

The Beam Line

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Synchrotron Radiation Project Underway

A new facility at Stanford University to exploit the high intensity electromagnetic radiation from circular high-energy electron devices will enable scientists from all over the U. S. to probe in new ways into the structures and characteristics of all types of materials, including living tissue.

The "synchrotron radiation" (SR) is a by-product of the highly successful SPEAR storage ring under Professor Burton Richter's direction here at SLAC.

The 2.6 GeV electrons circulating in SPEAR emit light with a variety of wavelengths. The light emerges in a thin wedge-shaped pancake with a vertical divergence of less than one-tenth of one degree. The light consists of photons with energies of up to 20,000 electron volts. For the purposes of particle physics, this radiation is an unwanted byproduct of the fact that the circulating electrons are accelerating as they go, losing energy in the process. It is this energy loss, in fact, which limits the energy attainable in circular electron accelerators.

While SPEAR was built expressly for research in high-energy particle physics, it will now become a useful tool in an entirely different field of research aimed at discovering new facts about the composition and behavior of matter.

Under a \$1.2 million, two-year grant from the National Science Foundation, SPEAR's high-energy radiation will be bled off into research areas for use in investigations of all kinds of materials extending right down to their atomic structures. In effect it will give investigators a kind of ultra-powerful x-ray probe capable of resolving details on an atomic scale.

The Stanford Synchrotron Radiation Project (SSRP) will be headed by applied physics Professor Sebastian Doniach, director, and electrical engineering Professor William E. Spicer, deputy director. Together with several other faculty members they first proposed the project nearly two years ago. The new facility is expected to operate in 1974.

The facility will be open to use by qualified scientists from institutions throughout the nation. Already more than 20 preliminary proposals for experiments have been received. A special board of experts from various research centers will oversee the project's operations and set up ways to decide priorities among proposed experiments.

Although some SR research is being done at other U. S. centers (U. of Wisconsin and the National Bureau of Standards) the high intensity and energy range of the Stanford radiation will be unique in this country. In Europe, Russia, and Japan, on the other hand, SR research is underway and in some cases well ahead of U. S. work in this field.

What makes this radiation so useful is its very

high intensity, ranging from the infrared region of the spectrum through all the visible and ultraviolet light frequencies on up into the x-ray region. It also is highly collimated, or one-directional, as well as polarized.

By using mirrors, crystals, gratings, and other diffraction devices as "monochromators," the scientists can "tune in" the particular kind of radiation they want. For medical and biological experiments they might require x-rays. For studies of chemical compounds or solid surfaces perhaps short wavelength ultraviolet radiation, unavailable from other sources, may be used.

The planners expect to be able to run at least six experiments using different frequencies simultaneously with the radiation emanating from a single window or "port" in the storage ring. The SR

facility also has the potential of being expanded at a later date by adding more ports and research areas.

For studies in solid state and atomic physics, materials science, and both physical and organic chemistry, SR can provide a valuable improvement in the present resolving power of ESCA (electron spectroscopy for chemical analysis) techniques. The method requires measuring the energies of electrons ejected from material being irradiated.

With the new techniques made available by the SR facility the scientists hope to accurately determine the electronic binding energy that holds elements together in different compounds. It should provide a new way to reveal the distribution of electric charge in a molecule.

The high resolution should improve the understanding of complex materials and permit studies of compounds in both the crystalline and amorphous, noncrystalline state. Details of binding characteristics in metal alloys and other materials could be studied with a view to improving these alloys. Corrosion, metal fatigue, and many other materials problems could be affected by such work.

Among other investigations also proposed for the Stanford SR facility are studies of muscle flexing, blood cell membranes, catalytic reactions, semi-conductors, and proteins.

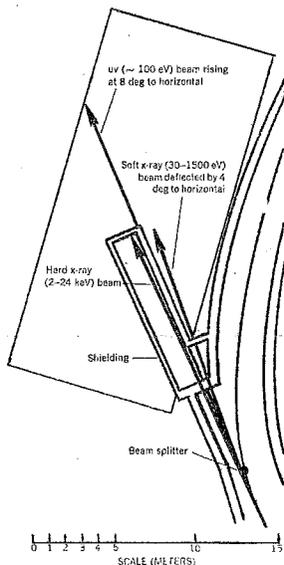
Preliminary tests at the SPEAR site are now being carried out, said Doniach, and he expects construction of the facility to begin in the late summer or early fall. By early next year the experimenters hope to commence operations.

The SR facility will be located at, though not part of, SLAC. Instead it will have much the same status as other SLAC experiments being carried out by both visiting and local scientists.

The radiation experiments will not interfere in any way with the SLAC experimental program in high-energy particle physics, said Doniach. Therefore SR investigators will necessarily follow the same operating schedule as SLAC.

Others involved in the SR facility include a group of scientists whose specialties range from the use of ultraviolet radiation to bio-physics; Dr. Frederick Brown of the Xerox Research Laboratory in Palo Alto; Dr. Victor Rehn of the Naval Weapons Center at China Lake; Dr. Robert Stroud and Dr. John D. Baldeschwieler of Caltech's Chemistry Department; Dr. Nicholas Webb of Stanford's W.W. Hansen Laboratories; and Dr. Arthur Bienenstock, Stanford professor applied physics and materials science.

Dr. Gerhard E. Fischer (Group C) is the coordinator between SLAC and the SR planners. He, among others, was also responsible for the feasibility studies for the SR project to assure its compatibility with SLAC operations.



Preliminary layout for SSRP.

Energy Conservation at SLAC

In a memo circulated August 15 to group leaders, SLAC Director W.K.H. Panofsky outlined a number of measures to help curtail energy consumption on the site. Dr. Panofsky noted this is necessary (1) as a conservation measure in this time of energy shortage; (2) to conform to the government-wide program of energy conservation; and (3) as a budget control measure.

1. **Lighting.** When SLAC was built, the economics of fluorescent lights favored leaving the lights on continuously. Although this is no longer true, many of the circuits and controls were designed on that basis. It is now planned to turn off at night and on weekends and holidays as many lights as possible. Discussions are proceeding to determine how this can best be done. Each building manager will inform its occupants what the plan for that building is, and how an occupant can turn his or her lights on and off in the event work is to be done during a "lights-off" period.
2. **Heating, Ventilating, and Air Conditioning.** Plans are being formulated in these areas.
3. **Gasoline Consumption by Vehicles.** GSA is likely to shift to compact vehicles,

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University, USE to Begin Negotiations

(Editor's note: This article is taken, almost in its entirety, from the August 8, 1973, issue of "Campus Report.")

A contract between the University and United Stanford Employees (S.E.U.-AFL/CIO) is still some time away. However, initial preparations for contract negotiations have been proceeding since USE was certified by the National Labor Relations Board on June 15 as the official representative for the employees in the bargaining unit.

Both the University negotiating team and various USE committees have been meeting jointly and separately, discussing preparatory and topical matters and planning for the contract negotiations which probably will commence in early autumn.

The University negotiating team comprises Douglas Barton of the Office of the Vice-President for Business and Finance as chief negotiator; Emil Sarpa, Director of Personnel and Employee Relations; Earl Cilley, Director of Research Administration and Procurement Services; Janet Sweet, Manager, Government Cost and Rate Studies; and Douglas Dupen, Personnel Director for SLAC. (One third of the members of the bargaining unit are employed at SLAC.)

USE has yet to identify its official contract negotiating team. During the half dozen preparatory joint meetings held so far, at the table at various

times were Glenda Jones, Jim Berk, L.A. Breckenridge, Florie Berger, Alfred Castro, Mike Harris, Jack Truhler, Beverly Tighman, Mack Dillard, Rick Sterling, Joe Sodia, and Ken Gunter.

Membership in USE is not restricted to the members of the designated bargaining unit. Other Stanford workers are and may become members as well. According to the USE newspaper Employees Organize, "final decisions in USE are made by the membership, but between membership meetings the Executive Committee is ultimately responsible for carrying out the decisions of the membership... six general officers and 15 delegate officers (group representatives) make up the Executive Committee. The six general officers are each elected by the entire membership. Each of the group reps is elected only by members in their group... USE has an annual election of officers in October."

Whether or not all designated members of the bargaining unit must become members of USE or pay dues or fees to USE, and whether or not any such dues or fees will be payroll deduction are just a few of the many questions which will be answered only in the final contract negotiated between Stanford and USE.

Meanwhile, Stanford may not make changes in policies or methods of operation which would substantially affect wages, hours and working conditions of unit members without giving USE prior notice and the opportunity to bargain concerning such changes in the "status quo."

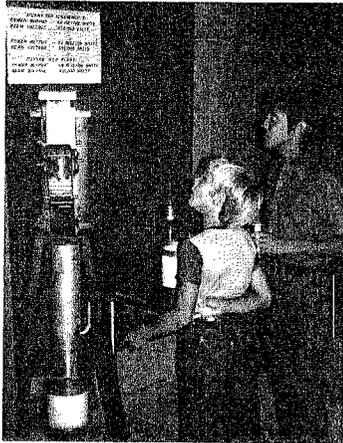
As an example, in accordance with the "status quo" all employees will continue to receive annual salary reviews and appropriate increases in accordance with the University range structure adopted a year ago.

However, any adjustment of pay ranges different from those in the existing Pay Plan are new changes and may not be made unilaterally by the University

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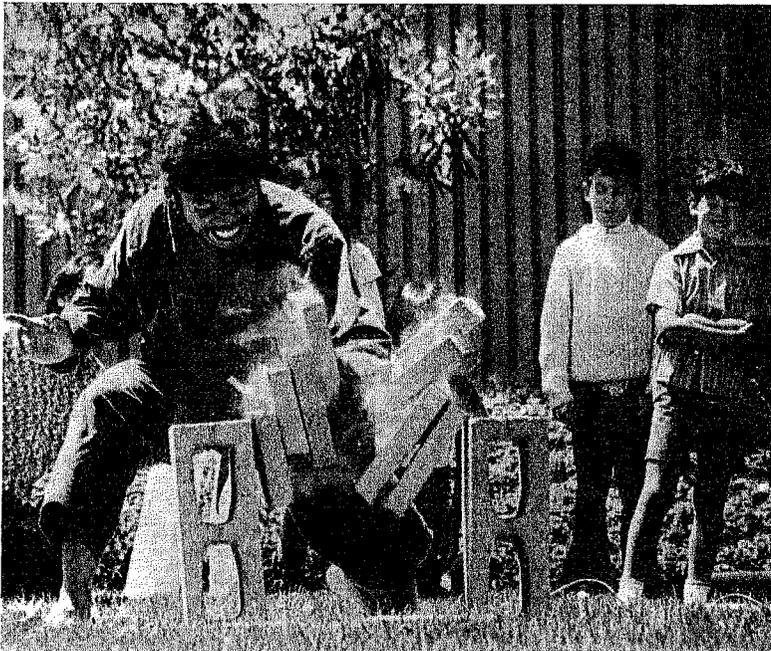
SLAC Families Gather

A sunny, warm day greeted all comers to the Family Day held August 11. Paintings by SLAC artists were displayed in the breezeway for all passers-by to enjoy. A big thanks to Shirley Livingood, Ned Lee, Ida Donalds, Florence Schuster, Robbie Johnson (Don's wife), Glenn Hughes, John Alcorn, and Marco Buenrostro for loaning us their works!



Possible future scientists study an equipment display in the breezeway.

Willie Roberts and Bob Boesenberg also deserve thanks for setting up a display in the breezeway of various pieces of equipment from the Test Lab which drew much curiosity.



The karate demonstration definitely captured the attention of many. Photo courtesy of Joe Faust.



Three lively little reasons why Family Day is held.

The Auditorium was turned into an arena dominated by the younger set, some of whom approached their movie-watching with a vigor, loaded with a grocery store volume of food and drinks, the remains of which were distributed equitably throughout the Auditorium. Intermissions proved quite tantalizing for some youngsters who enjoyed the game of Throw the Can, so films began to run consecutively to provide wall-to-wall movies. Many quiet watchers also enjoyed the comedies and cartoons provided by Bob Maskell, as well as a Disney nature film and a popular physics film.

On the lawn between the cafeteria and Auditorium a karate demonstration was given by a group brought in by Gene Cisneros and his wife, and ping-pong as well as softball games were carried on.

A bus circulated around the site every 20 minutes for tours through points of interest. Many thanks to all the volunteers who manned displays and areas for the visitors, and we hope to see as many SLACers present when Family Day rolls around again!

An estimated 1200 people attended.

Job Openings at SLAC

Mathematician: The Spectrometer Facilities Group has an opening for a mathematician. The position involves programming, both in Fortran and assembly language, at a medium sized computer for scientific and largely real-time application. The duties include development and modification of programs for reading, interpreting, or controlling experimental equipment; development and documentation of routines for testing and diagnosing experimental equipment; modification of installation wire listing program. **Qualifications:** Applicant should have B. S. Degree or equivalent experience in physics, mathematics or related fields and must have experience in Fortran and/or assembly language programmings and must be able to adapt programming logic to practical experimental conditions. **Salary - open.**

Secretary II - applicant will act as secretary to a department head and supporting engineering personnel. This position involves considerable phone work, arranging visitor interviews, setting up conferences. Typing of complicated technical material, operate and maintain xerox machine. This position requires dictation (50 wpm), technical typing 60-80 wpm with interchangeable keys. Maturity in working with and for several engineers and physicists. **Shift: Days Salary: \$544-696 Req. No. 7289**

Shipping/Receiving Furniture Assembler - applicant will be required to load and unload incoming and outgoing shipments. Checks and inspects incoming material for quantity, damages and correctness. Expedites the handling of "hot cargo." Prepares and arranges outgoing deliveries in accordance with his delivery route and schedule. Coordinates with Property Control whenever material requires other tasks as required by work load and supervisor. **Qualifications:** must have a valid California driver's license. Experience with operating electric and gasoline forklifts (up to 5000 lbs. capacity) loading and unloading of material with such equipment. Must demonstrate. One to two years experience in shipping and receiving or related field. Capable of working with various types and levels of personnel. **Shift: Days Salary: \$600-766 Req. No. 7457**

Radiation Gate Guard - act as guard at Sector 30 entrance. Checks personnel dosimeters, issues temporary dosimeters, operates radio link, taxi and paging system. Controls two remote gates by TV monitors and reports various alarms. Issues keys to authorized personnel. Certain physically handicapped persons may qualify for this position. **Shift: Rotating Salary: \$518-662 Req. No. 7568**

Contact the Employee Relations Office (phone extension 2355) if you are interested in any of these positions.

two cities have had a history of joint activities designed to bring closer together their citizens. The aim during this period has been the yearly exchange of boys and girls of high school age. Between 125 and 150 young unofficial diplomats from each city has visited the other, thus building bonds of friendship.

Alan Wilmunder (Accelerator Physics), who is coordinator of youth activities for Neighbors Abroad and who frequently helps out at SLAC by translating for Mexican or Spanish-speaking visitors on tour, made an interesting observation about this visit. Only last winter, he pointed out, a group of Palo Alto citizens flew to Oaxaca to witness the dedication of an astronomical observatory made possible by the cooperation of the two Sister Cities. These junketers were able to look at the largest things in existence through a relatively small 15 foot instrument. Here at Stanford, he concluded, the visitors from Mexico were observing the tiniest things in existence through an "instrument" that is two miles in length.

SLACers who were not already aware of the exchange program may be interested in its possibilities for their own children. Each spring, some 12 - 15 finalists are chosen from interested applicants who attend one of the three high schools of the Palo Alto Unified School District.

Persons interested in joining in the "casual diplomacy" of a people-to-people approach (which received its initial stimulus from Dwight D. Eisenhower a generation ago) are invited to contact Ralph Hendrickson, President of Neighbors Abroad, 4125 Donald Drive, Palo Alto, Phone: 493-9312.



High School students from Oaxaca, Mexico gather for a tour of SLAC. Oaxaca is the Sister City of Palo Alto.

USE Negotiations ...

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for employees in the bargaining unit. Thus non-exempt employees not in the bargaining unit may and will (on September 1) receive range adjustments in addition to their normal salary reviews. Application of this policy to employees in the bargaining unit must await contract negotiation.

All University departments have been advised to be sure to clear any other contemplated changes with Dupen for SLAC or Sarpa for the remainder of the University to insure compliance with legal requirements.

Energy Conservation ...

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except where larger vehicles are really essential and to supply air conditioning on a real need rather than on a wholesale basis. This will take time to accomplish; meanwhile, measures for reducing fuel consumption in the use of our GSA and AEC vehicles will be identified and called to the attention of those who drive them.

Dr. Panofsky expects the above measures to be accomplished without impact on SLAC's program,

and notes that energy consumption reduction is one of the few cost reduction measures available to us which does not also reduce personnel-related costs; thus energy conservation tends to preserve jobs at SLAC.

Employees are urged to submit any additional energy-saving ideas to their group leaders.

Oaxacan "Diplomats" at SLAC

Fifteen young visitors to Palo Alto from Oaxaca, Mexico visited SLAC on August 2. They were in the middle of a 6-week visit to Palo Alto as part of a program of exchange of students between the two Sister Cities. At the same time the Mexicans were at SLAC, a corresponding group of Palo Alto youngsters were enjoying a similar exchange visit with families in the Mexican city.

Neighbors Abroad is the Palo Alto organization which coordinates for Palo Alto activities with the southern Sister City. In 1964 Neighbors Abroad made formal arrangements allying Palo Alto and Oaxaca as Sister Cities. For nearly a decade the