CARRUTHERS

ever, that the AAU sample represented only 10% of the entire physics community, and only 20% of the academic physics community. While noting that the non-AAU universities have experienced a decline in their young staff, the panel stated that it could be argued that these institutions do not contribute as much to first-rate basic physics research, whose status was the principal concern of the subcommittee study. Also, although observers have claimed that the employment situation in basic research is equally bad at the national laboratories, the subcommittee pointed out that firm data are lacking to substantiate this claim. They concluded, as a "very conservative" estimate, that "the field of physics is at least 400 to 500 young scientists short of what is necessary to maintain a vigorous and internationally competitive research effort."

The subcommittee considered a number of options that have been proposed to alleviate this problem. They rejected a "do-nothing" attitude, as well as the creation of more graduate and postdoctoral fellowships or direct research grants to individuals. They gave moderate support to some split funding of positions, the creation of "parallel" or pure research positions funded by grants or contracts and involving few faculty responsibilities, and the creation of new positions in applied research at the national laboratories. The panel also stated that the establishment of new research institutes might strengthen physics, but nevertheless they believed that "it would be more effective to rescue the present system rather than create a whole new set of untried institutes."

The subcommittee's principal recommendations were the establishment of either one of two new programs that would more easily fit within the present system. The first of these, which was particularly endorsed by the Advisory Committee for Physics, is a National Research Scientist Program in Physics. It would provide full salary support for young physicists who have had from two to four years of post-PhD experience and "who have demonstrated outstanding talent for scientific research." The award would be made for five years with the possibility of a single five-year renewal; the stipend, set by NSF, would be comparable to salaries at major physics research institutions. While the appointee would be expected to devote most of his time to research and related activities, teaching (up to half the average load of the host department and at their expense) would be permitted. Selection of these awards (between 50 and 80 each year) would be made by a balanced panel of 12 nationally known physicists.

In the second program, National Research Faculty Appointments in Physics, the department, rather than the individual, would make the proposal. According to the subcommittee, the "criteria for award should include the opportunity for excellence in the proposed subfield in the host university, the research record of senior faculty, and the degree of a future university commitment to a tenured position in said field (not necessarily committed to the appointee)."

Individuals (between 50 and 80 nationally per year) appointed by the departments under this plan would also be expected to devote most of their time to research and related activities, and, in addition, to participate in department activities in the same way as regular appointees. Teaching would be allowed and encouraged up to a regular load, with the host department paying half the salary for the maximum amount of teaching. The stipend would be set by the university in accordance with its usual salary scale. According to Carruthers, the appointee would not necessarily need postdoctoral experience.

Under this plan the initial appointment would be for five years with a possible extension of three years. The appointee would be eligible for promotion to "Research Associate Professor" after the sixth year, or earlier if he or she was sufficiently senior and accomplished at the time of the appointment.

Either program would be phased out after 10 to 15 years when anticipated retirements generate sufficient new openings. Carruthers estimated that over this period a total of about $100 million plus overhead would be needed to implement either one of these programs. Such funds, according to the Advisory Committee for Physics, would have to be new to avoid damage to ongoing NSF-sponsored research.

The subcommittee also made several supplementary recommendations for increasing the employment of PhD physicists in applied science. These included NSF-funded workshops on topics of interest to national and industrial laboratories; an expanded summer-job program for physics students (not funded by NSF); the creation of "career development grants" to support young physicists temporarily in joint university–industrial laboratory research proposals and in work done at national laboratories (the first supported by NSF, the latter undertaken at the initiative of the responsible agency); and the collection of more complete and detailed data on physics employment. The subcommittee also noted that "current undergraduate and graduate curricula do not seem well designed for easy entry into applied science" (where most PhD physicists eventually find employment), but felt the universities, not NSF, should correct this situation. —CBW

DOE is funding young high-energy physicists

A temporary program for employing additional physicists in high-energy physics has been established by the Department of Energy beginning in FY 1978. Such a program was recently recommended by the High Energy Physics Advisory Panel's Subpanel on High Energy Physics Manpower, set up two years ago and headed by Jeremiah D. Sullivan (Univ. of Illinois). The subpanel also recommended the organization of a modest number of summer institutes sponsored by either NSF or DOE dealing with emerging subfields of physics and applied physics that may generate new employment possibilities at industrial and national laboratories.

The subpanel report was endorsed unanimously by HEPAP and transmitted to John Deutch, director of DOE's Office of Energy Research.

In their report the subpanel observed that many of the PhD's in high-energy physics are tenured and that their age distribution is such that about a decade will pass before retirements become numerous enough to have significant impact on employment opportunities for those seeking a career in the field.

The subpanel suggested two methods of setting up semi-permanent positions in high-energy physics during this interim period. Under the first, funding agencies would encourage large contract groups to transfer some of their postdoctoral money to long-term positions or earmark a small amount of money for such positions. The subpanel observed that this program "would retain experienced physicists who are necessary to the success of complex experiments." They also advised that teaching of up to one course per year (or other departmental responsibilities) would "further integrate these people into the department."

The other method would be a temporary five-year national fellowship program administered by the funding agencies. The award would be made through an institution chosen by the fellow and could possibly be renewed for an additional five years. The fellow would be encouraged to participate in physics-department affairs. The subpanel believed that this fellowship program "will prove most beneficial in the case of theorists."

Deutch responded to these recommendations by authorizing the High Energy Physics Program to give special consideration in FY 1978 for funding of junior high-energy physicists. DOE presently provides $400 000 to ten universities for research support of outstanding young high-energy physicists where such support will give the individual an opportunity for a position with future tenure responsibilities. DOE intends to continue such a program in FY 1979.

The subpanel acknowledged that more individuals receive PhD's in high-energy physics each year than can be absorbed into academic departments. To ensure that those who will pursue alternate careers receive sufficiently broad training in graduate school, the subpanel recommended that NSF and DOE support a modest set of summer institutes. They would be focused on newly developing subfields in pure and applied physics that may produce employment possibilities outside of high-energy physics at industrial and national laboratories. The subpanel felt that participants should have about two to four years of postdoctoral experience and would at these institutes have "an excellent chance to get started in a new field of research in advance of actually locating a new job."

Other members of the subpanel were Thomas L. Neff (MIT), Melvyn J. Shochet (Univ. of Chicago) and Walter D. Wales (Univ. of Pennsylvania). —CBW

Nuclear-science panel

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The subcommittee described the proposed facility at Michigan State as having the potential to "dramatically advance the frontiers of research in heavy-ion nuclear science." Positively charged ions from a Penning ion gauge source in the center of a cyclotron (K = 500 MeV) now being built would be injected into and accelerated by a second cyclotron (K = 800 MeV) (where $E = Kq^2/A$ and E is the energy gained by an ion with charge number q and mass number A). Beam energies would approach 200 MeV/A for ions with $A \sim 40$, and decrease to about 18 MeV/A for uranium ions. At the latter energy the beam intensity for uranium would be 10^{11} particles per second. The subcommittee agreed that the technical feasibility of the project had been established.

The first cyclotron was built with $3.4 million in NSF funds and is expected to produce a beam in late 1979. Michigan State has requested $18.9 million in 1978 dollars over 3½ years to construct the second cyclotron, a substantial addition to the laboratory building for new experimental areas, associated cryogenics, shielding and beam-transport elements, and new experimental equipment.

If funded in FY 1980, availability of beams from the coupled superconducting cyclotrons is expected in early 1984; operating costs thereafter have been estimated at $3.5 million, including support for the research program of the MSU group. The subcommittee stated that this group's past performance (particularly with a 50-MeV cyclotron it designed and built) strongly influenced the panel's evaluation of this new project.

The subcommittee viewed the Brookhaven project as still being in a preliminary stage, with a number of design problems still to be faced. The Brookhaven plan would entail having the double MP tandem accelerator inject ions into a newly constructed superconducting cyclotron (K = 800 MeV). Because Brookhaven is now constructing two other big projects (Isabelle and the synchrotron-radiation source), the subcommittee also questioned whether this laboratory would have sufficient technical manpower to carry out simultaneously this additional project.

Oak Ridge proposed to build a superconducting cyclotron (K = 1200 MeV) that would accelerate heavy-ion beams injected into it by the 25-MV tandem electrostatic accelerator now under construction. The subcommittee felt the design of the cyclotron was still in a preliminary stage. The subcommittee did encourage the laboratory to resubmit its proposal with more detailed design calculations to support the technical feasibility arguments; it also suggested that "ORNL may want to explore the scientific justification and technical feasibility of constructing a device with E/A > 200 MeV/A for light ions and E/A > 100 MeV/A for the heavy ions (A > 150)."

The Rochester proposal called for the injection of a bunched and isotope-separated beam from a negative 3-MV terminal (pressurized ion source) into an upgraded version of their MP tandem. From the tandem the beam would be either used directly for experiments or directed to the central region of a cyclotron (with superconducting magnet coils) to be designed and developed by Henry G. Blosser's group at Michigan State. Besides citing possible manpower problems at Rochester, the subcommittee noted that "If both MSU and Rochester have acceptable injectors and schemes for research operation, it would seem preferable to situate the first booster at the design site, from the standpoint of higher probability of rapid completion and satisfactory operation."

Medium-energy facilities. The subcommittee recommended the construction of a recirculator for MIT's Bates electron linac that would nearly double (from less than 400 MeV to approximately 750 MeV) the beam-energy capability. Four dipole bending magnets and straight drift sections would produce the recirculation, and focussing would result from pole-tip rotation and quadrupole magnet doublets. The project would cost $1.7 million in constant dollars and take a year to complete. The subcommittee declared that the project has great scientific merit, that it is technically feasible and that the Bates staff is competent to carry it out. This type of project was recommended by both the Friedlander and Livingston panels (PHYSICS TODAY, April 1978, page 18).

At the Los Alamos Meson Physics Facility, the subcommittee recommended strongly the construction, at a cost of $2.3 million in constant dollars, of an experiment staging area, which they stated will significantly improve the effectiveness and the productivity of LAMPF and be particularly helpful to outside users of this national facility. The subcommittee also recommended with lower priority the construction of a laboratory–office building for LAMPF, but expressed reservations concerning several aspects of the plans presented.

The upgrading of low-energy accelerators, another Friedlander Panel recommendation, was the subject of three proposals (Argonne, University of Washington and Yale). The subcommittee found Yale's proposal "worthy of consideration" for inclusion in the FY 1980 budget.

The Wright Nuclear Structure Laboratory at Yale proposes to increase the maximum terminal voltage capability (up to 20–22 MV) of its accelerator by converting the 14-MV MP tandem Van de Graaff to a stretched configuration. An improvement to 20 MV that outside consultants told the subcommittee was technologically attainable, would allow the Yale group to extend its research programs to regions of higher energy and ion mass while preserving high-precision characteristics of the available beams and the ability to perform light-ion studies. The project would take 33 months to complete at a cost of $3.8 million in constant dollars, with no major increase in operating budget foreseen.

The subcommittee recommended that consideration of funding for the Argonne project be postponed to FY 1981. The main ATLAS (Argonne Tandem Linear Accelerator System) accelerator would be a superconducting linac consisting of an array of independently phased resonators of the split-ring type grouped in seven accelerator sections. It would provide precision beams of heavy ions for research in the region of projectile energies comparable to nuclear binding energies.

The University of Washington proposed the construction of a room-temperature linac booster to be injected by its existing three-stage tandem accelerator.