

Can we save basic research ?

Despite the growing funding difficulties of recent years, American physics still has enormous strength and vitality and holds leading positions along nearly all frontiers of physics. Nevertheless, in the physics community, there is increasing doubt that our pre-eminence in physics, which took years to achieve, will be retained very much longer in this unfavorable financial climate. In particular there is concern that the research effort of our universities—traditionally the cornerstone of American physics—will soon experience a serious erosion.

During the middle fifties to the middle sixties, the physics departments in American universities greatly expanded their educational and research capabilities. The coupling of the enthusiasm, energy and inquisitiveness of youthful graduate students and postdoctoral fellows during this time of expansion with the experience, knowledge and insight of seasoned faculty members formed effective teams to explore nature in a free and creative approach. This period of unprecedented growth in university departments brought American physics to its present dominant position.

While the growth of the federal funding was precipitous, its decline has been equally sudden. Beginning in 1967, the downward trend in funding has continued into the present; a recent NSF report indicates that, in constant dollars, support for basic research in 1975 is now expected to decline by 8% from the 1974 level, the sharpest percentage drop ever recorded by NSF.

The drop in federal support for basic research, compounded with a decrease in science-student enrollments in colleges and universities, has not only created an immediate employment problem but threatens to seriously damage the university research system, without doubt our most important national asset for physics research. With fewer and fewer positions for graduate students, postdocs and junior faculty available, the average age of members of physics faculties has begun to increase at the rate of about 11 months per year. This stagnating situation for physics faculties can only lead to deep trouble—modern physics research teams must have the participation of enthusiastic and energetic young physicists to maintain their productivity.

To my mind the problem of how to avoid irreversible damage to the university research system is in the long range the most crucial of the problems that now face the physics community. Recommendations and suggestions have been made to alleviate this problem as well as the unemployment problem. First there is agreement that we must insist on doing long-range manpower planning and that we should encourage close interactions between technically-oriented industries and the academic research communities. Many suggest that we urge physicists to consider working in nontraditional fields and that the graduate programs be broadened to facilitate this kind of job mobility in the future. This

advice is in keeping with the increasing emphasis on federal support on research relevant to the missions of defense, space, environment and energy. Certainly it is important that physicists should contribute to the solutions of the social and economic problems facing our nation. However, others point out that emphasis on applied relevancy does little to help ensure the continued health of university-based basic research.

They suggest that the NSF establish quasi-permanent positions of research for a duration of 3 to 5 years (and renewable) for those physicists who have done outstanding research for a few years in a postdoctoral position and have shown exceptional talent and ability. Some theoretical groups even urge that new institutional arrangements for university research may be needed to maintain its strength. Several such study reports and letters have been presented to the NSF for their consideration. The institutions would be established in certain university physics departments and staffed by recent PhD's and faculty members on short-term appointments. The goal would be to provide opportunities for young physicists to continue to work in close contact with established university departments.

These suggestions all have merit and are receiving serious attention of groups such as the three APS Committees on Applications of Physics, Education and Professional Concerns, the Forum on Physics and Society, the Panel on Public Affairs and the American Institute of Physics.

If The American Physical Society, the largest scientific society of physicists in this country, is to continue to speak for physics to the public at large and to be concerned with the well-being of the physics community and physics research, it must assume the responsibility and leadership in organizing such in-depth studies concerning manpower and physics research in general and in universities in particular. It is also important that physicists generally become aware of these problems. I would urge individual physicists to communicate their ideas and suggestions to the groups mentioned above and to the APS leadership.

If American physics is to remain first rate, we must face and solve these problems together.

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