

The Interaction Point

Events and Happenings
In the SLAC Community
Jan/Feb 1998 Vol. 9, No. 1/2



Z⁰

SLC Continues to Break Records

Z⁰

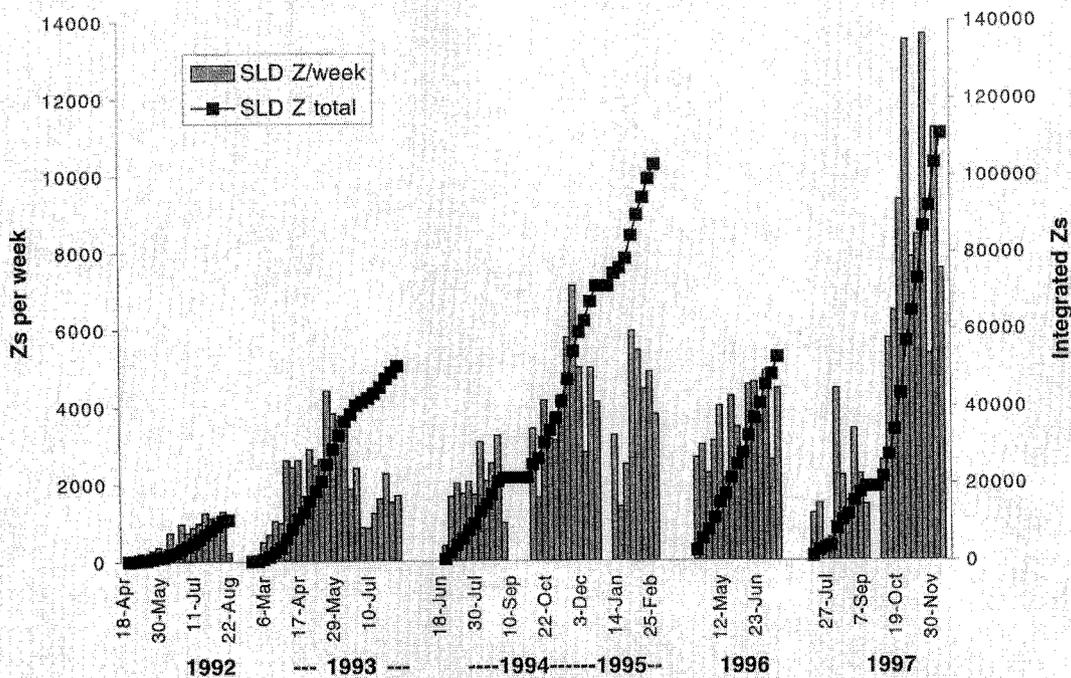
FROM MID-OCTOBER UP to the Christmas shutdown, SLD logged over 80,000 Z⁰ events, an average of 10,000 per week. That is almost a factor of three more than the average in the 1994-95 and 1996 runs. On the final day, yet another record was passed with more than 3,000 Z⁰s in 24 hours. One week of days like that would deliver 20,000 Z⁰s in a week, a milestone for which Burton Richter has promised a party for the entire laboratory. This dramatic increase in luminosity is due to an all-out campaign to improve the SLC performance spearheaded by Pantaleo Raimondi, the SLC physicist in charge of the arcs and Final Focus, working with Tracy Usher, the SLD physicist responsible for background control. Together they have spent long hours, far into the night, to devise and implement innovative solutions to long-

standing SLC problems. Major changes this run include a new stronger focusing optics for the Final Focus (FF) combined with a broad effort to rethink and improve tuning strategies throughout the SLC. The SLC now has the smallest beams ever delivered to the FF, small enough that the long-predicted pinch effect enhances the luminosity by more than 50%.

SLC began the 1997 run with a daunting goal of delivering as many of the half million Z⁰ events approved for SLD as possible. In the short 1996 first run for SLD with its new vertex detector VXD3, only 50,000 Z⁰s were logged, leaving 450,000 to go. To help with this challenge, Accelerator Research Department-A formed a task force. The SLD group contributed physicists, software and hardware engineers,

(continued on Page 3, Column 1)

1992 - 1997 SLD Luminosity



Joe Ballam 1917-1997



JOSEPH BALLAM, EMERITUS PROFESSOR and long time Associate Director for the SLAC Research Division died December 14 of emphysema-related complications. He was 80 years old. Over 150 friends and family honored the

accomplishments of Joe Ballam during a memorial service held at SLAC on January 10. Ballam was remembered with fondness and humor in speeches by Burton Richter, Pief Panofsky, David Leith and Bill Kirk. Comments from his daughter, Denise Clark, gave a more personal view of Joe the father and grandfather, teaching his kids to ski, always encouraging them to try again.

During his lengthy tenure as Associate Director and Head of the Research Division at SLAC, Ballam oversaw the efforts of some 300 physicists, engineers and technicians; he was involved in the construction of major scientific instruments, and the analysis of the experimental data which were produced. In addition, the Division assembled a world-renowned group of theoretical physicists and Ballam created a leading computational facility at the lab.

Ballam continued to be directly involved in experimental research through his leadership of an experimental program which matched a fast cycling bubble chamber and adapted the large bubble chamber constructed at the University of California to the SLAC electron beam. This configuration extended by an order of magnitude the data flow available to physicists at many participating institutions. Ballam personally participated in many of the experiments, authoring many papers on the interaction of strongly interacting particles with matter.

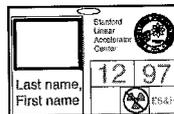
Under Ballam's stewardship, the efforts of the people in the SLAC Research Division, in conjunction with their colleagues from throughout the world, led to the award of three Nobel prizes: the uncovering of the internal structure of nucleons and the discovery of charm, as well as for the tau lepton.

Ballam received a Guggenheim Fellowship and was a visiting scholar at Imperial College in London, the Ecole Polytechnique in Paris, and Columbia University. He served on many committees for the Department of Energy, including the High Energy Physics Advisory Panel.

Joe Ballam will be truly missed.

--excerpts taken from Wolfgang Panosky's write-up in the Stanford Weekly.

Changes in Controlled Areas at SLAC



CHANGES HAVE TAKEN PLACE during January in the designation of controlled areas, the use of dosimeters, and radiological training requirements. Please refer to the memo from Burton Richter dated December 8, 1997 which outlines the changes.

Everyone will be issued a new SLAC ID identifying the level of radiological training and expiration date. This ID will be used for entry into the Accelerator Area. People wishing to enter areas which have restricted access due to radiological hazards will need an appropriate dosimeter.

All employees will be required to attend employee orientation ES&H training; however, only those whose jobs take them into radiologically controlled areas will need GERT or RWT training.

Call Kyle Millage in the ES&H Department at x3839 if you have questions, or visit the website at <http://www.slac.stanford.edu/esh/dosimetry/newdp.html>.



Holiday Food/ Toy Drive

WE THE COMMITTEE FOR the SLAC Food/Toy Drive 1997 would like to thank all of the SLAC employees and users who were so generous in their donations to the SECOND HARVEST FOOD BANK, and to the RED CROSS TOY DRIVE. We collected a total of 1,052 pounds of food, and turned in a good number of toys.

Special thanks to Jean Lee of the Research Division, and the shop workers in MFD, Bldg. 25.

—Committee: M. Parish, P. Bradley, P. Pickett

WELCOME GUESTS AND NEW EMPLOYEES

The following people joined SLAC through mid-January: **Lawrence Byers**, ES&H; **Clifford Chapman**, Facilities; **Domenico Dell'Orco**, SSRL; **Judy Fulton**, ES&H; **Neil Geddes**, BaBar; **Shudi Gu**, BaBar; **Burhan Haile**, SCS; **Dae Sung Hwang**, THP; **David Leung**, SCS; **Marilyn Mantle**, RD; **Henry Meier**, SSRL; **Wanjun Mi**, ARDA; **Brendan Murphy**, AD; **John Pople**, SSRL; **Andrew Reid**, EK; **Vanda Sanzogni**, SLC; **Gregory Scott**, Facilities; **Valerie Stone**, ES&H; **Joan Streit**, SSRL; **Vladimir Vinetsky**, SSRL; **Ralph White III**, PC; **Claudia Wiemer**, SSRL; **Reina Williams**, Library.

SLC Continues to Break Records *(continued)*

and technicians. The help of both groups has been essential. An added complication this year is the need to deliver beam for PEP-II commissioning at the same time as SLD is taking data. A concerted effort by a large number of people has made the coexistence of these two programs almost seamless, and so far the PEP-II studies are successfully ahead of schedule.

The stronger optics for the FF was first tried unsuccessfully in 1996. To make it work, several clever upgrades were needed to keep the backgrounds in the SLD detector under control. During the long shutdown, a problem was identified with a critical mask near the SLD which was removed and enlarged. Then some unused collimators in the FF were recycled as 45° collimators for the arcs with help from SLD. After recognizing that energy correlations in the beam were causing trouble, some spare damping ring permanent magnet sextupoles were installed in the beam switchyard. Another pair of unused sextupoles in the FF were also powered to cancel a remaining energy tail. This creative reuse of components has allowed the SLC to deliver high quality beams to SLD with a much more aggressive, high luminosity FF optics. Finally, a new optimization feedback is used to keep the very small beams tuned at the interaction point.

Upstream in the SLC, the changes are too numerous to describe in detail. Different optics designs were developed for the linac and for the ring-to-linac transfer lines with help from ARDA. Software written by SLD to quickly and accurately

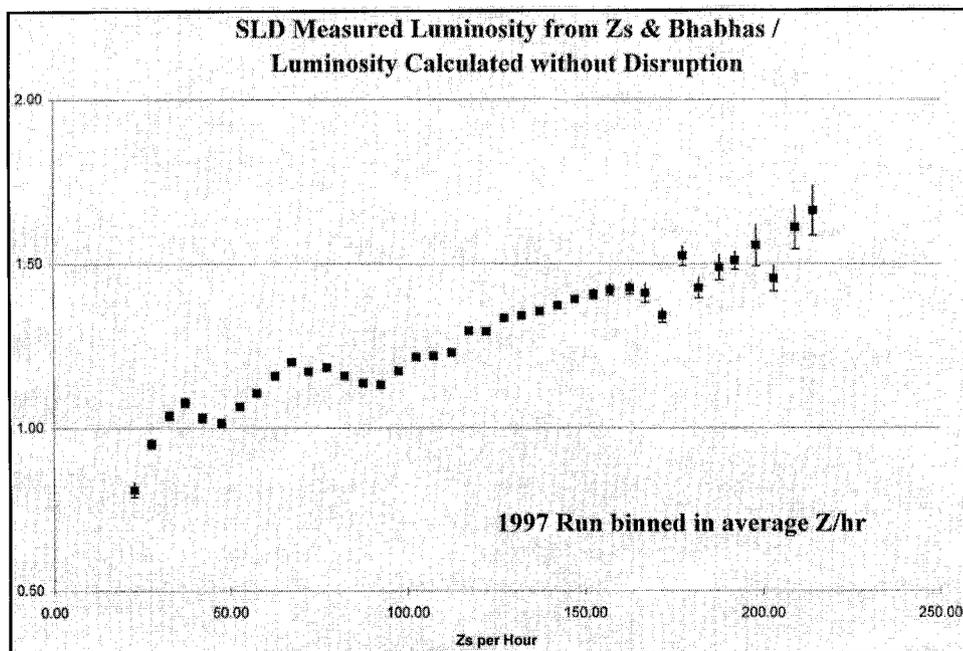
phase the linac klystrons helps maintain the optics. New techniques have been developed to correct the beam trajectories and perform more accurate beam-based alignment of magnets and linac structures. In the tricky, terrain-following arcs, careful work has reduced beam size growth to near design levels. Most importantly, the method for final tuning of the beams at the end of the linac has been completely revamped. Wire scanners at the entrance to the FF are now used for precision measurement of the beam size. To make these work reliably, high resolution beam position monitor electronics borrowed from the FFTB, some minor optics changes, and much hard work on the wire scanners themselves were required. In previous years when the beam size was measured near the end of the linac, undetected beam distortion could occur before the beam reached the FF. As in the past, linac orbit oscillations are used to cancel beam tails, but tuning is now done late in the linac, which appears to be more stable.

Although there is great excitement over what has been achieved so far with peak rates up to 200 Z⁰s logged in a single hour, there are still new ideas for further improvement. In the south ring-to-linac line, an additional skew quadrupole will be installed to improve tuning of positrons and the vacuum chamber bellows will be shielded to reduce wakefields. For the FF, a softened bend lattice has been implemented to reduce beam size growth from synchrotron radiation and permanent magnet octupoles will be installed. Together these should further reduce the beam

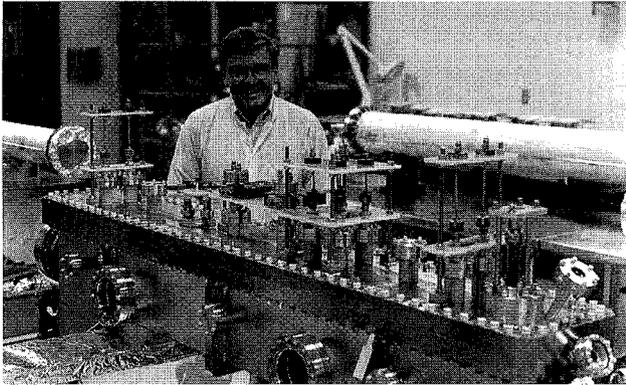
size at the interaction point by up to 30%.

Already the SLC has made a spectacular re-recovery from the Christmas shutdown, with more Z⁰s produced in the first 24 hours of logging on January 6 than in the pre-October record day. With over 120,000 Z⁰s already recorded by SLD, SLC is well on the way to the best run ever and to winning the promised lab-wide party.

-Nan Phinney



PEP-II Commissioning Progress



Pictured: PEP-II Chief Engineer Lowell Klaisner.

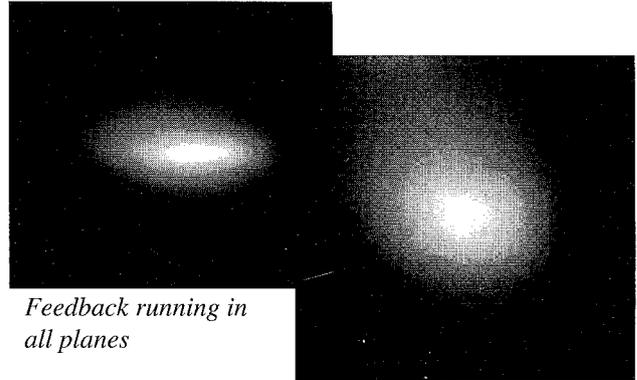
OCTOBER 13, 1997, MARKED THE completion of a very successful 6-week commissioning run of the High Energy Ring(HER) on the PEP-II Project. Our Level 1 DOE Milestone shows the scheduled completion of HER installation to be March 31, 1998. It is, in fact, essentially complete already. Here are some of the accomplishments:

- The beam energy was 9.0 GeV, which is the design value.
- Three of the 5 Radio Frequency (RF) stations were operated with beam. The hardware for the remaining 2 stations (klystrons, RF cavities and power supplies) is installed. With the upcoming addition of a few electronics cards, they will become fully operational.
- The accelerating voltage from each RF cavity was 0.79 million volts, better than the design value of 0.70.
- The complex system of RF feedback loops were all successfully run with beam.
- The separate longitudinal and transverse beam feedback systems were also successfully run.
- All of these feedback loops ran together and stabilized a beam current of 248 mA. Attaining our design current of 995 mA awaits completion of the remaining RF stations.
- 12 mA has been stored in a single bunch, well over the design of 0.6 mA. 1700 bunches have been stored, in excess of the design value of 1656.

Bunch Currents		Current Transformer	
Raw-Ped	172355472 cts	DCCT-Ped	302.860588 mA
equiv mA	333.74047 mA	DI/DT	-43.309 uA/sec
Fit Lifetimes based on		Linear	116.57 min
4 Seconds		Exponential	116.59 min
BIC STATE: Quiescent		STOP	INJECT
Calib Status	Goal Status	MPG Status	
All old	Okay	MPG and BIC on	

High Energy Ring: 291 bunches, October 2, 1997.

- The synchrotron light monitor and beam abort systems were successfully operated.
- Use of automated orbit steering is now routine.
- X/Y coupling has been reduced to 0.8% where the design requires that it be less than 3%.
- The control system, personnel protection system, and power supply systems all continue to function smoothly.



Feedback running in all planes

Vertical feedback off

- Positrons were run to the end of the injection line for the Low Energy Ring (LER). This was done on accelerator pulses interleaved with electrons to the HER, and with most of the accelerator pulses going to the SLD detector on the SLC.

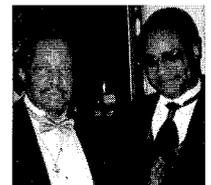
In summary, all the major HER systems have been operated and work well. Downtime due to component failure was very low. Of course, some improvements are still in progress. The present commissioning run began on January 2, 1998 and will end on January 31, 1998.

Many people from Lawrence Berkeley Lab, Lawrence Livermore Lab, and SLAC contributed to this very successful run, and congratulations with many thanks are extended to them all.

—Tom Himel, John Seeman

December TIP Corrections

YES, EVA SILVERSTEIN *IS* too young to have received her Ph.D in 1966, as stated in the Faculty Milestones. The CORRECT date was 1996. Also, the caption in the story, SLAC Employees Win Documentary Award, was reversed. Al Baker is on the left, and Hank Gray is on the right. Thanks to our astute readers for pointing out our goofs! And apologies to Eva, Al, and Hank.

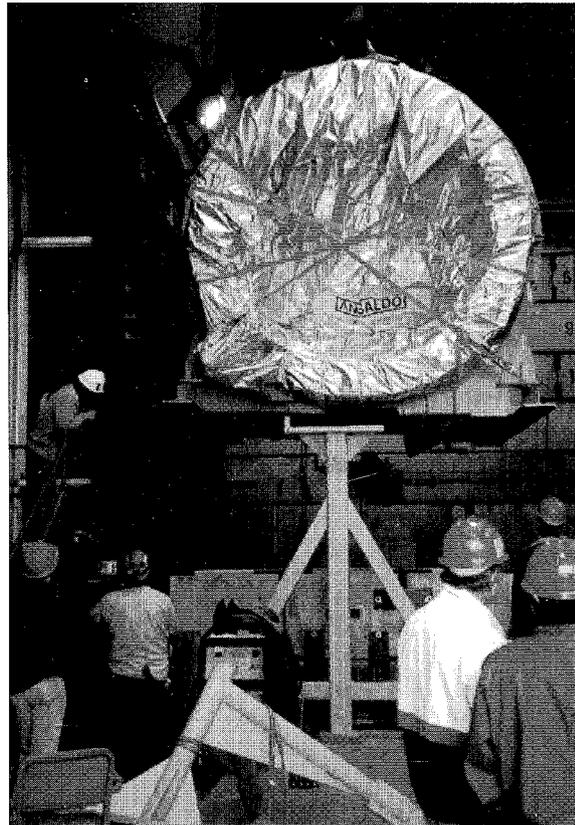


BaBar Coil In Flight and On Site

On December 2, 1997, a US Air Force cargo plane landed at Moffet Field carrying the 15-ton BaBar coil on the final leg of its journey to SLAC.



This photo shows that the 15-ton coil had about a 2-inch clearance in the hugh transport plane. The coil was then put on to the payloader for transfer to the truck and home to SLAC.



15 Tons and what do you get...The coil now resides in IR-2. Here, workers put it in place. Not exactly a piece of cake!

(Photos: P.A. Moore)



Vermont Quark Biscuits

*From Vermont Butter & Cheese Company,
Websterville, Vermont*

- 2 cups all-purpose flour**
- 2 tbsp granulated sugar**
- 2 tsp baking powder**
- 1 tsp salt**
- 1 cup quark cheese**
- 2/3 cup water**

1. Preheat oven to 450°F.
2. Sift flour, sugar, baking powder and salt into a large bowl.
3. In a small bowl, whisk quark and water.
4. Make a well in the dry ingredients. Add quark mixture and stir with a fork just until blended. (Do not overmix.)

5. Turn dough out onto a lightly floured surface. Knead a few times and pat into a 1-inch-thick circle. With a floured 2 1/2-inch round cutter, cut out biscuits and place on an ungreased baking sheet. Press dough scraps together and repeat to make 12 biscuits in all.

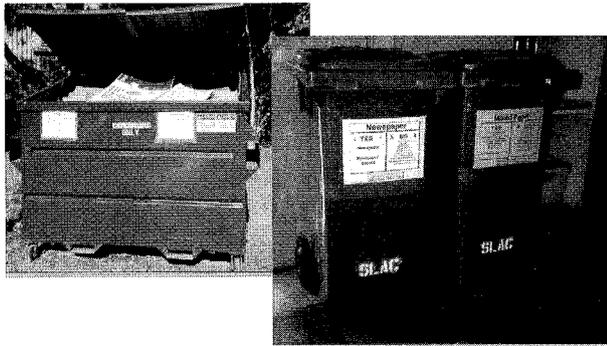
6. Bake for 12 to 15 minutes, or until tops are golden and firm to the touch. Serve warm.

MAKES 1 DOZEN BISCUITS

110 calories per biscuit: 4 grams protein, 1 gram fat (1 gram saturated fat).

19 grams carbohydrate: 260 mg sodium; 5 mg cholesterol; 1 gram fiber.

The Search for Trash and Truth



A SIGN OF THE SUCCESS of SLAC's recycling project is that Ed Garwin was observed cleaning out his files AND HIS DESKTOP. In his never-ending quest for truth, justice and less trash, Ed is participating in the pilot recycling program underway in the A&E Building (Bldg. 41) and the Central Laboratory (Bldg. 40). So, like Ed, give us your paper refuse, your tired soda cans and poor juice bottles. Don't forget the wretched refuse of corrugated cardboard, and SLAC will turn these items into cost savings. How, you might ask?

You fill the recycle containers with your trahs. SLAC janitors move the filled recycling containers outside where subcontractors empty them. This simple step reduces subcontractor labor (which saves costs), plus we get a rebate for materials recycled.

So, if you have large or unexpected quantities of office paper or beverage containers to recycle (an office cleanout or a special luncheon), call Facilities at x2207. Labor Pool will deliver a temporary collection container for your special occasion.

If you have any questions or feedback on the Pilot Project, please call Rich Cellamare at x3401, or email at rcellamare@slac.stanford.edu.

Work Safe, Work Smart

The last Workers' Compensation claim filed, involving days away from work, occurred on 8/29/97. As of 1/14/98, there have been no new claims involving days away from work. The number of calendar days accrued without a lost work day incident is 138 days. This beats our previous record of 77 calendar days between claims, according to Sharon Haynes, the Workers' Compensation Coordinator.

Keeping Up with the Brazilians

HOW DOES CANADA DIFFER from Brazil, Thailand and China? While a number of obvious differences may come to mind, the answer is more subtle. Those three countries, plus about 17 others, all have synchrotron research facilities, and Canada does not. A group of high level Canadian officials were at SLAC in January to see what they can do about it.

SSRL hosted eight representatives of federal and provincial Canadian governments, university leaders and economists in a day-long session about the scientific and economic benefits of a synchrotron lab. According to Herman Winick, who gave an overview of SSRL at the session, "There are about 43 rings in operation around the world, another 12 in construction, and about 16 in approval or design stages."

After information gathering, the Canadian team will submit its recommendations to the national government in the Fall and if approved, ground breaking could occur as early as April 1999. If a Canadian lab is approved, it would be built in the province of Saskatchewan.

The present design for the 2.9 GeV Canadian light source is similar in many ways to the design being developed for the upgrade of the 3 GeV SPEAR ring, called SPEAR3. As both of these new facilities progress, there is likely to be interaction between the two groups.

Ten Year Service Awards

Howard Gill and Norma Twisselman share a moment at the 10-year service award celebration.



(Photo: K. McClenahan)

THIRTY-ONE SLAC EMPLOYEES were honored at a party in December for completing 10 years of service at SLAC. They received a watch and a Stanford pin from Dr. Richter. The employees honored were: Romain Agostini; Ron Antrim; Jerry Belk; Frank Brenkus; Jeff Colon; Sandra Crawford; Lisa Dunn; Henry "Skip" Ethier; Scott Fisher; Mike Gaydosh; Ben Gibson; Howard Gill; Faye Graham; Pat Grygutis; Mike Horton; Ardie Jacob; Ted Lavine; Tom Markiewicz; Tom Mattison; Dianne Morris; Bill Myers; Mike Nalls; Clive O'Connor; Sandra Pickrom; Burl Skaggs; Martin Sorensen; Richard Strozinsky; Curtis Troxel; Norma Twisselman; Diedre Webb; and Sharon West.

1998 SLAC Safety and Environmental Discussions: February 27, 1998

IT'S TIME FOR SLAC'S third annual Safety and Environmental Discussions. This year the discussions will include a focus on what each individual can do to improve job safety. Site-wide discussions are scheduled for Friday, February 27, from 8:00am to 10:00am at locations designated by each SLAC division. The "kick-off" meeting for discussion group leaders (assigned by divisions) will be held on Monday, February 23, from 1:30pm to 2:30pm in the SLAC Auditorium. Top hazards reported during the 1997 discussions were: slips, trips, and falls; traffic; electrical shocks; sprains, strains, ergonomics; and general industrial safety. We've completed over 77% of the 214 corrective actions recommended last year and the rest should be completed in the next few months.

Here are details regarding each of these categories mentioned in 1997:

Traffic

Transportation hazards include speeding cars, cars that do not stop at crosswalks, and poor visibility of lanes and traffic signs. A traffic plan was proposed by the Operating Safety Committee and approved by the Directorate in 1996. This ongoing program consists of warnings and speeding tickets issued to violators. Facilities has repainted lane markers and posted new speed limit signs.

Electrical Shocks and Burns

Faulty equipment has been, or will be, replaced and responsibility for equipment maintenance will be assigned to specific individuals. New work rules have been put in place to make electrical work safer for AC and DC applications.

Sprains and Strains

Inadequate lifting devices, unrealistic lifting requirements, and workstations that are not ergonomically correct were considered to be the major causes of sprains and strains. Individual divisions have purchased proper lifting

equipment and ergonomically correct furniture. An ergonomics committee has been formed to address ergonomics concerns and to develop new proposals. The committee is nearing completion of a final report that will recommend, among other actions, a program to reduce costs for ergonomic furniture through cooperation with Stanford University. The ES&H Division will remind staff of available ergonomic resources through seminars and articles.

General Industrial Safety

SLAC staff have felt pressured by budget constraints and the need to keep operations on schedule, so safety did not receive the highest priority. According to Director Burton Richter:

"Do it safe, then do it right, then do it fast."

ES&H has intensified delivery of safety information (see ES&H Updates, ES&H Bulletins, WellNews newsletters, and *The Interaction Point*) and has added more safety information to training programs. Divisions will hold regular safety briefings.

In the fall of 1997, each discussion group member should have received updates on the corrective actions relating to their own group's safety and environment discussions held in February of 1997. The updates included a description of the proposed corrective action or "task," the task leader, and, if available, the scheduled completion date. If you did not receive this information, contact your SEDAC representative:

BSD - Gail Gudahl
Director's Office/ES&H - Ellen Moore
PEP-II - Darren Marsh
Research - Frank O'Neill
SSRL - Ian Evans
Technical - Janice Dabney

—Jack Hahn, Chair, Safety and Environment
Discussion Assistance Committee (SEDAC)

Meet Fran Balkovich

(Photo: P.A. Moore)



The last operator: Fran poses near the phone wires in the A&E Building, which were converted to the new system in 1988. A far cry from the switchboard she used in 1976.

FRAN BALKOVICH CAME FROM campus in 1976 to fill a vacant position as a telephone operator. Back "then," there were four operators who handled the 300 incoming lines to SLAC extensions during regular working hours (off hour calls were handled through the Stanford switchboard). The live switchboard operators made all long distance calls, often dialing an FTS operator to put the call through. It wasn't unusual to have a SLAC operator ring you back when your call had finally been placed. Fran's most memorable experience was frantically trying to reach a SLAC person in the Canadian wilderness. After she called an operator in Canada, the message to call work was taken 100 miles to the surprised vacationer!

The phone system changed dramatically in 1988, when SLAC went to an automated system. Eventually the number of operators was decreased to two, and then phased out as people got used to all aspects of the new system. Fran was head operator and then became supervisor in 1991. Her duties included handling billings, phone cards, and the phone directory. Fran's latest task is to teach the security guards on duty at the Main Gate how to answer and forward calls since they are the in-house phone attendants around the clock.

Fran has lots of memories of her years at SLAC and is amazed at how far the phone system has come in a relatively short period of time, from black rotary phones to the present digital name dialing feature. With the marriage of technology with computers and phones, SCS will now handle phone services.

If you haven't yet met Fran, you'd better hurry since she plans to retire this April after over 20 years at SLAC, and over 38 years in the phone business. She and her husband will have had a total of 48 years between Stanford and SLAC employment when she joins him in retirement.

FactinOs

An Invitation

Come on along to the Monday Colloquium. It's open to all SLAC staff who are interested and able to attend. There are a variety of topics to appeal to scientists, technical people, and administrators. Food, too, starting at 3:45pm with the program beginning at 4:15pm. Check the *Compendium* for upcoming talks and plan to attend.

Try Quick News

If you crave more Factinos and want a weekly update, try Quick News on the SLAC Home Page Announcements every Friday. All the news that's fit to print, as long as it's pithy and punchy.

Musical Notes

Here's a heads-up for March 6, when the Stanford String Quartet will come back to SLAC for its annual concert. Mark your calendars.

Ron Gould Sez

Even though he has retired from his budget responsibilities at SSRL, Ron plans to come back and handle the arrangements for Herman Winick's retirement party, whenever that might be. Must be that speech Herman made at the farewell party.

Star Billing

According to Bebo White, The mini-Annals of Improbable Research ("mini-AIR") Issue Number 1998-01 dated January 1998 has a Cafeteria Review which comments on "the Stanford Linear Accelerator Center fine dining facility." Take that, Michelin Guide! Way to go, Sigrun and all the Cafeteria team!

Christmas Party

SLAC's annual Christmas Party was held December 19. Under sunny skies, 1,100 lunches were served. We were once again treated to the music provided by Jamie Davis and his band. Carl Rago made a droll St. Nick. The Holiday Committee is to be commended for their excellent efforts.