together an exhibit for last February's Energy Technology Conference and Exhibition. He chose three AEP projects that he felt were ready to be brought to the attention of the technological community: a liquid membrane for oxygen enrichment of air, a fully stationary solar collector that uses newly developed principles of non-imaging optics, and the Ford sodium heat engine. As a result of that exhibition, negotiations for further support of all three of these concepts is underway, said Gajewski.

Taking chances. Because the projects that AEP supports inevitably involve a high degree of risk, Gajewski usually looks for a high potential payoff in the projects he chooses to fund. For example, AEP supports several projects exploring entirely new, untried approaches to heat-to-electricity conversion. They are all based on newly discovered properties of solid materials such as ionic conductors, solid electrolytes and ferroelectrics. If even one of these schemes leads to a technologically viable method of direct conversion, it could revolutionize the present-day approach to electricity generation.

For some concepts, however, the exact nature of the payoff is difficult to establish. For example, AEP has funded four projects in new sources of short-wavelength electromagnetic radiation. One is an attempt by Raymond Elton at the Naval Research Lab to generate an extended-ion source for short-wavelength lasers. The second is Charles Rhodes's experimental determination (at the University of Illinois, Chicago Circle) of the feasibility of generating high-brightness soft x rays by nonlinear optical processes involving both direct excitation and wave mixing. The third project, by Szymon Suckewer (Princeton Plasma Physics Lab), is an investigation of an x-ray laser based on a magnetically confined plasma column that is heated by a powerful laser and cools rapidly by radiation losses. The fourth project, by Raymond Dukart (Physics International), uses an imploding plasma source to produce laser transitions in the soft x-ray region. The first three of these projects were discussed at a session on short-wavelength lasers during the spring APS meeting last April. "To try to estimate, either in dollars and cents or in qualitative terms, what the payoff of these projects might be would be very difficult," says Gajewski. "But past experience indicates that new sources of electromagnetic radiation turn out to be very useful, so we support this work."

Sometimes the economic practicality of a concept is considered in AEP's decision making process, and sometimes it is dispensed with, says Gajewski. For example, in making a recent decision to support work on quartz-catalyzed fusion, economics was not a consideration, Gajewski says, because the concept is at too early a stage of technical definition. George Zweig at Los Alamos and Charles Hendricks at Livermore will attempt to isolate quarks on liquid droplets formed by the ink-jet technique and then use them as "nuclei" in "atoms" with two deuterons playing the role of "electrons." The Bohr radius for such "atoms" is so small that the two deuterons would fuse almost instantaneously, leaving the "nucleus" free to capture the next deuteron pair.

Budget. AEP is a relatively young program. Its first fiscal year of operation was 1978. Since then, it has funded over 50 projects with its modest but steadily growing budget. The AEP budget has risen slightly faster than the overall budget of DOE since 1978, an indication that AEP's importance to DOE's overall research program has not been overlooked. The FY 1982 budget for AEP is \$7.6 million. If the presidential budget request for 1983 is approved by Congress, the office will have \$8.6 million to work with. Although this budget is not large (in fact, AEP is one of the smallest divisions within the Office of Basic Energy Sciences), AEP does have one fiscal advantage, which is that each year roughly one-third of its research projects are completed, freeing up that fraction of the budget for new initiatives. "Normally, a program of this size does not have that much freedom to start new projects," Gajewski says.

It was originally intended that the program would fund about 20 new projects each year. Budget realities being what they are, however, AEP has been able to initiate only about a dozen projects per year. Of these, a relatively large fraction (almost 30%) have been proposals from small businesses, though the source of a proposal is not considered in the decision-making process, according to Gajewski.

The projects AEP supports generally cluster into seven "areas of concentration," according to Gajewski. They are:

- ▶ radically new approaches to fusion (with emphasis on the radical)
- ▶ new sources of electromagnetic radiation
- ▶ direct heat-to-electricity conversion
- ▶ efficient heat engines
- ▶ new methods of particle acceleration
- ▶ advanced solar collectors
- ▶ exotic photovoltaic materials and processes

However, AEP supports many projects that do not fall into any of these categories. "We will explore any novel, promising, technically sound idea," Gajewski says.

Physicists will soon have the opportunity to learn more about some of the concepts being pursued with AEP money. The APS Committee on Applications in Physics has decided to hold a symposium on Advanced Energy Projects at the March 1983 meeting. Speakers will include: Thomas Hunt (Ford) on the sodium heat engine; Harold Lonsdale (Bend Research, Inc) on the enrichment of air with oxygen; Roland Winston (University of Chicago) on high-performance solar energy collection; Ronald Sager (S.H.E. Corporation) on cryocooler applications, and Derek Tidman or Shyke Goldstein (GT-Devices) on mass accelerators as drivers for impact fusion.

More information about the AEP program can be obtained from Ryszard Gajewski, Director, Division of Advanced Energy Projects, Office of Basic Energy Sciences, ER-16, GTN, Department of Energy, Washington, D.C. 20545; the telephone number is (301) 353-5995. The office accepts research proposals throughout the year; so there is no application deadline. According to Gajewski, "good, strong proposals have an excellent chance of being funded."

—MICHAEL JACOBS

DOD university research on the rise

In a time of ever-tightening fiscal constraints, the FY 1983 budget request for Department of Defense research, development, testing and evaluation would represent an almost startling growth of 21.3% over last year. Simultaneously, R&D budgets for other agencies are being cut or barely held to stable levels against inflation (PHYSICS TODAY, April, page 55; May, page 77). According to Leo Young, who replaced George Gamota as director of Research and Technical Information at the Defense Department, the funds available for university research will increase by an even larger percentage. Young told us, "Approximately 45% of the RDT&E budget in Defense is spent at universities; in-house DOD labs get about 35%, and the balance goes to industrial labs doing defense contract research. Since we anticipate zero growth for in-house expenses, any increase in the previous year's research budget that is approved by Congress will be spent for university research."

Young has master's degrees in both mathematics and physics from Cambridge University and a PhD in electrical engineering from Johns Hopkins University (in 1958). From 1960 to 1973 he was at Stanford Research Institute. He then went to the Naval Research Laboratory, where he was asso-

YOUNG

ciate superintendent of the electronics division until joining the Defense Department last December.

The entire Federal budget request for FY 1983 was about 4% above FY 1982 levels, with the Federal investment in R&D rising approximately 10%. Of this increase in R&D obligations, however, 94% (or almost $4.2 billion) was slated for the Defense Department. Much more than half of this money would be related to weapons development. The increase in Defense R&D represents a shift in priorities for the Federal investment in R&D: In FY 1982 the Defense Department represented 38% of all R&D funding; in the FY 1983 request it represents 57%, with concurrent cuts in the other agencies that perform R&D.

Within the FY 1983 Defense Department budget, $24.3 billion was requested for RDT&E. Of this amount, only $828 million, up from $696 million appropriated in FY 1982, is for basic research and about $400 million is for research at universities. Overall funds for basic research would increase 19%, while funds for physics research would increase from $87 million in FY 1982 to $100 million in FY 1983, or approximately 15%.

Most of the RDT&E funds are slated to be spent on testing and development of large new weapons systems, such as accelerated development of alternatives for the MX basing modes, developing and testing the B-1 bomber, and further work on the advanced medium-range air-to-air missile concept.

Ailing university research budgets would receive a boost from the Defense budget increases in several ways. Each of the armed services would set aside $10 million per year over the next five years to support much-needed improvements in university research instrumentation. This program is a new initiative within the FY 1983 budget in response, at least in part, to a Defense Science Board study, "University Responsiveness to National Security Requirements," published in January. Young says that details about how the program will be administered by the Services have not yet been worked out, but should be ready this month. Inquiries should be directed to the Office of Naval Research, where proposals will be handled.

A graduate fellowship program in the Defense Department is at least partially in place. Each of the services is in the process of setting up programs that Young estimates would award about 100 fellowships in FY 1983. Under most of these programs, students would receive a stipend of $12 000 per year and the university would receive $8000 per year to cover fees and expenses; each fellowship would run for three years. Young said, "The exciting thing is that DOD is recognizing the importance of quality over quantity. This more generous support should insure that there is more money for the best students." —JC

Samios is chosen as Brookhaven director

High-energy physicist Nicholas P. Samios is the new director of Brookhaven National Laboratory. The Board of Trustees for AUI (a nonprofit organization that operates Brookhaven for the Department of Energy) conducted a formal search for a director, following the resignation effective last December of George Vineyard (PHYSICS TODAY, October 1981, page 56). Samios, who has been serving as the acting director since 1 January, assumed the directorship in May.

Commenting on his plans for Brookhaven, Samios said, "My specific goal is to keep alive the construction of a high energy collider to be finished in the late 80s." The Isabelle project, which has been beset with both technical and management problems (PHYSICS TODAY, April 1981, page 17), received a strong endorsement from the HEPAP subpanel headed by George Trilling of Berkeley (PHYSICS TODAY, January 1982, page 51). The Trilling panel, while recommending that Isabelle be completed during this decade, noted that DOE would have to receive a minimum of $440 million per year to accomplish this goal. The panel said "If support at this level cannot be made available in time for Isabelle completion within this decade, the Isabelle project cannot be continued." The FY 1983 budget request of $429 million for DOE is now being acted on by Congress, and includes no construction funds for Isabelle and $23 million for magnet R&D (PHYSICS TODAY, April 1982, page 20).

Samios received his PhD from Columbia University in 1957 and then taught in the physics department there until 1959. He then joined the physics department at Brookhaven. He has served as leader of the Nuclear Interactions Group (1965–1975), as chairman of the physics department (1975–1981), and as Deputy for High Energy and Nuclear Physics from February 1981 until being named acting director of the lab. Samios is perhaps best known for his discoveries of the Ω^- particle and the first charmed baryon.

Bautz heads NSF astronomy division

Laura Bautz, who had been serving as the acting director of the Division of Astronomical Sciences in NSF, was appointed to the directorship on a permanent basis effective in April. The Division of Astronomical Sciences is part of the Astronomical, Atmospheric, Earth and Ocean Sciences Directorate and is responsible for administering the national astronomical observatories operated by NSF and research programs in astronomy.

After obtaining her PhD in astronomy from the University of Wisconsin in Madison in 1967, Bautz joined the faculty at Northwestern University. She taught astronomy there until 1975, when she came to Washington. She has been with the Physics Division at NSF for about six years, serving as deputy director of that division for the two and a half years prior to being named acting director of the Division of Astronomical Sciences. Throughout

BAUTZ