

state & society

ERDA and NSF gain in Fiscal 1977 budget request

Energy-related efforts and basic research form the foundation for the FY 1977 federal research and development budget, in which fusion programs, the Liquid-Metal Fast Breeder Reactor and the Very Large Array radio telescope are a few of the projects that have gained in support. The Positron-Electron Project at Stanford has finally achieved construction funding, but there are losses for nuclear science basic research and in the National Science Foundation's Research Applied to National Needs program.

Federal funding obligations for R&D are increased 11% over the FY 1976 level, up to \$23.5 billion, with an additional \$1.2 billion for facilities. Federally funded physics spending at universities is up by 11% (\$132 million) as well—the extra money is to help reverse the erosion of Federal backing for basic research, which has gone on since 1968.

One unusual item this year is the need for transition-quarter funding, the result of a change in starting date for the government's fiscal year. The period FY 1976 ends with 30 June this year, and FY 1977 begins on 1 October. In most programs slightly more than 25% of the FY 1976 budget is allotted for the intervening three months; a detailed

breakdown is provided, wherever available, in the tables.

(Only the Energy Research and Development Administration and NSF budgets are considered this month. Developments in the funding of other agencies will be taken up in the next issue of PHYSICS TODAY.)

ERDA get PEP. The FY 1977 budget brings good news for high-energy physicists: ERDA is funding the long-anticipated Positron-Electron Project, proposed jointly by the Lawrence Berkeley Laboratory and the Stanford Linear Accelerator Center. A Federal obligation of \$25 million is sought in FY 1977 for PEP, a large positron-electron colliding-beam storage ring expected to cost \$78 million by its completion in the early 1980's, and \$6 million is included among high-energy physics construction outlays under ERDA's Division of Physical Research for the project's design and initial construction. In FY 1976 only \$2.9 million was appropriated for PEP.

Brookhaven's Alternating Gradient Synchrotron and Argonne's Zero Gradient Synchrotron have won modest gains for the two national laboratories. Funds have risen for the Fermi National Accelerator Laboratory, whose \$49.7



KANE

million budget request is 16% higher than in FY 1976. Nonetheless Edwin L. Goldwasser, deputy director of Fermilab, informed us that the lab's activities will be restricted by the allocation, because the facility—still not in full operation—needs close to \$100 million annually to offset inflation and successfully complete its growth period. Fermilab's Energy Doubler-Saver R&D project, for example, is to receive only \$2 million in earmarked funds in FY 1977; \$10 million was the hoped-for figure, and Goldwasser regards the reduced funding as barely sufficient to keep the project alive. Four million dollars can be taken from the lab's operating budget to provide \$6 million for the Doubler-Saver.

Elsewhere in the physical-research budget for ERDA, support is increased above FY 1976 levels for all regions except the nuclear sciences, down nearly \$2 million. According to James S. Kane, Deputy Assistant Administrator for Physical Research and director of the Physical Research Division at ERDA, increasing stress on the agency's non-nuclear undertakings is responsible for the de-emphasis of nuclear-science efforts: "Some of the non-nuclear areas—such as solar and geothermal energy—are new, others like fossil energy have been neglected. Basic research in these is needed, and we expect to put forward a very aggressive research and development program. In what is es-

Table 1. ERDA physical research division R&D

Program	(estimates in millions of dollars)		
	FY 1976	Transition Quarter	FY 1977
High-energy physics total	148.29	37.80	162.90
Fermilab	42.70	11.00	49.70
AGS	28.41	7.10	30.30
ZGS	15.35	3.85	16.60
SLAC	27.40	7.00	29.40
General R&D	34.43	8.85	36.90
Nuclear sciences total	79.12	20.70	77.30
Medium energy	28.16	7.36	28.43
Heavy ion	20.52	5.47	21.68
Low energy	19.15	4.89	16.10
Theory and separated isotopes	11.29	2.98	11.09
Material sciences	43.97	12.30	48.70
Molecular, mathematical and geosciences	44.11	12.00	48.00
Capital equipment	32.18	8.50	34.50
Construction	18.06	6.27	30.40*
Total	365.73	97.57	401.80

*This includes \$6 million for the Positron-Electron Project at Stanford

Table 2. ERDA fusion power R&D

Program	(estimates in millions of dollars)		
	FY 1976	Transition Quarter	FY 1977
Magnetically confined fusion			
Operating budget total	120.00	37.00	156.00
Confinement systems	62.00	19.30	74.60
Development and technology	32.00	9.00	42.90
Applied plasma physics	24.00	7.70	28.50
Reactor project	2.00	1.00	10.00
Laser-induced fusion			
Operating budget total	54.50	18.00	62.30
Neodymium glass laser	14.60	2.60	11.40
CO ₂ laser development	6.60	1.30	8.90
New laser systems	7.60	3.50	8.70
Pellet design, fabrication	7.50	1.60	9.70
Target interaction	13.50	6.10	17.20
Diagnostics development	4.00	1.10	5.40
System studies, applications	0.70	0.30	1.00
Electron-beam-induced fusion	5.00	1.50	7.00
Capital equipment fusion	29.30	5.85	29.80
Construction	15.40	2.34	57.80
Total	224.20	64.69	312.90

essentially a zero-growth budget, the choice was to reduce spending in the nuclear sciences in order to augment it in other areas." Most affected by ERDA's nuclear-science cuts will be the on-line isotope separator facility at the Ames Laboratory in Iowa and the University of Maryland's cyclotron laboratory, both reduced to zero funding in the FY 1977 budget, but all across the US, nuclear-research programs supported by the agency will suffer an average 7.5% decrease in actual dollars.

Fusion. In contrast to the fading fortunes of basic research in the nuclear sciences at ERDA, the agency's more mission-oriented programs show healthy budget increases in FY 1977: In fusion, for example, the magnetic-confinement approach is to be spurred on by a significant 30% increase in operating funds, while laser- and electron-beam-induced implosive fusion (under ERDA's Division of Military Applications) has scored a respectable 14% boost. The budget for fusion power R&D is augmented over FY 1976 levels in nearly every category, with special emphasis on confinement experiments. Beneficiaries include Doublet III at

General Atomic in California (due to commence operation in two years), the Princeton Large Torus, and the Poloidal Diverter Experiment, also at Princeton. Princeton's Tokamak Fusion Test Reactor will have sufficient support in the budget to proceed apace. An architectural-engineering firm for the TFTR has been selected, and Princeton and ERDA are in the process of choosing an industrial contractor for the project.

Fission, too, fares well. The operating budget total for programs connected with the Liquid-Metal Fast Breeder Reactor is \$455 million for the next fiscal year: \$217 million for basic R&D, \$171 million for the Clinch River breeder reactor (ground-breaking is planned there in November), \$52 million for reactor-safety work, and \$15 million for advanced-fuels research. In addition, FY 1977 LMFBR support includes \$120 million for construction, of which \$80 million is assigned for work at the Fast Flux Test Facility, on schedule in Richland, Washington. Thomas Nemzek, director of the reactor development and demonstration division at ERDA, informed us that the agency has initiated—

in cooperation with the Electric Power Research Institute—three 30-month large-plant-design efforts, which will lead to the next major demonstration activity in the LMFBR program.

NSF programs. NSF has requested \$812 million in FY 1977, with an increase of \$80.4 million in overall budget authority aimed primarily at bolstering Federal support of basic research in science. The NSF program for the next fiscal year includes \$624.9 million for basic research, about 19.5% over the FY 1976 level.

The new directorate of mathematical and physical sciences and engineering, one of four created during NSF's most recent reorganization, will gain \$39.9 million for a total of \$233.2 million. Assistant director Edward C. Creutz expressed enthusiasm for the increases in his directorate's means, and he had this to say about the jump in NSF basic research funding: "I think the intent in this budget is to make up for past deficiencies and get basic research back on the track. President Ford and the Office of Management and Budget are showing their recognition that we all depend heavily on science for our long-term needs." He added that NSF is looking into possibilities for building a dedicated facility that would produce synchrotron radiation for user groups exclusively.

One goal for the NSF physics division, which has gained a 24% increase over its FY 1976 budget request, is to relieve the straitened condition of university research. Funds will be provided, for example, to increase usage of existing accelerators and to provide additional support for intermediate-energy facilities that are just beginning operation—such as the Indiana University cyclotron and the Clinton Anderson Meson Physics Facility—and for users' groups and instrumentation. NSF is also considering the establishment of an institute to stimulate interaction among theoretical physicists.

A reliable guide to NSF spending on nuclear science, according to Marcel Bardon, deputy director of the physics division, is the sum of nuclear and in-

continued on page 88

Table 3. NSF physics division

Program	(estimates in millions of dollars)		
	FY 1976	Transition Quarter	FY 1977
Elementary particle	15.84	4.00	20.60
Intermediate energy	7.85	1.20	9.97
Nuclear	9.74	2.80	10.78
Atomic, molecular and plasma	4.73	1.20	5.58
Theoretical	5.10	1.70	6.57
Gravitational	1.54	0.40	1.93
Total	44.80	11.30	55.43

Table 4. NSF materials research division

Program	(estimates in millions of dollars)		
	FY 1976	Transition Quarter	FY 1977
Condensed matter	15.20	4.35	17.70
Metallurgy and materials	11.70	2.50	13.50
National Magnet Laboratory	3.30	0.70	3.80
Materials Research Laboratories	15.20	0	17.90
Synchrotron radiation facilities	1.40	0.45	1.20
Total	46.80	8.00	54.10

Federal budget request

continued from page 86

intermediate-energy physics funding. By this yardstick the budget for nuclear science at the Foundation has increased by \$3.16 million in FY 1977, seemingly off-setting the slump in nuclear funding at ERDA, to yield a net \$1-million increase. Bardon cautions, however, that this would mean only about a 1% rise in the FY 1977 nuclear-science budget overall, and inflation is sure to swallow up this meager increase for a net loss of several percent. It appears unlikely that NSF can rescue the nuclear-science programs slashed by ERDA.

Materials research. An increase of \$7.7 million, 16% over the FY 1976 total, for NSF's materials research division will be used to expand programs in condensed matter science, which includes solid-state physics, quantum liquids and solids, and low-temperature research. Ronald Kagarise, director of the division, pointed out to us the special importance of surface studies in the FY 1977 program, as well as continued efforts to relate superconductivity to the normal-state properties of metals. Helium superfluidity, anisotropic materials, and optical properties of solids are other topics to be studied.

The division also supports the development of new magnet systems, such as a hybrid magnet that will combine superconducting and conventional elements. The materials research laboratories maintained by the division are to receive additional funds, particularly

for studies that deal with the mechanical properties of materials.

The new directorate of astronomical, atmospheric, earth and ocean sciences enjoys close to a 12% increase in funding for the fields in its domain. One beneficiary of the \$25.7-million boost over the previous year's budget is astronomy project support; the 43% increase in this area is to enhance new thrusts in astronomical instrumentation and in observational and theoretical progress toward understanding stellar evolution. Other initiatives include a look at energy-generating processes at galactic centers and a search for stars with planetary systems. The budget request for the National Radio Astronomy Observatory includes an increase for initial operating costs at the Very Large Array project in New Mexico. An allocation of \$13 million should keep VLA construction on schedule.

Money for NSF's RANN program is down 12%, reduced from \$73.6 million in 1976 to \$64.9 million in the FY 1977 budget. The cutback reflects the transfer of responsibility for major RANN efforts to other agencies: studies of energy resources and related environmental effects are to shift to ERDA, fire research to the Department of Commerce.

—FCB

James Kane takes up new post at ERDA

James S. Kane has been appointed Deputy Assistant Administrator for Physical Research in the office of the

Assistant Administrator for Solar, Geothermal and Advanced Energy Systems at ERDA. Kane, who received his doctorate in chemistry from the University of California at Berkeley, will serve concurrently as director of ERDA's Division of Physical Research.

Kane had been Deputy Assistant Administrator for Conservation at ERDA since January 1975, and earlier, following the passage of the 1974 Energy Reorganization Act which created ERDA, he coordinated transitional planning for the agency's non-nuclear aspects. Prior to his government work, Kane was head of the Chemistry and Materials Science Department at Lawrence Livermore Laboratory.

Staff changes at new NSF physics division

The National Science Foundation's Physics Division was recently established during a reorganization as one of five in the Directorate for Mathematical and Physical Sciences and Engineering; Edward Creutz heads the directorate. Staff changes in the division, headed by William E. Wright, have been announced.

(Other divisions and their directors are as follows: Chemistry, Jack B. Kinsinger; Mathematical and Computer Sciences, John R. Pasta; Engineering, Thomas P. Meloy, and Materials Research, Ronald E. Kagarise.)

The Deputy Director for the Physics Division is Marcel Bardon. Howel G. Pugh of the University of Maryland replaces Stuart Meyer as program director for intermediate-energy physics; Meyer returns to Northwestern University. David Balamuth goes back to the University of Pennsylvania, and his position as program officer for nuclear physics is assumed by Michigan State University's Gerard Crawley. The program officer for atomic, molecular, and plasma physics for this year is Stephen J. Smith, from the Joint Institute for Laboratory Astrophysics of the University of Colorado and the National Bureau of Standards. The position of program officer for elementary particle physics will be occupied for an additional year by David Berley of Brookhaven National Laboratory.

Table 5. NSF astronomical, atmospheric, earth and ocean sciences directorate

Astronomy Program	(estimates in millions of dollars)		
	FY 1976	Transition Quarter	FY 1977
Project Support	11.30	2.50	16.20
Arecibo	3.85	1.10	4.00
Kitt Peak	8.40	2.15	8.90
Cerro Tololo	3.45	0.90	3.60
NRAO	21.55	5.85	22.00
Solar Eclipse	0.20	0	0
Subtotal	48.75	12.50	54.70
Atmospheric Program			
Project Support	14.40	2.80	18.70
GARP	4.00	1.00	4.80
Climate Dynamics	2.00	1.00	4.90
NCAR	23.80	5.00	23.00
Subtotal	44.20	9.80	51.40
Earth Program			
Project Support	13.60	4.20	18.80
Ocean Sediment Coring	12.00	3.50	13.40
Subtotal	25.60	7.70	32.20
Ocean Program			
Project Support	15.50	4.60	18.80
IDOE	15.80	3.40	18.50
Oceanographic facilities	16.50	1.00	19.20
Subtotal	47.80	9.00	56.50
Antarctic Research	48.90	13.10	45.00
Arctic Research	4.00	1.30	5.30
Total	219.25	53.40	245.10

in brief

President Ford has nominated physicist John L. McLucas, Secretary of the Air Force since 1973, as head of the Federal Aviation Administration. McLucas had previously served in the State Department and as NATO assistant secretary general for scientific affairs. □