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MEETING XVII BEVATRON RESEARCH CONFERENCE
April 20, 1954
4 PM Auditorium, Bldg. 50

E. J. Lofgren: Bevatron Operation

Bevatron operation has been stopped temporarily due to a generator fault. While repairs are being instituted the tank will be down to air for repairs and target installation. Operation on one generator is scheduled for May 3.

Burton Moyer: Proposed Experiments on π^o Mesons and Other Photon Emitting Events (Cont.)

It has been previously proposed that one could investigate the π_o lifetime by measuring the converted electron yield from π_o decay photons as a function of the thickness of a thin target in which both the π_o production and photon conversion occur. If the lifetime were effectively zero the electron yield should depend quadratically upon thickness; whereas if the lifetime is sufficiently great, this quadratic rise will be delayed as the thickness is increased, due to the distance travelled by the π_o before decay. In fact, the beginning of the yield dependence is cubic rather than quadratic in character.

It is estimated that a lifetime of 10^{-15} seconds should provide a distinctly detectable effect.

The investigation may be considered practical at the Bevatron providing: (a) the production cross section for π_o's at 6 Bev is about 100 times that at 340 Mev, (b) a Bevatron pulse of 10^8 protons, with a recirculation of 1000 times thru the thin target can be achieved. Thin foils of Au or of U would be used as targets, with thicknesses of the order of 10^{-4} cm.

Some assumptions about the meson momentum spectrum are implicit in these plans. It has been assumed that the pion kinetic energy spectrum in the nucleon-nucleon C.M. frame peaks at 0.3 Bev. This gives at 0° in the laboratory T_π = 1.5 Bev, or a time dilation of γ = 12.

Robert W. Birge: Nuclear Emulsion Techniques and Experiments

Techniques have been evolved for utilization of 6 x 6-inch Ilford G-5 plates of 600μ thickness. A typical operating schedule and some pertinent remarks with respect to processing are discussed. Some general remarks with respect to heavy meson experiments are included.

PLATE PROCESSING

Approximately 55 days elapse between the ordering of plates from Ilford and scanning. Nearly half of this time, 25 days, is due to delivery schedules. On arrival, emulsions are eradicated to eliminate background, dried, stripped from the glass backing, stacked, clamped, milled to size and marked on all edges with 2 mil X-ray marks which penetrate about 1/4 inch. After exposure, individual plates are squeegeed onto 6 x 6 glass plates to keep the emulsion from distorting during development. Actual development begins two days after exposure. Plates are immersed in 5° C water followed by 5° C developer. They are then transferred to 16° C air for 2 - 3 hours. After development, plates are fixed in 5° C hypo. Approximately 4 - 6 days are required for the emulsions to clear. Developed plates are washed

for one week during which time they swell to 8 times their final thickness. The washed emulsion is plasticized with glycerine and placed in an alcohol-water mixture. By varying the concentration of the solution, the water is gradually displaced from the plates. Finished glass plates are trimmed to size $\pm$ 200μ. Brass tabs are added which are then sanded to give alignment within $\pm$ 20μ.

EXPERIMENTS

The primary aim of Richman's film group* is to look for heavy mesons. Various targets will be used, and plates will be arranged in rabbit-hole containers to look only at back scattered particles. All tracks will be grain counted at their entrance to the plates. Only those tracks which if they are K-mesons and will later stop in the plates will be followed.

Approximately 3×10^4 tracks are desired per stack. The stack will be located approximately 15 inches from the target but can be moved within 6 inches if this proves desirable.

Another planned experiment is to utilize the magnetic field of the Bevatron to sort momentum. One then uses grain count and $H\rho$ to separate different mass particles as an aid in deciding which tracks to follow.

Some consideration has been given to the construction of a 70 Kg 4-inch diameter pulsed magnet to detect the sign of the charge on particles. The momentum is best determined from multiple scattering measurements.

* Robert W. Birge
Leroy Kerth
Jack Merritt
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Don Stork
Stan Whetstone

Summaries: Harry Heard
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