

The Interaction Point

Events and Happenings
in the SLAC Community
November 1996 Vol. 7, No. 8



How It Takes at Least Three Villages to Raise a Cavity

Story of the PEP-II RF Cavity

by Bob Rimmer, Matt Allen and Heinz Schwarz

THIS IS THE STORY of the development of the radio-frequency (rf) cavity for the B-factory project, also known as PEP-II. The rf cavities are structures that transform microwave power (from huge megawatt klystron amplifiers), into accelerating voltage to maintain the energy of the electrons and positrons that are collided together in the physics experiments.

It soon became apparent that a powerful and reliable rf system would be needed to maintain the extremely high beam power in the new machine. When a beam goes through a cavity it causes it to "ring" electrically much as a large bell rings when struck. A cavity can ring in many ways or modes and only one of these is useful to accelerate the beam; all of the others must be eliminated to allow the rf system to do its job and to keep the beams stable. For PEP-II this requires a new kind of cavity design to suppress these higher-order modes (HOMs) far more strongly than any machine currently operating, without significantly reducing the operating efficiency, otherwise construction and operating costs would be increased.

As the B-factory project gathered momentum key personnel
(cont'd. on page 6)

VM Migration Status Update

by Ilse Vinson

SCS PLANS TO REMOVE the ES9000 mainframe that runs VM by the end of 1997. To do that, we will phase out the remaining services on VM. After March 1, 1997, you will need to justify continued use of VM as described on the Web VM Migration page at <http://www.slac.stanford.edu/comp/vm/vmmigr.html>. (To access a Web page on VM enter the commands: web followed by go page-location, e.g., go <http://www.slac.stanford.edu/comp/vm/vmmigr.html>) Because some business applications won't be converted by then, Business Services Division account (\$BS) users may continue VM use without prior approval after this date.

Several classes are offered at SLAC to help VM users move over to replacement applications. Consult the Web page at <http://www.slac.stanford.edu/comp/edu/calendar.html> for the schedule of the classes *Beyond VM* and *Eudora-Pro*, the mail system replacement on the Mac and PC.

If you still use VM, please fill out the VM Migration Questionnaire at the Web URL <http://www.slac.stanford.edu/comp/vm/vmques.html> to assist the VM Migration Committee in making the necessary decisions leading up to the SLACVM shutdown.

The proposed implementation dates for SLAC Business Information Systems (BIS) are as follows:

Budget application	2/1/97	Purchasing Pilot	7/1/97
HRMS & Payroll	7/1/97	Financials application*	10/1/97
Purchasing site-wide	10/1/97		

People are responsible for moving their own applications. The Web VM Migration page describes replacement plans for many applications. For example, the SLAC Library data will move to UNIX on March 1, 1997, and ELDREQ will be replaced in October 1997 by the PeopleSoft Purchase module. SCS is in the process of contacting all ELDREQ users. If you would like to know the migration plan for an application that you do not see on this page or want more information than is given, contact the application owner.

Visit the Web VM Migration page for further information about replacement resources, and look for further updates in future issues of the *Interaction Point*. If you have any questions or concerns that are not addressed by the VM Migration Web page or our classes, please contact the Help Desk at help@slac.stanford.edu or x4357. If you wish to have an SCS representative meet with your group to discuss specific requirements, call the Help Desk to schedule an appointment.

*Includes: Project Costing, Accounts Receivable, Accounts Payable, General Ledger, Asset Management and Stores Inventory.

Techpubs to Give Second Poster Workshop

THE SECOND IN A SERIES of three workshops offered by the Technical Publications Department on making posters for scientific conferences is scheduled for November 15, at 3 p.m. in SCS Conference Rooms A&B. This workshop will focus on using Adobe Illustrator (on Mac or PC) to create large-scale printouts that can be used as conference posters. The workshop will demonstrate how to use an established suite of poster templates developed especially for SLAC authors and a few basic positioning and sizing commands to create one-piece posters that are visually compelling and easy to read.

The first workshop in the series (held in October) demonstrated basic design and paste-up techniques for building posters "the old fashioned way" without using graphics software. Notes from the workshop are available on the WWW as part of the TechPubs Help Pages, at <http://www.slac.stanford.edu/grp/techpubs/help/graphics/posters/basics.html>. The third workshop in the series (not yet scheduled) will demonstrate using Microsoft PowerPoint to build posters.

The poster workshops are coordinated and led by Terry Anderson (Computer Graphics) and Maria Breau (Information and Document Technology).

Like It or Not

Personal Info Available Electronically

by Diana Gregory

ANYONE LISTENING to the radio or reading a newspaper in mid-September probably heard about the Lexis-Nexis database. You also may have heard about it from a widely distributed e-mail message.

The available data in the P-Trak database includes current and former addresses, birth dates, and even maiden names. It is supplied by Lexis-Nexis to lawyers and law-enforcement officials trying to track down witnesses, debtors, or heirs, but the information is apparently available to anyone willing to pay a search fee of up to \$100. The database service has been operating since June.

Lexis-Nexis officials have said that searchers will not be able to find social security numbers, mothers' maiden names, credit or medical history, or personal financial data as the anonymous e-mail messages were accusing. Lexis did say that the service initially provided social security numbers, but that feature was dropped in June

after earlier complaints—but also noted that social security numbers are "available on the Internet from a number of sources."

To have your name removed from P-Trak, write to Lexis-Nexis, PO Box 933, Dayton, OH 45401-0933 or FAX to (513) 865-1930. Lexis-Nexis has said it will honor individual requests to have names removed. The deletions, however, may not take place for 60 days, when the database is updated. The number to call for verification of removal is (513) 865-6800.

Of additional interest to SLAC, home address information is available on the Web at <http://www.infosource.com>. This site calls itself "The Most Comprehensive Directory on the Internet," and has some useful information, including the "people" directory. The problem is that if you list your home address in the phone book, it has a link to a map service, and people can click on the link and get a map that shows them exactly where you are living.

"Ask Georgia"



HAVE A QUESTION about your retirement plan? Ask Georgia Printup at x2357 in the Benefits Office, located in the A&E Bldg., R236. Teresa Cervantes, x2356, can answer questions about medical plans and short- or long-term disability. Now is a good time to think about your benefits since November 1–22 is the open enrollment period to make changes to your plan. Individual appointments to discuss your benefits may be scheduled by phoning Georgia or Teresa. Materials will be mailed the end of October; if you have not received your packet at your home address by November 7, call the Benefits Office. The annual Benefits Fair* will be held from 10 a.m. to 3 p.m. on November 14 in the auditorium foyer and breezeway; representatives from retirement and health and welfare plans will be there to answer questions.

*SLAC Medical has announced that retired employees only can get flu shots between 10 a.m. and 2 p.m. in the auditorium breezeway on the day of the Fair.

SLAC Represented
**DOE Day in Oakland
Appeals to Public**



THE DEPARTMENT OF ENERGY became the focus of attention on October 10 when Bay Area laboratories and the DOE hosted exhibits, entertainment, and prizes for the crowds at City Center Plaza in Oakland.

The purpose of the annual event is to give the general public a glimpse of the many facets within the Department of Energy. SLAC was represented by P. A. Moore and Nina Stolar who distributed flyers and advice on science careers.

"I think DOE Day is a great way to bring science to the people since several thousand walked through the Plaza during the period we were there," said Stolar.

Welcome Guests & New Employees

THE FOLLOWING PEOPLE joined SLAC in September and early October: **Evgeniy Antokhin**, BaBar; **Brenton Baugh**, ARD-A; **Chih-Hsiang Cheng**, Exp. Group B; **Carol Chao**, SSRL; **Nels Christensen**, MFD; **Mark Convery**, Exp. Group B; **Philip Davis**, Tech Info Services; **Sergey Ganzhur**, BaBar; **Joseph Grandov**, PEP-II B Factory; **Kazumi Hasuko**, SLD; **Heino Henke**, ARD-B; **Donald Hughes**, Klystron; **Irwin Lee**, Exp. Group E; **Cecile Limborg**, SSRL; **Stephan Mikhailov**, BaBar; **Masahiro Morii**, Exp. Group C; **Steven Myers**, Exp. Group A; **Benoit Parise**, MFD; **Ann Redfield**, Tech Info Services; **Victor Rey**, Klystron; **Yue Yang**, SSRL

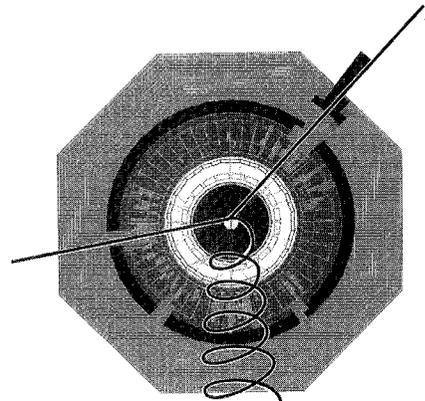
1996 Summer Institute Only a Memory

by Jennifer Chan and Lilian DePorcel

THE END OF SUMMER brought together a diverse and international group of young and senior physicists to study how QCD, the theory of strong interactions, is being probed at present-day colliders. The SLAC Summer Institute, held from August 19–30, focused on a series of lectures covering in-depth aspects of the strong interaction.

Gathered in the auditorium, approximately 240 participants from 16 countries displayed deep attention as James D. (Bj) Bjorken opened the school with a lecture addressing QCD questions, challenges, and dilemmas. Davison Soper (Oregon) followed with a series on QCD perturbation theory. Adam Falk, an ex-SLAC theorist now at Johns Hopkins University, lectured on "Heavy Quark Expansion of QCD." The series on QCD studies in hadron-hadron collisions was given by Michael Albrow from Fermilab. Returning for an encore after a three-year absence, TomDeGrand eloquently addressed lattice gauge theory. Phil Burrows, from MIT and a well-known face in the SLD/SLAC community, captured the students' interest with his lively series on precision tests of QCD in e^+e^- annihilations. The lectures on the "Search for Glueballs" were given by Walter Toki, also an ex-SLACer, currently at Colorado State University. The second week of the school began with Wesley Smith's (Wisconsin) lectures on QCD Studies in electron-proton collisions, followed by Al Mueller (Columbia University) on "Low x Phenomena." The school closed with Jim Wiss' (Illinois) talking on QCD in heavy quark production and decay.

During the School, stimulating afternoon discussion sessions, spirited by our local provocateurs,



took place in the Orange Room giving students an opportunity to probe topics that most interested them. The Institute concluded with a three-day topical conference on recent developments in theory and experiment.

The Institute was not only about physics, but also was an opportunity to tour experimental facilities and to learn about ongoing research projects. This year more participants than ever signed up for the annual tour of the Lick Observatory, sparked by curiosity and interest in the recent discovery of new planets beyond the solar system. Besides gazing at the stars, the moon, and Jupiter, participants were treated to an informal symposium covering the instrumentation and spectrograph used for the planet discoveries.

The Summer Institute was a strong attraction for young physicists from around the world who eagerly learned how QCD is explored at current colliders. The Institute was not all hard work, however, as the participants enjoyed dinners in the Cafeteria picnic grounds, a popular weekend outing, and an exciting soccer game with the unbeatable SLAC team.

Photographs that capture the essence of the 1996 Summer Institute are displayed in the Central Lab outside room 240.

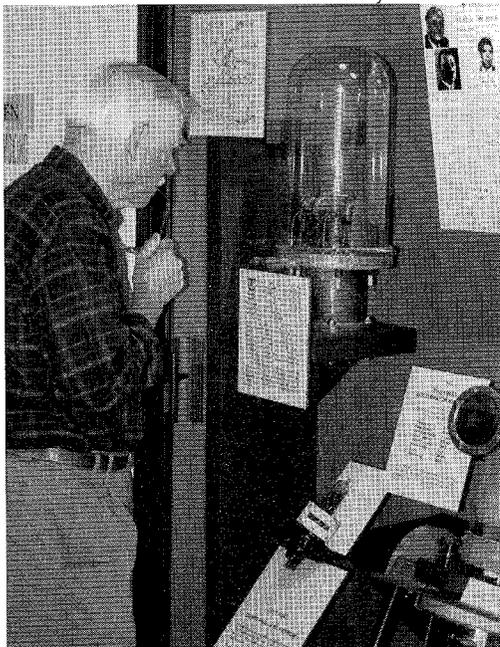
Visitor Center, Klystron Exhibits Str

AN OPEN HOUSE for campus representatives, local business leaders, and mayors and city managers was held at the new SLAC Visitor Center on Wednesday evening October 2. The purpose of the social event was to introduce our neighbors to the SLAC klystron exhibit, developed by George Caryotakis, and the Visitor Center, developed by Helen Quinn.

Director Burton Richter welcomed the group of approximately 150 guests with a short talk in the auditorium, followed by comments from Associate Director Arthur Bienenstock. Staff from the DOE Oakland Operations Office also visited, as well as reporters from the *Palo Alto Weekly* and the *Menlo Park Almanac*.

Lauren Friedman, at SLAC with her parents, enjoyed the talks. "They helped me to see where physics is heading in the next few years." William Friedman, Chairman and CEO of Allergene, was interested in details of experiments explained by Stanley Brodsky. Other scientists who provided explanations about the exhibits were Michael Peskin, Matt Allen, and Karl Brown. Guests lingered over the displays until closing time.

Photos by P. A. Moore



Perry Wilson, accelerator physicist, views the earliest klystron.



Glenn Tenney, recently retired from Plant Engineering, congratulates Adele Panofsky on her display of the Paleoparadoxia.



Theoretical physicist Stan Brodsky.



Bertha and Max Dresden, visiting scholar, chat with Nina Stolar from Public Affairs. Stolar coordinated the activities for the Open House.



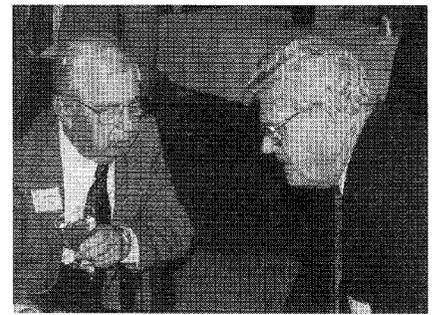
Above: In the Visitor Center a group centers around SLAC theorist Michael Peskin as he creates a particle collision with bare hands. (L to R) Lauren Friedman, William Friedman, Kathryn Henniss (7 Pubs), David Knight, and Eleanor Knight.



Anatoly Krasnykh, left, and Greg Loe enjoy the Visitor Center exhibits.

Right: Pief Panofsky, SLAC Director Emeritus, and Marvin Chodorow, Star Physics Department, in discussion with Ted Moreno views exhibits.

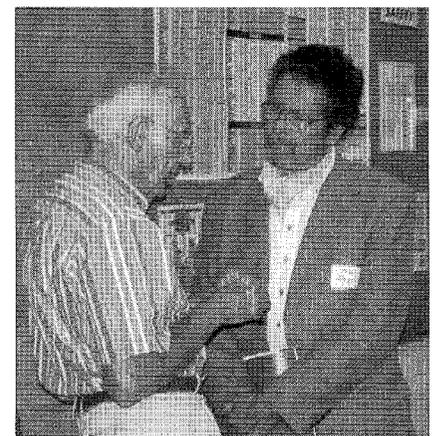
Strengthen Community Links



Ed Ginzton, left, SLAC and Varian Emeritus, and Richard Taylor, SLAC Nobel Laureate, deep in conversation.



Jim Turner, DOE Oakland Operations Office, views the klystron exhibits with physicist Matt Allen on his left.



Karl Brown, left, Research Division, and Tom Sege, Varian, catch up on news.

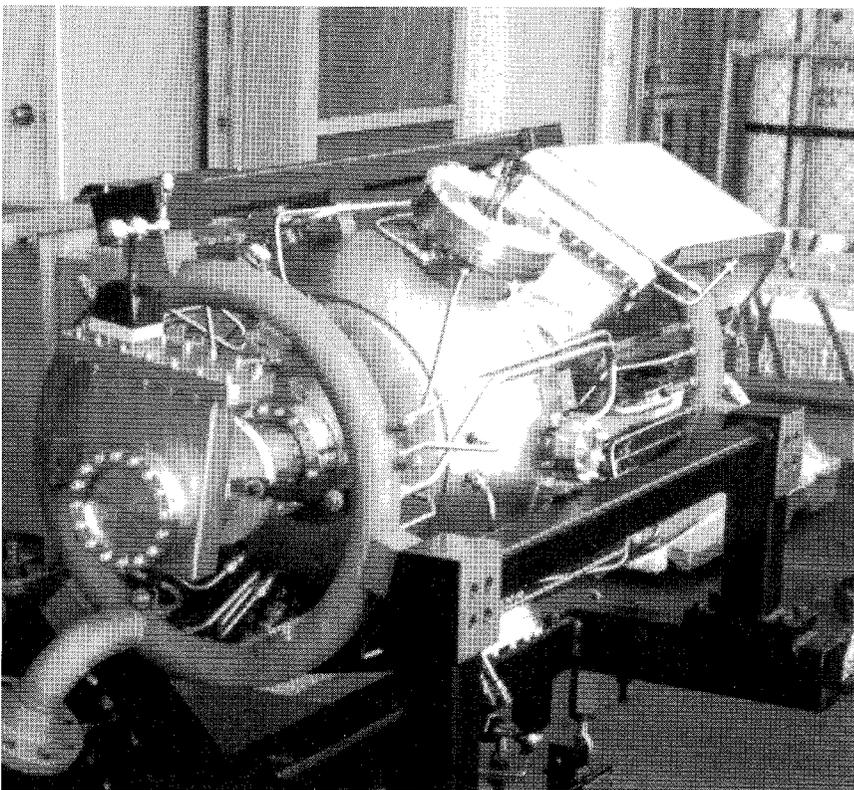
PEP-II RF Cavity

(cont'd. from page 1)

were drafted from each of the participating labs, SLAC, Berkeley (LBNL), and Livermore (LLNL). The team assembled to concentrate on the rf system drew people from all three labs and has been a prime example of how this project has benefited by close collaboration at all levels.

The Berkeley rf contingent, including Glen Lambertson, Bob Rimmer, and Ferd Voelker, set about developing a concept for the B-factory cavity. They added extra openings or "waveguides" to the body of the cavity, placed to afford the maximum suppression of the worst unwanted mode while simultaneously damping all others to acceptable levels. The idea was further developed using computer models built at SLAC by Kwok Ko, Cho Ng, and Rand Pendleton, with analytical help from Norman Kroll, and was validated by measurements on a full-size model cavity at Berkeley by Bob Rimmer and David Goldberg.

This rf design was so successful at the first attempt that the emphasis moved on to designing a high-power test model and developing the manufacturing technology to be used for the production run of cavities. John Hodgson at SLAC performed detailed 3D finite-element thermal and stress analysis to optimize the cooling scheme and achieve the lowest overall stress in the cavity body. Long-time SLAC engineer Knut Skarpaas developed the fabrication plan for the high-power cavities, in which brazed port assemblies are electron-beam welded into fabricated and electroformed bodies. First Tom McCarville and then Curt Belser



The first PEP-II rf cavity assembly (photo courtesy Bob Rimmer).

and Mark Franks played key roles in coordinating the R&D at Livermore. LLNL's Doug Berger developed the deep-penetration e-beam welding parameters, while Chris Stephanie, also at Livermore, developed a plating process to form thick jackets over the body water channels. SLAC's Joe Steiber and Hank Antilles and LLNL's Larry Cadapan designed the cavity raft assembly while mechanical engineer Joe Saba and designer Al Constable finished the design of the high-power cavity and produced a detailed drawing package.

The high-power tests of a prototype cavity were a complete success, meeting all of our design goals and validating both the rf design and the production technologies. On this basis and analysis of costs the project management decided to build the cavities

within the three-lab collaboration, under system manager Matt Allen, system engineer Heinz Schwarz, and LBNL physicist Bob Rimmer, with subcontracts to Bay Area machine shops and select industrial partners.

Once the go-ahead was given to begin production the fun really started. Large materials orders and service contracts were placed by Ron Antrim from SLAC's purchasing department; Livermore began producing cavity bodies, and Carl Rago of MFD kept SLAC's shops filled to capacity with other parts. Port assemblies machined in industry and brazed at SLAC fitted perfectly into bodies prepared at Livermore, thanks to rigorous quality control, overseen by SLAC's Darren Marsh. Mike Neubauer stepped up

(cont'd. on page 7)

(cont'd. from page 6)

to manage production of rf components built at SLAC while LLNL's Mark Franks continued to oversee the Livermore fabrication and industry contracts for the e-beam welding.

SLAC's Jim Judkins and Bob Rimmer from Berkeley performed the final frequency tuning at Livermore and in July this year the first production cavity was flow-balanced by LLNL's Ed Thomas and delivered to SLAC. Mark Hoyt and Jeff Jones fitted window and coupler components and HOM loads provided by engineers Karen Fant and Mike Neubauer and designer Tim Montagne. A new tuner was fitted courtesy of Heinz Schwarz and designer Ed Evans. The cavity was baked in an oven provided

by Mike Zurawel and Jay Venti of MFD and installed in the test bunker by Jim Judkins, Alan Hill, Alden Owens and Marcus Gorgees. The cavity processed quickly up to full power using a computer control system put together by Alan Hill, and on September 26 satisfied the criteria of a major project milestone, tracked by the DOE, for a "full rf cavity system integration test," once again showing that the project is right on track.

The development of the cavity from its earliest inception to the current production status would not have been possible without the help of many more people than it is possible to mention here by name, but they can all be proud of their contributions when the machine comes on line in 1998.

SLAC First US WWW Site, Not Fermilab

IN THE AUGUST 16 issue of *FermiNews*, the front-page headline reads "Birthplace of the Web" which one could interpret as meaning that the first US Web site was at Fermilab. Not so, according to SLAC experts Les Cottrell, Paul Kunz, and Joan Winters.

SLAC was the first Web site in the US, with a verified date of December 12, 1991, according to Robert Calliou of CERN. Fermilab joined in June 1992.

Close reading of *FermiNews* shows that the newsletter is crediting the field of high energy physics as the impetus for the spread of the Web to the US and on that point we can agree.

Around the Globe with C++

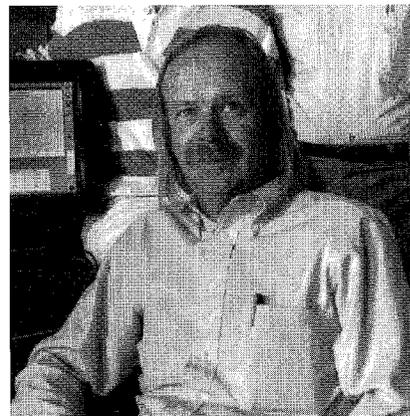
C++ IS AN OBJECT ORIENTED programming language, first released in 1985. At that time, FORTRAN was the programming package used by the scientific community. In 1989, Paul Kunz (Group B) and Bill Atwood (Group EK) were among the few SLAC staff who started learning object oriented programming to solve a lot of difficulties in maintaining large code. FORTRAN is still heavily used by physicists although object oriented programming has a large following in the industrial community.

Then BaBar submitted their *Technical Design Report* in March 1995 and announced that their software would be based on object oriented programming. Out of over 500 collaborators, less than a dozen knew how to use C++. So, how do you teach technical information to almost 500 people worldwide? Do they learn it slowly by actually using it, or take a course? Hands-on training was too difficult to oversee or to pick up the needed skills. So, then how to train—textbook or workshops by professionals?

It was decided that the best way was to have a course taught by a physicist for physicists to get the right flavor. Then examples would be directly from problems that they were used to dealing with. Since Kunz had been working with C++ for the past 7 years, the BaBar Collaboration invited him to design and teach a course, both to teach C++ and to show that it was the right programming decision to make. Not surprisingly, there was reluctance to move to

C++ due to familiarity with FORTRAN. The first class was held at SLAC in 1995 during May-June and met once a week for six weeks. It took Kunz the rest of each week to prepare the lectures. It can be noted here that the lecture notes have not changed significantly since this preparation was done. He quickly followed up with lectures at Lawrence Berkeley National Laboratory and Lawrence Livermore National Laboratory, then back for two more SLAC lectures. From May through September, 150 physicists attended his classes.

BaBar collaborators are not the only ones interested in learning C++ in this interactive style; over the past year, laboratories worldwide have invited Kunz to their locations. To date, over 750 physicists from six countries have attended his week-long lecture. Kunz, itinerant physicist, is now a frequent flying teacher.



Paul Kunz

Meet the Mechanics

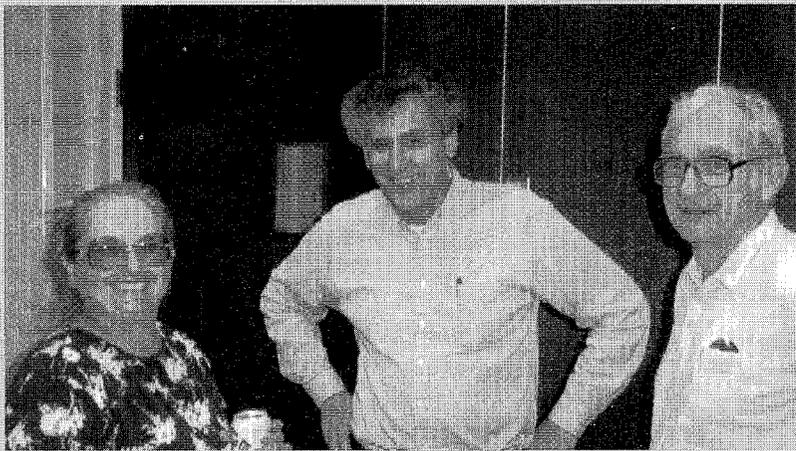


MEET (l to r) AL MANUEL (Lead Mechanic), RON ANDERSON (Mechanic Specialist), and MIKE SMITH (Journeyman Mechanic) of the Transportation Department. Al will be commemorating 31 years at SLAC on November 1; Ron and Mike have been here for a combined total of 38 years (almost as long as some of our vehicles). In addition to maintaining the DOE fleet of approximately 600 vehicles (trucks, forklifts, mopeds, electric carts, etc.), they are quite familiar to SLAC train commuters, since they are also the bus drivers who deliver SLACers to and from the Palo Alto train station four times a day.

The current pick-up schedule to and from the train station is as follows:

- 6:45 a.m. & 7:45 a.m. SLAC bus at Palo Alto train station.
- 3:20 p.m.-3:30 p.m. SLAC bus stops at Gate 17, SSRL, ESA, MCC and the Fire Station.
- 4:45 p.m.-4:50 p.m. SLAC bus stops at Computer Bldg, Bldg 24, and A&E Bldg.

Sylvia MacBride Says Farewell After 22 Years



SYLVIA MACBRIDE, left, flashes a big smile for the camera at her retirement party on Friday, October 11. Wishing her well are Stan Brodsky, center, and Dick Blankenbecler of the Theory Department.

FactinOs

Let's do the numbers...

Each weekday, SLAC security officers unlock 50 buildings, 125 offices, and 120 doors. The process takes 3 people about 45 minutes. Remember that with the early darkness of the wintertime, security officers also provide escort service to your car.

Letter to the Editor

Reader Connie Logg (SCS) disagrees that Elvis is alive and well and visited SLAC for Sid Drell's 70th birthday party. Jan Crehore (MD) disagrees, "Elvis always shows up for a birthday."

"Was it my tomatoes?"

Asks Tech Pubs Jennifer Masek when she saw that SLAC was featured in a recent edition of *Sunset Magazine*. "Our Garden Club is more famous than I thought," added club president Ruth McDunn.

Dog Daze

Daisy, the visiting cocker spaniel in the Theory department, didn't do it, but nonetheless, dogs aren't allowed in the workplace, according to Personnel Director Lee Lyon. Wait a minute! Lions?

SLAC cats

need feeding during the holiday closing in December. If you live in the area and are willing to help, please contact Julie Rogers at x2691.

Oh, Dear—more deer

As winter approaches, the deer start feeding on SLAC lawns. Drive safely and look out for deer in the early evening darkness.

Donations

Surplus equipment and office supplies are available for donation to public schools and non-profit organizations. Contact P. A. Moore at x2605 for further details.