

Congress Requires Relevance for DOD Research

Because the 1970 Defense Appropriations Act bans Pentagon support of research not directly related to its mission, the fate of many tens of millions of physics-research dollars is uncertain. The financial situation is likely to remain unclear for months. Anxious physicists are wondering if their projects will be terminated, and if so, will another agency, in a time of massive budget cuts be able to support them instead? Physics could be facing its most severe financial crisis of the post-war period, but it is too soon to tell.

Donald MacArthur, deputy director for research and technology in the Pentagon Office of Defense Research and Engineering, told *PHYSICS TODAY* that the amount of money to be cut because of the appropriations act will be less than the 13-15% budget cut for basic and applied research in fiscal year 1970. However, fundamental physics is clearly one of the most vulnerable areas and could possibly absorb the bulk of the trimming.

Campus researchers are now concerned that if they justify their DOD-supported work as militarily relevant,

ished military influence on academic science.

Mansfield. Section 203 of the appropriations act reads: "None of the funds authorized to be appropriated by this act may be used to carry out any research project or study unless such project or study has a direct and apparent relationship to a specific military function or operation."

Senate Majority Leader Mike Mansfield (D-Mont.) noted early in November how pleased he was with the restriction. He said that over the past fiscal year DOD spent \$400 million on non-mission-oriented research and development projects. DOD officials point out that this figure is the total for relatively basic research, much of which is related to current or potential military needs.

Quoting NSF figures Mansfield said that if DOD gives money for academic research as requested for fiscal year 1970, "DOD would support basic research of the kind traditionally carried out in universities at a level of \$311 million in comparison with \$277 million for the National Science Foundation. . . . While academic research is not wholly dependent upon the military for support, I submit that for the scientists of our universities to have to depend upon the military functions for as much funding as they receive from the National Science Foundation is a situation that should not continue. Hence, section 203."

"Congress, by writing section 203, is giving clear notice to the Defense Department and to university scientists who now rely upon military support and to Members of Congress responsible for funding of academic research by other agencies that the function of the military is not to support academic research, but rather is to obtain only that research which in the eye of a prudent and reasonable man relates to known requirements of the military for advances in science."

"A reasonable goal to be obtained through the working of this new provision could be to reduce DOD funding of academic research to no more than 25 percent of that funded by the National Science Foundation by the

end of fiscal year 1971. Such a goal provides time for the president and his advisers and Members of Congress concerned with funding of civil research to decide whether to sustain the overall level of academic research by increasing funds for the National Sci-

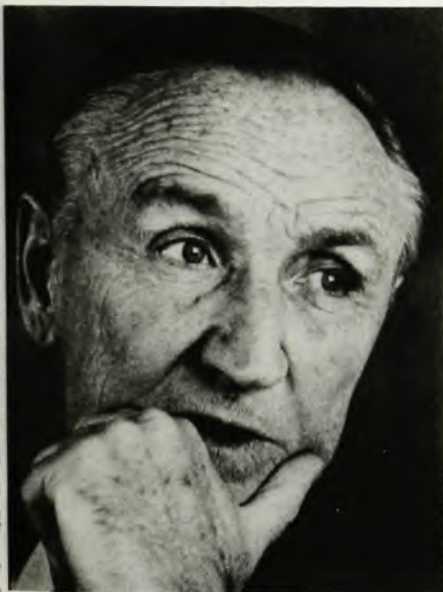


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ence Foundation and other agencies, or as a matter of national policy to reduce the overall level. That latter, I would add, would not be a national calamity."

Mansfield said he expected that the Comptroller General and his auditors would pay close attention to section 203. He expected that the Comptroller General would require DOD research administrators to "provide written determination of the need for and relevance of each project to military science and technology."

Pentagon response. By late November, Mansfield had been angered by a letter from the office of John S. Foster Jr., Director, Defense Research and Engineering, replying to an inquiry from Senator J. William Fulbright (D-Ark.), chairman of the Senate Foreign Relations Committee. The letter had said: "It has long been DOD policy to support only research which is relevant to military functions and operations. Most of our projects in the research and exploratory development



MANSFIELD

PHOTO BY RAY ORMAN

they may then have to justify to militant students their acceptance of support for work previously characterized as "pure." On the other hand, many are welcoming the prospect of dimin-

budget categories (from which comes most of our university funding) are, in fact, relevant to *many* military operations. From time to time, however, we eliminate support for research fields which are no longer relevant to DOD needs; high energy physics is a recent example. I do not expect, therefore, that implementation of these sections will entail any new type of review or selection. Nevertheless, Secretary Laird, Secretary Packard, and I have been instituting a number of new management approaches which will provide a basis for more coherent and explicit presentations to the Congress about the basis for our budget requests."

Commenting on the Pentagon reply, Mansfield said, "The Congress of the United States does not attempt to enact futile gestures; it should be most resentful when an Executive agency decides to ignore its clear expression of intent."

David Packard, Deputy Secretary of Defense, soon reassured Mansfield that the Pentagon would comply with the law, that those projects not fulfilling the criterion of section 203 would be terminated. He added that DOD had asked the National Academy of Sciences "to consider carrying out a complete examination of all projects and studies which might be regarded as marginal under the provisions of section 203." Packard said that fiscal year 1971 budget requests and program plans would reflect the restrictions of the section. Subsequently the Academy said it did not want to become involved in reviewing DOD projects for their mission relevance rather than their scientific merit, certainly not until after DOD had taken whatever actions it deems appropriate under section 203.

Packard issued a directive dated 2 December saying that "prior to the approval of a new research project or study, the project manager [must furnish] a written statement which describes, as clearly and simply as possible, the project or study and its purpose, together with its direct and apparent relationship to one or more designated military functions or operations. Any project which does not have a direct and apparent relationship to one or more designated military functions or operation must be terminated in an orderly way as soon as possible."

Foster. On 4 December Foster sent a long reply to a series of questions posed by Mansfield and listed four

points summarizing DOD philosophy on research and development:

"(1) Each major department and agency should carry out a research and development program needed to meet its responsibilities..."

"(2) For a research and development effort to be healthy in the long term, it must include some investment in applied research and in relatively basic research." DOD has chosen to support basic research in those fields with potential contributions to the overall defense research and development program, which is in turn directly related to the department's missions. He went on, "We have unique needs, larger in number than any other mission agency and necessarily more focused than those of NSF. Today these include relatively basic research in, for example, electronic engineering and physics related to sensors and other special electronic components, oceanography, high temperature and ultra-strong materials, some areas of mathematics and computer sciences, and many areas of aerodynamics and propulsion. When other sources of support do not encourage these basic fields sufficiently, DOD must ensure that the areas do not lag."

"(3) The Defense Department research project offices provide continuous and immediate 'coupling' of research results into developmental and operational activities." Frequent contact and exchange with scientists involved allows rapid transfer of results and discussion of implications of the results for defense.

"(4) University groups represent a unique national resource of excellence in research and development. This is why we select academic investigators to carry out some of our work [about 20% of the relatively basic and applied research that DOD supports]... If we attempted over a period of a few years to shift very much of this work to industrial or in-house laboratories we would obtain lower quality research and incur higher costs..."

Foster told Mansfield that DOD does not in fact support more academic basic research than NSF, that the Mansfield figure for DOD-supported research includes considerable applied research, much of it classified.

In reply to Mansfield's suggestion that NSF support the research that DOD needs, Foster said that DOD needs its own direct communication with the science and engineering community. He explained that DOD needs

to monitor research closely for early feedback of results and potential applications so that research program goals can be modified. "To do the same or equivalent job NSF would have to be continually exposed to military problem areas and involved in Army, Navy, Air Force and Defense agency briefings, program reviews, laboratory visits, evaluations, etc. Without this intimate involvement NSF would be an unnecessary and ineffective middleman without the appreciation of the research relevance or of the military applications."

Physics-research cuts. "How will section 203 affect physics research?" we asked MacArthur, who is one of Foster's deputies. MacArthur felt that the fund-cut associated with so-called "nonrelevant" research would be less than the 13-15% budget cut that DOD must now take anyway in its basic and applied research budget for fiscal year 1970. Selective cuts are now being made.

In addition Project Themis starts have been entirely eliminated, by law.

DOD support for basic and applied physics in fiscal year 1969 was estimated as \$236 million (in *Federal Funds for Science*, 1969) and for all the physical sciences at \$352 million. These figures include work in materials science, electronics, computers, etc., much of it being done by physicists. For the same year NSF recently estimated that the foundation gave about \$32 million for basic physics, a figure that does not include materials science, electronics, computers, etc.

"How much of your budget in fiscal 1969 and fiscal 1970 is for basic physics research?" we asked. MacArthur replied: "The NSF definition of basic research is knowledge for knowledge's sake. By that definition we don't have any. We have what I call basic research in that it's developing knowledge that's going to be used by somebody else to solve a problem. We have problems in applied research and in technology that we know we can't solve without doing basic research."

In that context, he went on, the Defense Department spent in fiscal year 1969 about \$8.4 million for nuclear physics and \$30.8 million for other basic physics. For fiscal year 1970, prior to the 13-15% budget cut for basic and applied research, DOD planned to spend \$6.4 million for nuclear physics and \$32.1 million for other basic physics. Although this physics is clearly identifiable, research

also goes on in electronics, materials science, solid-state physics and so on.

How will DOD conform to section 203? MacArthur told us that each project officer will be asked to write a paragraph showing why his program, contract or project conforms. He went on, "It really comes down to individual technical military judgment in the end. There are some clearly that don't comply, but there will be some for which, if you handed them out to a group of people, you would get different responses from different people. It's very difficult to associate [a project] in one

step with a specific military function or operation; but I could show it in three steps." He was reluctant to say what classes of projects do not conform.

MacArthur said, "We cannot support any project with fiscal year 1970 funds if it does not conform to section 203. When a program is up for renewal and does not conform to 203, if it is good quality work and in the national interest, we'll ask if NSF or any other appropriate agency can pick it up. If it's low-quality work, we'll cancel it. We'll try to make an orderly transition."

It is not clear just when the termina-

tion and transfer (or both) of projects would take place. In a Congressional speech on 18 December, Congressman Emilio Q. Daddario (D-Conn.) decried the present crisis. He urged that any transfers occur in an orderly, time-phased manner; if necessary the transfers should extend over a number of years, he said. He proposed that as a matter of policy, "Congress emphasize the application of section 203 to fiscal year 1971 budget, which is even now being prepared, rather than try to give it full effect in the remaining quarter of this fiscal year."

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New Academy Committee Begins Physics Survey

The committee headed by D. Allan Bromley, professor at Yale University, has begun a new survey of physics (see *PHYSICS TODAY*, September, page 71). Recent, major changes in the US (namely the leveling of federal support for science, the reorientation of public priorities, the new attitude of students towards science and technology, and the changes in the areas of physics themselves) led Frederick Seitz and later Philip Handler, past and present presidents of the National Academy of Sciences, to initiate the study (see box).

The study will be carried out in the Division of Physical Sciences and is under the aegis of the Academy's Committee on Science and Public Policy, with support of major federal agencies. It will build upon, rather than repeat, the 1966 *Physics: Survey and Outlook*,

the report of the committee headed by George E. Pake, professor at Washington University (see *PHYSICS TODAY*, April 1966, page 23), but will necessarily consider a broader range of topics.

While exploring physics as a discipline and its interrelationships with technology and other sciences, the survey will be much concerned with the role of physics in the current national and social context. Bromley cites these topics as including "... the structure and operation of the nation's physics enterprise, the cultural and educational significance of physics, the roles of basic and applied physics, its social and economic interactions, its manpower and training requirements and problems, the relationships among government, industry and universities, and the directions which US physics may take in the 1970's."

The committee intends, except possibly for major national facilities, to focus on the development of criteria that underlie funding and program priorities, rather than suggest the priorities themselves. It also plans to compare the structure of, and projections for, physics and other selected sciences in the US, where the required survey information is available. A similar but briefer comparison between physics in the US and in foreign countries is also contemplated.

Bromley and his committee are now studying problem areas and different approaches and urge any member of the physics community to submit a thoughtful presentation to the Division of Physical Sciences of the National Academy of Sciences. The presentations will be reproduced for distribution to the committee and the appropriate panel.

The nine panels, which were created by the committee, are concentrating on

NEW PHYSICS SURVEY COMMITTEE

D. Allan Bromley, Yale University; Daniel Alpert, University of Illinois; Harvey Brooks, Harvard University; Joseph Chamberlain, Kitt Peak National Observatory; Herman Feshbach, MIT; George B. Field, University of California, Berkeley; Edwin L. Goldwasser, National Accelerator Laboratory; Conyers Herring, Bell Telephone Laboratories; Arthur R. Kantrowitz, Avco-Everett Research Laboratory; Franklin A. Long, Cornell University; Walter H. Munk, University of California, San Diego; Emanuel R. Piore, IBM; Edward M. Purcell, Harvard University; Roman Smoluchowski, Princeton University; Charles H. Townes, University of California, Berkeley; Alvin Weinberg, Oak Ridge National Laboratory, and Victor F. Weisskopf, MIT.

PHYSICS SURVEY Panels and Chairmen

Astrophysics and Relativity, Robert Christy, Cal Tech; **Data**, Conyers Herring, Bell Telephone Laboratories; **Electronic, Atomic, and Molecular Physics**, Nicolaas Bloembergen, Harvard University; **Elementary Particle Physics**, Robert G. Sachs, University of Chicago; **Nuclear Physics**, Joseph Weneser, Brookhaven National Laboratory; **Physics in Biology**, Robert Shulman, Bell Telephone Laboratories; **Physics of Condensed Matter**, George Vineyard, Brookhaven National Laboratory; **Plasma Physics and Physics of Fluids**, Stirling Colgate, New Mexico Institute of Mining and Technology, and **Space and Planetary Physics**, Richard M. Goody, Harvard University.

certain subfields and areas. Additional areas may also later require the work of small groups. In particular, a small group headed by Marvin Goldberger, Princeton University, is studying the



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