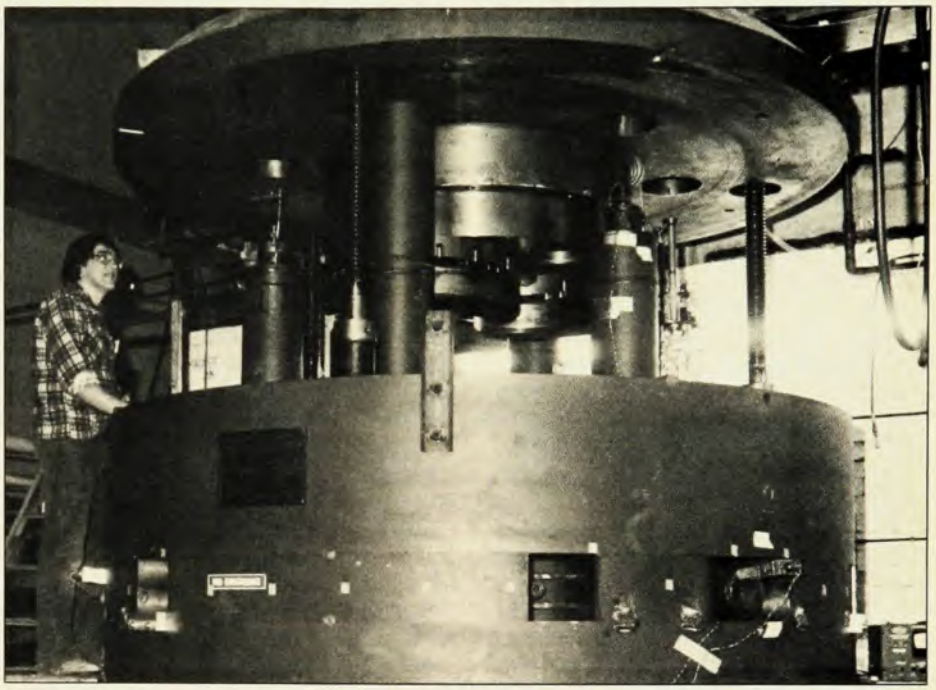
state & society

Nuclear-science panel makes recommendations for FY 1980

The DOE/NSF Nuclear Science Advisory Committee has recommended that construction of a major heavy-ion facility at Michigan State University be given the highest priority in the FY 1980 construction budgets of the agencies. Other high-priority recommendations of the panel include the construction of an energy-doubling electron-beam recirculator at the MIT Bates linear accelerator and the construction of an experiment staging area at LAMPF. The panel found the proposal by Yale University to convert its model-MP tandem electrostatic accelerator into model-STU status to be "worthy of consideration" for the FY 1980 budget. The construction of a laboratory–office building at LAMPF was given the lowest priority in the same budget.

The NUSAC 1978 Facilities Subcommittee, headed by Herman Feshbach (MIT), considered these and five other proposals for FY 1980 construction and prepared a report for NUSAC containing scientific and technical evaluations and a priority ranking. Marcel Bardon, director of NSF's physics division, praised the report as being the first time the nuclear-physics community has gotten together and examined simultaneously the construction proposals presented to NSF and DOE, which provide nearly all of the support in this field.



A heavy-ion facility has been recommended for construction at Michigan State University by the DOE NSF Nuclear Science Advisory Committee. The photo shows the magnet of the smaller of its two coupled superconducting cyclotrons, which have the parameters K = 800 MeV and 500 MeV.

Large heavy-ion facility. Four institutions (Brookhaven, Michigan State, Oak Ridge and the University of Rochester) submitted proposals for a large heavy-ion facility. Construction of such a facility was the "first priority" recommendation from last year's Friedlander Panel on the Future of Nuclear Science.

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NSF panel urges creation of jobs for young physicists

The US needs 400 to 500 additional jobs for young physicists to maintain the vitality and competitiveness of its research effort in physics. So concluded a panel set up last December by NSF's Advisory Committee for Physics. The Subcommittee on Job-Related Issues, under the chairmanship of Peter A. Carruthers (Los Alamos), recommended the creation of several hundred new positions for young research physicists through the establishment of either one of two new programs.

The subcommittee was formed "in view of the widespread concern over the lack of traditional teaching and research opportunities for young physicists and over potential impact of this situation on the long term vitality of the Nation's research effort in Physics." The panel cited several studies by Lee Grodzins (MIT), the American Council of Education and the HEPAP Subpanel on High Energy Physics Manpower (PHYSICS TODAY, this issue, page 70) that document the employment situation in physics.

The subcommittee believed that the assistant-professor population should be between 20 and 25% of those employed in academia. The higher figure is the average over the 1956–76 period and is near the 27% goal desired by physics department chairmen in a poll taken by the American Council on Education. Also, under a uniform model with a flat age distribution (and with normal attrition taken into account), a stable population should have 26% assistant professors, according to the subcommittee. Given a total physics faculty of around 1900 at universities that are members of the Association of American Universities (which do much of the basic physics research in the US), the 25% and 20% levels would mean respectively 475 and 380 assistant professors. Currently, out of a total AAU physics faculty of 1888, only 255, or 13.5%, are assistant professors; the rest have higher rank, including 1261 full professors.

The subcommittee pointed out, how-

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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.

Although the subcommittee declared that such a booster deserves continued study, it nevertheless felt that a number of major technical problems with this concept still remained unresolved.

Other recommendations. In forwarding the facilities subcommittee report with strong endorsement, NUSAC declared that

- appropriate instrumentation would have to be provided at the new facilities;
- a rationale should be developed for deciding the proper mixture of small-scale university-based research and that best done at centralized facilities; and
- the "absolutely vital" role of young scientists in nuclear research should be recognized.

The subcommittee, noting the erosion in technical staff levels at university laboratories over the past decade, strongly recommended that additional funds be made available for accelerator development and instrumentation projects at universities as well as at national laboratories.

Howel G. Pugh, the NSF representative on NUSAC, indicated that the Michigan State project could be accommodated if the budget of NSF's nuclear-science program were given in FY 1980 a 3% increase beyond inflation over the previous year's budget and a supplemental $10-million dollar allocation spread over three years beginning in 1980. (Such increases have been recommended in NSF planning guidelines for nuclear science.) George L. Rogosa, the DOE representative on NUSAC, said that the Bates recirculator, the LAMPF staging area and possibly the Yale project could be constructed if there were a 10% increase beyond inflation in the FY 1980 DOE budget for nuclear physics. —CBW

the physics community

AIP Corporate Associates meet in Columbus, Ohio

The annual meeting of Corporate Associates of the American Institute of Physics will be held at the Battelle Memorial Institute in Columbus, Ohio, on 28–29 September. The meeting brings together an audience of about 150–200 that includes top executives from industry (such as vice presidents for research and research directors), academic leaders (including heads of graduate physics departments), government officials, and officers of some AIP member societies to discuss topics of mutual interest.

The program for the meeting includes talks on policy matters such as long-range Federal planning of research in the US, the politics of energy, risk capital for industry, and the funding of science abroad, as well as talks on new research frontiers and applications of physics. A tour of the Battelle Columbus Laboratories has also been arranged.

Those who have not already received official notice of the meeting can request to attend; advance registration is necessary. Contact Dorothy Lasky, AIP, 335 East 45th Street, New York, N.Y. 10017 for details.

Timothy Ferris wins science-writing award

The author of the book, *The Red Limit: The Search for the Edge of the Universe*, Timothy Ferris, is the winner of the 1978 American Institute of Physics–United States Steel Foundation Science-Writing Award in Physics and Astronomy. Ferris, a free-lance journalist, received the award at a luncheon meeting of the AIP and the Washington Group of the National Association of Science Writers held on 25 April in conjunction with the spring meeting of The American Physical Society in Washington, D.C. The award, consisting of a cash prize of $1500, a Moebius strip and a certificate, was presented to Ferris by H. William Koch, the Director of the AIP.

Ferris is an assistant professor of English at Brooklyn College and has written articles that have appeared in *The New York Times Magazine, Rolling Stone, Esquire, New Times* and *Playboy*.

Graduate survey suggests job-market improvement

The job market for physics doctorate recipients is improving, according to the 1976–77 Graduate Student Survey of the American Institute of Physics' Manpower Statistics Division. This conclusion was supported by 2% drops both in the number of graduates going on to do postdoctoral work and in the number of graduates without job offers.

The annual survey supplies information on various characteristics of the graduate-student group, such as number and distribution, sources of support, employment offers, duration of study, specialities, work activities and salaries. Data on women, minorities and foreign students are also included. The report contains a special section on graduate students in astronomy.

The improvement in the employment picture may be partly due to a decrease in the total number of physics doctorate recipients from 1111 in 1976 to 1051 in 1977. The median monthly starting salary for the doctorate recipients is reported at $1490, up 15% from last year.

Broken down by field of specialization, the report found that a graduate specializing in elementary-particle physics (either theoretical or experimental) was most in demand, while jobs were scarcest for mathematical physicists, with 22% having received no employment at all. The single most populated field of study was solid-state physics.

The students showed a clear preference for experimental subfields, even though the report found that the median number of years of study for experimentalists is 5.4, while theoreticians require only 5.0 years.

The report also indicates a slight increase in the number and percentage of women doctorate recipients over the past year, and notes that the class of 1977 physics doctorate recipients included 22% foreign citizens. The total physics-graduate-student population in academic year 1976–77 fell slightly below ten thousand (to 9991) for the first time since 1960–61.

The number of astronomy doctorates granted increased, although there was a decrease in potentially permanent employment opportunities for them.

Copies of this survey (AIP Publication number R-207.10) may be obtained free from Susanne Ellis, AIP Manpower Statistics Division, 335 East 45th Street, New York, N.Y. 10017.

in brief

The American Astronomical Society will continue its program of Harlow Shapley Visiting Lectureships in Astronomy for 1978–79. Visiting professors over a period of two days are prepared to give public talks and colloquia, advise students on opportunities for advanced study and employment, and discuss teaching and curricular problems with faculty members. Colleges and universities wishing to participate should request applications from H. M. Gurin, Executive Officer, American Astronomical Society, 211 FitzRandolph Road, Princeton, N.J. 08540. Deadline for receipt of applications is 1 September 1978.

Progress in Crystal Growth and Characterization recently began publication, with Brian R. Pamplin (University of Bath) as editor. Subscription inquiries should be sent to Pergamon Press, Ltd., Headington Hill Hall, Oxford 0X3 OBW, England. □