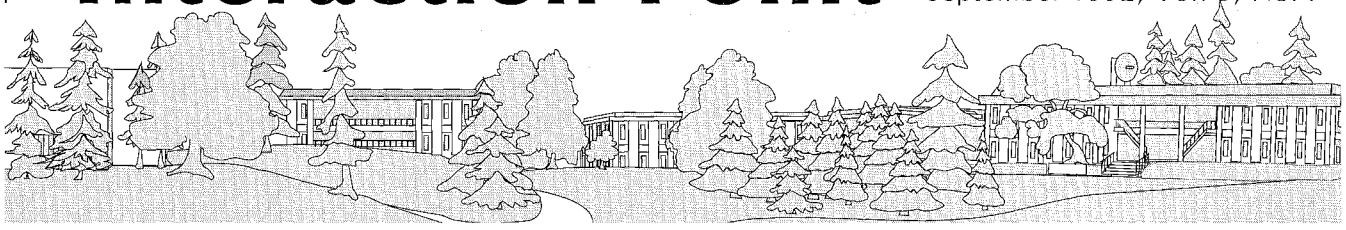
The Interaction Point

Events and Happenings
in the SLAC Community
September 1992, Vol. 3, No. 7



10,000 CHEERS FOR SLAC

Georgia Row

ON SATURDAY, AUGUST 14, while most of us were sleeping, the ten-thousandth Z particle produced by a polarized beam was created by the Stanford Linear Collider, representing a significant victory for SLAC. In the words of SLAC's director, Burt Richter, "We swore to the Department of Energy that in this running cycle we would produce ten-thousand Zs with polarized beams. We did it five weeks before the end of the running cycle; the machine has worked wonderfully. All I can say," Richter remarked at the party in honor of this triumph, "is that with the help of all of you we've managed to do more than we said we were going to do this running cycle."

A party was held the afternoon of August 21 to celebrate this achievement. Tables piled with mounds of fresh strawberries, brie and other good things to eat and drink were set up on the Green. The highlight was a huge cake, with strawberries and blueberries spelling out "10,000 Zs" on the top. Burt Richter, Lowell Klaisner, Nan Phinney, and Marty Briedenbach each spoke briefly, acknowledging and thanking the entire lab for their part in achieving the milestone. A key-chain flashlight printed with "10,000 Zs" was passed out to mark the event.

Tremendous effort from many people has culminated in this success. Almost every facet of the machine was improved. The SLC

(Cont'd. on p. 6)

SSRL BECOMES NEW DIVISION

AS OF OCTOBER 1, the Stanford Synchrotron Radiation Laboratory (SSRL) will become a division within SLAC. To begin with, this arrangement will be somewhat informal, because the contract negotiations that will formalize SSRL's new status are not likely to be completed by October 1. But that will happen eventually, and in the meantime the two facilities are beginning to merge their administrative functions in order to start acting as a unified laboratory as soon as possible.

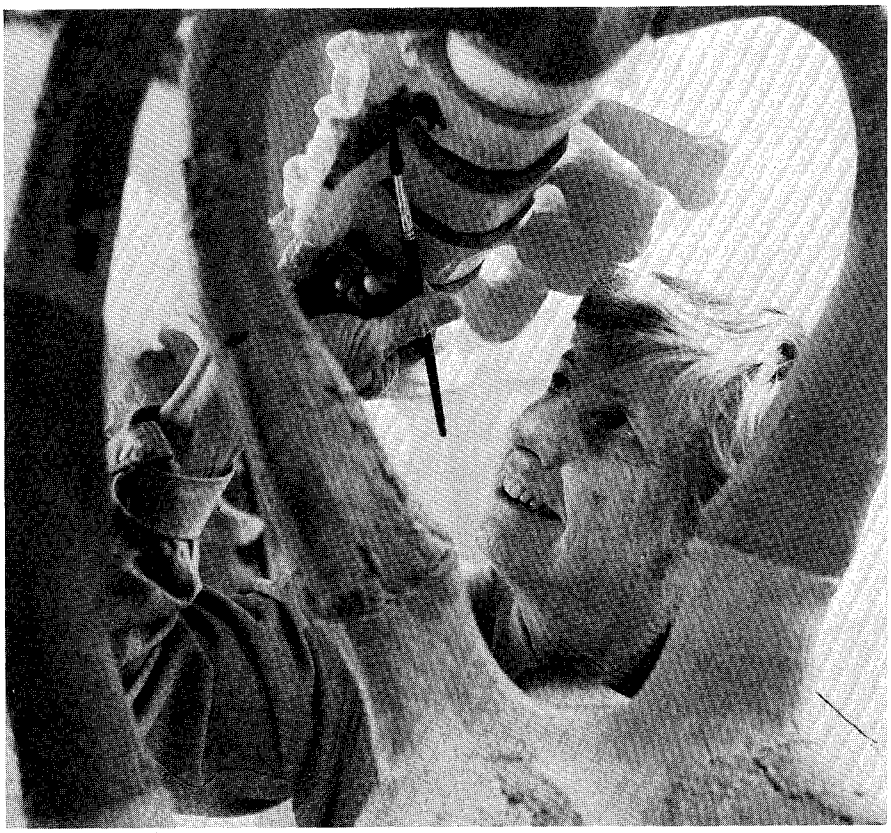
Even though SSRL is now to become a division of SLAC, its principal source of funding will continue to be the DOE's Office of Basic Energy Sciences. This means that its budget will remain separate from that of the rest of SLAC, which is funded by the DOE's Office of High-Energy Physics. Since the scientific programs of the two labs are quite distinct from each other, each will maintain its own program advisory committee to provide advice on proposed experiments. However, the policy-oversight function of SSRL's Science Policy Board is in the process of being absorbed into an expanded version of SLAC's Scientific Policy Committee. SSRL will be responsible for the maintenance and operation of SPEAR, its experimental stations and user program.

The merger of the two laboratories has been some years in the discussion and planning. There is now a lot of enthusiasm on both sides about common interests and collaborative projects. One example is the possibility of using the SLAC linac as the driver in a free-electron laser that would produce incredibly intense beams of x-rays for a variety of experimental research projects.

Next month's issue of the Interaction Point is expected to feature more information about SSRL and its program in order to better acquaint the staff with this new division of SLAC.

—Katherine Cantwell

PALEOPARADOXIA DEDICATED



IT WAS SLAC'S VERY FIRST scientific discovery. No atoms were smashed. No physics was involved. The accelerator was only just in the process of being built. A bulldozer went off the correct path and, to everyone's surprise, unearthed an almost complete skeleton (without a head), of a *paleoparadoxia,* an ancient sea mammal that probably looked something like a hippo with frog legs. Almost thirty years later, a full-size model of the skeleton is nearly completed.

Adele Panofsky, wife of the former director of SLAC, Pief Panofsky, took an immediate interest in the excavation of the bones. While Stanford wasn't going to keep the bones, she wanted at least a replica here, especially because she wished to dedicate it to a recently deceased friend, V.L. "Van" VanderHoof, who was a paleontologist himself and a forerunner in the study of the demostylus, a cousin of the animal found at SLAC.

In exchange for the actual skeleton, the University of California at Berkeley, gave SLAC plaster cast copies of the disassembled bones in January of 1969. Adele recalls, "I was flabbergasted, and thought, 'Now, what do we do with them?'" But with a promise of help from a friend at the USGS, Charles "Rep" Repenning, she set out to spend the next three months putting it together. "Well, the three months went by," she says, pauses for a moment, then adds "and so did many years."

She worked three days a week, teaching herself all she needed to know. The most intellectually challenging part—and only part not yet completely finished—was planning how the teeth should be lined up, since no examples of a full set of teeth have ever been found. Ironically, she derived much information from a tooth that VanderHoof himself excavated in a pile of demostylus teeth..

So, on September 4, Adele Panofsky finally stood in front of the completed skeleton—an embroidered paleoparadoxia emblazoned on the back of her shirt—to dedicate the results of almost twenty-years' worth of work. In the interim she has become a respected, self-taught paleontologist, and her restoration of the animal's skull has been distributed to a number of museums. A plaque which says "Dedicated to the memory of V.L. VanderHoof 1904-1964, geologist, paleontologist, friend of physicists" was the last addition, and SLAC's first experiment is finished at last.

—Karen Fox

Register to Vote by October 5

IF YOU HAVE MOVED, changed your name, or want to change your party affiliation since last election, your voter registration needs to be renewed. The League of Women Voters has provided displays with registration cards in the Auditorium Breezeway and the A&E building lobby. You must re-register before October 5 in order to vote in the presidential election on November 3. These materials have been provided by the local League of Women Voters in order to allow as many people as possible to participate in the democratic process.

—Nina Adelman Stolar

Norman R. Dean—1938-1992

NORM DEAN PASSED AWAY on July 25 at his home in La Honda after suffering from a long illness; he was 54. On August 1 a live oak was planted in his memory on the knoll in front of the SLAC cafeteria.

Norm's friends expressed that his caring came through in almost everything that he was involved in. This concern for others was obvious to those who worked with him. He didn't want to be in the spotlight, yet because of his success, he constantly found himself being relied upon. He was the kind of person who thrived on responsibility without asking for recognition.

Norm had the ability to motivate people to extend themselves beyond their usual limits. He succeeded in this regard partly because of the strict demands he placed on himself. He would never ask anyone to do something that he wouldn't readily take upon himself, and there was nothing asked of him that he would hesitate to do. Norm held those he worked with in high esteem, and was always concerned for their well being, adding an extra sense of meaning to the work he did.

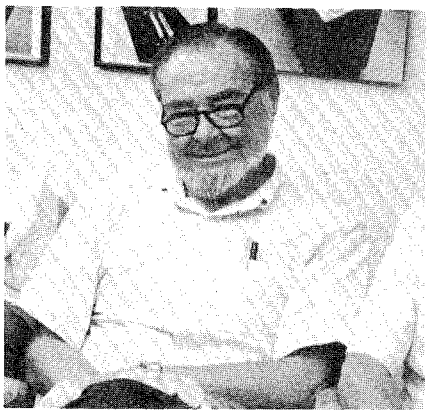
Gina Mastrantonio and Al Ashley read the plaque placed beneath the tree dedicated to Norm Dean's memory. About 75 people attended the August 1 memorial service.

At his home in La Honda, Norm enjoyed being with his close friends and his dog Swarte. He loved classical music, typically playing something like the 1812 Overture at about 100 decibels. Being out in nature, especially watching birds, brought comfort and peace to him away from the stress of his responsibilities.

It was at work that Norm was in his true element; he would rather have been doing what he did here than doing anything else. It was in his career that Norm's talent and dedication was so keenly demonstrated.

Norm's career is a lesson in what hard work and devotion can bring. It took him from an entry-level job at the Princeton Palmer Physics Laboratory to the position of Assistant Director at SLAC. He came to Stanford in 1962 to make the vacuum system on the CBX e-/e- collider installed at the Hansen Physics Laboratory function as it was intended. From there, Norm moved up the hill to SLAC in 1963, where he eventually became regarded as a world authority on accelerator and storage-ring vacuum systems.

Foresight and management skills brought Norm to the head of SLAC's vacuum group, where he was responsible for the design and construction of the vacuum systems for PEP and SPEAR. During this time, one of his more impressive achievements was realized after he donned the additional hat of Production Chief of the Klystron Task Force in 1985. Under his direction, the 5045 klystron tubes saw a 75% improvement in production efficiency. The system Norm established still operates



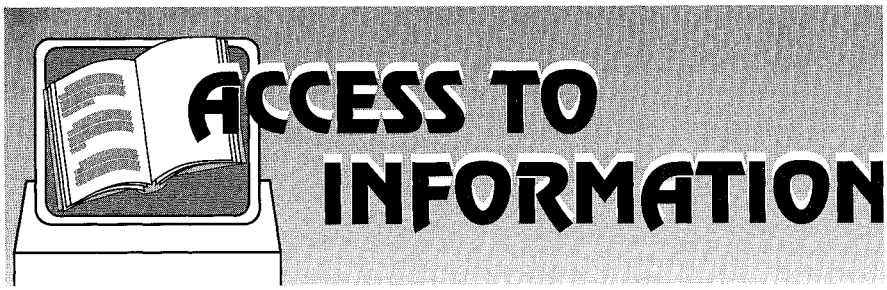
well above the commercial standards for klystron yields.

Because of his success, Norm was appointed to the position of Assistant Director in the Technical Division where he supervised Mechanical Engineering, Design, Vacuum, and Mechanical Fabrication. Later, Plant Engineering was also added to his list of responsibilities. Norm devoted himself to organizing these groups to work more effectively together, and to ensuring that they were cost-effective and responsible. If it was in SLAC's best interest, Norm would do anything that needed to be done, including making difficult and sometimes unpopular decisions without hesitation.

He did this not because it was his job, but because it was his vocation. He really loved his work, and the people he worked with were as important to him as anything in his life. This regard was captured by the inscription beneath the live oak that was planted in his memory on the knoll beside the cafeteria: "In Memory of Norman R. Dean who devoted his life to the success of SLAC."

Norm is survived by his fiancee Honey Rawlinson, his former wife, Joyce Dean, and his many close friends.

—Trevor Payne



IN LAST MONTH'S COLUMN we told you it is possible to access online information about job listings, then we didn't tell you how to do it. To correct that oversight, here is the information. To get online information about SLAC employment opportunities, enter the VM command: PRISM1 <CR>. (This selection is labeled "General Interest".) 7 <CR> (This is labeled "Employment Opportunities".) DISPLAY ALL (This lists the job opportunities.)

Electronic Preprints at the SLAC Library

You are probably aware of the electronic bulletin boards that distribute high-energy physics preprints in TeX format. What you may not know is that the SLAC Library subscribes to these bulletin boards, and now receives ten percent of the weekly collection of preprints electronically. The bulletin boards we subscribe to are

hep-lat	high-energy physics—lattice
hep-th	high-energy physics–theory
hep-ph	high-energy physics—phenomenology
alg-geom	algebraic geometry
astro-ph	astrophysics
cond-mat	condensed matter
funct-an	functional analysis
gr-qc	gravity-quantum cosmology

These automated bulletin boards run on software developed by P. Ginsparg at the Los Alamos National Laboratory. If you are interested in subscribing, stop by the library for an instruction sheet on how to set up a subscription, or call ext. 2411, or send e-mail to carolfey@slacvm.

The library's online database of preprints and reports, HEP, denotes each preprint available electronically with a bulletin board number and name. If you are interested in that preprint, and are a subscriber to the bulletin board service, you can get the preprint file directly, without waiting for the hard copy to be distributed. You can also post your own preprints to the appropriate service. *—Carol Chatfield*

Selecting and Buying Xstations, Modems, and Computer Manuals

Are you wondering how to buy an xstation, a modem, or computer manual? Are you concerned about network compatibility issues, which models are recommended, how much they cost, and how to arrange for network connections? Do you need to know which forms to fill out, who needs to sign them, and where they should be sent? SCS has installed information files on SLACVM, SLACVX, and on the UNIX network to help you with these three types of purchases. We hope to add other files to help with other computer-related purchases in the future.

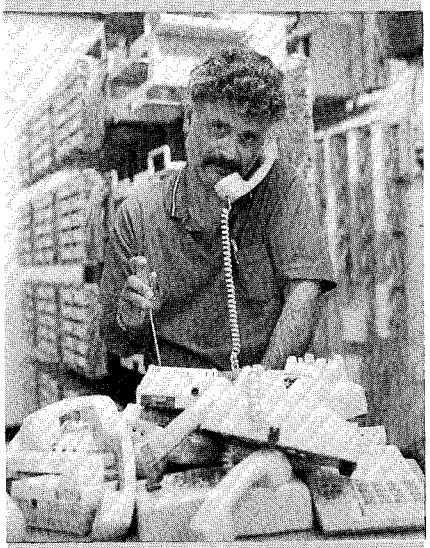
The files can be found on VM as XSTATION ORDERS*, MODEM ORDERS*, or MANUAL ORDERS*. If you forget, AID pointers have been installed. Just type AID MODEM, for instance, and you will be pointed to the MODEM ORDERS* file. *(Continued top of next column)*

On SLACVX, the files can be found as DOC$ORDERS:XSTATION.TXT, DOC$ORDERS:MODEM.TXT or DOC$ORDERS.MANUAL.TXT. On UNIXHUB, they are in /usr/local/doc/how-to-order/ as files xstation, modem and manual.

Please send any comments on the existing files or suggestions for future files to ARLA@SLACVM.

—Arla LeCount

GETTING YOUR PHONE REPAIRED



*Joe Fernandez, resident Pac*Tel service manager, repairing a phone.*

I tried making a call this morning but had no dial tone. What should I do? There are two choices.

• Log on to the SLACVM system. Then follow these steps: Enter the command: phone. On the menu you will be presented with, place the cursor on the line with the words: "2. Repair requests" Press carriage return. Fill out the repair request screen. Press function key 5 when you're finished to send the request to Telecommunications.

* Alternatively, call ext. 2200 and leave the information the recording asks you to leave.

Telecommunications checks for new repair requests twice a day and aims to have repairs completed within 24 hours of submittal (unless they require that hardware be ordered for some reason). *—Ilse Vinson*

Smaller Undulator Wins *R&D* 100 Award

WHEN ROGER CARR FIRST encountered an undulator—a key component of modern synchrotron radiation facilities—it was about a square foot across and no more than six feet long. Today, he says, scientists are building undulators which "weigh 20 tons, cost $1.5 million to build, and are 5 meters long. It's a tremendous machine, a very tricky thing to build. And I thought, there's got to be a cheaper way of doing this, because it's just getting out of hand."

Well, he thought right, and in return for a new design he's won one of this year's R&D 100 Awards, an award given out by *Research & Development* magazine for the 100 best inventions of the year. Over the past thirty years, its illustrious list has included the first electronic calculator (no bigger than a typewriter), the electronic video recorder, the automated teller machine and even the pop-top soda can.

While Carr's invention is not likely to become a household item, it has the potential to lower the ever-rising cost of building synchrotron radiation facilities which have blossomed during his scientific career.

After receiving his Ph.D. from UC Berkeley, Carr began working at SSRL in 1984, just a year after scientists here had introduced the undulator. An undulator is simply a special configuration of magnets that causes the electrons—you guessed it—to undulate. There are two rows of magnets, like opposing rows of teeth, above and below the beam. As the electrons circle in the horizontal plane, they are attracted first up and then down, tracing out a wave. An electron only emits radiation when it accelerates, which in physics jargon includes whenever it changes direction. So, the more the electron beam wiggles, the more radiation there will be to work with. The undulator produces up to thirty times as much radiation as the storage ring did alone.

Currently, most undulators are of the "adjustable gap" variety. The strength of the force field between two magnets depends on the distance between them, so, to adjust the field of the undulator, one has to alter the gap between the two rows. But that adjustment isn't so simple. There's a ten-ton force pulling together magnets that must be precisely positioned to a thousandth of an inch. Huge amounts of machinery are needed to move these magnets and then hold them exactly in place, which is why undulators are so expensive.

Roger Carr

Instead of pulling against the forces attracting the magnets together, Carr's undulator is built with a fixed gap; it is adjusted only by moving the magnets horizontally. "You just slide it back and forth," he says, "There are no gears and wheels and pulleys and motors and bells and whistles that you're stretching. This is a lot less metal, tons and tons less."

Carr began work on his idea during his fellowship in Grenoble, France. His research left him with extra time, which he spent on the computer creating mathematical models of undulators.

The models looked good, so when he got back to SSRL he decided to actually build this new "adjustable phase" undulator. Conveniently, a number of magnets from PEP were out of use and one of the beam lines had room for another undulator—the materials were already waiting for him. Even though the cost of the project would be pretty low, Carr still met with some problems. "SSRL's management wasn't too wild about it," he recalls, "They really didn't like it and even the last memo I had on the subject said don't do it. So, I did it anyway."

The new undulator worked as his model predicted. The magnetic field was easily adjusted and the radiation was nearly identical to what was normally produced. The undulator was fully functional, yet substantially smaller. The result, Carr says, is that his undulator costs anywhere from 50% to 80% less than an adjustable-gap undulator.

Stanford has recently applied for a patent on the adjustable-phase undulator. While Carr's primary goal was simply to publish his work in the open literature, he says that only a patent can make a company's commercial venture on the new undulator worthwhile. Still, Carr doesn't expect much financial reward for his new invention, "After they pay the lawyers, I'm thinking maybe I'll get a new set of bicycle shoes."

—Karen Fox

(Cont'd from p. 1)

produces Zs five times faster than last year, and the standard up-time is raised to 70% from 30%. Beams are better focused, and the polarized source has performed at record levels.

"Around the world people have copied the SLAC polarized-beam design," said Lowell Klaisner, Assistant Director and head of the polarized electron source project. "I think our recent performance has raised the standards for polarized sources, and people still look to us as leaders in this kind of effort."

While non-polarized Z particles have been produced at other colliders, the SLC is the first to collect any polarized ones. A polarized Z is created from the annihilation of a polarized electron with a positron, but particles that travel around and around in the storage ring common to most colliders lose their polarization, making it impossible to create a polarized Z. In a linear collider like the SLC, however, each particle only travels a semicircle before colliding in the middle, and this shorter trip allows the electrons to retain the necessary polarization.

Experiments with polarized Zs will help physicists to test the currently accepted particle theory, the Standard Model. This is one of the reasons why the high-energy physics community is so encouraged about what can be done here.

The renewed sense of pride and achievement was perhaps best captured by Marty Briedenbach, co-spokesman of the SLD collaboration, "It was really wonderful to go to a conference and have physics results," he said. "The comments that we heard were basically that SLAC is back in business."

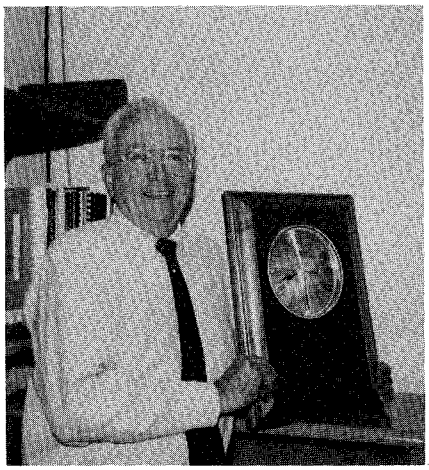
"In the last month I've been to conferences in Hamburg and Dallas," said Nan Phinney, coordinator of the development program. "High energy physics people are very excited. They're really stunned by the performance of the gun, by the luminosity and the reliability that we have achieved with this machine, and by the performance of the SLD detector."

—*Trevor Payne*

1000

Photos by Georgia Row

Phillips Awarded Free Electron Laser Prize



Georgia Row

ROBERT PHILLIPS, of the Klystron department, is this year's recipient of the FEL Prize (free electron laser), awarded annually since 1988 by the Institute for Laser Technology. Phillips flew to Kobe, Japan, the site of this year's International Free Electron Laser Conference, to be honored for his innovative work in the development of laser technology. Phillips invented the award-winning device, a fast-wave traveling-wave tube called the ubitron, in 1957, while doing military research with General Electric. According to Phillips, during that time they were very successful, achieving new power records at each phase of the project. However, after seven years of working full-time on the project, military research and development was cut and the project discontinued.

During these years the military kept Phillips on a tight tether, so he was unable to adequately publish his results. And perhaps for this reason the physics community was not aware for a long time of what he had done. "My work from 1957 to 1964 was always highly classified. The military was very reluctant to let me publish," Phillips said. "The really hot new results were never allowed to be covered in papers."

Phillips related a story about a paper he gave in Mexico City in 1959. He was approached by a gentlemen with a foreign accent whose delegation, as Phillips remembers, "was very interested in my work, as they were doing similar work in their country. He [the foreigner] said he would like to compare notes." When the man wrote down his address, Phillips saw the name M.B. Golant, USSR: "Back then, in 1959, it made me gulp." Phillips had to write to Golant telling him there was nothing he could do about it, the cold war having frozen his pen.

Phillips said it was really too bad, because the work Golant was doing was quite exciting. The Russian was working on the gyrotron, a powerful fast-wave generator, which utilized similar principles as the ubitron. This same technology was developed years later in the US for such important purposes as plasma fusion. Phillips commented that it would have been a good exchange: "We would have gained more than we lost."

Other factors aside from the military secrecy may also have kept his work obscure. For example, because of poor communication, researchers outside of the power tube community did similar research quite unaware of Phillips' previous accomplishment. Ten years after the discontinuance of Phillips' research, John Madey, a Stanford physics professor, independently developed a high frequency version of the ubitron, which he called the free electron laser. In the face of these handicaps, Phillips is, needless to say, ecstatic about the belated recognition: "Gradually the physics community has become aware, and they've chosen to recognize it [the ubitron], and call attention to it; this is a very, very fine gesture.

"I'm impressed with what the physics community has done," Phillips continued. "It would have been easy for them to slough it off, [thinking] that was a long time ago, and done at a much lower frequency, so it doesn't count."

Even though in 1987 he gave the opening paper on the history of the ubitron for the Institute's yearly conference, Phillips was unaware that the award existed until he received the letter telling him that he was going to receive it. The Institute only started awarding the prize in 1988, so it took Phillips by surprise.

Phillips will be in Japan for one week to attend the full conference, and then he will be right back to work at SLAC. As group leader in tube R&D, he is involved in some exciting projects, including work on the new klystron for the B-factory, as well as following up on the success of the newly developed XC-5 klystron for the NLC, for which he created the output circuit.

—Trevor Payne

EVENT CALENDAR: OCTOBER 1992

All meetings are held in the Orange Room, unless another location is listed. Please notify the Public Affairs Office of any additions or changes by calling ext. 2204 or sending e-mail to NINA@SLACVM.

October 1
SLAC/SSRL MERGE

October 2, 9:30 AM
Stanford President Casper Inauguration
Frost Amphitheater
Stanford Campus

October 3, 10 AM–4 PM
Family Day
The Green/Cafe
Picnic Area/
Auditorium/Breezeway

October 21
SLUO Annual Users Meeting
Auditorium
(D. Hitlin, A. Breakstone, M. Helton)

October 21
SSRL Workshop

October 22
SSRL Annual Users Meeting
Auditorium

October 23–24
SPC Meeting

3 SUMMER MONTHS + SCIENCE = 20 STUDENTS

Georgia Row

Pictured above are this year's bumper crop of young scientists. Back row, left to right: Omar Rodriguez, Edward Chan, Michael Crivello, Jeffrey Gima, Al Green (SSP Director), Andrew Gerber, Susannah Green, Dale Lambert, Carol Brooks, Murray Henderson, Carla Levy; front row, left to right: Lorraine Lim, Elizabeth Vokurka, Lori Rhodes, Sarrah "Avon" Russell, Robin Coxe, Stephanie Diemel, Hung Quan, A. Heather Coyne, Astul Parada, Howard Friedman.

THE SLAC SUMMER SCIENCE PROGRAM (SSP) was in full swing for the twenty-third straight summer. Twenty university students got the chance to learn more about science, and get some hands-on experience, or as Paul Corredoura, a member of the selection committee, said, "to let them know that there is some very interesting stuff out there," that physics outside the classroom is a good time.

Teresa Cervantes, the SSP coordinator, said that another goal of the program was to "focus on students who are under-represented in the physics world." For this reason women and minorities are encouraged to apply, with hopes that they will be given the additional encouragement that may have previously been lacking.

During the students' nine-week stay, their practical work assignments were supplemented with a Monday through Thursday morning lecture series and Friday field trips. SLAC also sets them up on campus and gives them a $250 per week stipend; it's no wonder that competition is high, with 250–300 people applying each year for the twenty spots. But Corredoura said that the benefits of the program go both ways. People at SLAC get some top-notch help, as well as some fresh blood in the office to liven it up a little.

Supervisors, like Courredoura, try to think of projects that give students a goal to work towards and a sense of progression and completion. Corredoura said that they may not always have time to complete what they start, but at the very least they get to "play with some things." For example, Corredoura's understudy, Edward Chan, worked on an adaptive algorithm for a digital signal processor. Fun stuff!

According to Chan, the field trips were fun, but he said that the lectures can be a bit much: "I get about two or three words of what they say...It is interesting, but there are a lot of interesting things I don't understand." Actually, Chan said that the work experience he is receiving is the best part of the program,is getting the feel for real working science.

Welcome Guests and New Employees

Daniel Brau, Accelerator; **Branden Cowan,** Klystron; **Roderick Curry,** Klystron**James Dunne,** Public Affairs; **Karen Fox,** Publications; **Audie Hickey,** Power Conversion; **Ruben Hunter,** Mechanical Fabrication; **Paul Keiser,** Mechanical Fabrication; **Aric Keller,** Mechanical Fabrication; **Robin Mair,** Physical Electronics; **Patricia Moore,** Information Services, Science Education; **Robert Pushor,** Mechanical Design; **Keith Reynolds,** Environment, Safety & Health (P&A); **Yves Roblin,** Experimental Group A; **Stephen Schaffner,** Experimental Group C; **Thomas Sommer,** Accelerator Department; **Linda Stuart,** Experimental Group A; **Sami Tantawi,** Klystron; **Eric Vella,** SLD; **Richard Yeager,** Business Services Division.; **Arthur Zeroulias,** Mechanical Fabrication

3rd Family and Physics of Flavor

Trevor Payne

Martin Perl, Judy Finer, and Rafe Schindler at the Perl Fest, a dinner held in Martin's honor the last Friday of the Summer Institute.

THE TWENTIETH ANNUAL SLAC Summer Institute has come and gone. This year's topic was "The Third Family and the Physics of Flavor," poetically describing the more-recently-found subatomic particles, including the tau lepton discovered by SLAC's Martin Perl.

The members of this third generation are heavier and require more energy to produce than their lighter cousins. The top and bottom quark correspond to the tau and its neutrino companion; the quarks interact through the strong force, whereas leptons which reside outside the nucleus are controlled by the weak force.

The first seven days of the institute were reserved for a pedagogical review of these particles. Advanced students, most at the post-doc level or further, were brought up-to-date on what has been happening in that particular area.

"In principle," said David Leith, an organizer of the institute over the past twenty years, "all of the people who have been at the school are up to speed and able to listen to that [topic] in an informed way."

In the words of Leith, "If I tried to classify it [the institute] with one word, it would be youth. The lecturers of the school portion all were quite a bit younger than in past years. And the participants lacked age as well. There was a different energy level—much livelier."

The last three days of the institute presented new results in such areas as B physics, neutrino physics, and cosmology. The inhomogeneities in the microwave background radiation found by the COBE experiment and described by George Smoot, and the detection of solar neutrinos by the Gallex experiment, described by Frank. Hartmann, were, according to Leith, "startling results."

An uneven microwave background shows that matter was distributed unevenly just after the big bang. Finding these inhomogeneities, therefore, is an important step in explaining how structure in the universe was formed. Theoretically, gravity in a non-uniform setting would enhance the denser regions making the galaxies, and eventually the stars and the planets.

The Gallex experiment exposed for the first time the lowest energy neutrinos from the sun. However, the overall rate of neutrinos seen was about two-thirds the level predicted, which could be explained if the amount of low-level neutrinos is as expected, and the high level are one third as predicted. This type of dissonance between experiment and theory is invigorating to physics, and possibly foreshadows other imminent breakthroughs.

Another notable talk was that of Michael Fero on the polarized Z results at SLC. This is a matter of much obvious local interest, as the success of the Z studies is integral to SLAC's immediate future.

"The first results from SLD were exciting," Leith said. "It was a nice talk, an important talk...the auditorium was full."

Because the focus of this year's institute was the tau lepton, and Martin Perl was instrumental in its discovery, a celebration was held in Perl's honor. The last day was devoted solely to the new results achieved on tau physics from colliders worldwide.

"The last two days were called the Perl Fest, recognizing Perl's achievements," Leith said. Attending in honour of Perl were many prominent physicists from throughout the world. Also, many people from Perl's early years in Michigan came to wish him well and commented on their past with him in glowing terms. In Leith's words, it was a real "Marty Party."

—Trevor Payne

BEAMTIMES, LIFETIMES, AND SLACTIMES

SHARON TRAWEEK USES AN anthropological point of view to investigate scientific communities, in particular the international community of high-energy physicists. After nearly twenty years of study, including several years at SLAC and KEK, she has observed:

- how knowledge, especially so-called craft or tacit knowledge, is transmitted from one generation to the next in a community which is committed to discovery, and that crucial features of their knowledge are never written down;
- how different styles of research practice emerge and survive;
- how disputes and factions begin and evolve;
- how national and international political and economic issues shape and are shaped by these physicists and their work.

Community Common Sense

All communities develop their own common sense. It is not taught formally; there are no textbooks on it. The content of common sense can be complex and an outsider may have difficulty identifying it. Using her field observations, Traweek studied the way common sense in a HEP community is defined.

Traweek noted that the people who are doing science have changed since the 1930s. In the 1930s, nearly all scientists were caucasian males either from rural areas or working-class families. Today, the demography has changed for those scientists practicing biology and engineering, but for physicists and chemists, it has hardly changed.

Traweek compared and contrasted the practice of high-energy physics in Japan and the US. She described the social allocation of knowledge by examining how jobs are divided up. In Japan, for instance, Group Leaders (mostly men) do the tasks that Administrative Assistants (mostly women) do at SLAC. Postdocs play a very important role in high-energy physics in the US. In Japan, professional engineers at private companies do the work that post-docs do here, and contract workers assemble the experimental apparatus.

According to Traweek, many US post-docs leave the field about six years after their Ph.D., and the remaining people have no idea where the postdocs go. Traweek thinks that it is strange that the US high-energy physics community "gives up its young" so easily, especially after so much time and energy has been spent on their upbringing; other communities don't do so.

Women on the Edge of Science

Women constitute a minuscule percentage in high-energy physics in both the US and Japan: about 3% of the employed high-energy physicists are women. The number is significantly higher in Europe, possibly because of the stronger class systems there, with women scientists typically coming from the upper classes. In all countries, women are kept on the fringes of high-energy physics.

Generation differences in Japanese women physicists were also noted by Traweek. Senior Japanese women, for instance, usually got their physics degree outside of Japan, but returned to find jobs. Labs led by these women have a friendly and warm environment where the students feel trusted. These women have learned how to negotiate with industry to achieve their goals, even though they receive less resources than their male colleagues.

Another important influence on science is the source of its funding and if there are sufficient funds. This influence has been changing over the past fifty years. Traweek observes that international science is facing a crisis brought on by the scale of contemporary big science, shifts in the world economies and politics, and demographic and political changes which influence who can become scientists, do research, and define problems. She believes that these major trends in the ecologies in which scientists and engineers work will fundamentally change the practices, organizations and education in science, including high-energy physics.

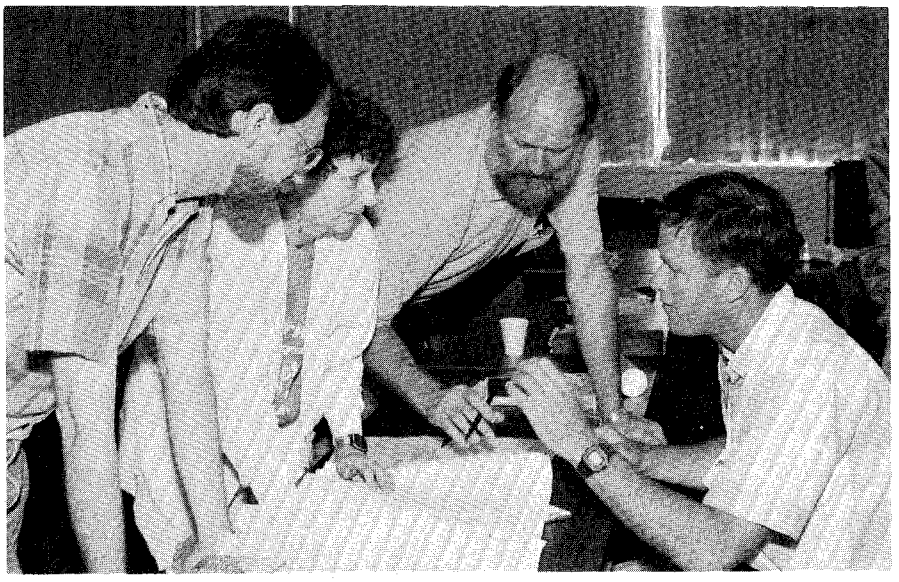
About the Speaker

Sharon Traweek spoke at a recent WIS-sponsored talk about women in national high-energy physics labs in the US and Japan. Traweek is an Associate Professor in Anthropology at Rice University in Houston, Texas, and the author of *Beamtimes and Lifetimes: The World of High Energy Physicists*, a book based on her anthropological study of SLAC, Fermilab, and KEK (the Japanese national high-energy physics lab). Her next book, on Japanese big science, will be completed by the end of the summer.

A videotape of the talk is available for overnight loan from the SLAC library.

—Janet Dixon and Cherrill Spencer

Summer Science Workshop



Andria Erzberger, lead teacher at the workshop, involved in lively discussion with some of the Summer Science Workshop teachers.

THIRTY-THREE OF THE NATION'S high school physics teachers went back to school for two weeks this summer by attending the Summer Science Workshop offered at SLAC. The workshop gave them new insights into the world of particle physics, as well as a reminder of what it means to be a student.

According to Helen Quinn, the science education coordinator at SLAC, this type of experience is designed to give the teachers "an eye on the world of real science." Quinn hopes that by seeing the scope of the projects, the teachers will get an impression "of what physics is all about, [that there was] a progression from the physics of Newton to the physics of today."

Having high school teachers understand that physics continues after the text book is shut is very important. If a bigger perspective is not shown in the classroom Quinn suggested it can be very disheartening to aspiring students: "Most of what you teach in a high school physics course is the physics of the eighteenth and early nineteenth century—it comes across as a dead subject." The goal of the workshop is to inject some freshness, keeping the science in high schools current.

The visiting teachers are able to make connections with physicists at SLAC. If a student expresses a passion for the subatomic, the teacher will not only have personal knowledge to share, but be able to put the student in direct contact with a physicist in the field. This type of connection is also very valuable for those teachers who themselves have a special interest in particle physics. For them as well, the text book can be limiting.

This year's conference coincided with the Third International Symposium on The History of Particle Physics, giving the teachers the opportunity to hear first-hand many of the important people in the modern physics world over the past thirty years. Most teachers found the opportunity to attend parts of that symposium and to interact with its participants an exciting experience.

—*Trevor Payne*

FAMILY DAY

BRING YOUR WHOLE FAMILY, your relatives, friends or neighbors to the 1992 SLAC Family Day, October 3, from 10 AM until 4 PM. This year's event celebrates the thirtieth birthday of SLAC, and special brightly-colored t-shirts will be sold for only $6.00 each. The free lunch menu features hamburgers, hot dogs, sausages, baked beans, and more. For the children we have Popsicles, soft drinks, and cotton candy, with lots of games to play, prizes to win, and magic shows from Pipi the Clown. We have face painters, fortune tellers, balloons, and an inflated "Jupiter Jump" for the kids to jump around in. The watermelon-eating contest will be as much fun to watch as to be in. Plenty of cold beer will be on hand at only $.50 a cup.

Remember that great band that livened up the Juneteenth celebration? They'll be there, too. A frisbee-catching dog will put on an exhibition, and we'll also have a dunk tank to sink your fellow co-workers in, several volleyball nets set up for pick-up games, guided tours of various SLAC facilities, a raffle of donations from local merchants, and more. Plan to come to this fun event.

—*The Family Day Committee*

The Interaction Point © 1992, is published by Information Services of Stanford Linear Accelerator Center. Editors: Evelyn Eldridge-Diaz and Bernie Lighthouse. Photographer: Tom Nakashima. Interns: Trevor Payne and Karen Fox. Deadline for articles is the first of every month. Submissions may be sent electronically to TIP@SLACVM or by SLAC mail to TIP, MS 68. Phone 415-926-