SLAC BEAM LINE

If the Lord Almighty had consulted me before embarking upon
Creation, I should have recommended something simpler.
—*Alphonso X, King of Castile and Leon, 1221-1284*

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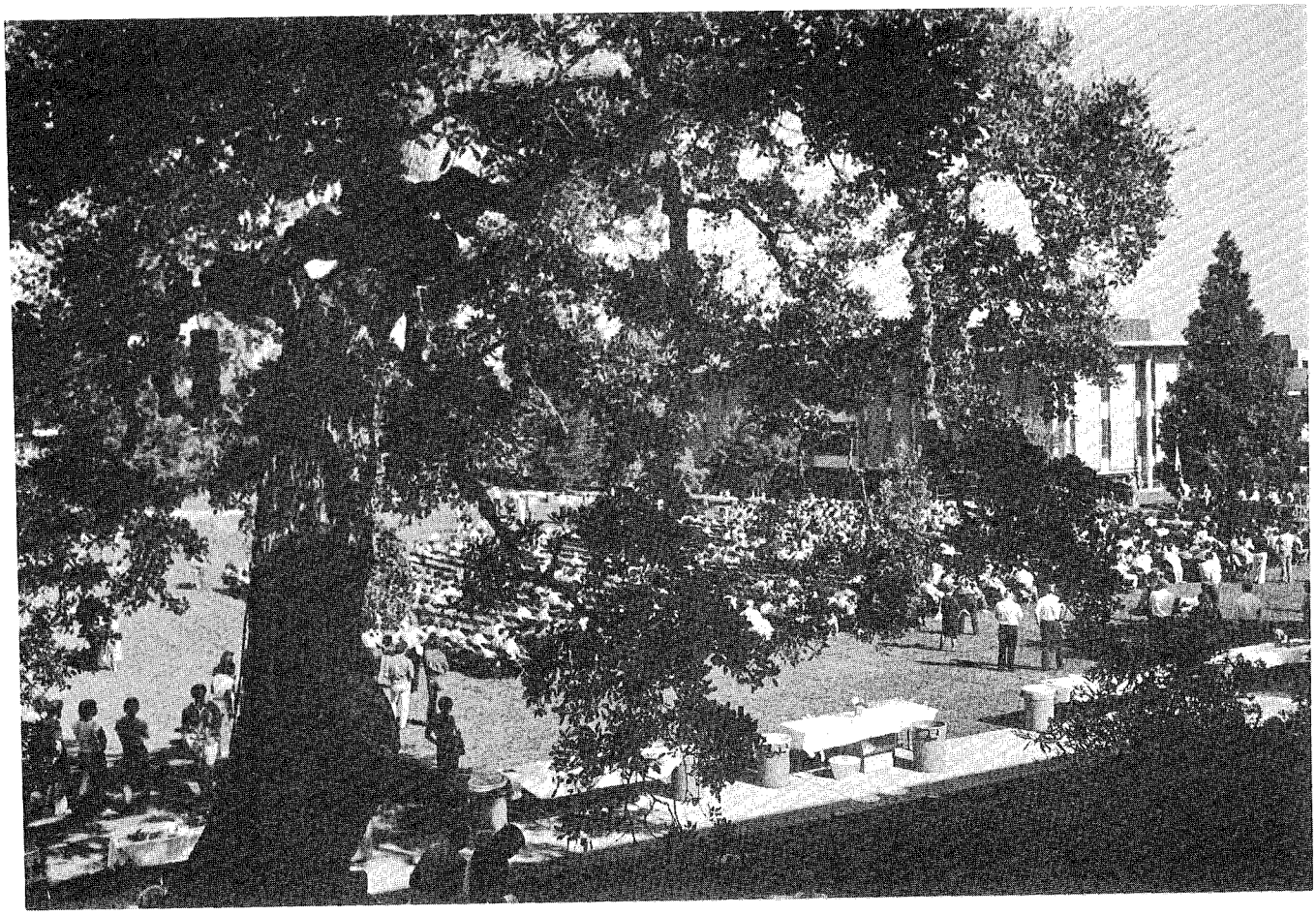


Joe Faust's photo, above, was taken on September 5 during the ceremonies dedicating the new PEP storage ring at SLAC. PEP is a joint project of SLAC and of the University of California's Lawrence Berkeley Laboratory, sponsored by the US Department of Energy. The keynote speaker at the dedication was Presidential Science Advisor Frank Press. Other speakers included Stanford President Donald Kennedy, UC President David Saxon, and Douglas Pewitt of DOE. A letter of congratulations from President Carter is reproduced on page *4* of this issue.

PEP has been operating for about the past six months, and experiments are being carried out by physicists from many different institutions in the US and around the world. The new PEP facility is expected to help keep SLAC in the forefront of particle-physics research for many years. The PEP facility has been described in some detail in "PEP: An Introduction," *SLAC Beam Line Report No. 6*, June 1977. Copies of this report can be obtained from the SLAC Public Information Office, or from Bill Kirk (Bin 80, ext. 2605).

In This Issue

Photo by Joe Faust

WILSON BECKER RETIRES

Wilson Becker, nominated last year as one of "the ten toughest buyers in America" by *Electronic Buyers News*, retired from SLAC on July 31, 1980.

Wilson first came to Stanford University 21 years ago, and soon afterward he began to hear about something called "Project M." It wasn't long until he found himself involved in what turned out to be the birth of the Stanford Linear Accelerator Center. After several location changes, the new SLAC Purchasing Department found itself permanently settled in the A&E Bldg. on the Sand Hill site, and Wilson set up for business in the office that he occupied for the duration of his employment here.

Wilson was at SLAC when they dug the tunnel and the beam switchyard. But even before that, he boasts, he performed the "first manual labor" at SLAC when he unloaded some of the supports for the accelerator structure.

In September, Wilson is planning to begin a six-week tour of Europe with his wife, Fredericka, a former teacher at the Lucille Nixon School on the Stanford campus. Although fond of the Stanford and Palo Alto area, he and Freddie are planning to settle in a home in Pine Acres, which is located a few miles from Jackson, California. They have two children, Bill and Nancy.

Wilson is a man who clearly loved his job, and he is retiring with "mixed emotions." When asked why he had remained so loyal to SLAC, he said, "It was the first job where I started something from scratch, watched it grow, and was a part of it."

SLAC will miss Wilson Becker.

—Marian Bono

JAMES DAVIS: 1928 - 1980

We are saddened to report that Jim Davis, a member of the SLAC Plant Engineering Dept., suffered a fatal heart attack on August 17. He was 52.

Jim first worked at the SLAC site in the early 1960's, during construction, for the Gamewell Company, a contractor involved in the original installation of the fire alarm system. He became a SLAC employee in September 1970, when he was hired as a maintenance electrician in the Crafts Shops. Shortly thereafter Jim was promoted to fire alarm systems specialist, and in this capacity he was responsible for the repair, maintenance and modification of SLAC's complex fire protection systems.

Jim's conscientiousness and dependability were well recognized. In April 1979 he was promoted to electrical supervisor in charge of a crew of electricians assigned to provide service in the SLAC research area, carrying out the requirements of the Experimental Facilities Dept. for electrical installation work.

Jim was born in 1928 in Mangum, Oklahoma, the seventh child in a family of 19 children. He was raised on a farm and from an early age learned to do his fair share of the chores. In 1947 he joined the U.S. Marine Corps and served for 33 months in the Pacific during the Korean conflict. He began to learn the electrical trade during the time he spent on the island of Guam.

Jim was married in 1953, and soon afterward he and his wife, Nelda, moved from Texas to the Santa Clara Valley, where Jim had lived for a short time as a teenager. He had become an avid fisherman during recent years, and his boat had been his pride and joy.

Jim will be missed by his fellow employees and many friends. He was a generous person, always willing to go out of his way to do a favor. He is survived by his wife and four children. Our sympathy goes out to them.

—Art Mainwaring

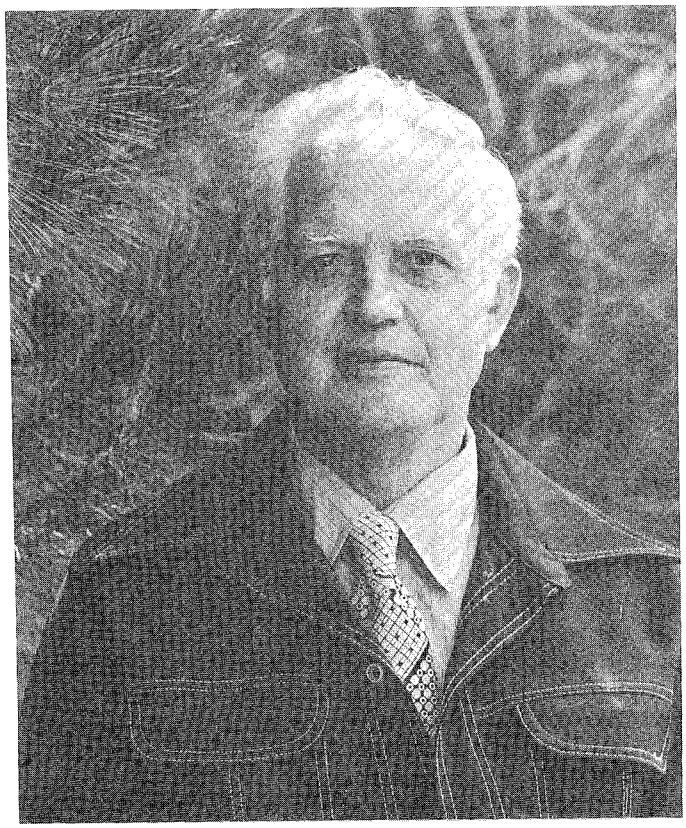


Photo by Joe Faust

LYNN BOYER RETIRES

Every man leaves his mark. During the late 1970's, an experiment known as E80 was running in End Station A in the SLAC research yard. On the heavy end of things was the huge 8 GeV spectrometer, one of the mouth-openers of the standard SLAC tour. These 1000 tons of magnet, detector and shielding looked at a polarized target—an expensive and sophisticated device but considerably smaller. Inside this refrigerator-sized can at the end of a retractable tube sat a little copper box which looked like a 3-inch doghouse. And inside this was a square plastic cup that in other circumstances might be full of a Kraft cheese snack. On the very bottom of the cup was stamped BOYER.

All of this came about as a result of a request to Lynn to make up hundreds of little plastic boxes for holding the polarized target material. Not all plastics would work at the very low temperatures of the target, and of these not all could be molded. Lynn went to work with molds, vacuum pump, heat lamps and sheets of different plastics. He found the right combination, and in making the final form he embossed his name on the bottom. Every day afterwards, when the shift physicists changed targets, they were rightly reminded of one of Lynn's many contributions.

Lynn joined the Spectrometer Facilities Group at SLAC in 1969 as Staff Assistant Specialist. Since that time he has worked on the development and maintenance of equipment for every experiment in End Station A. He has been part of a team that has produced much of the physics of SLAC during the last decade.

Before transferring to SLAC, Lynn worked at HEPL, the High Energy Physics Lab on campus, as an engineering coordinator. John Grant, who worked with Lynn at HEPL, recalls a particular setup there that required a 2½-inch diameter hole to be precisely drilled through five feet of solid steel of the 44-inch spectrometer magnet. The hole was needed to allow passage of the linac beam when the spectrometer was set on the beam axis. The first 1-5/8" pilot hole took a week to drill the five-foot distance and came out aligned extremely well. Several more days of drilling completed the difficult job. A special fixture was prepared to handle this job. Lynn has always been willing to tackle the tough jobs and bring them to a successful completion.

Leaving the big spectrometers and other denizens of the end station behind, Lynn is now off to ocean fishing, camping, bowling, grandfathering and square-dancing. He'll make his mark in all.

—Bill Ash

Laws of Thermodynamics:

1. You cannot win.
2. You cannot break even.
3. You cannot get out of the game.

--Anon.

The eighth annual SLAC Summer Institute on Particle Physics was held at SLAC from July 28 to August 8. The Institute was attended by a total of 374 physicists who came from 16 different nations around the world. As in previous years, the first seven days of the Institute were devoted to tutorial lectures on experimental and theoretical physics, with the addition this year of a series of lectures on particle detectors. This was followed by a three-day topical conference in which speakers from the major particle-physics labs brought the participants up to date on recent developments in the field.

The program directors of the institute are SLAC physicists David W.G.S. Leith, Frederick J. Gilman and Gary J. Feldman. The program was coordinated by Anne Mosher, with the assistance of several Stanford graduate students and SLAC staff members.

THE WHITE HOUSE

WASHINGTON

September 3, 1980

To the Members of the Stanford Linear Accelerator Center and the Lawrence Berkeley Laboratory

Congratulations on the dedication of the collaborative Positron-Electron Project (PEP) at the Stanford Linear Accelerator Center.

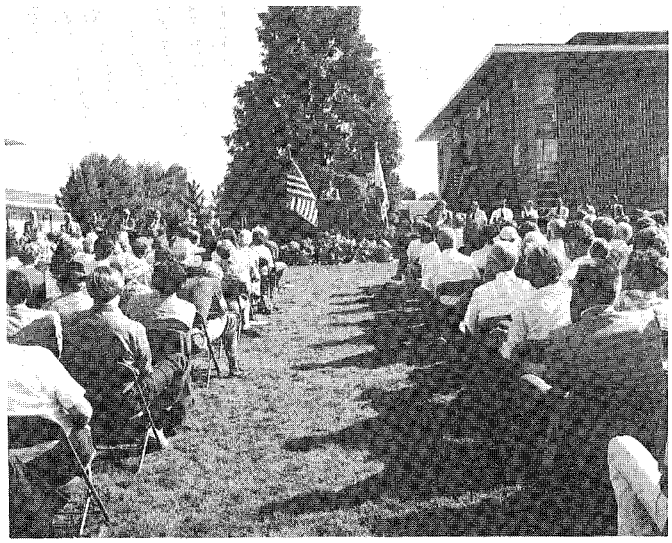
The operation of this new endeavor by two of this country's, and the world's, leading laboratories for research in high energy physics represents a major step forward into this exciting frontier of science. Through PEP you have a more powerful instrument to continue the search for elementary particles and to seek a greater understanding of the fundamental properties of matter and the universe. This is basic research of the highest order, of which my Administration and the Nation are both very proud.

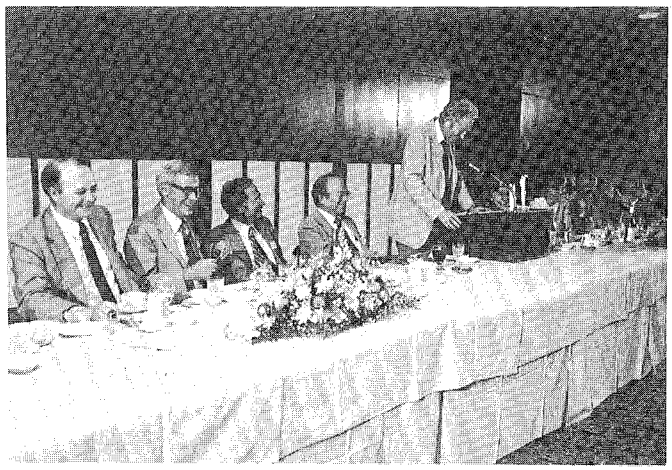
I welcome the opportunity to express my appreciation to all who have worked for many years to make this effort a reality. And to those who will be working with this fine facility, I extend my best wishes for success in their important scientific quest.

Jimmy Carter

PEP DEDICATION - SEPTEMBER 5, 1980

Stanford President Donald Kennedy





Banquet speaker Leon Lederman,
Director of Fermilab

Photos by Joe Faust

SCOPE OF US PARTICLE-PHYSICS PROGRAM MAY NEED REDUCTION

(Reprinted from *Physics Today*, September 1980)

The US high-energy physics program will have to rely increasingly on "special effort and ingenuity" to remain competitive with Western European research centers, according to the report of a subpanel of the Department of Energy's High Energy Physics Advisory Panel. The group was charged with reviewing the status and prospects of the program and developing a strategy for the program over the next decade, including specific recommendations for Fiscal Year 1982.

The HEPAP subpanel, headed by Sam Treiman (Princeton University), was the fourth in a series of so-called Woods Hole subpanels. It was given a more general charge than the previous subpanels, which were concerned chiefly with new research facilities.

Reviewing the progress made in our understanding of the subnuclear world during the last decade, the subpanel praised the work that led to successful theories for strong and weak interactions. "The field in 1980 has progressed much further than anyone could have dared to anticipate in 1970 ... If the present theoretical optimism is confirmed by the experimental program of the 1980's, we will have largely accomplished an advance in our understanding of the basic forces of nature comparable to the establishment of the theories of electrodynamics and gravitation."

Funding levels. The current level of funding for the particle-physics program is nominally governed by the DOE/Office of Management and Budget Long-Range Plan of 1978. That plan set a floor for DOE funding of high-energy physics of $300 million in FY1979 dollars. But the "painful reality," as Sidney Drell, HEPAP chairman, put it, is that inflation in power and other technological costs has not been fully allowed for in the conversion from 300 million 1979 dollars to real dollar budgets, so that a deficit has developed with respect to the DOE/OMB plan. According to Drell, this has "severely limited the R&D program underpinning the ongoing construction, and has also reduced the level of utilization of existing facilities to the point of causing serious loss of physics as well as great inefficiencies and difficulties for the research groups." HEPAP estimates that the high-energy physics program has fallen about $45 million short of the DOE/OMB plan since FY1979. According to Drell, "Continuation of the current funding level may force reduction in the scope of the US high-energy program."

In addition to the financial difficulties, the subpanel noted that the new superconducting magnet technology involved in the Isabelle and Energy Saver projects at Brookhaven and Fermilab, respectively, is turning out to be more arduous than had been anticipated. The subpanel noted that the two labs have different problems to overcome and that Fermilab is closer to a resolution than Brookhaven. The group suggested that Isabelle might benefit from an infusion of technical expertise both from within Brookhaven and from the physics community at large.

Aside from their technical challenge, the superconducting-magnet problems also reduce the money available to the rest of the program. For example, because Fermilab has had to focus on the Energy Saver construction project, the existing 400-GeV accelerator there is at present being used less than 50% of the available time. DOE considers a utilization level of about 75% optimum. According to William Wallenmeyer, director of the DOE high-energy physics division, Fermilab is not the only laboratory beginning to dip below 50% use time, and the prospects for FY1981 look even bleaker.

Among the victims of such underutilization are university-based research groups, which have suffered as well from lack of adequate equipment funds, serious increases in necessary travel costs, erosion of their efforts by inflation and increased overhead charges. The Woods Hole group therefore recommended greater use of the forefront accelerator facilities—the Fermilab 400-GeV accelerator, the newly commissioned PEP storage ring at SLAC and the CESR facility at Cornell.

The subpanel discussed in detail the problem the US is having in keeping pace with high-energy physics advances abroad, particularly in Western Europe. The level of financial support in Western Europe now substantially exceeds that in the US, and it is therefore necessary, according to the subpanel, "for the US to rely increasingly on special effort and ingenuity to keep our program at least well represented at the major forefronts." It is no longer financially possible for the US to proceed in parallel by the scaling up of conventional technology, concluded the subpanel, but the US can engage in more "financially modest" projects based on inventive new technology.

New facilities. In the tradition of past Woods Hole subpanels, the HEPAP group reviewed several ideas for new facilities, including the Stanford Linear Collider proposal for an e^+e^- collider at 100 GeV center-of-mass with one interaction region (*Physics Today*, January 1980, page 18); an e^+e^- ring contemplated by Cornell at 100 GeV center-of-mass, with four interaction regions; and a possible electron-proton facility involving a 10-GeV electron ring used in conjunction with a high-energy proton beam at Fermilab or Brookhaven, being explored by a Canadian consortium and independently by a US group

at Columbia University. They concluded, however, that it would be "premature to make a decision now on the exact direction such efforts should take. Maturing initiatives can be considered within the next one or two years." One of the report's recommendations is that a similar group convene in one year and reexamine these proposals.

The subpanel also considered opportunities for the more distant future, when still higher energies will clearly be important, such as Fermilab's Pentavac (a 5-TeV proton accelerator), and SLAC's idea for two large linacs that would give 350-GeV electrons and positrons colliding head on.

The subpanel made the following recommendations for the next funding cycle:

→The Fermilab 400-GeV accelerator, the newly commissioned PEP storage ring, and the CESR facility at Cornell must be used as fully as possible to exploit for physics the large investments already made.

→Construction of the Energy Saver and of Isabelle must proceed with all deliberate speed. Necessary R&D funds must be provided to ensure their success.

→University-based groups should receive increased support to assure vitality of their efforts on immediate experimentation and also on detector development for the future.

→Accelerator studies and technical research should begin immediately toward the goal of starting the construction of a very large accelerator (electron energies of several hundred GeV or proton energies of 10 TeV or more) during the second half of this decade.

With regard to budgets, the subpanel stated that if the funding level remains at or below the 1978 DOE/OMB guidance level, the programs at the lower energy facilities, such as the Brookhaven AGS and the SLAC linac, will have to be reduced and new construction initiatives will have to be foregone. Even the DOE/OMB plan level of $300 million may be too low to buy the amount of research DOE and OMB had in mind when they constructed the plan, according to Wallenmeyer. DOE and OMB underestimated what the desired level of effort would cost, and we have fallen somewhat short of even that underestimate because of the inability to adequately estimate recent inflation rates, he said.

If, however, the program is given a modest (15%) increase in support beginning in 1982, it would be possible to begin a new construction initiative. "Specifically, the future US program would be greatly strengthened by an electron-positron collider operating in the energy region between 30 GeV and 100 GeV, where a rich output of physics is anticipated. Similarly, a facility designed to study high-energy electron-proton collisions promises exciting physics opportunities. It may be that both of the above goals can be met with a combined facility."

The subpanel report emphasized the importance of detector and accelerator R&D. Very high-charge-density bunches with low emittance in linear accelerators, very high-field superconducting magnets and superconducting rf cavities were singled out by the subpanel as being of great importance. "The present difficulties with superconducting magnet technology show that economies of effort and funds and more expeditious construction can be realized in the future if more extensive R&D occurs early in the technological innovations necessary for new facilities," the Woods Hole group said. But much of the R&D effort in the current US program is aimed at the short-term goals of existing or imminent projects. They warned that it is increasingly important to upgrade the effort devoted to goals of longer range.

Long-range R&D should be supported at a level approaching 4% of the operating budget, whatever that may be, they said, as was recently recommended by the HEPAP subpanel on accelerator R&D. This subpanel, headed by Maury Tigner (Cornell University), focused on questions connected with the long-term future of the field. It identified specific technical areas that need to be emphasized in long-range R&D. These include very high-field accelerator magnets, liquid-helium refrigerator systems, microwave linac gradients, beam-beam interactions, and new accelerator schemes with high performance potential, such as laser accelerators.

The accelerator R&D subpanel also recommended that laboratory and university managements take specific measures to make participation in accelerator R&D practical and more desirable for high-energy physicists and facilitate cross-fertilization from other fields such as plasma physics, lasers and materials science.

—MEJ

DICK TAYLOR AWARDED HONORARY DEGREE

Professor Richard Taylor of Experimental Group A at SLAC was recently awarded the degree of Doctor Honoris Causa at the Université de Paris-Sud in Orsay, France. The award was given in recognition of his contributions to experiments that provided some of the first evidence for the existence of structure within hadrons, and the recent demonstration of parity violation in the interference between neutral-current and electromagnetic interactions. Also cited was his important role during the period from 1958 to 1961 in bringing into operation the Orsay Linear accelerator.

A SENTIMENTAL TRIP DOWN ACCELERATOR LANE

No commemorative stamp has been issued, but the first 50 years of the accelerator in America was marked recently by a modest celebration in Washington. The "atom smasher" semicentennial took the form of a party at the Smithsonian Museum of History and Technology on 22 July and a hearing the next day on Capitol Hill.

Honored as "original developers" were L. R. Hafstad and M. Stanley Livingston. Starting in 1930, Livingston was a graduate student and then collaborator of Ernest O. Lawrence at Berkeley during the development of the first cyclotrons. At the same time, Hafstad was a member of a team at the Carnegie Institution's Department of Terrestrial Magnetism which experimented with accelerator technologies and settled on the electrostatic generator invented by R. J. Van de Graaff.

On hand also at the party were a number of physics luminaries including Nobel Laureates Owen Chamberlain, Donald Glaser, and Edwin McMillan of the University of California at Berkeley, all of whom won the big prize for work with the big machines. Major accelerator centers were represented by head men such as Wolfgang Panofsky of SLAC, the Stanford Linear Accelerator, and John Adams of CERN, the European Center for Nuclear Research. After dinner, speeches, and awards, a short sentimental journey was made down the hall to the Smithsonian's atom-smasher exhibit where samples of original hardware and memorabilia are on display.

The hearings focused partly on the past, with a discussion by Livingston and others of accelerator history. But the focus shifted inevitably to the present funding predicament of high energy physics and nuclear physics (*Science*, 1 August). The most arresting comment of the day came from CERN Director Adams who noted that in 1966 the United States and CERN member nations had allocated about the same fractions of their gross national products to the support of physics, about .025 percent, "but whereas the CERN member states have maintained this same fraction through 1978, the last year for which we have official figures, the fraction allocated in the U.S.A. has fallen to about half the 1966 value."

—*Science*
8 August 1980

APS FORUM HONORS DRELL AND SHURCLIFF

The American Physical Society Forum on Physics and Society has selected Sidney D. Drell, deputy director and executive head for theoretical physics at the Stanford Linear Accelerator Center, and William A. Shurcliff, an honorary research associate at Harvard University, to receive the Forum's prizes for 1980.

Drell won the Leo Szilard Award for Physics in the Public Interest for his "outstanding contribution to the formulation of national policy through the application of physical principles to the analysis of critical problems, particularly in the areas of arms control and national security policy." While pursuing a career as a high-energy physicist, Drell has served as a consultant to numerous agencies of the federal government including the President's Science Advisory Committee, the US Arms Control and Disarmament Agency, the Office of Science and Technology Policy, the Office of Technology Assessment and the National Security Council.

The University of Illinois granted Drell a PhD in physics in 1949. In 1956 he rejoined the Stanford Faculty (having worked there early in his career) and has remained there since. Drell's research has included studies of quantum field theory, elementary-particle physics and hadron structure—particularly the quark confinement problem....

The awards, which include a plaque and $250 honorarium, were presented at the APS general meeting in Washington, D.C. in April.

—*Physics Today*
July 1980

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	2-7	10-3	21-4	32-1	39-10	51-58	60-23	67-4	74-9	83-8	91-3	98-30
	3-6	11-15	22-15	33-27	40-107	52-19	61-20	68-10	75-3	84-9	92-2	
	4-19	12-115	23-23	34-4	42-12	53-47	62-35	69-54	78-26	85-27	93-0	
	6-18	13-29	24-18	35-10	43-30	54-0	63-15	70-1	79-94	86-6	94-33	
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