NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL

COMMISSION ON PHYSICAL SCIENCES, MATHEMATICS, AND APPLICATIONS
Board on Physics and Astronomy
Plasma Science Committee

TECHNICAL PROGRESS REPORT
to the
Department of Energy
on the

DOE/ER/13326--4

DE92 007701

Committee on Atomic, Molecular, and Optical Sciences (CAMOS)

Grant No. #DE-FG05-85ER13326

This progress report covers activities of the Committee on Atomic, Molecular, and Optical Sciences (CAMOS) for the period February 1, 1991 to January 31, 1992.

THE COMMITTEE

The Committee on Atomic, Molecular, and Optical Sciences is a standing committee under the auspices of the Board on Physics and Astronomy, Commission on Physical Sciences, Mathematics, and Applications of the National Academy of Sciences--National Research Council. The atomic, molecular, and optical (AMO) sciences represent a broad and diverse field in which much of the research is carried out by small groups. These groups generally have not operated in concert with each other and, prior to the establishment of CAMOS, there was no single committee or organization that accepted the responsibility of monitoring the continuing development and assessing the general health of the field as a whole. CAMOS has accepted this responsibility and currently provides a focus for the AMO community that is unique and essential. The membership of CAMOS is drawn from research laboratories in universities, industry, and government. Areas of expertise on the committee include atomic physics, molecular science, and optics. A special effort has been made to include a balanced representation from the three subfields. (A roster is attached.) CAMOS has conducted a number of studies related to the health of atomic and molecular science and is well prepared to respond to requests for studies on specific issues.

CAMOS was originally created (in 1970) with the following objectives: (1) to provide a source from which the federal agencies could obtain technical advice and assistance; (2) to conduct and publish studies concerning atomic, molecular, and optical science and its multidisciplinary connections to other fields of science and technology; (3) to provide a forum for discussion among atomic, molecular, and optical scientists and, thereby, provide a unifying force in this diverse and varied field; and (4) to provide an interface for communication among the atomic, molecular, and optical science communities and federal agency program directors who fund research in the field. These objectives continue to serve as the guidelines for the committee and, in response, several mechanisms have been developed to achieve these objectives. In particular, CAMOS organizes and conducts special technical studies, surveys, workshops, and other meetings. CAMOS also functions as an oversight committee for *ad hoc* panels charged with the task of preparing reports on specific issues or topics. Symposia held at the National Academy of Sciences or at research centers have been used to focus attention on particular issues connected with facilities, programs, or other matters of concern to the AMO community. CAMOS continues to use these mechanisms to develop and undertake new projects.

Highlights of Recent Meetings of the Committee

In accordance with its efforts to monitor continuing developments in the field of AMO science and to respond quickly to inquiries from federal agencies, CAMOS attempts to meet twice a year. CAMOS met once just prior to the commencement of this contract (not described in the previous progress report) and twice during the performance period. Unless otherwise noted, the following meetings were (or will be) held at the National Research Council in Washington, D.C. The highlights of meetings held during the past year and a half are presented below.

December 7, 1990. The agenda for this meeting included discussions on (1) federal AMO programs (with representatives of DOE, NSF, NIST, and AFOSR), (2) AMO science in Europe, (3) an NRC study on plasma processing of materials, (4) the utilization of national facilities, and (5) a general review of the assessment of the field that the committee has been planning. Minutes from the meeting are attached.

April 26, 1991. This meeting was held in conjunction with the April 22 - 25 DAMOP meeting. The agenda included (1) a report on the recently-held Congressional Day, (2) a discussion of the recently-prepared research briefing—*Research Briefing on Selected Opportunities in Atomic, Molecular, and Optical Sciences*—and the oral presentation to Jim Decker, DOE, (3) a status review of the assessment, (4) discussions with representatives from DOE, NSF, AFOSR, and ONR, and (5) development of plans to evaluate the AMO experimental physics survey. Minutes from the meeting are attached.

December 6, 1991. This will be the next meeting of CAMOS and will be used, in part, to (1) review highlights of the October 28 meeting of the Panel on Future Opportunities in Atomic, Molecular, and Optical Sciences (FOAMOS), (2) discuss ways in which CAMOS may assist the panel in its activity, (3) examine the results of the survey of AMO experimental physicists, and (4) consider other committee business.

STATUS OF CAMOS PROJECTS

Summary

Over the past several years, CAMOS initiated the following projects:

- Update of AMO science Directory
- Survey of AMO experimentalists
- Assessment of Future Opportunities in Atomic, Molecular, and Optical Sciences

The current status of these projects bears directly on the activities of CAMOS during the performance period for this contract.

Directory of AMO Scientists

In 1986, CAMOS issued the Directory of Atomic, Molecular, and Optical Scientists in the United States. The directory contained the names, addresses, and research interests of approximately 4750 atomic, molecular, and optical scientists in the United States. Since that time, it has been widely utilized because of its demographic value, its usefulness in locating scientists, and its value in characterizing their specialties. In response to the Board on Physics and Astronomy strategic plan which calls for supplemental funding for all special projects, CAMOS is looking to establish the updating of the directory as a cooperative effort with the American Institute of Physics.

Survey of AMO Experimentalists

In response to concerns over the current status and health of the experimental segment of AMO physics, CAMOS developed and distributed a questionnaire to that specific segment of the research community. The data has been tabulated and will be reviewed at the December 1991 meeting.

Research Briefing on Opportunities in AMO Sciences

At the request of the director of the Office of Energy Research of the Department of Energy (DOE), CAMOS prepared a research briefing to provide the DOE, other federal agencies, and the atomic, molecular, and optical science community at large with a rapid assessment of the forefront research in the field. The request was motivated by a concern for the health of atomic, molecular, and optical sciences mutually shared by the DOE, the National Academy of Sciences, and members of the atomic, molecular, and optical science community.

In addition to giving a glimpse of the nature and character of the field of atomic, molecular and optical science, the briefing identifies and discusses a few selected opportunities and highlights from forefront research in the field, and acknowledges specific issues associated with these areas of opportunity. No attempt was made to conduct a detailed assessment of the field nor to be comprehensive in the perspective given. Therefore, no attempt was made to develop recommendations or set programmatic priorities. In addition, those forefront areas of research identified in the briefing were not selected on the basis of any connection with the mission of any specific federal agency.

CAMOS has recently proposed that a detailed study on the scientific and technological opportunities of the field be conducted to assess the state of knowledge of the field of atomic, molecular, and optical science and to identify the priorities of the community in pursuing its research agenda over the next several years. It is expected that this broader study will not only assist federal agencies in future program planning, but also enable those researchers who are just entering the field to identify those areas that show special promise for addressing the nation's needs. The proposed study is now underway.

The preparation of the research briefing was intended to provide background for the broader study described below. A copy of the briefing—*Research Briefing on Selected Opportunities in Atomic, Molecular, and Optical Sciences*—is attached.

Future Opportunities in Atomic, Molecular, and Optical Sciences

The community of AMO scientists has indicated that, in its view, AMO science is in critical need of a comprehensive assessment that can serve as an education and research planning guide for the 1990s for use by federal agencies, national and industrial laboratories, individual investigators, and students. In response, CAMOS devoted much of its effort during the past years in planning for and organizing a detailed assessment of future opportunities in atomic, molecular, and optical sciences. This project has received sufficient supplemental funding (from DOE, NSF, and AFOSR) to proceed. The Panel on Future Opportunities in Atomic, Molecular, and Optical Sciences has been appointed and met for the first time on October 28, 1991. A roster is attached.

The charge to the panel is to conduct an assessment of atomic, molecular, and optical science in the United States, which reflects the opinions of the AMO community at large and addresses the following:

- Determines manpower, instrumentation, facility, and funding requirements not only in the context of the intellectual challenges of AMO science, but also in the context of national needs such as (a) science education; (b) defense, energy, space, and environmental applications; (c) industrial and technological competitiveness; and (d) appropriate aspects of human health and welfare.
- Seeks to identify scientific forefronts, technological opportunities, and windows of future opportunity.
- Seeks to establish sets of research and educational priorities from various perspectives.
- Sets forth goals and planning scenarios that reflect these research and educational priorities.

- Develops long-range strategies that will best meet the goals set forth.
- Assesses the institutional infrastructure in which AMO science is conducted and identifies changes that would improve its constituent research and educational efforts.
- Provides a comparison of AMO science in the United States with its counterpart in other industrialized nations.
- Reviews the scientific advances made during the last decade.

CAMOS, as the oversight committee for the panel, will assist the panel, as necessary, in addressing the charge. Following completion of the study, CAMOS will actively promote and disseminate the results of the study.

Attachments

(1) Roster of the Committee on Atomic, Molecular, and Optical Sciences (CAMOS)
(2) Minutes of the December 7, 1990 CAMOS Meeting
(3) Minutes of the April 26, 1991 CAMOS Meeting
*(4) *Research Briefing on Selected Opportunities in Atomic, Molecular, and Optical Sciences*
(5) Roster of the Panel on Future Opportunities in Atomic, Molecular, and Optical Sciences (FOAMOS)

* Cycled. Separately

NATIONAL RESEARCH COUNCIL

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COMMITTEE ON ATOMIC, MOLECULAR, AND OPTICAL SCIENCES

All terms end June 30 of the year indicated.

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COMMITTEE ON ATOMIC, MOLECULAR, AND OPTICAL SCIENCES

All terms end June 30 of the year indicated.

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MINUTES

COMMITTEE ON ATOMIC, MOLECULAR, AND OPTICAL SCIENCES (CAMOS)
National Research Council
2001 Wisconsin Avenue
Washington, D.C.
December 7, 1990

Attendees: Gordon H. Dunn, Chair; Michael S. Lubell, Past Chair; Daniel Grischkowsky; Andrew U. Hazi; William Klemperer; Peter Koch; Daniel J. Larson; Donald H. Levy; William H. Miller; Ronald Phaneuf; David Pritchard; Roberta Saxon

Absentees: John E. Bjorkholm, Richard E. Smalley

Ex Officio Members: Charles Clark, Chair, CLSE; Bernd Craseman, Chair, NIST Panel on AMO Physics; Anthony F. Starace, Chair, DAMOP

Agency Liaisons: DOE: Allan Laufer, Joseph V. Martinez, Ronald McKnight; NSF: John Cooper, Stephen J. Smith; NIST: Katharine Gebbie; AFOSR: Jerry Perrizo

NRC Staff: Donald C. Shapero, Ronald D. Taylor

Note: All attachments to these minutes were distributed or reviewed at the meeting.

1. Opening

The meeting convened at 8:45 a.m. with Gordon Dunn presiding. All attendees introduced themselves by name and institution. Dunn reviewed the agenda and plans for the day. He also thanked committee members for their efforts throughout the past six months.

2. Minutes of the May 1990 CAMOS Meeting

The minutes of the May 1990 meeting were reviewed and approved.

3. Reports/Requests From the Agencies

Prior to beginning the formal presentations from the agency representatives, Dunn stated that special efforts had been made to encourage funding agents from the molecular and chemical physics communities to attend and similar efforts would continue in the future. The goal is to increase the ability of CAMOS to provide effective representation for the molecular and optical communities.

John Cooper began the agency presentations with a discussion of the NSF AMO physics program. Details of the presentation are given in Attachment A.

Stephen Smith continued discussion of the NSF AMO program with some general remarks. There still exists some uncertainty at NSF because Walter Massey has yet to be confirmed as director or even assume a role as acting director. Although the allocation of program funds has not been finalized, it appears that there will not be an increase in support for AMO and that this trend will continue for another 5 years. Smith indicated that NSF will continue to attempt to identify and support the best science at an adequate level and

interested in the role of the Department of Energy (DOE) Office of Basic Energy Sciences (OBES) in individual-investigator science.

4. Research Briefing

During the past few months, CAMOS has been involved in producing a report entitled *Research Briefing on Selected Opportunities in Atomic, Molecular, and Optical Sciences*. Dunn reported on the origin of this activity—a request by James Decker, Director, Office of Energy Research, DOE—and summarized the results of an oral briefing that was presented to Decker and other DOE officials on April 3. In Dunn's view, although the written briefing might serve as a useful introduction to the assessment of the field that is being organized, it was not what DOE representatives wanted. Dunn felt that they wanted something more issues-oriented; in other words, something that the assessment will likely produce. On another note, a copy of the report had been transmitted to Norman Ramsey who commended it highly and then forwarded it to Will Happer (for his information). Dunn added that plans were being made to brief other agencies. After some discussion on the advantages and disadvantages of including additional speakers at these briefings, the committee recommended that the CAMOS Chair be the sole speaker.

5. Assessment of Future Opportunities in AMO Sciences

Allan Laufer began a discussion on the proposed study by indicating that DOE would be notifying the NRC within a week that it intended to provide financial support for the assessment.

Andrew Hazi summarized John Bahcall's presentation at the APS meeting. Particularly noteworthy was the approach that Bahcall took prior to commencement of the study. He visited the relevant agencies, OMB, OSTP, and members/staff of Congress and solicited "up front" their views on how an assessment of astronomy might be useful to them and what questions they would like answered by the study. Hazi recommended that the AMO panel adopt a similar approach.

Dunn informed the CAMOS members that both Ramsey and Neal Lane had declined to be nominated for chair of the panel. He also suspected that Lineberger would decline when asked. Committee members constructed a list of possible alternatives; including, N. Bloembergen, D. Herschbach, E. Merzbacher, W. Klemperer, R. Zare, J. Macek, S. Berry, A. Dalgarno, H. Dehmelt, D. Kleppner, Hall, U. Fano, and D. Levy. The committee decided to again approach both Ramsey and Lane with the following alternative suggestion: Specifically, three Executive Vice-Chairs would be nominated (one from each subfield) to assist the Chair with the administrative responsibilities, thereby relieving the Chair of this responsibility. (Should they again decline, Lineberger would be extended the same offer.)

6. Comments From Agency Representatives

John Cooper (NSF) reported that representatives from the Plasma Science Committee (PLSC) were briefing David Sanchez and other NSF officials later today. He distributed a recently-compiled list of abstracts of grants supported by the NSF Division of Physics in the areas of atomic, molecular, optical, and plasma science (Attachment A). Finally, he stated that there were no funds for new initiatives this year, but that might change in FY92.

Aaron Temkin (NASA) read a statement (Attachment B) identifying specific AMO science areas of interest to NASA. Anthony Starace questioned whether it would be possible to get any department/office at NASA to produce information on program abstracts that were specific to the AMO sciences.

Ronald McKnight (DOE) mentioned the PLSC study and urged that both studies be coordinated. He added that in general it is easy for program managers to provide detailed statistics on programs should that data be useful for the study panel. He also stated that information on the ability of any particular field to produce students does not help justify programs or program initiatives.

Joseph Martinez (DOE) also urged that the CAMOS and PLSC assessments be coordinated. He emphasized that the goal should be to elevate funding for small science in general. He added that he had just received $400,000 in new money and was in the process of soliciting proposals.

Ralph Kelly (AFOSR) stated that his budget for atomic and molecular physics was about $2 million per year and that Howard Schlossberg's budget for optical science was about $4 million per year. His expressed his view that well-done assessments are useful; they provide ammunition for requesting higher budgets. With

AFOSR was currently seeking clarification on some ambiguous conference language. Until the clarification arrived, AFOSR was not well-positioned to assess its total program picture.

A few highlights from the subsequent discussion are mentioned below:

Laufer mentioned that while the funding agencies and program managers accept responsibility for the well-being of the AMO sciences, the practicing scientist must take a much more global approach toward assessing the relevance of his/her activity. In particular, it is becoming increasingly necessary to justify the scientific activity within the context of its contribution to national needs. Laufer also stated that the goal of the AMO community should be to help raise the funding level for all of small science not just AMO. Lubell added that the AMO community is now beginning to appreciate the need for that approach. He then reviewed some details of a briefing by Representative Bob Traxler that he recently attended—budget partitioning (domestic, defense, international), the role of OMB, zero-sum rules, and the competition between basic research and VA/HUD benefits for limited resources.

Klemperer initiated a discussion on the effectiveness of producing reports that request additional funding. Although there was some disagreement on the net effect of Academy reports, for example, there was agreement that the recent report *Materials Science And Engineering For The 1990s* seemed to be producing positive results, *i.e.*, some increased funding for that community. Donald Shapero pointed out that OSTP involvement in the process, an issues-oriented report, and agency support for developing initiatives (*e.g.*, NSF) were among the key ingredients for success.

4. General Discussion of Agency Concerns and Needs

Du[illegible] began the discussion by referring to correspondence between Frank Press and Jim Decker (Attachments C and D) about a scientific assessment of plasma science that is being planned by the Plasma Science Committee. He expressed concern about whether CAMOS should or could bring its concerns to the attention of Decker in the short time period that was being mentioned. In addition to some general discussion on these questions, there was some discussion about the 1989 BESAC report and its recommendations regarding atomic, molecular, optical, and plasma physics. Roberta Saxon suggested that CAMOS should continue to focus on all the federal agencies that support the AMO sciences and not get too worried about DOE activities. Following a suggestion by Anthony Starace and Klemperer, CAMOS decided that an appropriate tact would be to inform Decker of the proposed study, indicate what the committee could prepare for him should he desire, and also indicate on what time scale. Lubell suggested that the communication should come from Frank Press.

5. AMO Science in Europe

Koch gave a brief presentation on activities in Europe that relate directly to AMO science. Details of the presentation are given in Attachment E.

6. Panel on Plasma Processing of Materials

Hazi has been serving as CAMOS liaison on the Panel of Plasma Processing of Materials (PPPM). In that capacity, he made a brief presentation on the status of the PPPM activity. Details are contained in Attachment F.

7. Utilization of National Facilities

Bernd Crasemann initiated a discussion on the problems associated with the utilization of national facilities—costs of operation, lost opportunities for significant research, etc. He acknowledged that this set of problems actually transcends the concerns of just the AMO sciences. He asked the committee to consider whether it wanted to become involved in this issue, *i.e.*, gathering facts, figures, and making recommendations. Following discussion on several aspects of this issue—the impact and importance of facilities to small science, in general, and AMO sciences, in particular; the relationship between facilities and pork barrel funding—it was decided that the proposed AMO assessment (with associated priorities) provided the proper context to address this issue.

8. Executive Session—Action Items, Old Business, New Business

ASSESSMENT. Dunn began the Executive Session by suggesting that the plans for the assessment be reevaluated. Noting that the charge to the study panel was one of the more important aspects, he advised that the first item for consideration be the Statement of Task that would be conveyed to that panel. Following a brief discussion, CAMOS unanimously agreed that the Statement of Task should be revised to read as indicated in Attachment G.

Following that item, the committee reviewed the scope of the assessment. In particular, to what extent should the assessment address the concerns of the molecular sciences, including chemical physics, and the optical sciences and what might be the optimum way to ensure an unbiased assessment of each AMO subfield. The discussion focused on several issues: the historical ties between CAMOS and DAMOP, the need to extend the committee's constituency to the molecular and optical communities, the practical considerations associated with a broader representation as compared and contrasted to the political advantages. During the discussion, David Pritchard presented a copy of a letter that he had sent to Lubell (Attachment H) and that addressed this issue. As a result of the discussion, Daniel Grischkowsky introduced the following motion (seconded by Craseman):

> **Motion: That the scope of the study be changed to include each subfield of AMO and that the new title be *An Assessment of Future Opportunities in Atomic, Molecular, and Optical Sciences*.**

During consideration of the motion, it was the committee's sense that this could only be accomplished if the study panel was carefully chosen to represent each of the subfields. In effect, this would mean going to the different communities for nominations of candidates to serve on the panel. Pritchard suggested that representatives from the Optical Society of America (OSA) and the Division of Chemical Physics (DCP), as well as those from DAMOP, should participate in the nomination process. Accordingly, Lubell proposed the following amendment to the previous motion (seconded by William Miller):

> **Amendment: That CAMOS pursue the broader approach suggested by Pritchard in identifying candidates to be nominated for the study panel.**

The motion passed my majority vote (with Donald Levy casting the minority 'nay' vote); the amendment passed unanimously.

To support the idea that the study panel must set priorities in order to have an impact on program planning, Dunn reviewed presentations and discussions that took place at the November 28 meeting of the BPA. These included Bahcall's comments about the astronomy survey, plans for an assessment of plasma science, and agencies' expectations. Following Dunn's lead, the consensus of the committee was that a matrix scheme for priorities in the context of national needs was a good approach.

Dunn opened up the discussion to suggestions for nominees to chair the study panel. CAMOS adopted the following recommendation:

- Option 1: Chair—Ramsey; Vice-Chair—Lane, Lineberger, Zare, Armstrong, Bardsley, Leone, Pritchard, Koch, Freeman (in that order)
- Option 2: Chair—Lane; Vice-Chair—Lineberger, Armstrong, Leone, Freeman, Pritchard (in that order)
- Option 3: Chair—Lineberger; Vice-Chair—Armstrong, Zare (in that order)

CAMOS decided that Frank Drake, BPA Chair, should be requested to contact Ramsey, Lane, and Lineberger (in that order) and assess their willingness and availability to serve as chair of the study panel. Ronald Taylor would initiate the request.

Finally, three subcommittees (one from each subfield) were formed and charged with identifying slates of candidates to serve on the panel. These subcommittees were: Optics (Pritchard and Grischkowsky), Chemical Physics/Molecular Sciences (Klemperer and Levy), and Atomic Physics (Starace and Koch). The subcommittees would return a slate of 12 candidates each by January 11. CAMOS would vote on these candidates by mail ballot due January 18. A final slate (with 4 primary and 4 alternate candidates in each subfield) would be proposed to the BPA by January 25.

CAMOS recommended that additional support for the study be requested from NIST and AFOSR.

NEXT MEETING. CAMOS decided that the next meeting would be Friday, April 26, 1991 in Washington, D.C. This meeting would follow the DAMOP meeting that will be held in conjunction with the Spring Meeting of the APS.

NOMINATIONS. As Chair of the Nominating Committee, Lubell presented a list of nominees to serve on CAMOS during the next three years (see Attachment I). This list would provide the basis for the names submitted to the BPA for consideration.

9. Adjournment
The meeting adjourned at 5:20 p.m.

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MINUTES

COMMITTEE ON ATOMIC, MOLECULAR, AND OPTICAL SCIENCES (CAMOS)
National Research Council
2001 Wisconsin Avenue
Washington, D.C.
April 26, 1991

Attendees: Gordon H. Dunn, Chair; Michael S. Lubell, Past Chair; Andrew U. Hazi; William Klemperer; Peter Koch; Ronald Phaneuf; Roberta Saxon

Absentees: John E. Bjorkholm, Daniel Grischkowsky; Daniel J. Larson; Donald H. Levy; William H. Miller; David Pritchard; Richard E. Smalley

Ex Officio Members: Anthony F. Starace, Chair, DAMOP

Professional Society Liaisons: Paul J. Dagdigian, Chair, DCP; William Stwalley, LSTG

Agency Liaisons: DOE: Allan Laufer, Joseph V. Martinez, Ronald McKnight; NSF: John Cooper; AFOSR: Ralpn Kelly; ONR: Peter Reynolds; NASA: Aaron Temkin

NRC Staff: Ronald D. Taylor

Note: This meeting of CAMOS was scheduled for those members who were also attending the April 22 - 25 DAMOP meeting in Washington, D.C. All attachments to these minutes were distributed or reviewed at the meeting.

1. Opening

The meeting convened at 9:00 a.m. with Gordon Dunn presiding. All attendees introduced themselves by name and institution and/or other affiliation. Dunn reviewed the agenda and called for additional items that attendees wanted to consider during the meeting.

2. Minutes of the December 1990 CAMOS Meeting

Approval of the minutes of the December 1990 meeting was postponed until the next regularly scheduled meeting.

3. Report on Congressional Day

Michael Lubell reported that on April 25 approximately 140 members of the American Physical Society visited Senators and Representatives as part of an APS-sponsored Congressional Day. This activity was promoted largely by DAMOP. Congressmen Brown and Gore both were strong supporters of the activity. Lubell indicated that the APS plans to conduct a followup survey the participants to assess their reactions. Peter Koch indicated that the high production rate of PhDs from the small sciences was an issue that drew a lot of notice and positive reaction. Dunn reported that David Skaggs (D, Colorado) seemed to be very

not spread the money too thin. In addition, some new people will be funded and some money will be provided for new equipment. As a result, some programs will be terminated. Smith stated his enthusiastic support for the proposed CAMOS study, while acknowledging that the NSF Physics Division Director was less enthusiastic.

Allan Laufer and Joseph Martinez began the DOE presentations. Attachment B contains information presented to the committee. According to Laufer, the Chemical Sciences Division provides $20 million per year for AMO research (not including facilities). Fundamental issues in combustion comprise approximately 75% of the program. High resolution spectroscopy, chemical kinetics, and chemical dynamics are examples of areas that are funded. The major thrust of the chemical physics program, though, is chemical reactivity. Laufer added that maintaining adequate support levels was a serious concern. Although there was a nominal increase in the total chemical physics budget, this was primarily because of a 25% increase in facilities' money; the research funding actually remained essentially flat. In response to a question about the rationale behind an increased facilities component versus its affect on small science, Laufer pointed out that the DOE mission includes an obligation to support facilities. Approximately, 33% of the Chemical Physics Division budget supports facilities. Andrew Hazi added that the emphasis on environmental safety has put a load on the system; cleanup, safety design, reviews are all costly. William Klemperer suggested that over the long term DOE might end up supporting predominantly facilities while the individual investigator would be forced to go only to NSF. Laufer responded that although this has been the trend over the last 10 years, the program managers and directors continue to argue strongly against and resist that trend. Laufer also added that extra consideration is not given to individual investigators who plan to use facilities. To Peter Koch's request for clarification on travel support, Laufer stated that salary, student support, post doc support is remaining constant. Requests for travel support must be included in the proposal and are not treated as special items for consideration.

Ronald McKnight opened a discussion about programs within the DOE Office of Fusion Energy by stating that his comments would address magnetic fusion and not inertial fusion programs. McKnight reviewed the history and recommendations of the DOE Fusion Policy Advisory Committee (FPAC). Admiral Watkins had created FPAC to review and make recommendations on the DOE fusion program. FPAC laid out a plan to bring fusion to the "demo" level early next century, which meant it would transition to an energy program. However, a cut in the fusion budget from $325 million to $275 million had essentially killed the FPAC plan. McKnight stated that as a result the decision had been made to concentrate on fusion in tokamaks. Thus, programs emphasizing alternative concepts would be terminated, such as LASL, ORNL, LASLX, and PBX (had not operated). The net effect would be the loss of 600 - 750 fusion jobs. However, efforts were ongoing to attempt to restore $25 million of the lost money for reprogramming and damage control. McKnight assessed the situation as brutal and grim, noting that environmental considerations applied here as well. He concluded by stating that AMO physics programs would be impacted. To Hazi's question about the FY90 AMO budget, McKnight responded that it was between $1.5 - 1.8 million for atomic physics with most of this concentrated at NIST or ORNL. After Michael Lubell pointed out that eliminating alternative concepts meant the tokamak was it, McKnight added that alternative concepts have not been eliminated from programs in other parts of the world.

Katharine Gebbie began discussion on NIST programs by stating that NIST is currently undergoing a reorganization in response to its mission to support industry and the science community. Gebbie indicated that the NIST budget had increased by 30%; $30 million to grants and $14.2 million to research. She also stated that while an initiative for basic research had gotten to Congress, it was not funded. Therefore, none of the $14.2 million was currently earmarked for physics research. The net effect, Gebbie noted, was a reduction of approximately $15%.

Jerry Perrizo stated that current plans at AFOSR were to support atomic and molecular physics at a level of $2 million and optical physics at a level of $7 million. While the optical component reflects a steady increase (with slight fluctuations), the atomic and molecular component continues to follow a slightly decreasing slope. Perrizo commented that this was less than he preferred and that although one research area had been eliminated, there might be an opportunity to increase support in another by about $.25 million. Perrizo also indicated that AFOSR was suffering from some unanticipated budget confusion. The source, he stated, was well-meaning Congressional staffers that were attempting to help seismic research; specifically, a program that was transferred from DARPA to AFOSR and involved a consortium of about 70 universities.

regard to this year, as a result a Congressional effort to earmark $8 - 10 million for geophysical research, AFOSR had suffered a $2 million loss in its budget allocation. Of this, 15% was money that funded AMO projects. Helmut Helwig, Director, was able to restore only about $500,000 for FY91. He also added that AFOSR was in the process of implementing a new policy to fund only Air Force-affiliated laboratories.

Peter Reynolds (ONR) indicated that the core program in atomic and molecular physics was approximately $1.5 million per year. He did not have an estimate for the optical program managed by Herschel Pilloff. Occasionally, this amount is supplemented through the award of Navy Accelerated Research Initiatives. Presently, he was interested in funding research on clusters and strongly-coupled systems.

7. Comments From Professional Society Representatives

Starace (DAMOP) reiterated the importance of Congressional Day and the role that DAMOP played in the process. He noted that the APS is considering ways to tighten the acceptance standards for publication in Physical Review A. There had been 12 sessions at the just-completed DAMOP meeting and it was his belief that number provided good coverage of the field. He cited increasing concerns among the DAMOP membership about the job shortages in the AMO sciences.

William Stwalley (LSTG) expressed his appreciation at being invited to participate in the CAMOS meeting. He reviewed efforts by the LSTG to satisfy requirements necessary to achieve division status. He also reviewed the LSTG meeting schedule. He suggested that CAMOS might consider holding its next meeting in conjunction with the next LSTG meeting in Monterey, CA on September 22 - 26.

Paul Dagdigian (DCP) also expressed his appreciation at being invited as a representative of the molecular community. He said that the DCP represents areas of research that span gas phase to condensed matter and that he hoped that the ties between the communities would grow stronger.

8. Action Items

EXPERIMENTAL SURVEY. Dunn expressed concern that the questionnaires that had been returned as part of the survey of experimental AMO scientists had still not been tabulated and analyzed. It was the consensus of the committee members in attendance that CAMOS should begin to do this immediately with the goal of producing a short report. Ronald Phaneuf indicated that he would be willing to lead the effort to tabulate the data contained on the questionnaires. Martinez added that the support that DOE provided for the core activities of the committee included the expectation that results would be produced each year. Ronald Taylor stated that the preparation, publication, and dissemination of the research briefing had and would use a large amount of the committee's resources since no additional funding had been provided. Taylor stated that the research briefing would be the tangible result of the committee's efforts until additional funding were received in the next fiscal year.

NEXT MEETING. CAMOS decided that the next meeting would be scheduled once the study panel was appointed and was ready to commence its activities.

9. Adjournment

The meeting adjourned at 1:00 p.m.

DISCLAIMER

END

DATE FILMED

3/16/92