Budget Cuts and the Draft Threaten Graduate Students

"Don't worry about our support, professor, the draft will probably solve all your problems," said a physics graduate student recently to the chairman of a large midwest department. And across the country, in big departments and small ones (especially at middle-sized private universities), those responsible for physics graduate programs are feeling increasing concern over reduced federal fellowship and research support on the one hand and the consequences of the new draft law on the other.

Though precise figures are not known in the current fluctuating budget situation, Washington observers estimate that the physical sciences may have to carry on with at least 7% less federal funds for research and development in fiscal 1968 than in 1967 and with about one third fewer fellowship and traineeship awards than were available two years ago. But even these estimates may have to be lowered. For the Administration has ordered cutbacks of 10% in "controllable" programs and 2% in personnel in the 1968 budgets for most federal agencies. Meanwhile, Congress has agreed on a resolution that would write into law this expenditure reduction plan of the President.

Evidence does not as yet point to any drastic disruption of physics graduate support. Preliminary estimates from both the National Science Foundation and the American Institute of Physics agree that total physics graduate enrollment during 1967–68 will not decline. Only between 5–6% of physics graduate students are self-supporting, says NSF, a figure that is much higher for many other disciplines. Nor is there any apparent shift toward fewer postdoctoral research associates as a means of providing funds for graduate students. The overall system of support, it is pointed out, has a rather large ballast capacity, and it takes a long time before the levelling effects of federal budgets are felt.

But for some departments, difficulties are at least in the offing, if not already a reality. "We can see the pinch coming," says Winston Bostick, head of the department at Stevens Institute of Technology. "Over the last five years we have had a large increase in federal traineeships. But grants and contracts are becoming more difficult to get. We have not yet decreased the number of research assistants on our projects but I'm apprehensive. Probably I won't be able to take on as many students as before. Increasing teaching assistantships is a possibility."

The number of teaching assistantships, however, is geared to the undergraduate enrollment, and private university enrollment has increased by only about 40% in the last ten years as compared with 125% for public universities. "Over the period of a decade, we've had a static number of teaching assistants," says Richard Norberg, department chairman at the University of Washington in St. Louis. "Our admissions committee is quite concerned about next year. We don't quite know how we are going to go out and look for new students, because we may have to use our teaching assistantships to bail out advanced students who have had the rug pulled

RESONANCES

Broad draft deferments for graduate students in natural science, mathematics, engineering and health have reportedly been recommended by an interagency committee to the National Security Council, which was expected to decide on the question soon. Meanwhile the American Council on Education has recommended that deferments be granted only for narrow and critically needed specialities rather than for the entire field of the physical sciences.

Effects of recent changes in federal research support are being closely studied in a survey by the American Institute of Physics committee on physics and society (COMPAS). Acting through its subcommittee on the support of physics, COMPAS has sent questionnaires to physics- and astronomy-department chairmen at PhD-granting institutions requesting data on experimental facilities as well as faculty and graduate students.

Trieste will continue to have its International Centre for Theoretical Physics as a result of an agreement between the Government of Italy and the International Atomic Energy Agency. Italy had been a major sponsor of the center during its first four years, but there had been both financial and political uncertainty about its future. Italy has now offered to continue its $250 000 annual support for the next four years. The 1968 center budget is $532 000, of which Italy and IAEA each provide almost half and UNESCO $27 500.

Sigma Pi Sigma and Student Sections at their national convention have approved by two-thirds majority vote the merger into a society of physics students. Details of the merger will be defined during the first part of 1968.

from under them. The way our department has held up its number of research assistants was to reduce the number of research associates, the postdoctorals. By eliminating seven to eight postdocs, you can take care of about 16 research assistants. The last thing a professor will give up are his students."

Notwithstanding, many professors may, in the near future, have to give up their students to selective service. At the present time, only graduate study in the medical areas is sanctioned by Congress for continued deferment; physics and astronomy (or at least teaching assistants in these fields) may or may not be added to the deferred list in the coming months by the Administration. Says the Scientific Manpower Commission, "Most of those students whose field of study is not determined to be essential by the National Security Council or whose occupations are not found to be essential, will drop into the I-A eligibility pool in June. Under the present system of drafting the oldest first, this group of men will have priority of call within their draft boards.

"If the Department of Defense decides to activate the provision in the law allowing them to designate a prime age group for induction, these men,

TWO BLACK clouds threaten education of graduate students in the future.

who will have been deferred this year as students, will fall back into that prime age group. In either case, they will be primary targets for induction.

"University graduate departments whose subject areas are not eligible for deferment will find themselves for a period of about two years trying to maintain their momentum with a student body consisting of women, those men who could not pass the physical requirements for the draft and a handful of returning veterans."

Research Proposals: Agencies, Academics Provide Suggestions

Is there an art to preparing research proposals? No, say the federal program officers who have processed countless proposals and the academic physicists who have submitted them. But there are many valid suggestions, self-evident and otherwise, that beginning researchers are apt to overlook when writing their proposals. What agencies to solicit, whom to contract, how to style the proposal—these and other questions were put to knowledgeable administrators by PHYSICS TODAY, and the following information was derived from their many comments and pieces of advice.

Informal contact first. Before actually sitting down to write the proposal, it is a good idea to contact agency program officers either by telephone or at scientific meetings. Says George Kolstad of the Atomic Energy Commission, "Informal discussion with an agency representative sometimes gives one a better feel for the content of the proposal and to whom it should be addressed in the current funding environment." And William Green of the National Aeronautics and Space Administration notes, "A phone call is highly preferable to a letter. By spending just a few minutes on the phone, a person can tell whether there are any possibilities for his proposal and whether it is worth while his coming to Washington or meeting our people elsewhere for further discussion of his problem."

By conferring with the proper program officer, the scientist can also find out whether his research is being duplicated by another person under agency contract. Though there is no central clearinghouse for proposals, an interagency committee on high-energy physics meets regularly, and unofficial interagency groups for other physics subdisciplines also exist. In addition, program officers regularly review acquisition lists of all proposals received by the agencies.

The scientist should also obtain from each agency he is seeking support from a guide for submission of proposals. He can also ask others in his department and elsewhere how they present their own proposals to the agencies.

Writing. "In writing the proposal, you have got to convince your peers that you know the field and that you have something your peers would wish they were doing themselves," says Howard Etzel of the National Science Foundation. "Bring the reader who is not an expert in the field to the point where he knows what you are talking about," he notes. And Samuel Devons of Columbia University points out, "If you are an individual or small group, writing the proposals lucidly, forcefully and in a captivating way surely has some effect. When the proposal goes out to the agency and to the referees, it has to catch their imaginations a bit."

A common mistake of beginners is failure to explain exactly what they want to do. "I've seen a good many proposals come in with just the title, and then 'Let x equal . . . and they are off," says Green. "I've always advised people, the first thing they should do is to think out what type of project they want to do and then to write a first draft. Then afterward go back and rewrite it. In packaging the proposal, it is wise to lead off with an abstract and follow it up with a good technical description. This is the place where people often fall down. The reviewer is going to be a specialist in the field but he may have never heard of the researcher before. He has to get some kind of feeling that this chap knows what he is going to undertake."

Mission relatedness. "If the proposer shows an awareness of mission orientation as a factor in his research, he is several steps ahead of the game," says Green. And Kolstad says, "We are often pressed, particularly in basic research, for determining the mission relatedness of what we are doing. It helps when the researcher includes it in his proposals, but he should not tailor his proposal to what he thinks the agency might support; there is a danger in overemphasizing mission relatedness."

What agency? For nuclear and high-energy physics, the agencies that currently do the most funding are AEC and NSF. For solid-state physics, three quarters of the support is provided by AEC, NSF and the Air Force Office of Scientific Research. For atomic, molecular and plasma physics, the funding is fairly well spread out among the "big seven" agencies (NSF, AEC, NASA, AFSOR, Advanced Research Projects Agency, Army Research Office and Office of Naval Research). Particularly in the present depressed funding climate, it is wise to send the proposal to more than one agency. But you must indicate on each proposal to what other agencies you are sending it. If possible, try to obtain some partial local university or other nonfederal support for the project. "If one has such initial support, it shows one is interested in getting the project under way in any event," says Devons. With such support, an agency is often more agreeable to underwriting an otherwise costly experiment. Finally don't be discouraged

AIP ISSUES SUPPORT DIRECTORY

Detailed information on physics research support available from both federal and private sources can be obtained in *Directory of Physics Research Support for Academic Institutions*, compiled by the American Institute of Physics education and manpower division. The 33-page booklet describes how to select a sponsor, write a proposal, and prepare a budget and sample-cost estimate. In addition, data are provided on eight federal agencies and two private foundations. The *Directory* describes for each agency the various programs and activities that are of relevance to physics research, procedures to be followed in submitting research proposals as well as names, addresses and telephone numbers of program officers. John W. Barry of the University of Michigan prepared the text. Copies of the booklet can be obtained free of charge from AIP.