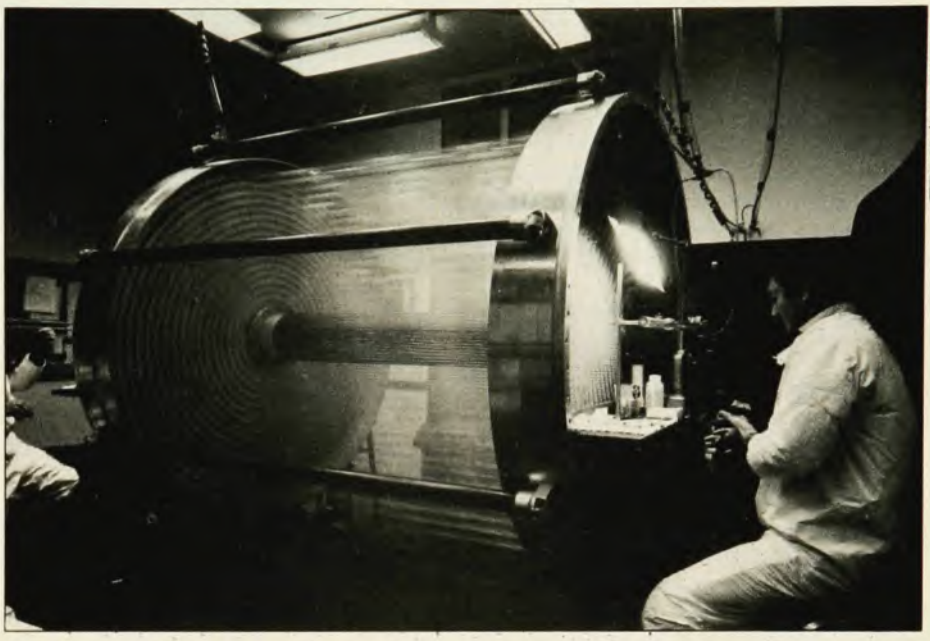
state & society

Budget boosts basic research; NSF gets smaller share

President Jimmy Carter has promised continued government support for basic research in Fiscal Year 1980, despite widespread cutbacks in many other areas of his 1980 budget. Outlays for basic research in 1980 are expected by the Administration to exceed $4.3 billion, or a 12% increase over FY 1979.

According to Frank Press, director of the Office of Science and Technology Policy and the President's Science and Technology Adviser, total Federal R & D outlays to universities in constant 1972 dollars in the 1980 budget are the highest they have ever been in the period 1970–1980. According to Press, the President recognizes that basic research is a "national investment" and acknowledges Federal responsibility for funding basic research. The government's role in development, he said, should be restricted to those high-risk, advanced-technology development projects in which the private sector, which funds about half of the development in the US, cannot participate. Press also stressed the need to make the research money that is budgeted go farther by simplifying grant application forms, speeding up the processing of grant applications and reexamining costly regulations.

The Department of Energy's obligations for basic research will increase 17.3%, to $551 million in FY 1980. The Department of Defense will spend $436 million on basic research, a 16.7% increase, and NASA's budget calls for $630 million for basic research, an 18.8% increase.



RUSS HAMILTON, CORNELL

CLEO magnetic detector under construction at Cornell for CESR electron–positron storage ring, scheduled to operate this May with 5 GeV in each beam. The technicians are installing wires in the drift chamber, to be inserted inside a solenoid. The chamber has about 20 000 wires.

According to James Krumhansl, Assistant Director for Mathematical and Physical Sciences and Engineering at the

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Kohn to head new theory institute at Santa Barbara

After five years of effort, the National Science Foundation is finally going ahead with its Institute for Theoretical Physics after receiving approval from the National Science Board on 19 January. The Institute, which will start operating this September, is to be at the University of California at Santa Barbara. Its director will be Walter Kohn, now professor of physics at the University of California at San Diego.

NSF has committed itself to support the Institute as an experiment for five years, providing roughly $1 million per year (in 1979 dollars) for the support of visiting physicists and for operating expenses.

NSF support for the rest of theoretical physics will not be substantially reduced by the new Institute, according to Marcel Bardon, director of the NSF Physics Division, because it is expected that the funding will be shared among all the programs of the Physics Division and by the condensed-matter sciences section of the Division of Materials Research.

A primary purpose of the Institute, according to Boris Kayser, program director for theoretical physics at NSF, will be to foster research that crosses traditional physics subfield lines. It is hoped that the Institute, by bringing together people with a variety of backgrounds to interact over extended periods of time, will prove especially effective in such work. About 30 physicists, ranging from postdocs to the full-professor level, will be present at any one time. The University of California, Santa Barbara has committed itself to providing three permanent faculty positions (at any level) for long-term Institute members in addition to that of the director.

Kohn is taking a two-year leave from La Jolla to serve as director. He is best known for his work in solid-state theory and has won both the Buckley and Davisson–Germer prizes. In addition, he has also made notable contributions to nuclear and particle theory.

By September 1979 about 20 physicists are expected to be at the Institute, and the full complement of theorists is anticipated by the end of the first academic year.

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In any given year, three different working groups are expected to be functioning. In the period October 1979 to October 1980 they will be:

- A field-theory group, led by Roger Dashen (Institute for Advanced Study) and Douglas Scalapino (Santa Barbara). The group will study physical systems in condensed-matter physics and related systems in high-energy physics.
- A quantum-gravity group led by Bryce De Witt (University of Texas, Austin). The program, which will begin in January, will include study of particle production in the early universe and related phenomena that occur in strong gravitational fields.
- A group on nuclear astrophysics, led by Gerald Brown (State University of New York at Stony Brook and Niels Bohr Institute, Copenhagen). The emphasis of this group will be on the equation of state for hot nuclear matter and neutrino trapping in supernova cores. This group will be at maximum strength during February and March 1980.

Another part of the Institute's program will be short-term visits by experimenters.

Although much of the first-year program of the Institute was planned during the period in which the proposal was under review, there are still some positions to be filled for the first year, with the possibility of some financial support. Most of the Institute's senior members will be on leave from their home university, typically for half a year to two years. Junior members will be appointed for periods from 2–5 years. Persons desiring information about the application procedure should write immediately to Walter Kohn, Director, Institute for Theoretical Physics, University of California, Santa Barbara, Calif. 93106.

The University is providing the Institute with the top floor of Ellison Hall, which has 9000 square feet of space for offices and conference rooms. The site is near the science library, the computer center and the physics building and overlooks the Pacific Ocean.

The Santa Barbara proposal was submitted by Scalapino, James B. Hartle, Raymond F. Sawyer and Robert L. Sugar, who became known in the NSF as the "Gang of Four."

The Institute will have an advisory board, whose executive committee will assist the director in setting the scientific direction for the Institute and help to attract leading physicists to it. In the list of names of board members given below, those with asterisks are on the executive committee:

Gordon Baym (University of Illinois, Urbana)
George Bertsch (Michigan State University)
* Richard Blankenbecler (SLAC)
* S. Chandrasekhar (University of Chicago)

UCSD

KOHN

John Michael Cornwall (UCLA)
* Roger Dashen (Institute for Advanced Study)
Douglas Eardley (Yale University)
Herman Feshbach (MIT)
Murray Gell-Mann (Caltech)
* James Hartle (Santa Barbara)
Leo P. Kadanoff (University of Chicago)
Paul Martin (Harvard University)
Michael Nauenberg (University of California, Santa Cruz)
David Pines (University of Illinois)
Malvin Ruderman (Columbia University)
* J. Robert Schrieffer (University of Pennsylvania)
Kip Thorne (Caltech)

Background. After discussions in the NSF physics advisory committee during 1974 and 1975, NSF publicly announced its concept of a theory institute in 1976 (PHYSICS TODAY, September 1976, page 80), and later asked for formal proposals. After considerable maneuvering in the academic community, 15 proposals were submitted. Although many physicists initially greeted the concept of the Institute with enthusiasm, some were enthusiastically opposed, as were some members of the National Science Board. But since then, many of the opponents have endorsed the Institute wholeheartedly.

Early last year the top choice of the panel of reviewers was Santa Barbara from among the five finalists. In May, when the question of the directorship for the Institute was still unresolved, the Science Board deferred action. Once Kohn agreed to serve as director, the Board gave its approval.

Those who served on the NSF review panel were Stephen Adler (Institute for Advanced Study), John Bahcall (Institute for Advanced Study), Eugene Commins (University of California, Berkeley), Robert Dicke (Princeton University), Martin Einhorn (University of Michigan), Joseph Macek (University of Nebraska), John Negele (MIT), Raymond Orbach (UCLA), Eugene Parker (University of Chicago), Martin Rees (Institute for Theoretical Astronomy, University of Cambridge), James Vary (Iowa State University), Chia-Wei Woo (Northwestern University) and Chen-Ning Yang (Stony Brook). —GBL

Budget boosts basic research

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National Science Foundation, the increases proposed for basic research in the "mission agencies, such as DOD and DOE, are "substantially larger" than that proposed for NSF. He told PHYSICS TODAY that this reflected a Presidential desire to reestablish the mission agencies as supporters of basic research. "The mission agencies have, over the past decade, backed away from the support of basic research," Krumhansl said. "There is an overt effort to reestablish and to support, at much more than the cost-of-living increase, areas of basic research that are important to those agencies." Krumhansl explained what this means for physics in FY 1980 at the NSF: "NSF is going to have to play the role of being very selective in construction commitments and concentrate mainly on the support, particularly in particle and nuclear physics, of user-group experiments . . . on gravitational physics, on theoretical physics, and those areas of physics which fall between the cracks of the mission agencies." A description of the FY 1980 budgets of the DOE, DOD, and NASA will appear in subsequent issues of PHYSICS TODAY.

The NSF total budget request for FY 1980 is $1.006 billion—the first time the NSF budget has exceeded one billion dollars. NSF obligations for R&D will increase from $819 million in 1979 to $910 million in 1980, an increase of 11%. In addition, $24 million will be obligated for research facilities in 1980. Funding for basic research programs will increase from $741 million to $828 million, or about 12%. When this figure is compared with the Foundation's overall increase of 8.4%, it is clear, Krumhansl told us, that applied research is not emphasized in the 1980 budget to the degree that basic studies are.

Although the total budget for Krumhansl's directorate is increasing by 10.5% (see table), physics will receive relatively little of that increase. Whereas the budgets for chemistry and engineering are to increase by 17.1% and 14.2%, respectively, the budget for physics will increase by only 3.2%.

Krumhansl said that the large increase in engineering reflects a new microstructure initiative, and that the chemistry increase reflects an increased emphasis on

laser chemistry and metallo-organic molecules and a perception that the cutoff level of chemistry has been "too tight" in the past.

Physics. According to Krumhansl, the low increase for physics can be largely attributed to the last-minute transfer of funds for construction of Michigan State University's superconducting cyclotron, MSU II, to the DOE. By the end of FY 1979, NSF will have completed the research and development phase of the Michigan cyclotron, a heavy-ion accelerator that was selected by the DOE/NSF Nuclear-Science Advisory Committee as the highest priority construction project of 1980 (see PHYSICS TODAY, August 1978, page 69). The actual construction of the cyclotron, originally also to be funded through NSF, will now be carried out by DOE. This transfer left a gap in the NSF budget, Krumhansl told us. MSU II would have added about $6 million per year over a four-year period to NSF's budget. NSF will plan to assume operational responsibility for the cyclotron on completion.

The first phase of construction of the Cornell Electron Storage Ring will be completed in 1979. The drop in funding for this activity, from $8.2 million in 1979 to $6.3 million in 1980, reflects the fact that large construction costs for CESR are included in the 1979 budget and not in the 1980 budget. By May of 1979 CESR will be operational for experiments slightly above 5 GeV on 5 GeV. Completion to the full 8-GeV design specifications is being postponed due to funding limitations, according to Marcel Bardon, director of NSF's Physics Division. However, he said, CESR will be able to search for the upsilon double prime (see PHYSICS TODAY, January 1979, page 17).

Although the total budget increase for physics at NSF is only 3.2%, Krumhansl told us that as major equipment expenditures decline there will be an increase in the fraction of the total budget going to programs, including an Institute for Theoretical Physics (see page 125).

The FY 1980 budget also contains a major new initiative in microstructure fabrication, which will involve work on topics such as submicron devices, integrated circuits and systems, synchrotron-radiation lithography and metal cluster chemistry. $3.8 million has been budgeted for this activity directly, mostly under the divisions of chemistry, computer science, solid-state physics, materials science and engineering. Indirect funding is expected to make an additional $6 million available for the microstructure activity, which will be controlled by an interdivisional steering committee.

Another addition to the 1980 budget is $2 million for "totally dedicated" operation of the Stanford synchrotron radiation laboratory at SPEAR, an e^+e^- storage ring. According to Krumhansl, the radiation lab has in the past been operating in a "parasitic mode, subject to whatever energy range was important to the main users, the particle physicists. Now we have a budget item so that we can fully dedicate approximately half of the operation time of SPEAR."

The materials-research budget has risen 10.6% to $70.4 million. This includes $3.8 million for increased emphasis on surfaces and interfaces, quantum and metallo-organic solids and materials processing. Materials research on transport phenomena in metals, polymers and molecular solids, and on the defect properties of materials will decrease by $1.8 million to a FY 1980 level of $2.7 million. The 1980 budget also calls for a decreased level of research at the Materials Research Laboratories because more money will be spent improving instrumentation.

As in the last two budgets, instrumentation will receive strong support in 1980. According to Richard Atkinson, director of NSF, "There is no question that [the US] has been lagging behind [many European countries] in equipping our laboratories." He said that the ratio of the percentage of the US research budget that goes into instrumentation compared with that for countries such as West Germany, France and UK is about 1:3.

For this reason, he said, the 1980 budget contains a major thrust for improving instrumentation. In 1979, $54.4 million was budgeted for general research instrumentation and equipment. The figure for 1980 is $81.6 million, or 50% higher. In the Mathematical and Physical Sciences and Engineering Directorate, a major component of the drive for improving instrumentation and equipment will be the continuation of the Regional Instrumentation Facilities program (see PHYSICS TODAY, February, page 20). In FY 1978, the program was initiated with about $3.5 million being spent to open six regional instrumentation facilities. In FY 1979, $4.5 million will be spent, both to provide sustaining support for the exist-

NSF physics-related research

	(estimates in millions of dollars) FY 1979		FY 1980	
MATHEMATICAL AND PHYSICAL SCIENCES AND ENGINEERING DIRECTORATE				
Mathematical sciences		22.8		25.5
Computer research		17.4		19.3
Physics				
Elementary particle	23.9		23.5	
Intermediate energy	10.9		11.5	
Nuclear	11.9		12.4	
Atomic, molecular and plasma	6.8		7.3	
Theoretical	6.9		7.4	
Gravitational	2.6		2.9	
Total physics		63.0		65.0
Chemistry		45.6		53.4
Engineering		47.6		54.3
Materials research				
Solid-state physics	7.6		8.2	
Solid-state chemistry	4.3		4.7	
Low-temperature physics	4.4		4.7	
Condensed-matter theory	4.3		4.6	
Metallurgy	7.5		8.1	
Ceramics	3.4		3.7	
Polymers	3.9		4.3	
Materials research laboratories	18.1		19.6	
National Magnet Laboratory	3.9		4.3	
Synchrotron radiation	6.0		8.0	
Small-angle neutron scattering	0.3		0.3	
Total materials research		63.6		70.4
Regional instrumentation facilities		4.0		3.8
Industry/university cooperative research		3.7		4.0
Total		267.7		295.7
ASTRONOMICAL, ATMOSPHERIC, EARTH AND OCEAN SCIENCES DIRECTORATE				
Astronomical sciences				
National astronomy centers	42.7		40.1	
Research project support	16.6		18.5	
Total astronomical sciences		59.3		58.6
Atmospheric sciences		58.5		65.8
Earth sciences		36.7		44.2
Ocean sciences		63.0		68.7
Arctic research program		6.0		6.0
Total		223.5		243.3

ing six facilities and to set up between four and six additional facilities. $4.8 million is budgeted throughout NSF for this program in 1980. The amount of money budgeted within his directorate for RIF's is down 5% from last year.

Astronomy. There will be an added emphasis in 1980 on improving instrumentation at the five national astronomy centers within the Astronomical, Atmospheric, Earth and Ocean Sciences Directorate at NSF, according to John Slaughter, head of that directorate. Plans for major new instruments are being developed at two of the national centers. NSF will budget $200 000 for exploring next generation optical telescope developments at the Kitt Peak National Observatory (PHYSICS TODAY, October 1978, page 19). Kitt Peak will augment this amount with funds from its operating budget. The National Radio Astronomy Observatory will continue to plan for a new 25-meter-diameter millimeter-wave telescope. Major funding for this project is expected to begin in FY 1981 or later. At Cerro Tololo Interamerican Observatory, $200 000 is budgeted for instrumentation for the 4-meter optical telescope. Several new minicomputers costing $300 000 will be installed at the telescopes on Kitt Peak for use by visiting scientists.

The sum of $5.3 million has been budgeted for the completion of the Very Large Array radio telescope at Socorro, New Mexico in FY 1980. In addition, $3.4 million is slated for operation of the VLA in 1980 as more of the antennas come into operation. Fifteen of the planned 27 antennas are currently operational there, and by the third quarter of FY 1980, 20 antennas will be operating.

At universities receiving astronomy research grants, there will be more emphasis on detectors and spectrometers for existing telescopes ($260 000) and very-long-baseline interferometry ($150 000).

The budget for the National Radio Astronomy Observatory is $18 million. This includes construction and operation costs for the VLA totalling $8.7 million. The other observatories are being funded as follows: Kitt Peak National Observatory, $10.6 million; National Astronomy and Ionospheric Center (Arecibo, P.R.), $5 million; Cerro Tololo Interamerican Observatory (La Serena, Chile), $4.9 million; Sacramento Peak Observatory, $1.7 million. —MEJ

the physics community

AAPM chooses Waggener as president-elect

The American Association of Physicists in Medicine has chosen Robert G. Waggener as its president-elect for 1979. Waggener is a professor of radiology in the division of medical physics at The University of Texas Health Science Center, San Antonio. He succeeds Bengt E. Bjarngard (associate professor of radiation therapy, Harvard Medical School), who became president on 1 January.

AAPM's new secretary is Arnold Feldman, a radiological physicist at

WAGGENER

Methodist Medical Center of Illinois in Peoria. Ann L. Forsaith has been re-elected to a second term as treasurer. She is manager of the medical physics section of the department of medical physics and engineering at William Beaumont Hospital, Royal Oak, Michigan.

Waggener received his PhD in biophysics from the University of Texas Graduate School of Biomedical Sciences, Houston, in 1967. He served as a postdoctoral fellow in physics at the M.D. Anderson Hospital and Tumor Institute, Houston, during 1967 and 1968. He became professor at The University of Texas Health Science Center in 1972. He is the co-editor of the *Handbook of Medical Physics* and has been a member of AAPM's board of directors since 1974.

Einstein exhibit and catalog of photos ready

A traveling exhibit and a catalog of photographs, both dealing with Albert Einstein, have been prepared by the AIP Center for History of Physics. The exhibit emphasizes Einstein's contributions to science and also illustrates his cultural and intellectual concerns. It consists of eighteen 2′ × 4′ foam-core panels, each with photographs, reproductions of documents and captions. The Center produced the exhibit for the Institute for Advanced Study in Princeton under a grant from the National Endowment for the Humanities. There are 65 copies of the exhibit available for distribution during this, the Einstein Centennial Year (March 1979–March 1980), to museums, universities and other appropriate facilities.

Images of Einstein: A Catalog contains miniature reproductions of over 600 photographs of Einstein. It also includes information on film clips and some photographs of significant predecessors and colleagues of Einstein.

For a copy of the catalog, send $10 (for individuals) or $15 (for organizations) to Einstein Catalog, Center for History of Physics, AIP, 335 East 45th Street, New York, N.Y. 10017. The catalog contains a $5 credit coupon for orders of photographs that are available from the Center. Inquiries concerning the exhibit can also be sent to the Center.

AIP holds workshops to guide long-range plans

The dissemination of physics information to scientists and to the general public was the focus of two workshops held by the American Institute of Physics last October. The workshops were preparation for subsequent AIP Executive Committee discussions of long-range planning of AIP's activities. Participants included AIP staff members and committee chairmen and several Executive Committee members.

The workshops focussed on three areas that AIP Governing Board chairman Philip M. Morse has identified as important in AIP's current and future activities. These are "the publishing of scientific information for physicists, other scientists and engineers; the development of secondary information services that would improve the transfer of this technical and scientific information, especially to the larger science and engineering community as a whole; and other, primarily non-publishing activities which create an informed lay public, work to assure continued high standards of education for non-scientists and physicists alike and which ensure an ample recruitment of talent."

H. William Koch, director of AIP, noted that "while no new mechanisms for support and no major new directions were identified at the workshops, opportunities exist for expansion within current activities along an evolutionary path." He welcomes further comment on AIP's future programs from the physics community and the interested public. □