 30 (1983) 162, NIM 217 (1983) 259, PRL 52 (1984) 168, PRL 52 (1984) 577, PRL 52 (1984) 2201, PRL 52 (1984) 2332, PRL 53 (1984) 130, PRL 53 (1984) 2199, PRL 53 (1984) 2378, PRL 53 (1984) 2465, PR D30 (1984) 2436, ZPHY C27 (1985) 39, ZPHY C27 (1985) 187, ZPHY C27 (1985) 495, PRL 54 (1985) 270, PRL 54 (1985) 274, PRL 54 (1985) 763, PR D31 (1985) 996, PRL 54 (1985) 2564, PR D31 (1985) 2719, PRL 55 (1985) 1047, ZPHY C28 (1985) 31, PR D33 (1986) 844, PRL 57 (1986) 51, PRL 57 (1986) 404, PRL 57 (1986) 945, PRL 57 (1986) 1836, PRL 57 (1986) 2500, PRL 57 (1986) 3140, PRL 57 (1986) 3245, PR D34 (1986) 1945, PL B184 (1987) 114, PL B184 (1987) 299, PRL 58 (1987) 97, PR D35 (1987) 1553, PR D35 (1987) 2650, ZPHY C34 (1987) 1, PRL 59 (1987) 751, PR D36 (1987) 3506, PRL 60 (1988) 2355, PR D37 (1988) 28, PR D38 (1988) 1, PL B209 (1988) 107, PRL 61 (1988) 1263, ZPHY C44 (1989) 357, PR D40 (1989) 2772, PRL 64 (1990) 172, PL B252 (1990) 499, PR D41 (1990) 2667, and PR D43 (1991) 29.

SLAC-PEP-06 (Dec 1976) Approved Jan 1977; Started 1980; Completed Mar 1986.

THE MAC DETECTOR AT PEP

COLORADO U - E Fernandez, W Ford, N Qi, A L Read, Jr, J Smith

FRASCATI - T Camporesi, R DeSangro, A Marini, I Peruzzi, M Piccolo, F Ronga

HOUSTON U - H T Blume, R B Hurst, K Lau, J P Venuti, H B Wald, R Weinstein

WISCONSIN U - M C Delfino, B K Heltsley, J R Johnson, T L Lavine, T Maruyama, R Prepost

NORTHEASTERN U - H R Band, M W Gettner, G P Goderre, E Von Goeler, O A Meyer, J Moromisato, R Polvado, D Shambroom, J C Sleeman

SLAC - W Ash, E D Bloom, G Chadwick, S H Clearwater, R W Coombes, G Godfrey, H S Kaye, R E Leedy, H L Lynch, R L Messner, L T Moss, F Muller, D Ritson, D E Wiser, R W Zdarko

UTAH U - D Groom (✓ Spokesperson), H Lee, E C Loh, P Verdini

STANFORD U - H Nelson, L Rosenberg

Accelerator SLAC-PEP *Detector* MAC

Reactions

$e^+ e^- \to \mu^+ \mu^-$	29 GeV (E_{cm})
$e^+ e^- \to \tau^+ \tau^-$	"
$e^+ e^- \to e^+ e^-$	"
$e^+ e^- \to$ quark $\overline{\text{quark}}$	"
$e^+ e^- \to \mu^+ \mu^- \gamma(s)$	"
$e^+ e^- \to e^+ e^- \mu^+ \mu^-$	"
$e^+ e^- \to \gamma \gamma$	"
$e^+ e^- \to e^+ e^-$ hadrons	"
$e^+ e^- \to \gamma X$	"

Particles studied τ, B

Comments Studies lifetimes using the high-precision vertex chamber, measures $\tau^\pm$ branching ratios and the $\mu^+\mu^-$ asymmetry. Other topics include production limits on supersymmetric particles, B lifetime determination, charge asymmetry in hadronic production, $\gamma\gamma$ and e^+e^- production, and α_s determination from the shape of hadronic events. For a detailed description of the MAC detector, see NIM A281 (1989) 291.

Papers PRL 49 (1982) 106, PRL 50 (1983) 1238, PRL 50 (1983) 2054, PRL 51 (1983) 257, PRL 51 (1983) 1022, PR D28 (1983) 2721, PRL 52 (1984) 22, PR D31 (1985) 1537, PR D31 (1985) 2724, PRL 54 (1985) 95, PRL 54 (1985) 1118, PRL 54 (1985) 1620, PRL 54 (1985) 1624, PRL 54 (1985) 2477, PRL 55 (1985) 1831, PRL 55 (1985) 2118, PR D33 (1986) 3472, PR D35 (1987) 1, PR D35 (1987) 10, PR D35 (1987) 374, PR D35 (1987) 408, PRL 58 (1987) 640, PRL 58 (1987) 1080, NIM A261 (1987) 399, PR D36 (1987) 1971, PRL 59 (1987) 415, PL B198 (1987) 297, PL B200 (1988) 221, NIM A281 (1989) 291, PL B218 (1989) 369, and PR D40 (1989) 1385.

SLAC-PEP-12 (Oct 1977) Approved Jan 1978; Completed Mar 1986.

THE HIGH RESOLUTION SPECTROMETER AT PEP

ARGONNE - M Derrick, P Kooijman, B Musgrave, L Price, J Repond, K Sugano

INDIANA U - D Blockus, B Brabson, J Brom, C Jung, H Ogren, H W Paik, D Rust

MICHIGAN U - C Akerlof, J Chapman, D Errede, M T Ken, D Meyer, H Neal, D Nitz, M Petradza, R Thun, R Tschirhart

PURDUE U - S Abachi, P Baringer, R De Bonte, B G Bylsma, D Koltick, F Loeffler, E H Low, R McIlwain, D H Miller (✓ Spokesperson), C R Ng, E Shibata

LBL - B Cork

Accelerator SLAC-PEP *Detector* HRS

Reactions

$e^+ e^-$	29 GeV (E_{cm})

Particles studied τ, ν_τ, D^+, D^0, $D^*(2010)$, D_s^+, $f_2(1270)$

Comments Obtained a data sample of 300/pb integrated luminosity. Published on all aspects of lepton and hadron production, such as charmed meson studies, rare τ decays and limit on the ν mass, electroweak tests, searches for new leptons, and detailed quark fragmentation studies.

Papers NIM 169 (1980) 413, NIM 186 (1981) 513, NIM 203 (1982) 119, PR D30 (1984) 515, PRL 53 (1984) 1971, PL B146 (1984) 261, PL B149 (1984) 519, PR D31 (1985) 1, PL B153 (1985) 116, PR D31 (1985) 2352, PRL 54 (1985) 1775, PRL 54 (1985) 2568, PRL 55 (1985) 570, PL B156 (1985) 271, PL B158 (1985) 519, PL B161 (1985) 412, PL B164 (1985) 199, PL B165 (1985) 449, PL B166 (1986) 463, PL B166 (1986) 468, PL B168 (1986) 299, NIM A249 (1986) 185, PRL 56 (1986) 1039, PRL 56 (1986) 1346, PRL 56 (1986) 1775, PR D34 (1986) 3286, PR D34 (1986) 3304, PRL 57 (1986) 1990, PL B181 (1986) 403, PL B182 (1986) 101, PL B183 (1987) 232, PR D35 (1987) 2269, PL B189 (1987) 260, PR D35 (1987) 2639, PR D35 (1987) 2880, ZPHY C35 (1987) 323, PRL 58 (1987) 2627 [erratum: PRL 59 (1987) 2388], PL B195 (1987) 301, PL B197 (1987) 291, PL B199 (1987) 151, PL B199 (1987) 585, PRL 59 (1987) 2519, PR D37 (1988) 577, PL B205 (1988) 111, PL B205 (1988) 407, PL B205 (1988) 411, PL B206 (1988) 551, PL B212 (1988) 533, PR D39 (1989) 123, NIM A276 (1989) 496, PR D40 (1989) 706, PR D40 (1989) 902, PL B226 (1989) 405, PR D41 (1990) 1414, PR D41 (1990) 2045, and PR D42 (1990) 2180.

SLAC-PEP-21 (Mar 1983) Approved May 1983; Started Nov 1984; Completed Jan 1986.

A SEARCH FOR $e^+e^- \to$ UNSEEN STATES USING PHOTON TAGGING

CERN C Matteuzzi
BOSTON U A Johnson, S Whitaker
SLAC G Bartha, D Burke (Spokesperson), C Hawkins, M Jonker, L Keller, N Roe, T Steele, R Wilson
WASHINGTON U, SEATTLE C Hearty, J Rothberg, K Young
FERMILAB P Garbincius
PENN U R Hollebeek (Spokesperson)
GENEVA U P Extermann

Accelerator SLAC-PEP *Detector* Calorimeter

Reactions

$e^+ e^- \to \gamma X$ 29 GeV (E_{cm})
$e^+ e^- \to e^+ e^- \gamma \gamma$ "

Particles studied photino, s-electron, nuino, ν, η, η'

Comments Obtained a data sample of 117/pb integrated luminosity. Among other topics, searches for light particles predicted by supersymmetric theories. Photons are detected in a calorimeter of lead-glass blocks. No anomalous signal is seen. Places limits on number of neutrino generations with masses less than a few GeV, and on the mass of the selectron.

Papers PRL 56 (1986) 685, PRL 58 (1987) 1711, PR D39 (1989) 3207, and PR D41 (1990) 17.

SLAC-SLC-SLD (1983) Approved May 1984; Started Apr 1991.

THE SLD DETECTOR FOR THE SLC

ADELPHI U R Steiner
BOSTON U J Coller, A Johnson, J T Shank, M Tahar, D Warner, J S Whitaker, B Wilson
BRUNEL U P D Acton, G Agnew, P E L Clarke, R Cotton, S Hedges, A K McKemey, S J Watts
CAL TECH F DeJongh, G Eigen, D G Hitlin, M H Kelsey, M Klein, A I Mincer, W J Wisniewski
COLUMBIA U C Arroyo, Y Au, A O Bazarko, T Bolton, L Camilleri, E Hyatt, P C Rowson, M H Shaevitz
INDIANA U H Ogren, D Rust, A Snyder
INFN, BOLOGNA A Benvenuti
FERRARA U B Camanzi, E Mazzucato, L Piemontese, B Saitta
INFN, PISA M Carpinelli, R Castaldi, R Dell'Orso, E Pieroni, C Vannini, P G Verdini
KEK J Fujimoto
FRASCATI A Calcaterra, M Gallinaro, I Peruzzi, M Piccolo, R De Sangro, P De Simone, S De Simone
LBL M Kowitt, B Schumm, G Shapiro, H Steiner
MIT O Bardon, P N Burrows, W Busza, S Cartwright, R F Cowan, B Farhat, M J Fero, J I Friedman, S Gonzalez, T Hansl-Kozanecka, H W Kendall, A Lath, T Lyons, L S Osborne, A Palounek, J Quigley, L Rosenson, U Schneekloth, F E Taylor, E Torrence, R Verdier, B F Wadsworth, D C Williams, R K Yamamoto, J M Yamartino
NAGOYA U R Kajikawa, A Sugiyama, S Suzuki
NORTHEASTERN U H R Band
RUTGERS U K G Baird, P Jacques, M Kalelkar, J N Matthews, R J Plano, P Stamer, G B Word
RUTHERFORD C J S Damerell, R L English, T Gillman, L Lintern, R J Stephenson, D Su, G J Tappern, F J Wickens
SLAC D F Alzofon, P Antilogus, W W Ash, D Aston, W B Atwood, W Baker, F Barrera, R A Bell, R Berger, E Beville, T Bienz, R Blumberg, J R Bogart, G R Bower, R F Boyce, M Breidenbach (✓ Spokesperson), T E Browder, B Burgess, D Burke, B L Byers, R Cassell, G B Chadwick, D Chambers, R Claus, W Craddock, H Cutler, S Dasu, R Davis, T Dean, R Dubois, W Dunwoodie, R D Elia, J Escalera, F Fernandez-Texon, J Ferrie, J Flynn, J D Fox, M J Fox, D R Freytag, G M Haller, G D Hallewell, V Hamilton, M Hildreth, R C Hilomen, J Hodgson, J J Hoeflich, D Horelick, M E Huffer, E W Hughes, C Jako, S Jones, T Junk, S Kaiser, H Kang, H Kawahara, D Kharakh, P C Kim, R King, P F Kunz, Y Kwon, J F Labs, R Larsen, D W G Leith, H L Lynch, D Mansour, T W Markiewicz, T Maruyama, H Masuda, G Mazaheri, R Messner, K C Moffeit, B Mours, G Mueller, D Muller, T Nagamine, H Neal, D Nelson, M Nordby, A Nuttall, J Olsen, R Ossa, G Oxoby, L Paffrath, T J Pavel, H Petersen, M Petradza, C Y Prescott, G D Punkar, G Putallaz, B N Ratcliff, P E Rensing, R Rinta, L S Rochester, A Rothenberg, J J Russell, P Saez, O H Saxton, R H Schindler, D Schultz, S L Shapiro, H Shaw, D J Sherden, C Simopoulos, K Skarpaas, S R Smith, P Stiles, M Swartz, T Takahashi, N Toge, T Usher, J Va'Vra, A P Waite, D Walz, R Watt, T Weber, S H Williams, C Yee, A Yim, C C Young, R W Zdarko
TOHOKU U K Abe, K Hasegawa, Y Hasegawa, Y Iwasaki, F Suekane, H Yuta
TRIUMF D P Gurd, C Oram
UC, SANTA BARBARA D A Bauer, A Bean, D O Caldwell, R Dolin, J E Duboscq, D L Hale, J Huber, A Lu, L Mathys, S McHugh, R J Morrison, J D Richman, S A Wickert, M S Witherell, S J Yellin
UC, SANTA CRUZ G Blaylock, M Cavalli-Sforza, P A Coyle, D G Coyne, X Liu, T Schalk, M Schneider, A Seiden, E N Spencer, D A Williams
PADUA U & INFN, PADUA N Bacchetta, D Bisello, A Castro, M Loreti, A Mazzucato, L Pescara, M Tecchio, J Wyss
PERUGIA U & INFN, PERUGIA R Battiston, M Biasini, G M Bilei, G Mancinelli, G Mantovani, M Pauluzzi, L Servoli
BRITISH COLUMBIA U D A Axen, S Bougerolle, D Peters, R L Shypit, R Sobie
CINCINNATI U K Choi, A D'Oliveira, R A Johnson, J L Martinez, B T Meadows, M Nussbaum, E Rutz, A K Santha, A Shoup, M D Sokoloff, I E Stockdale
COLORADO U C Alber, G J Baranko, J Carr, D D Durrett, E Erdos, C Fan, N M Krishna, J Lauber, U Nauenberg, P Rankin, G E Schultz
ILLINOIS U, URBANA I Abt, D Blockus, R W Downing, B I Eisenstein, K M Fortune, G Gladding, M J Haney, J M Izen, I Karliner, W A Majid, J F McGowan, D J Mellor, G Stewart, J J Thaler
MASSACHUSETTS U, AMHERST R J Belcinski, S S Hertzbach, R R Kofler, M G Strauss
OREGON U J Brau, R Frey, K Furuno, H Hwang, H Park, K T Pitts, C Zeitlin
TENNESSEE U S C Berridge, B Bugg, H O Cohn, P Du, T Handler, E L Hart, R S Kroeger, A W Weidemann, S L White
VICTORIA U & TRIUMF A Astbury, G Beer, T A Hodges, A Honma, R K Keeler, R R Langstaff, G R Mason, P R Poffenberger, L P Robertson, P R Schenk, M Turcotte
WASHINGTON U, SEATTLE T H Burnett, V Cook, D A Forbush, J Harrison, H Y Kim, J Ma, P M Mockett, J E Rothberg, A Szumilo, F Toevs, E Vella, R W Williams, K K Young
WISCONSIN U H R Band, J R Johnson, R Prepost, G Zapalac
VANDERBILT U L Chen, R S Panvini, T W Reeves, J P Venuti
YALE U C Baltay (✓ Spokesperson), R Ben-David, A Disco, W T Emmet, S Manly, J A Snyder, J D Turk

Accelerator SLAC-SLC *Detector* SLD

Reactions

$e^+ e^-$ <100 GeV (E_{cm})

Particles studied Z^0, higgs, top

Comments Studies include (1) precision tests of the Standard Model of the electroweak interactions and the Z partial width to bottom states, particularly by measuring the left-right polarization asymmetry A_{LR}, (2) heavy quark physics of the B system, (3) $B\bar{B}$ mixing with polarized beams, (4) tests of QCD in multi-jets, and (5) a search for new phenomena. The detector system consists of a high precision CCD vertex detector, a cylindrical central drift chamber with four circular endcap drift chambers, a Čerenkov Ring Imaging Detector, finely segmented projective tower geometry calorimetry, and a muon tracking system. Taking data (May 92).

Papers NIM A238 (1985) 489, IEEE TNS 33 (1986) 46, IEEE TNS 33 (1986) 65, IEEE TNS 33 (1986) 81, IEEE TNS 33 (1986) 113, IEEE TNS 33 (1986) 167, IEEE TNS 33 (1986) 176, IEEE TNS 33 (1986) 194, IEEE TNS 33 (1986) 197, IEEE TNS 33 (1986) 201, IEEE TNS 33 (1986) 261, NIM A252 (1986) 295, NIM A257 (1987) 139, NIM A257 (1987) 625, IEEE TNS 35 (1988) 231, IEEE TNS 35 (1988) 282, IEEE TNS 35 (1988) 311, IEEE TNS 35 (1988) 398, NIM A264 (1988) 219, NIM A265

(1988) 99, NIM A273 (1988) 858, IEEE TNS 36 (1989) 23, IEEE TNS 36 (1989) 276, IEEE TNS 36 (1989) 339, IEEE TNS 36 (1989) 595, IEEE TNS 36 (1989) 675, IEEE TNS 36 (1989) 751, IEEE TNS 36 (1989) 822, IEEE TNS 36 (1989) 1657, NIM A275 (1989) 484, NIM A276 (1989) 94, NIM A277 (1989) 222, NIM A283 (1989) 582, NIM A283 (1989) 590, NIM A284 (1989) 339, IEEE TNS 37 (1990) 1132, IEEE TNS 37 (1990) 1191, NIM A288 (1990) 236, NIM A289 (1990) 449, NIM A289 (1990) 463, NIM A289 (1990) 577, NIM A290 (1990) 353, NIM A293 (1990) 136, NP (Proc. Suppl.) B23 (1991) 219, NP (Proc. Suppl.) B23 (1991) 227, and NIM A300 (1991) 501.

SLAC-SLC-6 (Apr 1983) Approved May 1983; Started Apr 1989; Completed 1990.

MARK II AT THE SLC

CAL TECH - B C Barish, M Kuhlen, J McKenna, B Milliken, C Peck, F Porter, R Stroynowski, A Weinstein, A Weir
CERN - J F Kral
COLORADO U - D D Durrett, W T Ford, D Hinshaw, P Rankin, J G Smith, P Weber
FERMILAB - J Hylen, E Wicklund
HAWAII U - A M Breakstone, R Cence, F Harris, C Kenney, S Parker
INDIANA U - D A Averill, D Blockus, B Brabson, G G Hanson, W N Murray, H Ogren, D Rust, M Yurko
IOWA STATE U - J Hill, F K Wohn
JOHNS HOPKINS U - B A Barnett, P Dauncey, D Drewer, B D Harral, J Matthews
LBL - G S Abrams, S Bethke, G Gidal, G Goldhaber (√ Spokesperson), R Harr, C Hearty, J A Kadyk, M Levi, F Rouse, M Schaad, B A Schumm, G Trilling
MICHIGAN U - J Chapman, M Chmeissani, E C Gero, S J Hong, W Koska, R P Thun, D Wu
OREGON U - R E Frey
SLAC - C Adolphsen, J Ballam, T L Barklow, A M Boyarski, F Bulos, D L Burke, D Cords, H DeStaebler, J Dorfan, R Elia, G Feldman (√ Spokesperson), R C Field, B H Fong, D H Fujino, T Glanzman, T M Himel, D P Hutchinson, W Innes, J A Jaros (√ Spokesperson), M E King, D S Koetke, L A Kowalski, W Kozanecki, V G Luth, T Mattison, K C Moffeit, C T Munger, K O'Shaughnessy, M L Perl, M G Petradza, R Pitthan, A E Snyder, E J Soderstrom, D P Stoker, M Swartz, R E Taylor, E L Veum, S R Wagner, M B Woods
SSCL - D P Coupal
UC, SANTA CRUZ - P Burchat, D E Dorfan, C Gatto, J Gomez-Cadenas, G Gratta, C A Heusch, J Kent, L Labarga, A Litke, H Sadrozinski, A Seiden, S Watson, C Zaccardelli, C Von Zanthier
VANDERBILT U - J E Bartelt

Accelerator SLAC-SLC *Detector* MARK-II

Reactions
$e^+ e^-$ <100 GeV (E_{cm})

Particles studied Z^0, B, higgs, top, τ

Comments Studies include (1) measurement of Z^0 mass and width and determination of the number of light neutrinos, (2) tests of standard-model electroweak predictions in dilepton final states, (3) a search for new heavy quarks and leptons, (4) a search for Higgs particles, (5) tests of QCD in multi-jets, (6) measurement of b fractions and properties of b events, and (7) a search for new phenomena. Uses an existing PEP detector, the Mark-II. A high resolution vertex detector system was installed in December 89 and successfully operated in 1990.

Papers PRL 63 (1989) 724, PRL 63 (1989) 1558, PRL 63 (1989) 2173, PRL 63 (1989) 2447, PRL 63 (1989) 2780, PRL 64 (1990) 987, PRL 64 (1990) 1091, PRL 64 (1990) 1211, PRL 64 (1990) 1334, PRL 64 (1990) 2877, PRL 64 (1990) 2881, PRL 64 (1990) 2980, PRL 64 (1990) 2984, PR D41 (1990) 3542, and PRL 67 (1991) 3347.

SLAC-SP-032 (May 1981) Approved May 1981; Started Apr 1982; Completed Dec 1988.

MARK-III AT SPEAR

CAL TECH - G P Dubois, G Eigen, D G Hitlin, C Matthews, A Weinstein, W Wisniewski
SLAC - K O Bunnell, R E Cassell, D H Coward, J Labs, A C Odian, R H Schindler (Spokesperson), W H Toki (Spokesperson), F Villa
UC, SANTA CRUZ - M Burchell, D Dorfan, C A Heusch, W Lockman, H Sadrozinski, T Schalk, A Seiden, R C Xu
ILLINOIS U, URBANA - B I Eisenstein, G E Gladding, J Izen, G Stewart
IOWA U - U Mallik, M Wang
WASHINGTON U, SEATTLE - T H Burnett, V Cook, A D Li, P Mockett, L W H Parrish

Accelerator SLAC-SPEAR *Detector* MARK-III

Reactions
$e^+ e^-$ 3.097, 3.686, 3.770, 4.14 GeV (E_{cm})

Particles studied D^0, D^+, D^-, D_s^+, $\psi(3770)$, $J/\psi(1S)$, $\psi(2S)$, $\eta_c(1S)$

Comments Mark-III is a general purpose detector for the study of hadronic final states in e^+e^- annihilation. It is optimized for the reconstruction of exclusive decays of charmed particles. The trigger chamber was replaced in 1986 by a new high resolution vertex detector. The physics program is focused on detailed studies of the J/ψ system and higher ψ states, D mesons (branching fractions, rare decays, mixing, dynamical features of decays), and the τ lepton.

Papers PRL 52 (1984) 2126, PRL 54 (1985) 1976, PR D31 (1985) 2192, PR D32 (1985) 566, PR D32 (1985) 2883, PRL 55 (1985) 150, PRL 55 (1985) 1723, PRL 55 (1985) 1842, PR D33 (1986) 629, PR D33 (1986) 1222, PRL 56 (1986) 107, PRL 56 (1986) 2136, PRL 56 (1986) 2140, PR D35 (1987) 2077, PRL 58 (1987) 2171, PL B193 (1987) 147 [erratum: PL B198 (1987) 590], PR D36 (1987) 2185, PL B196 (1987) 107, PRL 59 (1987) 186, PRL 59 (1987) 1527, PR D37 (1988) 2023 [erratum: PR D40 (1989) 3788], PRL 60 (1988) 89, PRL 60 (1988) 1375 [erratum: PRL 63 (1989) 1658], PR D38 (1988) 2695 [erratum: PR D40 (1989) 3788], PL B208 (1988) 152 [erratum: PL B227 (1989) 501], PRL 62 (1989) 1821, PR D40 (1989) 906, PRL 63 (1989) 1211 [erratum: PRL 63 (1989) 2858], PRL 64 (1990) 169, PR D41 (1990) 1410, PRL 64 (1990) 2615, PRL 65 (1990) 686, PRL 65 (1990) 1309, PRL 65 (1990) 2507, PL B263 (1991) 135, PRL 66 (1991) 1011, NP A527 (1991) 753, and PRL 68 (1992) 282.

SSCL Experiments

SSCL-GEM (Jun 1991) Approved 1992.

GAMMA, ELECTRON, AND MUON EXPERIMENT

Accelerator SSC *Detector* GEM

Comments Exploits with the GEM detector the physics opportunities opened up by the new collider. The detector has a large superconducting open-geometry solenoid, emphasizing the detection of photons, electrons and muons with high precision. Muons will be tracked with a combination of drift tubes (in barrel region) and cathode strip chambers (end caps), with resistive plate counters in the barrel region to trigger on muons and tag beam crossings. The chambers surround the calorimeters and fill a large (16 m diameter, 30 m long), 0.8 T superconducting solenoid. Inside the calorimeters is a compact central tracker. The collaboration consists of 600 physicists from 15 countries, and is likely to grow. The development of a Technical Design Report is in progress (April 92). For further details, please contact the spokespersons, Dr. Barry Barish, Cal Tech, and Dr. William Willis, Columbia University.

SSCL-SDC (1989) Approved Jan 1991.

SOLENOIDAL DETECTOR COLLABORATION

SDC COLLABORATION

Accelerator SSC *Detector* SDC

Comments The major goal is to exploit the physics opportunities opened up by the SSC collider with its design luminosity of 10^{33} cm^{-2} s^{-1} and counter-rotating beams of 20 TeV protons. The study will include the search for Higgs boson(s) and higher mass gauge bosons, new spectroscopies such as supersymmetry, and searches for compositeness effects and new phenomena not necessarily suggested by present theories. The detector has a large cylindrical volume (1.7 m radius by 8 m length), concentric with the beam and surrounded by a superconducting solenoid coil that produces a 2 T magnetic field. The volume is filled with tracking detectors which measure momenta and directions of charged particles emitted over the angular interval between 10 and 170°. Outside of the solenoid and tracking volume, there is an hermetic central calorimeter providing total energy measurements for electrons, photons, and hadron jets. The calorimeter includes a shower detector that provides position information on electromagnetic showers. Two forward calorimeters extend the coverage for calorimetry down to 0.5°, and up to 179.5°. On the outside of the central calorimeter there is an extensive system for identifying and triggering on muons. The collaboration consists of over 700 physicists and engineers from 12 countries, and is likely to grow. On April 1, 1992, the collaboration submitted the Technical Design Report, and hopes to initiate construction in early 1993. Physics operation is scheduled for 1999. For further details, please contact the spokesperson, Dr. George H. Trilling, LBL, Berkeley.

TRIUMF Experiments

TRIUMF-182 Completed 1988.

MEASUREMENT OF THE np SPIN CORRELATION PARAMETER A_{nn}

TRIUMF – R Abegg, L G Greeniaus, C A Miller
MANITOBA U – J Birchall, N E Davison, W P Lee, W T H van Oers (✓ Spokesperson), P R Poffenberger
ALBERTA U – P W Green, G A Moss, G Roy, G M Stinson, J Wesick

Accelerator TRIUMF *Detector* Wire chamber, Counter

Reactions Polarized beam and target

$n\,p \rightarrow n\,p$ 220, 325, 425 MeV (T_{lab})

Comments Measures A_{nn}, A_{0n}, and A_{n0}.

Papers PR C40 (1989) 2406, PR C40 (1989) 2684, and NIM A306 (1991) 432.

TRIUMF-248 (Jul 1983) Approved Jul 1983; Started Oct 1983; Completed Jun 1986.

A STUDY OF THE $\pi^+ \rightarrow e^+\nu_e$ DECAY

VICTORIA U – D Britton, D A Bryman, E T H Clifford, A Olin
NATIONAL RESEARCH COUNCIL, OTTAWA – M S Dixit
TRIUMF – S Ahmad, Y Kuno, J A Macdonald, T Numao (✓ Spokesperson)
BRITISH COLUMBIA U – J M Poutisson
ALBERTA U – P Kitching

Accelerator TRIUMF *Detector* Photon spectrometer

Reactions

$\pi^+ \rightarrow e^+\,\nu_e$ 70 MeV/c
$\pi^+ \rightarrow \mu^+\,\nu_\mu$ "
$\mu^+ \rightarrow e^+\,\bar{\nu}\,\nu$ 52 MeV/c

Particles studied π^+

Comments A measurement of branching ratios to test universality in weak interactions, and a search for secondary peaks. Analysis of data in progress (February 92).

Papers PRL 56 (1986) 2241, and PR D37 (1988) 1131.

TRIUMF-297 Completed Jan 1987.

ENERGETIC NEUTRON SPECTRA FROM μ^- CAPTURE IN THE DEUTERON

JOHNS HOPKINS U – T J Hallman, Y K Lee (✓ Spokesperson), L Madansky, E K McIntyre, Jr
VICTORIA U – G R Mason

Accelerator TRIUMF *Detector* Counter

Reactions

μ^- deut $\rightarrow n\,n$ 0 MeV/c

Papers PL B188 (1987) 33. No other papers expected.

TRIUMF-298 (Dec 1984) Approved Dec 1984; Completed Nov 1989.

RESONANT STRUCTURE IN Cu$(p,\pi^+)X$: A POSSIBLE DIBARYON SIGNAL

TRIUMF – R Abegg, S Burzynski, A Celler, D Frekers, R Helmer, K P Jackson, J Lu, C A Miller, R Schubank, A Trudel, M C Vetterli, Y S Wu, S Yen (✓ Spokesperson)
ST PETERSBURG, INP – I I Strakovsky
WESTERN ONTARIO U – W P Alford

Accelerator TRIUMF *Detector* Spectrometer

Reactions

p Cu $\rightarrow \pi^+$ X 341–376 MeV (T_{lab})
p Cu $\rightarrow \pi^-$ X "

Particles studied dibaryon

Comments No resonant structure observed in the π^+ or π^- yield.

Papers PL B269 (1991) 59. No other papers expected.

TRIUMF-300 (Oct 1984) Completed 1987.

SPIN TRANSFER K_{SS} IN THE REACTION $pp \rightarrow d\pi^+$

ALBERTA U & TRIUMF – R Abegg, L G Greeniaus, D A Hutcheon (✓ Spokesperson)
ALBERTA U – L Antonuk, J M Cameron, J Collot, G Gaillard, G A Moss, W C Olsen, G Roy, R Sawafta, D M Sheppard
BRITISH COLUMBIA U – G R Smith
INDIANA U – B Blankleider

Accelerator TRIUMF *Detector* Spectrometer

Reactions Polarized beam

$p\,p \rightarrow$ deut π^+ 510 MeV (T_{lab})

Papers NP A503 (1989) 649.

TRIUMF-301 (Oct 1984) Completed Sep 1986.

THE REACTION $pp \rightarrow pp\pi^0$ NEAR THRESHOLD

BRITISH COLUMBIA U – D F Measday (✓ Spokesperson), A J Noble, S Stanislaus
BUDAPEST, CRIP – D Horvath
TRIUMF – M Salomon

Accelerator TRIUMF *Detector* Photon spectrometer

Reactions

$p\,p \rightarrow p\,p\,\pi^0$ 280–500 MeV (T_{lab})

Comments Measures the π^0 asymmetry and differential and total cross sections.

Papers PR C41 (1990) 1913, and PR C44 (1991) 2287. No other papers expected.

TRIUMF-304 (Oct 1984) Approved Dec 1984; Started Jul 1985; Completed Aug 1988.

MUONIUM-ANTIMUONIUM CONVERSION

VICTORIA U – G A Beer, A C Janisson, G R Mason, A Olin (✓ Spokesperson)
BRITISH COLUMBIA U – J B Warren
ARIZONA U – T Bowen, P G Halverson
WYOMING U – T Huber, A R Kunselman
TRIUMF – K Kendall, G M Marshall
SIMON FRASER U – B Heinrich, K Myrtle

Accelerator TRIUMF *Detector* Wire chamber, Counter

Reactions

$\mu^+\,e^- \rightarrow \mu^-\,e^+$ 20–29 MeV/c

Papers PRL 57 (1986) 611, PRL 61 (1988) 2189, PR D41 (1990) 2709, and PR A42 (1990) 161.

TRIUMF-332 (Oct 1984) Completed 1988.

RATIO OF SPIN TRANSFER PARAMETERS D_t/R_t

MANITOBA U – D Bandgopadhyoy, J Birchall, N E Davison, W T H van Oers, S A Page, P R Poffenberger, D Ramsey
MANITOBA U & TRIUMF – C A Davis (✓ Spokesperson)
ALBERTA U – P W Green, C Lapointe, G Moss, R Tkachuk
ALBERTA U & TRIUMF – R Abegg, G Greeniaus, C A Miller

Accelerator TRIUMF *Detector* Counter

Reactions Polarized beam

p deut $\rightarrow n\,p\,p$ 220, 325, 425, 495 MeV (T_{lab})

Comments Measures the ratio of the Wolfenstein parameters D_t and R_t for the np system. Uses a scintillator and DLC's.

Papers PR C38 (1988) 2173.

TRIUMF-337 (Dec 1984) Approved Dec 1984; Completed Dec 1986.

MEASUREMENT OF TENSOR OBSERVABLES IN THE $\pi^+ d$ ELASTIC SCATTERING REACTION

TRIUMF - P Delheij, D Gill, D Healey, D Ottewell, G R Smith (Spokesperson), G Wait, P Walden
REGINA U - G Lolos, E L Mathie
BRITISH COLUMBIA U - A Altman, R R Johnson, G Jones, F Teruisidis, P Trelle

Accelerator TRIUMF *Detector* Counter

Reactions Polarized target
π^+ deut $\rightarrow$ π^+ deut 100-294 MeV (T_{lab})

Papers PRL 57 (1986) 803.

TRIUMF-360 (Nov 1985) Approved Dec 1985.

POLARIZATION TRANSFER IN $\pi\vec{d}$ ELASTIC SCATTERING

TRIUMF - P Dehij, D Gill, D Healey, D Ottewell, G Wait
BRITISH COLUMBIA U - A Altman
SASKATCHEWAN U - I Chun, K Itoh, Y M Shin (Spokesperson), N Stevenson
TORONTO U - T Drake, R Schubank

Accelerator TRIUMF *Detector* ?

Reactions Polarized target
π^+ deut $\rightarrow$ π^+ deut 160 MeV (T_{lab})

TRIUMF-369 (Dec 1985) Approved Dec 1985; Started 1991.

CHARGE SYMMETRY BREAKING IN np ELASTIC SCATTERING AT 350 MeV

TRIUMF - R Abegg, P P J Delheij, P W Green, L G Greeniaus (✓ Spokesperson), D C Healey, R Helmer, P Levy, C A Miller
MANITOBA U - A R Berdoz, J Birchall, J R Campbell, C A Davis, N E Davison, W T H van Oers (✓ Spokesperson), S A Page, W D Ramsay, J Zhao
ALBERTA U - N Kolb, E Korkmaz, J Li, N Rodning, J Soukup, G M Stinson

Accelerator TRIUMF *Detector* Counter, Wire chamber

Reactions Polarized beam and target
$n\ p \rightarrow n\ p$ 350 MeV (T_{lab})

Comments Studies the isospin-mixing component of the np interaction by measuring the analyzing power differences. Uses a frozen spin target. In progress. Next run scheduled for August 92.

TRIUMF-372 Approved Dec 1985; Completed Feb 1991.

SINGLE PION PRODUCTION IN np SCATTERING

MANITOBA U - A R Berdoz, J Birchall, J R Campbell, C A Davis, N E Davison (✓ Spokesperson), W R Falk, W T H van Oers, S A Page, W D Ramsay
TRIUMF - P W Green, D A Hutcheon, C A Miller
TEXAS U - P J Riley
HOUSTON U - B W Mayes, L Pinsky
RICE U - D L Adams, G W Mutchler
CAL STATE, LA - M Epstein, D J Margaziotis

Accelerator TRIUMF *Detector* Wire chamber, Counter

Reactions Polarized beam
$n\ p \rightarrow p\ p\ \pi^-$ 450 MeV (T_{lab})

Comments Data analysis in progress (February 92).

TRIUMF-375 Completed 1988.

FEW BODY PHYSICS VIA THE PION-DEUTERON BREAKUP REACTION

REGINA U - G Huber, G J Lolos, E L Mathie (✓ Spokesperson), S I H Naqvi, V Pafilis, Z Papandreou
BRITISH COLUMBIA U - G Jones, M Sevior, P Trelle
TRIUMF - P Delheij, D R Gill, D Healey, D Ottewell, G R Smith, G Wait

Accelerator TRIUMF *Detector* Counter

Reactions Polarized target
pion deut $\rightarrow$ pion $p\ n$ 134, 180, 228 MeV (T_{lab})

Comments The experiment has two distinct parts. TRIUMF-375A measures unpolarized cross sections with a liquid target. Data taking for this phase was completed in 1986. TRIUMF-375B studies analysing powers with a polarized target. Data taking was completed in 1988. Pions and protons are detected by measuring the time of flight. Data analysis for both experiments is in progress (February 92).

Papers PR C41 (1990) 193.

TRIUMF-377 Approved Dec 1985; Completed Aug 1986.

TEST OF CHARGE SYMMETRY IN πd ELASTIC SCATTERING

TRIUMF - D Gill, D F Ottewell, G R Smith (Spokesperson), P L Walden
BRITISH COLUMBIA U - A Altman, R R Johnson, G Jones, F Tervisidis, P Trelle
COLORADO U - J J Kraushar, R J Peterson, R A Ristinen, J L Ullmann

Accelerator TRIUMF *Detector* Counter

Reactions
π^+ deut $\rightarrow$ π^+ deut 143-256 MeV (T_{lab})
π^- deut $\rightarrow$ π^- deut "

Comments Measures differential cross sections and A_π.

TRIUMF-387 (Nov 1985) Approved Dec 1985; Completed 1989.

MEASURE OF BIRKS FACTOR IN TMP

VICTORIA U - A Astbury (✓ Spokesperson), M Fincke-Keeler, R Keeler, P Poffenberger, L Robertson, M Rosvick, P Schenk
CERN - D Schinzel
ANNECY - A Gonidec
TRIUMF - C J Oram
BRITISH COLUMBIA U - R Sobie

Accelerator TRIUMF *Detector* ?

Reactions
π^+ 50-400 MeV/c
p "

Papers NIM A (submitted).

TRIUMF-394 (Jul 1986) Approved Jul 1986; Completed 1986.

$\pi^\pm p$ DIFFERENTIAL CROSS SECTIONS FROM 20 TO 65 MeV KINETIC ENERGY

COLORADO U - J T Brack, J J Kraushaar, R A Loveman, R J Peterson, R A Ristinen (✓ Spokesperson), J L Ullmann
TRIUMF - D R Gill (✓ Spokesperson)
BRITISH COLUMBIA U - R R Johnson, R Olszewski, M Sevior, G R Smith, R P Trelle
REGINA U - E L Mathie

Accelerator TRIUMF *Detector* Counter

Reactions
$\pi^+\ p \rightarrow \pi^+\ p$ 20-65 MeV (T_{lab})
$\pi^-\ p \rightarrow \pi^-\ p$ "

Papers PR C41 (1990) 2202.

TRIUMF-399 (May 1987) Completed Jul 1990.

MEASUREMENT OF $\pi^\pm d$ ELASTIC SCATTERING DIFFERENTIAL CROSS SECTIONS AT T_π = 30, 50, AND 65 MeV

COLORADO U - J T Brack, J J Kraushaar, R A Loveman, R J Peterson, R A Ristinen (✓ Spokesperson)
TRIUMF - D R Gill
REGINA U - E L Mathie
BRITISH COLUMBIA U - R R Johnson, R Olszewski, M Sevior, G R Smith (✓ Spokesperson), R P Trelle

Accelerator TRIUMF *Detector* Counter

Reactions

π^+ deut $\rightarrow \pi^+$ deut	30, 50, 65 MeV (T_{lab})
π^- deut $\rightarrow \pi^-$ deut	"
$\pi^+ p \rightarrow \pi^+ p$	66.8 MeV (T_{lab})

Comments Results of the run at energies near 65 MeV have been published. The analysis of the data at 30 and 45 MeV is in progress (February 92).

Papers PR C38 (1988) 2427, and PR C44 (1991) 15.

TRIUMF-441 (Nov 1986) Completed 1987.

AMPLITUDE DETERMINATION OF THE PION-NUCLEON ELASTIC SCATTERING REACTION. PART 1: ANALYZING POWER

TRIUMF - D R Gill, D Healey, D Ottewell, G R Smith (Spokesperson), G D Wait
COLORADO U - J T Brack, J J Kraushaar (Spokesperson), R J Peterson, R A Ristinen
BRITISH COLUMBIA U - R R Johnson, G Jones, R Olszewski, M E Sevior, R P Trelle
REGINA U - E L Mathie

Accelerator TRIUMF *Detector* Counter

Reactions Polarized target

$\pi^+ p \rightarrow \pi^+ p$	90, 120, 150, 180, 210, 240, 270 MeV (T_{lab})
$\pi^- p \rightarrow \pi^- p$	"

TRIUMF-443 (Nov 1986) Completed 1987.

STUDY OF THE $\pi^+ d \rightarrow \pi^- \pi^+ pp$ REACTION AT T = 250 AND 280 MeV

TRIUMF - D R Gill
INFN, TRIESTE - N Grion
TRIESTE U - R Rui (Spokesperson)
BRITISH COLUMBIA U - M Hanna, R R Johnson, R Olszewski, F M Rozon, M Sevior, G Smith, V Sossi, P Trelle
TRIESTE U & INFN, TRIESTE - G Margagliotti
BRITISH COLUMBIA U & BEIJING, IHEP - Z Wu

Accelerator TRIUMF *Detector* Counter, Spectrometer

Reactions

π^+ deut $\rightarrow p\, p\, \pi^-\, \pi^+$	250, 280 MeV (T_{lab})

Papers NP A517 (1990) 455.

TRIUMF-446 (May 1987) Completed Apr 1989.

PION-PROTON BREMSSTRAHLUNG

OREGON STATE U - F Farzanpay, P Fuchs, A Stetz (✓ Spokesperson), L W Swenson, N Wen
ALBERTA U & TRIUMF - P Kitching (✓ Spokesperson)
TRIUMF - G Smith
ALBERTA U - W C Olsen
SASKATCHEWAN U - N Stevenson

Accelerator TRIUMF *Detector* Counter

Reactions Polarized target

$\pi^+ p \rightarrow \pi^+ p\, \gamma$	265 MeV (T_{lab})

Comments Data analysis in progress (February 92).

TRIUMF-452 (Nov 1986) Started Aug 1990.

RADIATIVE MUON CAPTURE ON HYDROGEN

RMC COLLABORATION
BRITISH COLUMBIA U - C Q Chen, P Gumplinger, M D Hasinoff (✓ Spokesperson), A J Larabee, D G Sample, W Schott, S Veillette, N S Zhang
VIRGINIA TECH - D S Armstrong, M Blecher, A Serna-Angel
TRIUMF - T von Egidy, J A Macdonald, J Poutissou, R Poutissou, D H Wright
MELBOURNE U - R Henderson, S C McDonald, M Munro, G N Taylor
MONTREAL U - G Azuelos (✓ Spokesperson), P Depommier, B Doyle, G Jonkmans
PSI, VILLIGEN - W Bertl
KENTUCKY U - T P Gorringe
QUEENS U, KINGSTON - B C Robertson

Accelerator TRIUMF *Detector* Drift chamber

Reactions

$\mu^- p \rightarrow n\, \nu_\mu\, \gamma$	0 MeV (T_{lab})

Comments Extracts the induced pseudoscalar coupling constant g_p of the weak hadronic current. In progress. Scheduled to run till December 92.

Papers IEEE TNS 37 (1990) 1116, and IEEE TNS 37 (1990) 1200.

TRIUMF-460 (1989) Started 1987; Completed 1989.

A MEASUREMENT OF THE CROSS SECTION AND ANALYZING POWER OF THE $pn \rightarrow pp(^1S_0)\pi^-$ REACTION AT TRIUMF ENERGIES

TEL AVIV U - D Ashery, H Hahn, M A Moinester
BRITISH COLUMBIA U - E G Auld, F Duncan, G Jones, M Sevior
TRIUMF - D Hutcheon, P L Walden (✓ Spokesperson)
BRITISH COLUMBIA U & TRIUMF - R R Johnson
ALBERTA U - E Korkmaz

Accelerator TRIUMF *Detector* Spectrometer, Counter

Reactions Polarized beam

$p\, n \rightarrow p\, p\, \pi^-$	345-495 MeV (T_{lab})

Comments The target is liquid deuterium. Uses a QQD spectrometer and a counter hodoscope. Ran in September 87 and in August 89. Data analysis in progress (February 92).

Papers PRL 63 (1989) 1792.

TRIUMF-466 (May 1987) Completed 1988.

MEASUREMENT OF $np \rightarrow d\pi^0$ CROSS SECTIONS NEAR THRESHOLD

TRIUMF - R Abegg, L G Greeniaus, D A Hutcheon (✓ Spokesperson), C A Miller
MANITOBA U - N E Davison
ALBERTA U - G W R Edwards, G A Moss, W C Olsen, Y Yanlin
WESTERN CAPE U - I J van Heerden

Accelerator TRIUMF *Detector* Spectrometer

Reactions

$n\, p \rightarrow$ deut π^0	276, 277, 279, 283, 291 MeV (T_{lab})

Comments Measured total and differential cross sections.

Papers PRL 64 (1990) 176, and NP A535 (1991) 618.

TRIUMF-478 (Oct 1987) Completed 1989.

PROTON INDUCED πNN RESONANCES

TRIUMF - R Abegg, D Frekers (✓ Spokesperson), K Hicks, J Iqbal, B Jennings, C A Miller, P Trelle, P Walden, S Yen
SASKATCHEWAN U - R Schubank
TORONTO U - R Azuma, C Chan

Accelerator TRIUMF *Detector* Spectrometer

Reactions

$^{12}C\, p \rightarrow p\, p\, \pi^-$ X	500 MeV (T_{lab})
$^{12}C\, p \rightarrow p\, n\, \pi^+$ X	"
$^{13}C\, p \rightarrow p\, p\, \pi^-$ X	"
$^{13}C\, p \rightarrow p\, n\, \pi^-$ X	"

Comments Data were taken only for the first listed reaction, results were negative.

TRIUMF-482 (Oct 1987) Completed Sep 1991.

MEASUREMENTS OF SPIN TRANSFER COEFFICIENTS IN pd ELASTIC SCATTERING

TRIUMF - R Abegg (✓ Spokesperson), D A Hucheon, J Iqbal
TRIUMF & ALBERTA U - P W Green
ALBERTA U - G A Moss, W C Olsen, N Rodning

SASKATCHEWAN U - R Schubank, Y M Shin, N Stevenson
TRIUMF & TORONTO U - D Frekers

Accelerator TRIUMF *Detector* Spectrometer

Reactions Polarized beam

p deut $\rightarrow$ p deut 200, 290, 400 MeV (T_{lab})

Comments Measures the spin transfer coefficients D_{NN}, D_{SS}, D_{LS}, and D_{LL}. Data analysis in progress (February 92).

TRIUMF-496 (Oct 1987) Completed Oct 1989.

MEASUREMENTS OF THE ANGULAR DISTRIBUTION OF THE SPIN TRANSFER PARAMETER D_{LS} IN $pp \rightarrow d\pi^+$

TRIUMF - R Abegg (✓ Spokesperson), L G Greeniaus, D A Hutcheon
ALBERTA U - D Mack, G A Moss, Y Ye
TRIUMF & ALBERTA U - P W Green

Accelerator TRIUMF *Detector* Spectrometer, Counter

Reactions

$p\ p \rightarrow$ deut π^+ 507 MeV (T_{lab})

Comments Measures the spin transfer coefficient D_{LS}.

Papers NP A (to be published).

TRIUMF-497-287 (Oct 1987) Approved Dec 1987.

MEASUREMENT OF THE FLAVOR-CONSERVING HADRONIC WEAK INTERACTION

MANITOBA U - A R Berdoz, J Birchall (✓ Spokesperson), J R Campbell, N E Davison, A Hamian, W T H van Oers (✓ Spokesperson), S A Page (✓ Spokesperson), W D Ramsay
LOS ALAMOS - J D Bowman, R E Mischke
TRIUMF - C A Davis, D C Healey, P Levy, P W Schmor
ALBERTA U - P W Green, E Korkmaz, G Roy, J Soukup, G M Stinson

Accelerator TRIUMF *Detector* Ionization

Reactions Polarized beam

$p\ p \rightarrow p\ p$ 222 MeV (T_{lab})

Comments Measures the parity-violating longitudinal analyzing power A_z, and the weak meson-nucleon coupling constant h_p. In the first phase, data-taking will be performed in the transmission mode. A scattering detector will be added at a later stage. In progress (February 92).

Papers PR D37 (1988) 1769, and NIM A307 (1991) 26.

TRIUMF-498 (Oct 1987)

ANALYZING POWER ZERO CROSSING ANGLES IN np ELASTIC SCATTERING BELOW 300 MeV

MANITOBA U - A Berdoz, J Birchall, J Campbell, N E Davison, L Gan, W T H van Oers, S A Page, W D Ramsay
TRIUMF - C A Davis (✓ Spokesperson), L G Greeniaus
ALBERTA U - P W Green

Accelerator TRIUMF *Detector* Counter

Reactions Polarized beam

$n\ p \rightarrow n\ p$ 180, 230 290 MeV (T_{lab})

Comments Neutrons will be detected in scintillator counter arrays, protons with scintillators and DLC's. Scheduled to run in 1992/93.

TRIUMF-502 (Nov 1988)

MEASUREMENT OF ANALYZING POWERS IN LOW ENERGY πd ELASTIC SCATTERING

KARLSRUHE U - E T Boschitz
TRIUMF - P Delheij, D R Gill, D Healey, B K Jennings, D F Ottewell, G Sheffer, G R Smith, G D Wait
TRIESTE U - N Grion, R Rui
BRITISH COLUMBIA U - M Hanna, R R Johnson, V Sossi, P Weber
REGINA U - E L Mathie, M Yeomans
COLORADO U - R A Ristinen
SASKATCHEWAN U - R B Schubank, Y M Shin, N R Stevenson (Spokesperson)

Accelerator TRIUMF *Detector* Spectrometer

Reactions Polarized target

π^+ deut $\rightarrow$ π^+ deut 50 MeV (T_{lab})
π^- deut $\rightarrow$ π^- deut "

TRIUMF-503 (Oct 1987) Completed Dec 1987.

SEARCH FOR A πNN BOUND STATE

BRITISH COLUMBIA U - R R Johnson, R Olszewski, M F Rozon, M E Sevior, P Weber
REGINA U - E L Mathie
TRIUMF - D Frekers, D R Gill, D Ottewell, G R Smith
COLORADO U - R A Ristinen, R P Trelle (✓ Spokesperson)
SASKATCHEWAN U - R Schubank, N R Stevenson

Accelerator TRIUMF *Detector* Spectrometer

Reactions

π^+ deut $\rightarrow$ $p\ p\ \pi^+\ \pi^-$ 256 MeV (T_{lab})
π^- deut $\rightarrow$ $n\ n\ \pi^+\ \pi^-$ "

Comments No firm evidence was found.

TRIUMF-506 (Oct 1987)

LOW ENERGY $\pi d \rightarrow pp$ ANALYZING POWERS

REGINA U - G J Lolos, E L Mathie (✓ Spokesperson), S I H Naqvi, D M Yeomans
WESTERN KENTUCKY U - D Humphrey
TRIUMF - D Healey, D Ottewell, G R Smith
BRITISH COLUMBIA U - G Jones
SASKATCHEWAN U - N R Stevenson

Accelerator TRIUMF *Detector* Counter

Reactions Polarized target

π^+ deut $\rightarrow$ $p\ p$ 25, 45, 65 MeV (T_{lab})

Comments Measures the vector analyzing power iT_{11} and the tensor analyzing power. Data taking at 25 and 65 MeV was completed in 1990. Analysis in progress (February 92).

TRIUMF-508 (Oct 1987)

STUDY OF THE $\pi^+ d \rightarrow \pi^- \pi^+ pp$ REACTION AT $T = 240$ MeV

TRIESTE U - P Camerini, R Rui (Spokesperson)
INFN, TRIESTE - N Grion
BRITISH COLUMBIA U - M Hanna, R R Johnson, R Olszewski, F M Rozon, M Sevior, G Smith, V Sossi, P Trelle
VALENCIA U - E Oset, M J Vicente-Vacas

Accelerator TRIUMF *Detector* Counter, Spectrometer

Reactions

π^+ deut $\rightarrow$ $p\ p\ \pi^+\ \pi^-$ 240 MeV (T_{lab})

Comments Deferred for running on CHAOS.

TRIUMF-530 (May 1988) Completed Dec 1988.

$\pi^+ p$ TOTAL CROSS SECTIONS AT LOW ENERGIES

HEBREW U - E Friedman (✓ Spokesperson), A Goldring
TUBINGEN U - G Wagner
SOREQ NUCLEAR RES CTR - A Altman
BRITISH COLUMBIA U - R R Johnson, O Meirav
TRIUMF - B K Jennings

Accelerator TRIUMF *Detector* Counter

Reactions

$\pi^+\ p \rightarrow X$ 51.5, 62.6, 66.8, 70.9, 91.5, 121.9, 125.9 MeV (T_{lab})

Papers PL B231 (1989) 39, and NP A514 (1990) 601.

TRIUMF-537 (May 1988) Completed Jun 1991.

RADIATIVE DECAY OF THE Δ RESONANCE

BRITISH COLUMBIA U – D F Measday (✓ Spokesperson), S Stanislaus, P Weber
KENTUCKY U – M A Kovash
NEW MEXICO U – B Bassalleck
BOSTON U – E C Booth, J P Miller

Accelerator TRIUMF *Detector* Photon spectrometer

Reactions Polarized target

$\pi^- p \rightarrow n \gamma$ 100–250 MeV (T_{lab})
$\pi^- p \rightarrow \pi^0 n$ "

Comments Measures Δ^0 radiative decay multipoles and differential cross sections. A polarized target has been successfully used in phase II of the experiment. Data analysis in progress (February 92).

TRIUMF-541 (May 1988) Completed 1990.

SPIN-MOMENTUM CORRELATIONS OF NUCLEONS IN POLARIZED ^{3}He

SIMON FRASER U & TRIUMF – O Haeusser (✓ Spokesperson), A Rahav
TRIUMF – P P J Delheij, R Henderson, K P Jackson, C D P Levy, C A Miller (✓ Spokesperson)
HARVARD U – T E Chupp
SIMON FRASER U – J Mildenberger, M C Vetterli
WESTERN ONTARIO U – W P Alford

Accelerator TRIUMF *Detector* Counter, Spectrometer

Reactions Polarized beam and target

$p\ ^3\mathrm{He} \rightarrow p\ p\ X$ 290 MeV (T_{lab})
$p\ ^3\mathrm{He} \rightarrow p\ n\ X$ "

Comments The setup consists of a polarized ^{3}He target, the Medium Resolution Spectrometer (MRS), and two arrays of plastic scintillators. The target was developed using the method of optical pumping of alkalide Rb vapor and spin exchange via atomic collisions with ^{3}He. A similar experiment (TRIUMF-616) was completed at 220 MeV in 1991.

Papers PL B275 (1992) 259.

TRIUMF-544 (May 1988) Completed Feb 1989.

AN EXPERIMENTAL SEARCH FOR A NEW LIGHT BARYON

TRIUMF – R Abegg, D Frekers (✓ Spokesperson), R Helmer, R S Henderson, K P Jackson, C A Miller, S Ram, S Yen
TEL AVIV U – D Ashery, S Nussinov, E Piasetzky, A Rahav, A I Yavin (✓ Spokesperson)

Accelerator TRIUMF *Detector* Spectrometer, Counter

Reactions

$p\ p \rightarrow n\ X$ 460 MeV (T_{lab})

Comments Data taken, results are negative. Publication in preparation (February 92).

TRIUMF-552 (Nov 1988) Completed 1990.

$pp \rightarrow d\pi^+$ ANALYZING POWERS NEAR THRESHOLD

TRIUMF – R Abegg, L G Greeniaus, D A Hutcheon (✓ Spokesperson), C A Miller
ALBERTA U – E Korkmaz, D Mack, W C Olsen, N L Rodning

Accelerator TRIUMF *Detector* Spectrometer

Reactions Polarized beam

$p\ p \rightarrow \mathrm{deut}\ \pi^+$ 291, 295 MeV (T_{lab})

Papers NP A535 (1991) 637.

TRIUMF-556 (Nov 1988)

THE REACTION $\pi^+\ ^4\mathrm{He} \rightarrow pppn + \pi^+\pi^-$

INFN, TRIESTE – P Camerini, N Grion, R Rui
BRITISH COLUMBIA U – R Johnson, O Meirav (Spokesperson), M Sevior, V Sossi, D Vetterli, P Weber
TRIUMF – D Gill, G Smith

Accelerator TRIUMF *Detector* Spectrometer

Reactions

$\pi^+\ \mathrm{He} \rightarrow p\ p\ p\ n\ \pi^+\ \pi^-$ 280 MeV (T_{lab})

TRIUMF-557 (Nov 1988) Started 1991; Completed 1992.

ELASTIC SCATTERING OF 100 MeV π^+ FROM A POLARIZED ^{3}He TARGET

WESTERN ONTARIO U – A Celler
TRIUMF – P Delheij, D R Gill, R Helmer, P Levy, D F Ottewell, P Schmor, S Yen
TRIUMF & SIMON FRASER U – O Haeusser (✓ Spokesperson)
TRIUMF & MELBOURNE U – R Henderson
OREGON STATE U – R H Landau
SIMON FRASER U – M Law (✓ Spokesperson), A Trudel, M Vetterli
SASKATCHEWAN U – R B Schubank, N R Stevenson
BRITISH COLUMBIA U – V Sossi

Accelerator TRIUMF *Detector* Spectrometer

Reactions Polarized target

$\pi^+\ ^3\mathrm{He} \rightarrow \pi^+\ ^3\mathrm{He}$ 100 MeV (T_{lab})

Comments Measures the asymmetry parameter and differential cross section.

Papers PRL 67 (1991) 3356.

TRIUMF-560 (Nov 1988)

DETERMINATION OF THE Σ TERM FROM A MEASUREMENT OF THE POLARIZATION IN $\pi^- p$ SCATTERING AT T_π = 51 MEV

TRIUMF – D R Gill, D Ottewell, G R Smith (Spokesperson), G D Wait
SASKATOON U – R Schubank, N Stevenson
BRITISH COLUMBIA U – R R Johnson, G Jones, O Meirav, M E Sevior, V Sossi, D Vetterli, P Weber
REGINA U – E L Mathie
COLORADO U – R J Peterson, R A Ristinen

Accelerator TRIUMF *Detector* Spectrometer

Reactions Polarized target

$\pi^- p \rightarrow \pi^- p$ 51 MeV (T_{lab})

TRIUMF-561 (Nov 1988) Started Aug 1990; Completed Jan 1991.

THRESHOLD MEASUREMENTS OF $H(\pi^-, \pi^+\pi^-)n$ AND $H(\pi^+, \pi^+\pi^+)n$

BRITISH COLUMBIA U – R R Johnson, O Meirav, M E Sevior (✓ Spokesperson), V Sossi, D Vetterli, P Weber
BONN U – J Ernst
TRIUMF – D R Gill, D F Ottewell, G R Smith, G Wait

Accelerator TRIUMF *Detector* Counter

Reactions

$\pi^- p \rightarrow n\ \pi^+\ \pi^-$ 172, 184, 190, 203 MeV (T_{lab})
$\pi^+ p \rightarrow n\ \pi^+\ \pi^+$ "

Comments Measures the chiral symmetry breaking parameter ξ, together with $I = 0$ and $I = 2$ $\pi\pi$ scattering lengths. Ran with a π^+ beam in August 90, and with a π^- beam in January 91. Analysis in progress (February 92).

Papers PRL 66 (1991) 2569.

TRIUMF-598 (1990) Approved Jul 1990; Started Jul 1990.

INTEGRAL CROSS SECTIONS FOR THE $\pi^+ p$ INTERACTION IN THE 3,3 RESONANCE REGION

HEBREW U – E Friedman (✓ Spokesperson), A Goldring
BRITISH COLUMBIA U – R R Johnson, D Vetterli
KARLSRUHE U – J Jaki, M Metzler

TRIUMF – B K Jennings

Accelerator TRIUMF *Detector* SCINT

Reactions

$\pi^+ p$	125–200 MeV (T_{lab})
$\pi^- p$	"

Comments Measures integral cross sections using the transmission method. In progress. Scheduled to run till August 1992.

Papers PL B254 (1991) 40.

TRIUMF-612 (Jul 1990) Approved Jul 1990.

HYPERFINE DEPENDENCE OF EXCLUSIVE MUON CAPTURE ON ^{19}F, ^{23}Na, ^{27}Al, ^{35}Cl, AND ^{37}Cl

KENTUCKY U – J Bauer, T P Gorringe (Spokesperson), B Johnson, M Kovash, M Pickar
BRITISH COLUMBIA U – P Gumplinger, M D Hasinoff, D Measday, B Moftah, W Schott
VIRGINIA TECH – D S Armstrong
TRIUMF – D H Wright

Accelerator TRIUMF *Detector* Photon spectrometer

Reactions

$\mu^- \, ^{23}\mathrm{Na} \rightarrow \, ^{23}\mathrm{Ne} \, \nu$	0 MeV (T_{lab})
$\mu^- \, ^{27}\mathrm{Al} \rightarrow \, ^{27}\mathrm{Mg} \, \nu$	"
$\mu^- \, ^{35}\mathrm{Cl} \rightarrow \, ^{35}\mathrm{S} \, \nu$	"

Particles studied p

Comments Studies the weak pseudoscalar coupling g_p. Germanium semiconductor with a BGO Compton suppression shield is used as a photon detector.

TRIUMF-624 (Nov 1990) Approved Nov 1990.

THE $(\pi, 2\pi)$ REACTION, A TOOL TO DETERMINE SCATTERING LENGTHS AND COUPLING CONSTANTS

TRIUMF – D Ottewell, G Smith
BRITISH COLUMBIA U – M Iqbal, R R Johnson (✓ Spokesperson), C Jones, M Sevior (✓ Spokesperson), V Sossi, D Vetterli
REGINA U – E Mathie, R Tacik
COLORADO U – R Ristenen
TRIESTE U – S Buttazoni, P Camerine, N Grion (✓ Spokesperson), R Rui (✓ Spokesperson)
KARLSRUHE U – E Boschitz
HEBREW U – E Friedman
CARNEGIE MELLON U – M Rozon

Accelerator TRIUMF *Detector* CHAOS

Reactions

$\pi^+ p \rightarrow \pi^+ \pi^+ n$	230–350 MeV (T_{lab})
$\pi^+ p \rightarrow \pi^+ \pi^0 p$	"
$\pi^- p \rightarrow \pi^+ \pi^- n$	"
$\pi^- p \rightarrow \pi^- \pi^0 p$	"

Comments Studies the $\pi\pi$ scattering length, and π-π phase shifts near threshold. Scheduled to run in summer 1993.

TRIUMF-633 (Nov 1990) Approved Nov 1990.

MEASUREMENT OF $pp \rightarrow pn\pi^+$ AT 420 AND 500 MeV

OHIO U – H Clark, R Finlay, K Hicks (✓ Spokesperson)
MANITOBA U – W Falk
TRIUMF – D Hutcheon, A Miller, I Strakovsky, P Walden, S Yen
ALBERTA U – E Korkmaz
REGINA U – G Huber

Accelerator TRIUMF *Detector* Single-arm spectrometer

Reactions Polarized beam

$p\,p \rightarrow p\,n\,\pi^+$	420–500 MeV (T_{lab})

Comments Measures differential cross section. Detectors are large magnetic spectrometers. Scheduled to run August 92.

TRIUMF-643 (Jun 1991) Approved Jun 1991.

TEST OF THE LOW ENERGY THEOREM FOR RADIATIVE PION CAPTURE

NEW MEXICO U – B Bassalleck
WASHINGTON U, SEATTLE – C Gossett
TRIUMF – D Hutcheon (✓ Spokesperson), R Jacot-Guillarmod, D Ottewell, R Schubank, N R Stevenson
KENTUCKY U – M A Kovash (✓ Spokesperson), K Liu
ALBERTA U – E Korkmaz, A Opper
BOSTON U – E Booth, J Miller
SASKATCHEWAN U – Y M Shin

Accelerator TRIUMF *Detector* Photon spectrometer

Reactions

$\pi^- p \rightarrow n\,\gamma$	10–20 MeV (T_{lab})

Comments Scheduled to run in 1992.

TRIUMF-645 (Jun 1991) Approved Jun 1991.

ABSOLUTE DIFFERENTIAL CROSS SECTIONS IN THE $\pi^{\pm}p \rightarrow \pi^{\pm}p$ REACTION AROUND THE Δ RESONANCE

BRITISH COLUMBIA U – A Feltham, G Jones, M M Pavan (✓ Spokesperson), M E Sevior
BRITISH COLUMBIA U & TRIUMF – R R Johnson
TRIUMF – J Brack (✓ Spokesperson), B Jennings, D Ottewell, G Sheffer, G R Smith
REGINA U – E L Mathie
COLORADO U – M Kohler, R J Peterson, R A Ristinen
ST PETERSBURG, INP – I Strakovski

Accelerator TRIUMF *Detector* SCINT

Reactions

$\pi^+ p \rightarrow \pi^+ p$	144–263 MeV (T_{lab})
$\pi^- p \rightarrow \pi^- p$	"

Comments Uses flat, solid CH_2 (polyethylene) targets as well as a supercooled flat-window liquid hydrogen target. Scintillator telescopes are used for coincidence detection. Scheduled to run May 92.

Underground/Underwater Experiments

UNDERGROUND-FREJUS Started Feb 1984; Completed Sep 1988.

NUCLEON DECAY EXPERIMENT WITH A MODULAR FLASH CHAMBER DETECTOR

FREJUS COLLABORATION

AACHEN, TECH HOCHSCH, I PHYS INST C Berger, M Froehlich, H Moench, R Nisius, F Raupach, P Schleper
ORSAY, LAL Y Benadjal, D Blum, C Bourdarios, B Dudelzak, P Eschstruth, S Jullian, D Lalanne, F Laplanche, C Longuemare, C Paulot, O Perdereau, P Roy, G Szklarz
ECOLE POLYTECHNIQUE L Behr, B Degrange, U Nguyen-Khac, S Tisserant
SACLAY C Arpesella, P Bareyre, R Barloutaud (√ Spokesperson), A Borg, G Chardin, J Ernwein, J F Glicenstein, L Mosca, L Moscoso
WUPPERTAL U J Becker, K H Becker, H J Daum, B Jacobi, B Kuznik, J Loeffler, H Meyer, R Moeller, M Schubnell, Y Wei, P Wintgen

Accelerator NONE *Detector* Calorimeter

Particles studied p, n

Comments A 900-ton array of 3-mm steel plates separated by layers of 5×5-mm polypropylene flash chambers. There are 115 planes of Geiger tubes for triggering. The detector is 4850 m of water equivalent underground. Searches for nucleon decays, $n\bar{n}$ oscillations, studies high energy cosmic ν_μ's from point sources, and atmospheric muons and neutrinos.

Papers PL B174 (1986) 118, NIM A262 (1987) 463, PL B227 (1989) 489, PR D40 (1989) 2163, NP B313 (1989) 509, ZPHY C48 (1990) 221, PL B240 (1990) 237, PL B245 (1990) 305, NIM A302 (1991) 406, ZPHY C50 (1991) 385, and PL B269 (1991) 227.

UNDERGROUND-GALLEX Approved Apr 1985; Started Jun 1990.

GALLIUM EUROPEAN EXPERIMENT

HEIDELBERG, MAX PLANCK INST P Anselmann, W Hampel, G Heusser, J Kiko, T Kirsten (√ Spokesperson), E Pernicka, R Plaga, B Povh, U Roenn, M Sann, C Schlosser, H Voelk, R Wink, M Wojcik
KERNFORSCHUNGSZENTRUM, KARLSRUHE R von Ammon, K Ebert, T Fritsch, K Hellriegel, E Henrich, L Stieglitz
GRAN SASSO M Balata, E Bellotti, C Cattadori, N Ferraris, H Lalla, S Pezzoni, T Stolarczyk
MILAN U O Cremonesi, E Fiorini, S Ragazzi, L Zanotti
MUNICH, TECH U F von Feilitzsch, R Moessbauer, U Schanda
NICE U G Berthomieu, E Schatzman
ROME U C Bacci, P Belli, R Bernabei, S D'Angelo, L Paoluzi
WEIZMANN INST I Carmi, I Dostrovsky
SACLAY S Charbit, M Cribier, G Dupont, L Gosset, J Rich, M Spiro, C Tao, D Vignaud
BROOKHAVEN R L Hahn, F X Hartmann, J K Rowley, R W Stoenner, J Weneser

Accelerator NONE *Detector* Counter

Reactions

$\nu_e\ {}^{71}\mathrm{Ga} \rightarrow e^-\ {}^{71}\mathrm{Ge}$

Particles studied ν_e

Comments This is a radiochemical neutrino experiment. Uses 30 tons of gallium in 8.2-molar $GaCl_3$ solution. Installed in the South wing of Hall A of the Gran Sasso Laboratory. Has an overhead shielding of about 3400 m of water equivalent. An interaction with neutrinos effectively transforms gallium chloride into $GeCl_4$, which is then extracted from the solution with an appropriate gas purging system. Counted in extremely low-level proportional counters. Sensitive to the low energy neutrinos produced by the pp fusion in the Sun. Designed for an order of one event per day. Taking data (March 92).

UNDERGROUND-HOMESTAKE Started 1970.

THE HOMESTAKE CHLORINE SOLAR NEUTRINO EXPERIMENT

PENN U R Davis, Jr (Spokesperson), K Lande (Spokesperson)
LOS ALAMOS B T Cleveland
BROOKHAVEN J K Rowley

Accelerator NONE *Detector* Counter

Reactions

$\nu_e\ {}^{37}\mathrm{Cl} \rightarrow e^-\ {}^{37}\mathrm{Ar}$

Particles studied ν_e

Comments The ^{37}Cl solar neutrino detector in the Homestake Gold Mine consists of 615 tons of tetrachloroethylene (C_2Cl_4, at a depth underground of 4000 m water equivalent. It uses radiochemical techniques to determine the ^{37}Ar production rate. The detector was built at BNL in 1965-67, and operated by Brookhaven until 1984. At that time the laboratory was transferred to Penn U. Collecting data regularly since 1970.

Papers PRL 47 (1981) 1507.

UNDERGROUND-IMB Started 1982; Completed Apr 1991.

THE IRVINE-MICHIGAN-BROOKHAVEN EXPERIMENT

UC, IRVINE W Gajewski, P G Halverson, W R Kropp, C McGrew, L Price, F Reines (√ Spokesperson), J Schultz, H W Sobel
UC, IRVINE & WARSAW U, IEP D Kielczewska
BROOKHAVEN M Goldhaber
BOSTON U D Casper, S T Dye, J L Stone, L Sulak
CLEVELAND STATE U C B Bratton
HAWAII U J G Learned, S Matsuno, G McGrath
LOUISIANA STATE U R S Miller, R Svoboda
NOTRE DAME U J M LoSecco
MARYLAND U T J Haines
SLAC R Becker-Szendy

Accelerator NONE *Detector* Counter

Particles studied p, n, muon, ν, monopole

Comments An 8000-ton water Čerenkov detector, 1570 m of water equivalent underground. The modified detector, IMB-3, has operated since May 86. It has 8-inch phototubes attached to wave-shifting plates. The PMT time resolution has been improved from 11 to 8 ns. Studies nucleon decays, stellar-collapse neutrinos, and high-energy cosmic ν_μ's. Data analysis in progress (April 92).

Papers PRL 51 (1983) 27, PRL 51 (1983) 245, PRL 52 (1984) 720, PRL 52 (1984) 1092, NIM A239 (1985) 467, NP B252 (1985) 261, PRL 54 (1985) 22, PRL 54 (1985) 2299, PRL 55 (1985) 2114, PRL 57 (1986) 1986, PRL 57 (1986) 2872, PRL 58 (1987) 1494, NIM A261 (1987) 540, PL B184 (1987) 305, PL B188 (1987) 388, PR D35 (1987) 2073, PR D36 (1987) 30, ASTJ 315 (1987) 420, PR D37 (1988) 3361, PRL 61 (1988) 2522, NIM A264 (1988) 28, PR D38 (1988) 768, PRPL 163 (1988) 137, PR D39 (1989) 1492, PRL 62 (1989) 2069, PR D42 (1990) 2974, and PRL 66 (1991) 2561.

UNDERGROUND-KAMIOKANDE-II-III Started Nov 1985.

THE KAMIOKANDE EXPERIMENT

TOKYO U, ICRR K S Hirata, K Inoue, T Ishida, T Kajita, K Kihara, M Nakahata, K Nakamura, S Ohara, A Sakai, N Sato, Y Suzuki, Y Totsuka (√ Spokesperson), Y Yaginuma
KEK M Mori, Y Oyama, A Suzuki, K Takahashi, M Yamada
TOKAI U, HIRATSUKA M Koshiba, K Nishijima
KOBE U T Kajimura, T Suda, T Tajima
NIIGATA U K Miyano, H Miyata, H Takei
OSAKA U Y Fukuda, E Kodera, Y Nagashima, M Takita, H Yokoyama
TOKYO INST TECH K Kaneyuki, T Tanimori
PENN U E W Beier, R Van Berg, L D Feldscher, E D Frank, S B Kim, A K Mann, F M Newcomer, W P Zhang

GIFU U - S Tasaka

Accelerator NONE *Detector* Counter

Reactions

$\nu\, e^- \rightarrow \nu\, e^-$ —

$\bar{\nu}_e\, p \rightarrow n\, e^+$ —

Particles studied p, n, monopole, muon, ν

Comments A 3000-ton water Čherenkov detector, 2700 m of water equivalent underground. The Kamiokande-I detector has been upgraded with new electronics, TDCs and 1000 20-inch phototubes surrounded by aluminized reflectors. Studies nucleon decays, solar, supernova, atmospheric, and high-energy cosmic neutrinos, high-energy muons, etc. The second phase was completed in April 90, the third phase started in October 90. (The Penn U. group does not participate in the third phase). Taking data.

Papers PRL 58 (1987) 1490, PRL 59 (1987) 2604, PL B205 (1988) 416, PR D38 (1988) 448, PRL 61 (1988) 385, PRL 61 (1988) 2653, PR D39 (1989) 1481, PL B220 (1989) 308, PRL 63 (1989) 16, ASTJ 359 (1990) 574, PRL 65 (1990) 1297, PRL 65 (1990) 1301, PR D43 (1991) 2843, PR D44 (1991) 2220, PR D44 (1991) 617, PR D44 (1991) 2241, PRL 66 (1991) 9, and PL B270 (1991) 89.

UNDERGROUND-KGF Started Oct 1980.

THE KOLAR GOLD FIELD EXPERIMENT

TATA INST - H Adarkar, S R Dugad, S D Kalmani, M R Krishnaswamy, J D Kulkarni, M G K Menon, N K Mondal, P S Murty, P Nagaraj, V S Narasimham (Spokesperson), B Satyanarayana, B V Sreekantan
OSAKA CITY U - Y Hayashi, N Ito, S Kawakami, T Mitsuyama, T Nakamura, K Tanaka
KANAGAWA U - S Miyake

Accelerator NONE *Detector* Calorimeter

Particles studied p, n

Comments Phase-I of the experiment was completed in 1985. The phase-II detector is a 260-ton iron tracking calorimeter with 60 layers of proportional counter tubes, 6600 m of water equivalent underground. A monopole detector has been added in phase-III. Studies nucleon decays, and searches for magnetic monopoles and point sources of high energy ν_μ's. Has been taking data since November 85.

Papers PL B106 (1981) 339, PL B115 (1982) 349, PL B142 (1984) 99, NC 9C (1986) 167, NIM A284 (1989) 422, and PL B267 (1991) 138.

UNDERGROUND-LVD Approved Apr 1985.

SEARCH FOR STELLAR-COLLAPSE NEUTRINOS WITH THE LARGE VOLUME DETECTOR

BOLOGNA U - G Bari, M Basile, G Bruni, A Castelvetri, L Cifarelli, A Contin, P Giusti, G Iacobucci, G Maccarrone, T Massam, R Nania, V O'Shea, F Palmonari, C Del Papa, E Perotto, G Cara Romeo, G Sartorelli, M Willutzky
BROWN U - M Aryal, K De, A M Shapiro, M Widgoff
CAMPINAS U - J A Chincellato, C Dobrigkeit-Chincellato, A C Fauth, A Turtelli
CERN - F Rohrbach, A Zichichi (✓ Spokesperson)
CALABRIA U - L Caputi, G Susinno
FLORENCE U - G Barbagli, G Conforto, G Landi, P Pelfer
FRASCATI - G Anzivino, S Bianco, R Casaccia, F Cindolo, Y Dong, M Enorini, F L Fabbri, M De Felice, C Jing, I Laakso, S Qian, Z Shi, A Spallone, Y Sun, L Votano, A Zallo
HOUSTON U - K Lau, F Lipps, B Mayes, G H Mo, L Pinsky, J Pyrlik, D Sanders, W R Sheldon, R Weinstein
BEIJING, IHEP - Y Dai, L Din, G Jing, Z Lu, P Shen, Q Zhu
INDIANA U - D Alyea
KINKI U, OSAKA - T Kitamura, Y Minorikawa
AQUILA U - G Di Sciascio, R Scrimaglio
LECCE U - P Rotelli
IOFFE PHYS TECH INST - G E Kocharov, V Vasileyev
MIT, LNS - M Deutsch, E S Hafen, P Haridas, H H Huang, B Jeckelmann, G Ji, C S Mao, A Pitas, I A Pless, S W Wang, Y R Wu, Y R Yuan, C Z Zhao
MOSCOW, INR V S Berezinsky, V L Dadykin, F F Khaichukov, E V Korolkova, P V Kortchaguin, V B Kortchaguin, V A Kudryavtsev, A S Markov, V G Ryassny, O G Ryazhskaya, V P Talochkin, V F Yakushev, G T Zatsepin
NORTHEASTERN U E Von Goeler, J Moromisato, E Saletan, D Shambroom
OKAYAMA UNIV SCI - N Takahashi, I Yamamoto
OKAYAMA U - T Wada
PALERMO U - G D'Ali, S De Pasquale
PERUGIA U - B Alpat, F Artemi, P Diodati, M Italiani, P Salvadori
SAITAMA U N Inoue, A Misaki
TOKYO U, ICRR - T Hara
TURIN U - C Aglietta, G Badino, L Bergamasco, C Castagnoli, A Castellina, G Cini, M Dardo, W Fulgione, P Galeotti, P Ghia, C Morello, G Navarra, L Periale, P Picchi, O Saavedra, G C Trinchero, P Vallania, S Vernetto
URBINO U - F Grianti, F Vetrano

Accelerator NONE *Detector* Counter, Streamer chamber

Reactions

$\bar{\nu}_e\, p \rightarrow e^+\, n$ —

$\nu\, e^- \rightarrow \nu\, e^-$ —

$\nu_e\, C \rightarrow e^-$ Nit —

$\bar{\nu}_e\, C \rightarrow e^+$ Bor —

Particles studied p, n

Comments The multipurpose detector consists of a large volume (1520 tons) of liquid scintillator interlayered with streamer chambers. Studies stellar-collapse neutrinos, solar neutrinos, and nucleon decays. With an effective area of 800 m^2, its is suitable for searching for magnetic monopoles and high energy cosmic ν_μ's from point sources. Under construction in the north wing of Hall A of the Gran Sasso Laboratory. Has an overhead shielding of about 3800 m of water equivalent.

Papers NIM A264 (1988) 5, NIM A274 (1989) 177, NIM A277 (1989) 11, NIM A277 (1989) 17, and NIM A295 (1990) 466.

UNDERGROUND-MACRO Approved Apr 1985; Started Feb 1989.

MONOPOLE, ASTROPHYSICS, AND COSMIC RAYS OBSERVATORY

MACRO COLLABORATION

BARI U - R Bellotti, F Cafagna, M Calicchio, G DeCataldo, C DeMarzo, O Erriquez, C Favuzzi, P Fusco, N Giglietto, P Spinelli
BOLOGNA U - R Antolini, B B Bam, S Cecchini, G Giacomelli (✓ Spokesperson), G Mandrioli, A Margiotta-Neri, P Matteuzzi, L Patrizii, F Predieri, E Scapparone, P Serra-Lugaresi, M Spurio, V Togo
BOSTON U - S Ahlen, R Cormack, D Ficenec, E Kearns, S Klein, G Ludlam, A Marin, C Okada, J L Stone, L R Sulak, W Worstell
CAL TECH - B C Barish (✓ Spokesperson), S Coutu, J T Hong, E Katsavounidis, S Kyriazopoulou, G Liu, R Liu, D G Michael, C W Peck, N D Pignatano, K Scholberg, J Steele, C W Walter
DREXEL U - C Lane, R Steinberg
FRASCATI - G Battistoni, H Bilokon, C Bloise, P Campana, M Carboni, V Chiarella, A Cobis, C Forti, A Grillo, E Iarocci, A Marini, V Patera, F Ronga, L Satta, M Spinetti, V Valente
GRAN SASSO - C Gustavino, S Parlati, J Reynoldson
INDIANA U - A Habig, R Heinz, L Miller, S Mufson, J Musser, S Nutter
AQUILA U - A Di Credico, P Monacelli
LECCE U - P Bernardini, G Mancarella, D Martello, O Palamara, S Petrera, P Pistilli, A Surdo
MICHIGAN U - E Diehl, C Lee, D Levin, M Longo, G Tarle
NAPLES U, IFS - M Ambrosio, G C Barbarino, D Campana, F Guarino, G Osteria
PISA U - A Baldini, C Bemporad, F Cei, G Giannini, M Grassi, R Pazzi
ROME U - G Auriemma, S Bussino, C Chiera, A Corona, L Foti, E Lamanna, P Lipari, G Martellotti, G Rosa, C Satriano, A Sciubba, M Severi, G R Verdone, M De Vincenzi
TEXAS A AND M - R Webb
TURIN U - V Bisi, P Giubellino, A Marzari-Chiesa, M Masera, M Monteno, L Ramello, M Sitta

BARTOL RESEARCH INST - J Petrakis
SANDIA - P Green

Accelerator NONE *Detector* Counter, Streamer chamber

Particles studied monopole

Comments The MACRO detector has been primarily designed to conduct a search for supermassive grand unified magnetic monopoles. When completed, it will have twelve supermodules in two levels, each instrumented to operate independently of the others. Each module consists of an array of two layers of liquid scintillation counters and ten layers of streamer tubes in between. The detector is located in Hall B of the Gran Sasso Laboratory. Has an overhead shielding of about 3800 m of water equivalent. Two lower supermodules collect data, the other sections are under construction (Feb 92).

Papers NC 9C (1986) 281, NIM A281 (1989) 213, PR D42 (1990) 1396, PL B249 (1990) 149, NIM A301 (1991) 275, and NP (Proc. Suppl.) B (accepted).

UNDERGROUND-NUSEX Started Jun 1982; Completed 1986.

THE NUCLEON STABILITY EXPERIMENT

NUSEX COLLABORATION

TURIN U - M Aglietta, G Badino, G Bologna, C Castagnoli, A Castellina, W Fulgione, P Galeotti, G Mannocchi, B D'Ettorre Piazzoli, P Picchi, O Saavedra, G Trinchero, S Vernetto
FRASCATI - G Battistoni, C Bloise, P Campana, V Chiarella, A Ciocio, E Iarocci, G P Murtas, G Nicoletti, L Satta
MILAN U - E Bellotti, E Fiorini (✓ Spokesperson), C Liguori, P Negri, A Pullia, S Ragazzi, M Rollier, L Zanotti
CERN - D C Cundy, M Price

Accelerator NONE *Detector* Calorimeter

Particles studied p, n

Comments The detector is a 3.5×3.5×3.5-m cube of 136 layers of 1-cm-thick iron plates separated by layers of 1×1-cm plastic streamer tubes. The total mass is 150 tons. The experiment is located in the Mont Blanc tunnel, 5000 m of water equivalent underground. Searches for nucleon decays, and studies high energy cosmic ν_μ's from point sources.

Papers NIM 202 (1982) 459, PL B118 (1982) 461, PL B133 (1983) 454, NIM 219 (1984) 300, NC 8C (1985) 76, PL B155 (1985) 465, and NIM A245 (1986) 277.

UNDERGROUND-SAGE Started May 1988.

THE SOVIET-AMERICAN GALLIUM SOLAR NEUTRINO EXPERIMENT (SAGE)

SAGE COLLABORATION

MOSCOW, INR - O L Anosov, E L Faizov, V N Gavrin (✓ Spokesperson), A V Kalikhov, T V Knodel, I I Knyshenko, V N Kornoukhov, S A Mezentseva, I N Mirmov, A V Ostrinsky, A M Pshukov, N E Revzin, A A Shikhin, P V Timofeyev, E P Veretenkin, V M Vermul, G T Zatsepin
LOS ALAMOS - T J Bowles (✓ Spokesperson), S R Elliott, J S Nico, H A O'Brien, D L Wark, J F Wilkerson
PENN U - B T Cleveland, R Davis, K Lande
LOUISIANA STATE U - M L Cherry
PRINCETON U - R T Kouzes

Accelerator NONE *Detector* GGNT

Reactions

$\nu_e\ {}^{71}\mathrm{Ga} \rightarrow e^-\ {}^{71}\mathrm{Ge}$

Particles studied ν_e

Comments Uses the Gallium-Germanium Neutrino Telescope (GGNT) situated in an underground laboratory built in the Baksan Neutrino Observatory, Northern Caucasus, Russia. Has an overhead shielding of about 4700 m of water equivalent. Sensitive to the low energy neutrinos produced by the pp fusion in the Sun. Exploits the radiochemical procedure, and uses liquid metallic gallium (30 tons in the first stage, 57 tons in 1991). A removal of the cosmogenic ^{68}Ge was carried out in 1988/89. The first data in the 1989 run had a high background. A purification procedure, implemented beginning with the January 90 extraction, resulted in a significant background reduction. A calibration with a ^{51}Cr artificial neutrino source of about 1 mC activity is planned. Taking data (April 92).

Papers PRL 67 (1991) 3332.

UNDERGROUND-SOUDAN-II Started 1988.

THE SOUDAN-II PROTON DECAY EXPERIMENT

ARGONNE - I Ambats, D S Ayres, L J Balka, W L Barrett, K Coover, J W Dawson, T H Fields, M C Goodman, N Hill, J H Hoftiezer, D J Jankowski, F V Lopez, E N May, L E Price, J L Schlereth, J L Thron
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OXFORD U - W W M Allison, G D Barr, C B Brooks, J H Cobb, R H Giles, L M Kirby-Gallagher, D H Perkins, P D Shield, M A Thomson, L M Tupper, N West
RUTHERFORD - G J Alner, D J A Cockerill, V W Edwards, C Garcia-Garcia, P J Litchfield, G F Pearce
TUFTS U - D Benjamin, T Kafka, J A Kochocki, W A Mann, L McMaster, R H Milburn, A Napier, W P Oliver, B Saitta, J Schneps, N Sundaralingam

Accelerator NONE *Detector* Calorimeter

Particles studied p, n

Comments A 1000-ton iron detector will use drift projection tubes arranged in an hexagonal array. The tubes are 15 mm in diameter separated by 1.6 mm of steel. The experiment is located in the Soudan mine, Minnesota, 2090 m of water equivalent underground. The data taking began in mid-1988 when 275 tons of detector was installed. New modules are added constantly, and it is expected that all 240 modules will be installed by the end of 1992. Physics topics include studies of proton decay and neutrino oscillations, and a search for magnetic monopoles and point sources of cosmic rays. Taking data.

Papers NIM A276 (1989) 371, NIM A283 (1989) 642, and PR D42 (1990) 2967.

UNDERGROUND-SUDBURY (1985)

THE SUDBURY NEUTRINO OBSERVATORY (SNO)

QUEENS U, KINGSTON - H C Evans, G T Ewan (Spokesperson), H W Lee, J R Leslie, J D MacArthur, H Mak, W McLatchie, B C Robertson, P Skensved
OXFORD U - E W Hooper, N A Jelley, M E Moorhead, M Omori, N W Tanner, D L Wark
BIRKBECK COLL - J C Barton, P T Trent
NATIONAL RESEARCH COUNCIL, OTTAWA - J D Anglin, M Bercovitch, W F Davidson, C K Hargrove, H Mes, R S Storey
CHALK RIVER, AECL - E D Earle, G M Milton
GUELPH U - P Jagam, J J Simpson
PENN U - E W Beier (Spokesperson), R Van Berg, W Frati, F M Newcomer
PRINCETON U - R T Kouzes, M M Lowry, A B McDonald
LAURENTIAN U - E D Hallman, R U Haq
CARLETON U - A L Carter, D Kessler

Accelerator NONE *Detector* Counter

Reactions

$\nu\ e^- \rightarrow \nu\ e^-$
ν_e deut $\rightarrow p\ p\ e^-$
ν_e deut $\rightarrow p\ n\ \nu_e$
$\bar{\nu}_e$ deut $\rightarrow n\ n\ e^+$
$\bar{\nu}_e\ p \rightarrow n\ e^+$

Comments The first phase of the experiment is in operation. Completion is expected in 1996. In the final phase, the detector will consist of a transparent tank with 1000 tons of pure heavy water. Phototubes will cover 40% of the surface area. Relativistic particles will be viewed by the Čerenkov light they produce. The detector is 5900 m of water equivalent underground. Aims to measure the solar ^{8}B ν_e flux, spectrum,

and direction. Studies also the stellar-collapse neutrinos, and high energy cosmic ν_μ's from point sources. In preparation (May 92).

Papers NC 9C (1986) 308, and PL B194 (1987) 321.

UNDERWATER-BAIKAL (1984) Approved Jan 1984, Jan 1987; Started 1984.

THE LAKE BAIKAL DEEP UNDERWATER NEUTRINO TELESCOPE, NT-200

BAIKAL COLLABORATION

MOSCOW, INR - I A Belolaptikov, L B Bezrukov, B A Borisovets, E V Bugaev, Z A M Djilkibaev, G V Domogatsky (√ Spokesperson), L A Donskich, A A Doroshenko, M D Galperin, M N Gushtan, A M Klabukov, S I Klimushin, O J Lanin, B K Lubsandorzhiev, N V Ogievietzky, A I Panfilov, I A Sokalsky, I I Trofimenko
IRKUTSK STATE U - N M Budnev, A G Chensky, V I Dobrynin, O A Gress, A P Koshechkin, J B Lanin, G A Litunenko, A V Lopin, V A Naumov, M I Nemchenko, Y A Parfenov, A A Pavlov, O P Pokalev, V A Primin, A A Sumanov, V A Tarashansky, V L Zurbanov
MOSCOW STATE U - A V Golikov, V B Kabikov, L A Kuzmichov, E A Osipova, E S Zaslavskaya
TOMSK POLYTECHNIC INST - G N Dudkin, V Yu Egorov, A A Lukanin, A M Ovcharov, V M Padalko, A H Padusenko
NOVGOROD POLYTECHNIC INST - S V Fialkovsky, V F Kulepov, M B Milenin
MAKAROV ST PETERSBURG MARITIME UNIV - A A Levin, A I Nikiforov, M I Rosanov
DESY, ZEUTHEN - R Heller, H Heukenkamp, J Krabi, T Mikolajski, C Spiering, T Thon, R Wischnewski
BUDAPEST, CRIP & DUBNA - L Jenek, D Kiss, L Tanko
IRKUTSK, LIMNOLOGY INST - Y S Kusner, V A Poleschuk, P P Sherstyankin

Accelerator NONE *Detector* Counter

Particles studied ν, muon, monopole, exotic

Comments The deep underwater Čerenkov detector NT-200 will consist of nearly 200 optical modules arranged on 8 strings at 1000 m depth. The main component of a module is a highly sensitive phototube. The experiment studies muons generated in neutrino interactions, measures fluxes of muons generated in the atmosphere, searches for local sources of very high-energy particles, gives limit on the flux of heavy magnetic monopoles catalyzing proton decay, etc. Data already taken with single string variants. The completion of the detector is expected in 1993/94.

Papers NP (Proc. Suppl.) B14 (1990) 51, NP (Proc. Suppl.) B19 (1991) 388, and SJNP 52 (1990) 54.

UNDERWATER-DUMAND (1980) Started Nov 1987.

DEEP UNDERWATER MUON AND NEUTRINO TELESCOPE

DUMAND-II COLLABORATION

AACHEN, TECH HOCHSCH, III PHYS INST - P Bosetti, V Commichau, C Wiebusch
BERN U - P K F Grieder, P Minkowski
BOSTON U - S T Dye, E Hazen
UC, SAN DIEGO - H Bradner
HAWAII U - C M Alexander, J Bolesta, P Gorham, S Kondo, J G Learned (√ Spokesperson), S Matsuno, M Mignard, R Mitiguy, V Peterson, A Roberts, V J Stenger, G Wilkins
IOWA U - W Anderson, J Hauptman
KIEL U - D Dau, P Koske
KOBE U - K Kobayakawa
KINKI U, HIZUKA - T Kitamura
LBL - H Crawford, L Stevenson
LOUISIANA STATE U - R Svoboda
OKAYAMA UNIV SCI - Y Yamamoyo
SCRIPPS INST OCEANOGRAPHY - H Bradner
TOHOKU U - T Hayashino, M Ito, H Kawamoto, S Tanaka, A Yamaguchi
TOKYO U, ICRR - T Aoki, K Mitsui, Y Ohashi, A Okada
KEK - M Sakuda, S Uehara
VANDERBILT U - J Clem, M Webster
WASHINGTON U, SEATTLE - P E Boynton, J J Lord, R J Wilkes, K K Young
WISCONSIN U - U Camerini, J Gaidos, W Grogan, M Jaworski, T Narita, D Nicklaus

Accelerator NONE *Detector* Counter

Particles studied muon, ν

Comments In the first stage of the experiment, a test of the operation of 7 phototube modules has been completed. Measurements were made with a vertical string of modules suspended from a ship. Phase-II was approved in 1990. The plans call for an octagonal 9-string array, 24 tubes per string to be built by 1993. The array called DUMAND-II will be located at a depth of 4500 m, off the coast of the Hawaiian Islands. The aim of the experiment is to build a system capable of searching for point sources of high energy neutrinos of astrophysical origin, and very high energy cosmic ray muons. The detector is a 2-megaton Čerenkov counter, with a muon area of 20,000 m^2, and an angular resolution of 1°. Under construction.

Papers NIM A276 (1989) 359, and PR D42 (1990) 3613.

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