

letters

most critical needs of their countries and to prepare lists of approved items. After some trial and error, procedures evolved for processing the requests and making appropriate payments, and the operation is now proceeding smoothly. Most difficulties have been associated with equipment purchases, including arranging for vendors to ship goods directly to Latin America and understanding customs procedures in the receiving countries. The services of Fermilab's purchasing and accounting departments—administrative and secretarial assistance, computerized record keeping and telephone calls—are provided to the grant at no cost. To date, almost two-thirds of the funds have been disbursed in the following proportions: journal subscriptions, 25%; page charges, 15%; equipment, 45%; per diem, 15%.

Much has been learned from administering this grant over the past year; perhaps the most obvious point is that distributing \$300 000 in a fair, and auditable, way involves a nonnegligible amount of effort! However, the feedback from the recipient countries convinces us that this effort has been extremely worthwhile, enabling their physics institutions to receive equipment and journals that they could not otherwise obtain, due to the unavailability of foreign currency. Such items are crucial if these researchers are to continue to produce high-quality physics. Because other people may be involved in, or contemplating, activities of a nature similar to those described here, the knowledge we have gained could be of wider interest. More information on our experiences so far is available from me at Fermilab, P.O. Box 500, Batavia, IL 60510.

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Forum on Physics and Society

It has been several years since the Forum on Physics and Society of the The American Physical Society has made a progress report on its activities to the physics community. As the past, present and future chairs of the Forum, we would like to inform you of our current activities and guidelines.

The Forum on Physics and Society was formed in 1971 in response to the growing interest among APS members in the broad issues of physics and society. Membership in the Forum is open to all APS members; today the Forum's membership of 4000 ties it for

second place among APS divisions.

The Forum's primary role is educational. From the beginning its most visible activities have been the sessions at APS meetings. Several Forum-sponsored sessions are held at almost every national meeting. Forum sessions are often held in the evenings, and standing-room-only crowds are not unusual. In recent years weapons policy and arms control have been the single area of greatest Forum activity. Sessions have described and debated such topics as the MX missile, the Comprehensive Test Ban Treaty, the SALT Treaty and new weapons systems. Other areas of Forum interest include energy, environmental issues, human rights and government restriction of scientific exchanges. Several sessions have been cosponsored with the AAPT and the APS committees on education, on opportunities in physics and on international freedom of scientists. The Forum also publishes a newsletter, *Physics and Society*, which is distributed to all Forum members and many physics libraries; the editor, John Dowling, will consider timely, brief articles for publication. One early Forum project was the highly successful Science Congressional Fellow Program, begun jointly by APS and AAAS and now expanded to 20 professional societies. The Forum also played an active part in organizing the well-known APS technical study on efficient uses of energy in 1974.

The Forum does not shrink from addressing topics that are controversial or that have a political component. In these instances it strives to ensure that the presentations span the spectrum of views on the issues. Last year the Forum sponsored nine sessions at APS meetings. Two dealt with the Strategic Defense Initiative. Key individuals presented a broad spectrum of views of the program. Among the speakers were some of the leaders from the Fletcher report, which launched SDI: Edward Gerry (Shafer Associates), chairman of the Systems Concepts Panel; Walter Sooy (Lawrence Livermore National Laboratory), member of the Countermeasures and Tactics Panel; and Gerold Yonas (SDI, DOD), chairman of the Directed Energy Weapons Panel and now chief science adviser to General James A. Abrahamson, the director of SDI. Those who spoke against "Star Wars" were Kurt Gottfried (Cornell), codirector of the Union of Concerned Scientists study on space-based missile defense; Kosta Tsipis, codirector of the Program for Science and Technology for International Security at MIT and an early author on space-based weapons; and Spurgeon Keeny, former deputy director of the Arms Control and Disarmament Agency and currently executive director of

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the Arms Control Association. Three other sessions last year centered around National Academy of Sciences reports on nuclear winter, acid rain and the electromagnetic pulse. These sessions were good examples of the Forum's policy of running balanced presentations on important issues with a strong science component. This year there will be three additional sessions on SDI at the San Diego and Washington meetings, as well as a session on energy risk analysis (Atlanta meeting), a visit to the Nevada test site (Las Vegas meeting) and a session on precision-guided conventional weapons (Washington meeting). At the Washington meeting, the Forum will also present its annual awards.

The Forum sponsors topical conferences and short courses on timely subjects. A two-day course on energy conservation was held after last year's Washington APS meeting. This course reviewed progress on energy-conservation technologies since the oil embargo of 1973-74. Two short courses on the arms race were held: in San Francisco in 1982 and in Baltimore in 1983. Two conferences on graduate physics education were held at Pennsylvania State University in the mid-1970s, back when the employment prospects for young PhDs were very bleak. The materials on energy conservation, on the arms race and on graduate education have been published in the AIP Conference Series. In addition, the proceedings of Forum sessions on nuclear proliferation, the arms race and acid rain have been published as AAPT booklets (see January, page 60).

For the past decade, the Forum has presented two annual awards. The Szilard Award recognizes outstanding accomplishment by a physicist in promoting the use of physics for the benefit of society. Recent winners include two groups—Paul Crutzen and John Birks, and Richard Turco, Brian Toon, Thomas Ackerman, Jim Pollack and Carl Sagan—for work on nuclear winter (1985), Kosta Tsipis (1984), Andrei Sakharov (1983), Wolfgang Panofsky (1982), Hans Bethe and Henry Kendall (1981) and Sidney Drell (1980). The Forum Award recognizes accomplishment in promoting public understanding of issues involving physics and society. Recent winners include Mike Casper (1984), the *Bulletin of the Atomic Scientists* (1983), Philip Morrison (1982) and William Shurcliff (1980). Nominations for these awards can be made by any member of APS.

As Forum membership has expanded, the Forum has developed the capability to undertake special studies. These will provide an opportunity for

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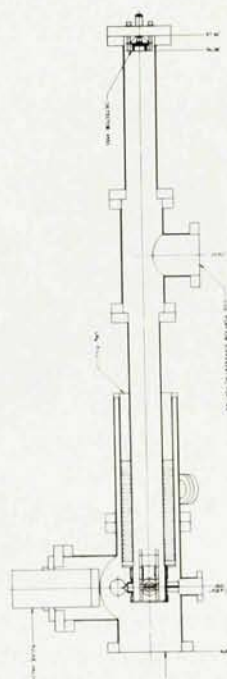
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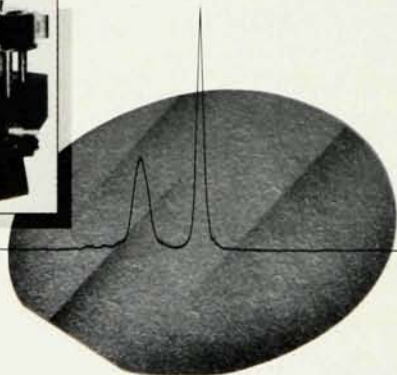
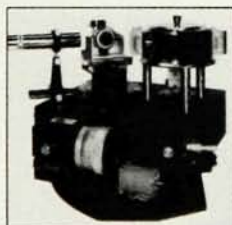
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APS members both to educate themselves and to contribute to public understanding of problems having significant physics content. The first Forum study, on civil defense, was chaired by John Dowling, and it is now approaching completion. A second study, which will analyze the viability of the Midgetman missile as a "stabilizing" technology, is in the planning stage.

During its first decade the Forum on Physics and Society has evolved and matured. Today it plays an important role within The American Physical Society. Robert R. Wilson, the current APS president, recognized this role explicitly in the letter he included with the APS billing notices. "Today," he wrote, "through POPA [the Panel on Public Affairs] and the Forum, many ... [social] issues are faced by APS." As our society must make ever more decisions with strong physics components, new opportunities for the Forum to contribute are emerging. Growing membership and enthusiasm are making it possible for the Forum to rise to these challenges.

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12/85 *University of California at Davis*

Comfortable physics

The problems of physical-science education in the nation may well have their origin in the elementary schools, where teachers communicate their confusion and anxiety and children are "turned off" to physical science in the early grades. A required "comfortable-physics" course for prospective elementary-school teachers and a comfortable-physics staff-development program for in-service elementary-school teachers may be the solution. Considerable effort and funds have been devoted to the high schools and junior high schools in the past, with modest returns. Perhaps a little attention to the elementary schools is in order.

Elementary-school teachers are "comfortable" when they teach history and geography. They can convey their knowledge of these subjects to their students and can encourage and motivate thought and understanding. The young people that grow up with them to become the adults of the nation are similarly comfortable in history and geography. There are no reports of

history anxiety or geography anxiety disturbing elementary-school teachers or their students. However, when we get to physics, elementary-school teachers are quite uncomfortable, if not petrified, by their complete lack of fundamental understanding in this field reserved "for geniuses only." Most have no ideas whatsoever of forces, motions, energy, liquids, gases, heat, light, sound and electricity. Nevertheless these subjects are all part of the elementary-school science curriculum. The teachers convey their confusion and distaste to their students. Physics anxiety looms as an insurmountable roadblock to careers in science and engineering, as well as to a clear understanding of the physical world. We have all heard evidence that many children are already "turned off" to science in the very early grades. In the elementary school, where perhaps the most can be accomplished toward establishing a strong science foundation, the teachers are least prepared.

Recent cognitive-research contributions to the teaching of science and mathematics indicate¹ that one must challenge children's naive notions about how the world works by scientific theories at an early stage and not postpone such challenges until high school. The National Science Board Commission on Precollege Education in Mathematics, Science and Technology also recommends² preparing elementary-school students earlier in mathematics and science.

How can we develop elementary-school teachers who are comfortable in physics so that they may encourage and motivate thought and understanding in this field?

For over a dozen years the physics department of City College has been successfully teaching a one-semester required physics course for prospective elementary-school teachers. The students approach the course with fear and trepidation, harboring a total antagonism toward physics, yet leave at the end of the semester comfortable in physical science. How is this magic accomplished?

Every college in the nation has at least one professor on its physics faculty who is part theatre, part salesperson, part simpatico and part physicist, and has the personality and teaching ability to conduct a comfortable-physics course. If such a person is available, the dean of the college's school of education should be brave enough to require his prospective elementary-school teachers to take a comfortable-physics course. For these prospective teachers comfortable in physical science, the school of education can then provide courses in the strategies and techniques needed to bring the

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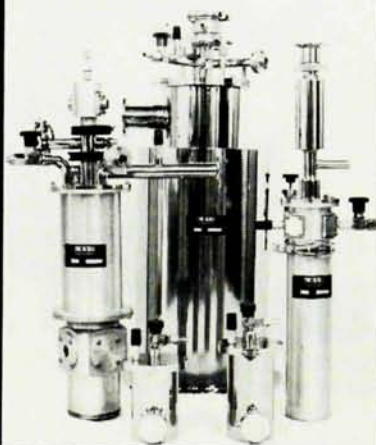
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