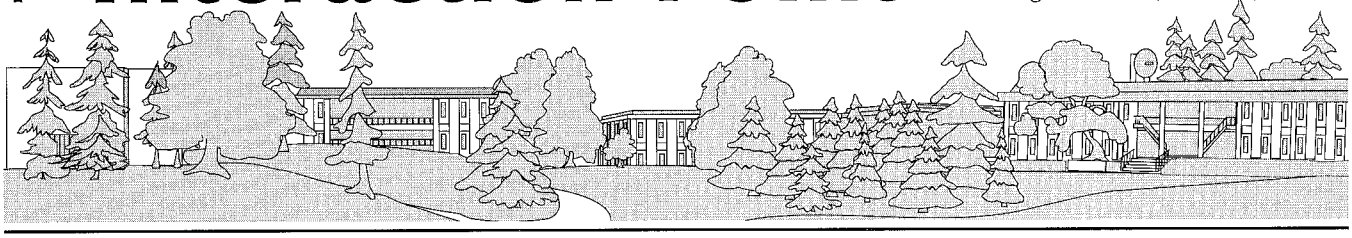
The Interaction Point

Events and Happenings
in the SLAC Community
August 1994, Vol. 5, No. 8



PEP-II and BaBar to unite in *B* Factory by 1999

Jill Mhyre

Shown above are just a few of the over 400 people working with Jonathan Dorfan on the BaBar Collaboration, an international effort to create the B *Factory.*

by Eric W. Harpell

BEFORE STUDIES OF CHARGE and parity (CP) violation can begin at PEP-II at the end of the millennium, researchers must solve a mathematical problem of an entirely different flavor: How can work on one detector with seven subsystems be divided among seventy separate institutions?

This is precisely the challenge facing the BaBar Collaboration, a group of some four hundred individuals around the world who are responsible for designing and building the BaBar detector. Despite hurdles that still lie ahead, many feel that the *B* Factory (PEP-II and BaBar) is the best near-term opportunity for physicists to find a complete mathematical description of the weak interaction. Better still, data from BaBar may illuminate a crack in the Standard Model, providing theories such as Supersymmetry or Technicolor with an opening into the discourse of high-energy physics.

According to David Leith, director of research at SLAC, preliminary designs for BaBar's subsystems have been completed and approved as part of the "Letter of Intent" describing the detector.

However, the particle identification system remains uncertain. Currently, three separate designs are being considered, including a Fast Rich system similar to the current one in SLD, an Aerogel Threshold Counter, and detection of internally reflected Cherenkov light which images light transported down a quartz bar. All three rely on the detection of Cherenkov radiation produced in a shock-wave-like cone of light as a charged particle traverses an optical medium. None of the three designs, however, has demonstrated performance compatible with detector requirements. "We are still in an R&D situation, " said Professor Leith.

According to Leith, the other subsystems are much farther along. The vertex detector, central tracking chamber, crystal calorimeter, and muon detector "are all based on well-understood technology." Construction of subsystems will begin next spring with the crystal calorimeter. Its materials cost (approximately

*See **BaBar,** page 2*

Babar *Continued from page 1*

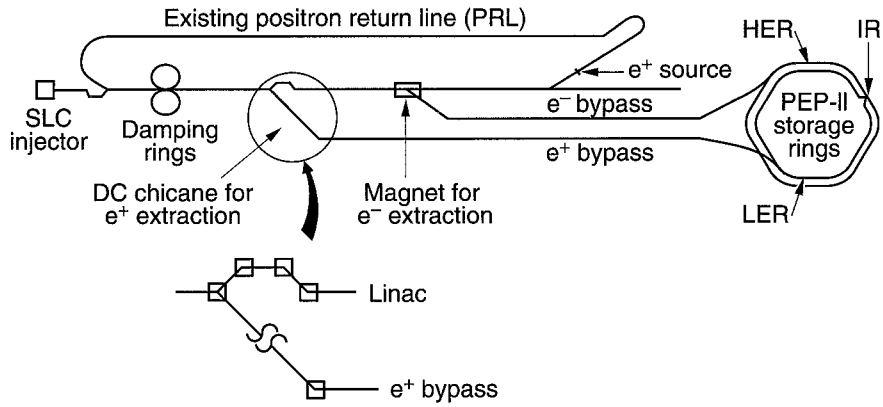
twenty million dollars), and the sheer number of crystals and accompanying electronics dictates that work begin as soon as possible. Work on the superconducting magnet will also begin next year, pending approval of the DOE.

"With seventy some institutions planning to dance together to build the detector, it's been a difficult thing to choreograph," said Leith, "but now it's coming together quite nicely."

A Technical Design Report must be completed before work can begin in earnest. This report will rely substantially on work done in the Letter of Intent, but will further address engineering concerns. Whereas the subsystems detailed in the Letter of Intent "are held up by imagination and optimism," the design report will be based on mechanical drawings, mock-ups, and simulations of the detector.

The schedule for construction and installation of BaBar depends on the commission date for the high- and low-energy storage rings for PEP II, now set for late 1997, and mid 1998, respectively. This provides a time line of four years for the completion of the detector's subsystems, with installation and testing to begin in late 1998.

Professor Leith admits that the schedule is "very aggressive," but adds "it's one we have to hold to if we want to be ready to do physics with PEP-II when it is ready." According to Leith, the year between commissioning of the high-energy ring and the detector will offer very important learning experiences for both research groups. Where PEP-I, for example, maintained six bunches of electrons and positrons in its storage ring, PEP-II will maintain sixteen-hundred bunches. Studies of the integrated detector will begin



Schematic of the PEP-II $e^{\pm}$ injection system, based on use of the SLC linac with bypass lines.

offline in 1998 using high-energy cosmic rays. If all goes according to plan, the concrete shielding surrounding the interaction region will be removed in 1999, signaling the onset of the *B*-Factory era.

The acronym BaBar stands for the B^0 and anti-B^0 (written B^0 with a bar on the top: $\overline{B}^0$) mesons that will be mass produced by PEP-II. Although the accelerator will run at about ten percent of the energy used in the *Z* particle experiment at SLC, PEP-II will still make use of the linear accelerator by removing the electrons and positrons far upstream of the semicircular arcs leading to SLC's interaction point (see diagram). This detour is arranged with bypass and extraction lines that remove the electron beam at an energy of 9 GeV, and positrons at 3.1 GeV (when the linac is operating at full power). Construction of the extraction lines is scheduled to begin in March of next year. Soon after, welding of fifteen-foot copper chambers to form the high-energy storage ring should begin. The E-beam welder has already been ordered, but "it will take a year to get up and running," said Jonathan Dorfan, the PEP-II project director. The SLAC vacuum building will also be extended to accommodate the fifteen foot sections.

Once particles are loaded in the storage rings, PEP-II earns the title of "Asymmetric *B* Factory." The asymmetry, in this case, is the unequal energies of the two beams. Like two similar automobiles colliding, the center of the collision will move in the direction of the faster (and higher-energy) car. Similarly, the center of mass of collisions in PEP-II will continue moving in the same direction as the high-energy electron. As seen from the laboratory frame of reference, the center of mass will be moving at a substantial fraction of the speed of light.

But why go to all the trouble of building an asymmetric collider? A symmetric collider, where the center of mass is at rest, would require only one extraction point, one bypass line, and one storage ring. The answer lies in the boost that a moving center of mass provides. Physical law (and relativity theory) compels a moving object to travel for a longer distance and longer time when measured by a stationary observer than by its own odometer and clock. An astronaut traveling at ninety-nine percent of light speed, for example, will age one year while his friends on earth age ten. He will have likewise traveled a distance of one light year, while ground observers will measure ten light years.

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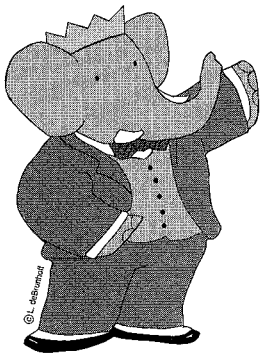
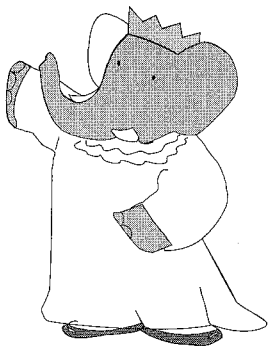


"With seventy some institutions planning to dance together to build the detector, its been a difficult thing to choreograph, but now it's coming together quite nicely." —*David Leith*



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In PEP-II, the astronauts are neutral B mesons. After they are produced in the interaction region, they will travel apart for approximately two hundred and fifty microns before they decay, rather than thirty microns if the center of mass were at rest. The extra distance will allow precise tracking of decay products and identification of the decay vertices. Precision measurement of this distance is crucial: CP violation will reveal itself in a slight deviation from the exponential decay of B^0's as a function of distance between the vertices.

Relativity also dictates that the 9.0 and 3.1 GeV beams collide with a center-of-mass energy of 10.58 GeV, rather then 12.1 GeV (if you simply added the two energies). Previous studies have shown this to be the magic number for producing the Upsilon 4S resonance, a short-lived particle that invariably decays to either B^0 and anti-B^0, or a B^+ and B^- pair. It is the subsequent decay modes of the B^0 system that will allow the study of CP violation. Dorfan and his colleagues expect approximately one hundred CP violating decays out of every one million interactions. These decay modes will show evidence of "mixing," where a B^0 and anti-B^0 decay into one another as their constituent quarks change flavor in the weak interaction. Due to the high luminosity (3×10^{33} interactions/s/cm^2) of the collider, however, the collaborators will be able to "over-determine" or to challenge the standard model of the weak interactions with far better or higher statistics than has been achieved in the past.

In the twenty years since Fitch and Cronin received the Nobel Prize for the discovery of CP violation in K meson systems, several theories or mechanisms, such as the CKM model, have been proposed to account for nature's lack of symmetry in the weak interaction. In the original experiment, a spinless K (KL) meson decayed to a pion and anti-pion, moving in opposite directions with opposite spin. If one were to interchange the directions of motion of the pair, and then change the pion into an anti-pion (and vice versa), the system would be unchanged. Charge and parity, in the language of high-energy physics, are conserved. This conservation, however, is not based on an exact symmetry as Fitch and Cronin verified. There is also a rare three-pion decay of the K system without such symmetry. Since their classic experiment, CP violation has become a trademark of the weak interaction

At SLAC, studies of the B system are routinely carried out at SLD. Although aided by polarization of the electron beam, CP violating B decays are masked by the large number of other interactions. Unlike SLC, however, the B Factory will be optimized for the production of B mesons

"In particle physics," said Professor Dorfan," it is possible to do experiments at the high-energy frontier, and at the high-precision frontier. The B Factory will do experiments at the high-precision frontier."

Fitness facility to feature new machine

THE FITNESS FACILITY committee is adding a brand new multi-gym/universal style weight lifting system, to be delivered in the next few weeks. The facility also includes stationary bicycles, a NordicTrack, a treadmill, a stepper, and a rowing machine. Rooms with showers and lockers for men and women are located adjacent to the exercise room, and are available to all employees.

To become a SLAC Fitness Facility member, call Bob Gex (ext. 4388) or Chris Traller (ext. 3667). Membership is open to SLAC employees for an annual fee of $20 plus a fitness-room key deposit of $10. The facility is conveniently located in the west-end Electronics Annex, Bldg. 34.

Funding short for child care

SLAC'S CHILD-CARE TASK force ran into financing problems when the proposed $1 million child-care facility could not be covered by SLAC's operating budget, according to Bernie Lighthouse, chair of the task force committee. For now, parents looking for nearby child care are advised to send their children to The Whistle Stop, a day-care center at the Palo Alto VA Hospital.

Last fall, SLAC director Burton Richter formed the task force to examine the feasibility of providing a child-care center for the children of SLAC employees. Chaired by Bernie Lighthouse, the task force toured similar facilities in the area, analyzed SLAC's childcare needs, and interviewed possible providers in the area. It analyzed the feasibility of several alternatives including an on-site center and an off-site facility shared with other employers on the Sand Hill Corridor.

A survey of SLAC employees conducted by the task force found that 150 people were interested in the possibility of enrolling their children in an on-site facility. Based on studies of similar surveys, the task force concluded that a facility would need to accommodate 60 children, according to Lighthouse.

The task force estimated the cost of the facility to be $1 million by analyzing the prices of similar facilities at other sites, with the plan to use modular units, and to abide by government regulations for the safety and construction of child-care centers. The center would be self-sustaining in the long run; however, the initial building costs of $1 million would need to come out of SLAC's already tight operating budget.

According to Richter, the SLAC budget for fiscal year 1995 is $6 million below that of 1994. "This budgetary situation makes it very difficult to maintain our current scientific programs and allows almost no wiggle room for extra programs." Lighthouse explained SLAC's position: "Although SLAC would love to provide its employees with an on-site child care center, [SLAC] is a relatively small facility with only 1500 employees, and very little extra funding, compared to someplace like BNL." Richter concluded in a March memo to the child care task force that for the time being SLAC "will be unable to proceed with a child care facility."

The initial urgency for the child care center derived from parents' frustrations that there were no financially feasible child-care facilities in the area. So when the Task Force learned about the Whistle Stop care center, which opened in the fall of 1993, at the Palo Alto VA Hospital with 90 vacancies, it decided to invite SLAC parents to tour and enroll their children in the Whistle Stop.

SLAC's Parents' Group is not satisfied with the The Whistle Stop solution. Although the VA Hospital is only about 2.5 miles from SLAC, it is located in a congested area that cannot be reached directly. According to Denise Larsen, "The option of visiting one's child at lunch or break time is gone as the round-trip time to get to Whistle Stop from SLAC is at least half an hour." This also means there is "no reduction in commute time, especially for those who live north of SLAC."

Since last fall, Battelle Pacific Northwest Laboratory, a DOE contractor located in Washington State, was able to negotiate with outside contractors to build a facility on their site at no expense to Battelle, which provided only the land.

If a solution similar to the one at Battelle cannot be reached, the parent's group would like to see SLAC develop contacts with other employers on the Sand Hill corridor to try to form a joint center. Tom Ford, from Ford Land Co., which owns the land and facilities of about 80% of the small companies on Sand Hill, was interested. However, according to Lighthouse, apparently when Ford canvassed his leasees, he found no significant interest on the part of the companies. Lighthouse supposed that the companies are too small to make child-care a priority. The Parents' Group is not so sure, and would like to further explore the possibility of a joint facility.

The Parents' Group also questions the task force's $1 million price tag for the child-care center. Based on a comparison with the cost of a new PEP-II staff facility, and a proposal to scale the child-care facility down to 3000 square feet for 40 children, they estimate that the cost should be only $750,000.

The Parents' Group will be holding scheduled meetings over the next few months to publicize the need for a child-care center. To join them, call Kathy O'Shaughnessy at ext. 3439.

—Jill Mhyre

Long ago and far away...

Nancy, left and Rene, today.

STRANGE COINCIDENCES happen all the time but when two co-workers in Central Labs discovered they had known each other in Illinois over thirty years ago, they were very surprised. Nancy Hendry came to SLAC a year ago from campus to work for Director Emeritus Pief Panofsky, and brought with her a love of orchids. Recently, Rene Donaldson, manager of publications, and also an orchid fan, stopped by Nancy's office to discuss a work-related matter when she noticed the plant on Nancy's desk. The conversation turned to phalaenopsis, a genus of ornamental orchids from India, and they decided to have lunch together to discuss orchids. Over lunch, they began to talk about their pasts; they were amazed to discover that Nancy had been Rene's typing teacher in York High School, in Elmhurst, Illinois.

Since leaving York High School, both women have married and changed their last names from Krumin to Hendry and from Gore to Donaldson, so it was not until Rene mentioned she had worked at Fermilab, in Illinois, that they were able to trace their connection. As Nancy explained, "I just didn't expect to meet someone from way back then here [at SLAC]." But she remembers Rene's maiden name, Gore, because it was so distinctive.

Rene was also pleasantly surprised to meet her teacher, "Miss Krumin." As Rene put it, "My father insisted I take typing in high school so I'd always have a job—and I resented it terribly. But numerous times over the years I have wanted to thank Miss Krumin for being such a tough teacher. When I left her class, I was typing 80 words per minute with almost no errors. Previously I had thanked my father, and finding 'Miss Krumin' closed the loop."

Today, Rene and Nancy take occasional trips to orchid nurseries where they share their hobby and memories of Illinois.

—*Jill Mhyre*

Nancy Hendry, née Krumin.

Rene Donaldson, née Gore.

EVENT CALENDAR: September–October 1994

All meetings are held in the Orange Room, unless another location is listed. Larger meetings and conferences have a contact listed. Please notify the Public Affairs Office of any additions or changes by calling ext. 2204 or sending e-mail to nina@slac.

September 8–10
PEP II Detector
Collaboration Meeting
Auditorium
V. Luth, A. Pacheco

September 19–23
SLD Week (TBA)

September 22, 8:30-3 PM
SUBB Mobile Blood Drive
Auditorium Lobby

September 26, 7:00 PM
OS/2 Users Meeting
Auditorium

September 30–October 1
SPC Meeting

October 8
SLAC Family Day
SLAC Green

October 7
SLUO Executive Committee
TBA

October 17–21
SLD Week
TBA

October 17–18
SSRL Annual Users Meeting
Auditorium

October 19
SSRL Synchrotron
Radiation Workshop
Auditorium

October 19–22
PEP-II Detector
Collaboration Meeting
Pisa, Italy
D. Hitlin, A. Pacheco

October 20
PEP-II Rally, Auditorium
J. Dorfan, D. Jones,
L. Klaisner, R. Nixon

October 24, 7:00 PM
OS/2 Users Meeting
Auditorium

October 30–November 5
IEEE Nuclear Science
Symposium
Norfolk, VA
L. Klaisner

Fant and Winters take the initiative

WOMEN ARE NOT ONLY entering the work force, they are learning how to run it. Approximately 200 mid-level female scientists and engineers from across the country congregated in Washington D.C. from May 12–14 for a conference called "Taking the Initiative: A Leadership Conference for Women in Science and Engineering" sponsored by the Association for Women in Science (AWIS), DOE, and NASA.

Prior to the conference DOE established regional teams composed of representatives from the individual laboratory sites. Joan Winters and Karen Fant from SLAC joined seven women from other Bay Area DOE laboratories, including LLNL, LBL, DOE Operations, and Sandia National Labs (SNL), to form Team 11. Joined by team member Laura Santos from SNL, Winters and Fant gave a panel presentation on the national conference at the Women's Interchange at SLAC (WIS) meeting on Tuesday, July 26.

Winters, who organized the panel, reported that the conference aimed to "increase the numbers of women scientists and engineers prepared to assume positions of leadership in the workplace." It was held as part of an AWIS/DOE initiative "to improve educational, employment, and advancement opportunities at all levels for women and girls in science."

Santos reported that a major part of the conference focused on the difference between leadership and management. Whereas management "produces order and consistency," leadership "is the process of producing useful change." Both are necessary jobs, but "most US organizations are over-managed and under-led."

Women have important roles to play in filling the leadership void.

Joan Winters, left, and Karen Fant.

However, Santos warned that "nobody is a leader unless they act like leaders." The ingredients of good leadership include "establishing a vision and direction, aligning people to the vision, [and] inspiring people to stick with it." The majority of people seek leaders who are "honest, competent, forward looking, and inspiring."

Fant described attributes of leadership as discussed by conference speaker Dr. Susan Henry, Dean of the Mellon College of Science. In Henry's view, a leader possesses a good ear, a willingness to give credit, perspective, patience, decisive actions, careful assessment of people's strengths and weaknesses, a level head in crises, the ability to find common ground, straight forward communication, and a diverse background.

According to Fant, another conference speaker, Dr. Frances Cordova, Chief Scientist from NASA, urged the women to find their own voices, embrace change, be willing to look foolish, and to do more homework than the next person, especially in scientific fields.

During the WIS presentation, Helen Quinn cautioned that in a scientific laboratory such as SLAC, many of the leaders acquired their authority through scientific achievements. So although leadership skills may be important, they cannot overrule the value of excellent scientific skills.

The panelists agreed that leadership is a skill not only to be analyzed and studied from the sideline but must be practiced as well. Research shows that the most frequently used way for people to increase their leadership skills is to become involved in situations that will place them in leadership roles.

As participants of the conference, attendees were required to convey information learned at the conference back to their individual laboratory sites and through the regional teams to continue promoting the goals of the conference. Members of Team 11 are currently polishing their mission statement and objectives. They aim to "catalyze Department of Energy women in the San Francisco Bay Area to maximize their leadership potential by sharing information, providing tools, and inspiring action."

As a first effort Team 11 will participate in the LLNL Technical Women's Symposium to be held in October. There they will hold a leadership skills seminar and will present a poster on ways leadership differs from management.

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Members of Team 11 are also discussing plans for future projects and action. Among other ideas, they have considered creating a mentoring program, providing support for affirmative action recruitment, and collecting and distributing informational resources for Bay Area female scientists. Team 11 is interested in community input, and urges SLAC members to e-mail any suggested needs to *winters@slac.stanford.edu* or *fant@slac.stanford.edu*.

"When it comes to the future," quoted Santos from John M. Richardson, "there are three kinds of people: those who let it happen, those who make it happen, those who wonder what happened." Team 11 belongs to the middle group that aims to create the future.

—Jill Mhyre

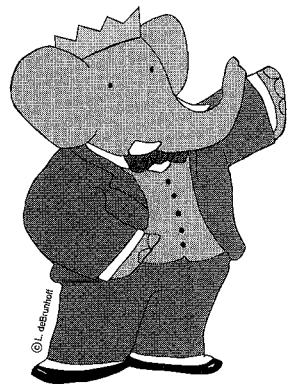
Beam Line Distribution to Change

SO FAR the distribution of the *Beam Line* at SLAC has been achieved by sending a certain fixed number of copies in bulk to each mail stop, where they could be picked up by whoever wanted one. This policy has been changed so that now individual copies will be sent to those people who ask to be included on the *Beam Line* mailing list—just as is done for everyone outside SLAC. We anticipate we will achieve substantial savings by doing so.

If you would like to continue to receive the *Beam Line*, send e-mail to Rene Donaldson at *rened@slacvm*.

—Rene Donaldson and Michael Riordan

EPAC notes: More *B*-Factory news



AT THE MEETING of the Experimental Program Advisory Committee on July 15–16, the *B*-Factory detector collaboration, officially known as the BaBar Collaboration, gave a full day of talks (14 of them) amplifying their Letter of Intent (possibly the largest letter of intent ever—over 300 pages of text, equations, figures, and tables), which covered the present status of the design and capabilities of the detector proposed to go into IR-2 of PEP. The collaboration has over 400 members from nine countries. Its composition, in fact, is about half US and half foreign.

The detector will have a solenoidal magnet and many special-purpose detector elements characterized by a large solid angle, which will detect the final states from the $e^+ e^-$ collisions generated by the upgraded high-luminosity PEP-II storage ring. The ring will be operated in the asymmetric mode (9 GeV electrons colliding with 3.1 GeV positrons), giving the final state of the $\psi(4S)$ decay a $\beta\gamma$ of 0.56 along the axis of the detector. This center-of-mass motion is a crucial factor in enabling the experiment to obtain much more accurate decay-time data for the short-lived *B* mesons. Those wishing to know more about the *B* Factory are invited to consult "An Asymmetric *B* Factory Based on PEP," SLAC–372, dated February 1991.

The main thrust of this facility will be to study CP violation in the *B* meson system (see page 7 this issue). This study is expected to lead to a critical test of the Standard Model for elementary particle physics. At a deeper level, it is possible that an understanding of CP violation will also lead to answers to yet more profound questions, like "Why is it that the universe appears to be comprised of matter with (essentially) no antimatter?" A readable account, authored by David Hitlin and Sheldon Stone, that describes CP violation in *B* physics can be found in the Winter 1991 edition of the SLAC *Beam Line*. For those who wish to delve further, I suggest the recent Letter of Intent (SLAC–443, June 1994) and references therein. Since a high-luminosity machine is contemplated, there will also be data on many other physics topics as well. These topics are also covered in considerable detail in the Letter of Intent.

After a full review, and upon the advice of the EPAC, Director Burton Richter cleared the way for the collaboration to proceed to the next step—the submission of a Technical Design Report to the laboratory. It is anticipated that this report will be available in December of this year, with an EPAC review in January 1995.

—David Fryberger

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Computing takes a new direction

THESE DAYS it seems like everyone is talking about computing. In fact, eight committees have been working together in "a well-coordinated effort" to improve SLAC's computing environment.

In 1993, with the goal of expanding SLAC's computing power while creating a system to connect the entire laboratory, the Associate Directors coalesced into the Associate Directors' Committee on Site-Wide Computing at SLAC (called Associate Directors), chaired by David Leith.

The SLAC Computer Advisory Committee (the Butler Committee), chaired by Joel Butler of Fermilab, was created in 1992 to make recommendations for meeting SLAC's short-term and long-term computing needs.

The Butler Committee recommended that SLAC abandon the VM mainframe because it will not accommodate future demands for storage and processing power which are estimated to be 100 times SLAC's current mainframe capacity for the *B* Factory alone. In its place, a distributed client-server system would network about a dozen computer "servers" to act as number crunchers. People could access the system from work stations distributed throughout the lab, and to expand the system in the future, SLAC would incrementally add more servers.

The Butler Committee also recommended that "SLAC clearly commit itself to follow the mainstream of computing, meaning UNIX, Macintosh, and PCs." This "will provide the greatest 'agility'—that is the ability to switch quickly to new mainstream technologies."

In order to review and prioritize its plans, the Associate Directors formed the SLAC Strategic Computing Planning Working Group (Strategic Planning) chaired by Stephen Williams. According to Williams, Strategic Planning began last March by thinking "in terms of information rather than hardware" to identify "how people use computers to access information at SLAC." The group collected data from almost 20 different departments and is currently compiling a high-level time line and strategy for the Associate Directors.

Strategic Planning recommended that SLAC provide full support only for selected computer products, or standards. By creating standards, SLAC will be able to establish blanket orders, which will simplify and economize the purchasing process. The Standards for Computing at SLAC Working Group (SC), chaired by Charles Boeheim has devised a methodology to identify standard products. Boeheim hopes the process of choosing the standards is "open to public comment" and fast, "because technology changes rapidly."

To phase out VM and VMS "with the minimum of disruptions, in the minimum amount of time," the Associate Directors created the VM Phase-out Working Group, in April 1994, chaired by Marvin Weinstein. VM Phase-out created a plan to move the majority of users to the distributed client-server machines within two years.

To modernize the systems that handle things like personnel data, payroll, purchasing, budgeting, and accounting, the Associate Directors formed the Business Information Systems Steering Committee (BIS), in March 1994, chaired by Doug Kreitz. BIS aims to create "more dependable, up-to-the-minute business and personnel information...available right at [people's] desktop computers."

Working since last October, the Cost of Computing at SLAC Working Group (CostCo), chaired by Charles Dickens, recently completed a review of "hidden" computing costs. Earlier accounting identified only the support services provided by the traditional computer departments: Controls, CAD CAM, and SCS. However, today many groups do not rely solely on the support departments. CostCo polled all departments individually and found that "about 25% of the estimated total costs" were not identified by the old method of accounting.

Since the fall of 1993, the Institutional Data at SLAC Working Group (IDSWG), chaired by Jerry Jobe, has reviewed SLAC's corporate data which includes "information about the laboratory's people, financial resources, physical plant, and tools." IDSWG's goals are to define what constitutes institutional data, to make recommendations for its management, and to "convert current institutional databases to the client-server architecture."

The movement to a distributed client-server system will be a challenge to all employees. "This approach is upsetting because it inevitably leads to making changes in comfortable ways of doing work," said a BIS report. Nevertheless, long-term savings will certainly outweigh the short-term costs of changing systems.

In the future, the Associate Directors' Committee plans to remain "abreast of developments in the computing industry," said Jerry Jobe. By using their mid-level corps of committees the Associate Directors hope to make important changes in the current computing environment, and to track future developments in computer products and SLAC's information needs.

—Jill Mhyre

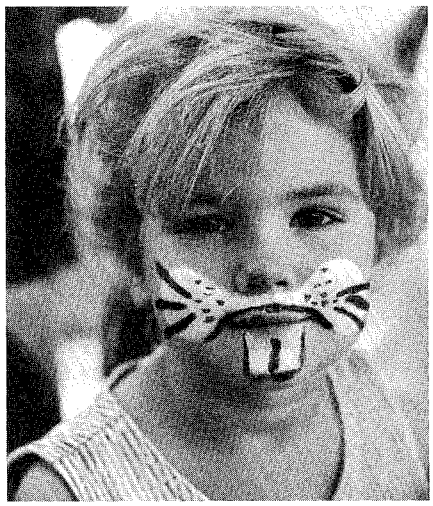
Family Day is coming soon!

SLAC WILL CELEBRATE its 10th annual Family Day on Saturday, October 8, from 10:00 AM until 4:00 PM. Organizers expect three thousand employees, contractors, users, friends, and family members to join the fun this year. Games and other activities will begin when the guests arrive, and a barbecue lunch will be served from 1:00 to 2:00 PM.

You and your guests will enjoy the Carnival Midway with games and prizes for kids of all ages. The Midway includes a Fun City for children, featuring arts and crafts, a giant parachute, and other kinds of fun. In addition, come check out the Volley Ball Tournament, SLAC Jeopardy, a Dunk Tank, a Raffle, and the Human Sling Shot for adults and older children. As always, the highlight of the day will be tours of the lab so you and your guests can learn what it is we really do here at SLAC.

Members of the SLAC Family Day committee may approach you to volunteer your special talents during the celebration. If you want to volunteer to work during Family Day, please let any committee member know, or call Karen McClenahan at ext. 2265.

—Family Day Committee

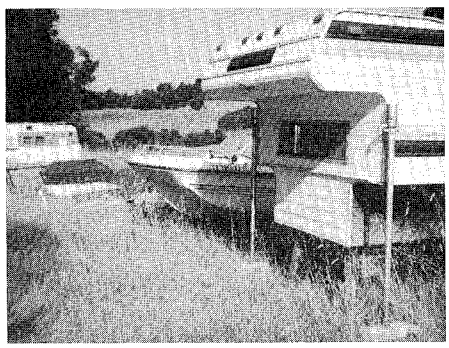


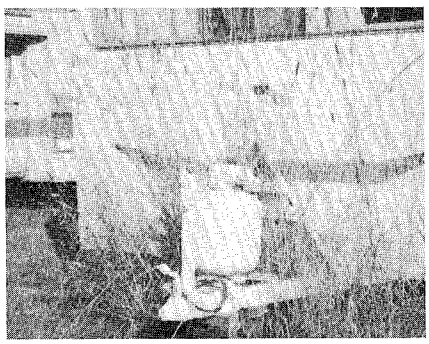
Family Day's face painting attracted Shelby Anderson, daughter of Terry Anderson of Publications.

Welcome Guests and New Employees

Ron Akre, Klystron; **Dakila Baltazar,** Power Conversion; **Patrick Bong,** Controls; **Pezhman Boussina,** SSRL Accelerator Operations; **Michelle Charpentier,** Purchasing; **Alan Cheilek,** Controls; **Glen Crawford,** SLD; **John Hiller,** Theory; **Melanie Jio,** Purchasing; **Bernd Krietenstein,** Accelerator Theory & Special Projects; **Stephanie Land,** Computation; **Jennifer Leland,** Research Division; **Chris J. Maxwell,** Theory; **Charles McKenzie,** Jr. Plant Maintenance; **Scott Merritt,** SSRL Beam Line Operations; **Frank O'Neill,** Research Division; **Noriyasu Ohtsubo,** Theory; **Katsunobu Oide,** Experimental Group I; **Tsumoru Shintake;** Experimental Group I; **Anand H. Subbaraman,** Theory; **Susan Witebsky,** Environmental Waste Management; **Noboru Yamamoto,** Experimental Group I; **Michael Zurawel,** Mechanical Fabrication.

Tall grass = severe fire hazard





THE FIRE DEPARTMENT requests that all RV space users cut the grass in their slots by September 9. The tall grass growing around the RVs (see photos above) presents a serious fire danger. If you cannot cut the grass in your space, call Santiago at ext. 2135, page him at 132, or call him at home at (408) 294-2962. He will cut the grass during lunch or after hours for a small fee.

—G.J. Collet
RV Space Coordinator

THE WAY WE WERE

1970

- On August 23 the accelerator attained an energy of 22.1 GeV —surpassing by three percent the April 27, 1969 record of 21.5 GeV.
- The Stanford Positron-Electron Asymmetric Ring, called SPEAR, was approved as part of the SSRL budget and construction began almost immediately. Installation of the thirty-foot modular units that make up SPEAR was expected for June 1971. The first beam into the ring was anticipated for April Fool's Day, 1972, and physics research was expected to begin on Halloween.

—Sarah Morisseau

Teachers get Crash Course in HEP

FOR SIX HIGH SCHOOL and college instructors, this autumn's return to the classroom will offer an additional challenge—incorporating summer research experiences at SLAC into their physics courses. While such curriculum changes may not usually come easily, these six "graduates" of Helen Quinn's workshop on particles and interactions all agree that change is inevitable. Working with five separate research groups, the teacher interns were exposed to large, if not critical, doses of high-energy physics; certainly large enough to change their relationship with the subject matter. Already, most of the interns are planning new laboratory and lecture materials to bring students closer to the "real world" of experimental physics.

Jerry Loomer learned not only how experiments at SLAC are carried out, but also contributed to the success of the mili-charge project. Jerry was involved in several aspects of the experiment, from plumbing and photo-documentation, to development of a pneumatic switching system, and assembly and testing of the apparatus in the pit.

Chris Hunt, from Newark Memorial High School, believes that the "helpless, lost feeling was very important," as it allows her to better understand what her students go through. Although Chris is new to teaching physics, she has taught the renaissance combination of math and English for many years. This summer, she ran tests on a wire scanner used for measuring the size of particle beams. A surprising twist to Chris's experience was that the wire scanner itself was designed by her former math student, Eric Bong from Newark.

Editors note: Not all of the summer interns worked on a single project. Eric Harpell, who teaches at Las Positas College in Livermore, wrote for the *Interaction Point* while working with Knut Skarpass VIII on the vertex detector upgrade, and with Willie Langeveld, John Venuti, and Steve Shapiro on their inexpensive cosmic-ray detector for use in high school and college laboratories. Eric believes writing to be the "best tool for learning" and that his education is, as always, "just beginning."

Summer teacher interns are, left to right: Chris Hunt, Dennis Dijak, Sue Wang, Jerry Loomer, Eric Harpell, and Marc Afifi.

Unlike Jerry and Chris's hardware projects, Dennis Dijak and Marc Afifi have been learning about methods of data analysis. Both worked for Group K, assisting Elliott Bloom's group in analyzing the x-ray and gamma-ray emissions of neutron stars, white dwarfs, and black holes. While Marc searched for signs of yet-undetected black holes in binary systems, Dennis's assignment was "to analyze the seven million bytes of five-millisecond data from the High-Energy Astronomical Observatory satellite (HEAO-1) for the neutron-star pulsar in the Crab Nebula (supernova remnant)." Because the nebula is one of the best-studied astronomical objects, its characteristics "can be used to judge the precision and reliability of other data."

Dennis intends to pass the project on to his students at Carmel High School in Indiana. "Most of what I learned happened by doing. I intend to let the students start off like I did (confused!) and let them make sense out of the project."

On the engineering side, Sue Wang, who teaches at neighboring Foothill college, engaged in a crash course in cryogenics this summer. Sue's primary responsibilities for the project were to develop a theoretical model of the pumping system, and to write a technical report describing the entire project. In Sue's case, writing the report proved to be especially challenging—she's has very little writing experience outside of her native China.

Perhaps the most valuable part of Sue's experience, however, was conversations with fellow engineers working on part two of the injection-beam vacuum test. By asking how they approached particular problems, Sue learned "that the principles and skills she learned in China were important here as well."

Chris Hunt best summarized the SLAC experience for the teachers: "I really felt like an employee at SLAC."

—Eric W. Harpell

Blood—the drop that doesn't stop

SUMMER IS TYPICALLY A difficult time for blood banks to get enough donors. Even dedicated blood donors are often thinking more about airline tickets, hiking boots, or hotel reservations than about making a blood donation. Yet patients need blood year round, and human blood cannot be manufactured or stored indefinitely. Over 4 million patients in the US will receive transfusions this year, using 14 million units of blood collected from 8 million volunteer blood donors.

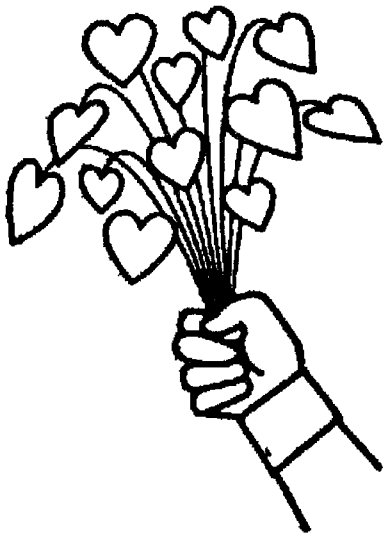
Each blood donation can help up to four patients, because the bank divides the blood into components. After donation, technicians spin the blood in a centrifuge. The red cells that "pack" at the bottom of the bag can be transfused to accident victims, surgical patients, or patients with ulcers.

The fluid plasma above the red blood cells can be given to cardiovascular surgery patients and organ transplant recipients who require the fluid volume and proteins, immunity factors, clotting factors, and hormones contained in plasma.

The blood bank also spins some of the plasma samples a second time to collect the platelets. These proteins, which are easily destroyed by radiation and chemotherapy, are needed by cancer patients and cardiovascular patients to initiate clotting.

The remainder of the plasma is a rich source of more clotting factors called cyoprecipitate. Physicians give the clotting factors in cryoprecipitate to hemophiliacs and other patients who lack them.

Blood donors make this entire process possible. You need not take a vacation from helping



others in this very special way. To make an appointment for the next blood drive at SLAC on September 22, call the Public Affairs Office at ext. 2204.

—Jill Mhyre

Do not even *think* about parking here!

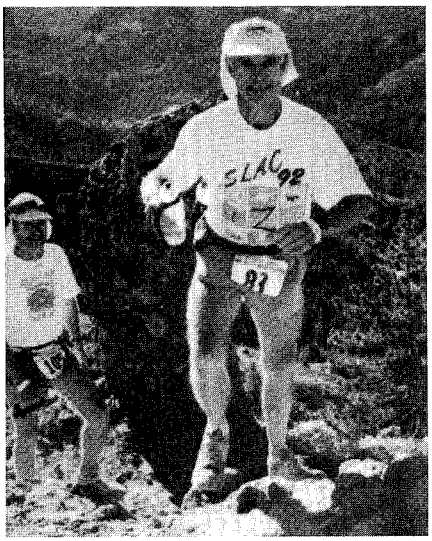
THE VEHICLES SHOWN above are illegally parked in red zones. No matter what type of vehicle you drive, remember to park in a legal parking space. Never park in a fire lane or a handicapped space—not even for a minute while you dash into a nearby building. Fire lanes must be kept clear at all times so that you do not impede emergency personnel from providing quick medical assistance or deploying equipment to extinguish a fire.

Although SLAC's fire lanes are clearly posted as such, a few people have been ignoring the markings and using the fire lanes as parking areas. These repeat offenders could have their vehicles towed, which would result in expensive tow and storage fees.

Remember, when you see the red striped spaces or curbs, think "Don't park here, keep the fire lanes clear."

—Melinda Saltzberg

Lewis and Walz complete grueling 100-mile race



Dieter Walz

MILO LEWIS AND DIETER WALZ had never met each other around SLAC; instead, they crossed paths at the Western States 100 Mile Endurance Run, an ultramarathon held from Squaw Valley to Auburn, California on June 25–26.

This ultramarathon traces part of the historic Western States Trail, first used by the Paiute and Washoe Indians, and later followed by '49ers traveling between the gold camps of California and the silver mines of Nevada. From start to finish, the race trail climbs a total of 18,000 vertical feet and descends another 23,000. Temperatures on race day ranged from 47° at the 5 AM start to 102° F in the mid-afternoon canyons.

Lewis and Walz ran all day and through the next night, picking their way along the last 38 miles of the trail with the help of a flashlight and a pacing companion. After climbing over the mountains, they descended into a series of canyons, and at 78 miles into the race, crossed the American River, traversing 150 feet of rapids and boulders at the Rucky Chucky crossing. According to Lewis, the river produced by snow melt is "extremely cold," even in June.

Of the 379 runners who entered the race, 249 finished. Lewis placed 105th with a time of 25 hours, 52 minutes; Walz was pleased to finish 174th in his first 100 miler at 28 hours, 17 minutes.

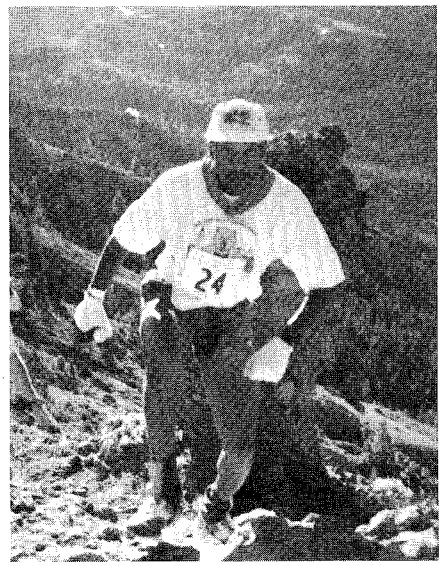
Both Walz and Lewis agree that "success or failure is determined by the thoroughness of the preparations. The great African runner, Ikanga, said that 'the will to win means nothing without the will to prepare.' The secret is desire." To prepare, Walz and Lewis filled their weekends with training runs in the Sierra Nevada mountains.

Lewis decided to move up to the longer races because of the "close-knit family in ultramarathons." When people train for such long distances, there is "a lot of time to be out there together." Walz also "likes the kind of people [he meets] in ultramarathon running," especially "their values and their concern for the environment."

Pacing companions accompanied the runners for the last 38 miles of the race. SLAC's Loren Godshall, veteran of the Race Across America bike race, paced Walz. Godshall made the race much more pleasant and safer at night. "Pacers provide motivation and a sense of direction, to help the runner through some of the bad times," explained Lewis. "They say you run your first fifty miles with your legs, and the second fifty with your mind," said Walz. Pacers were there to help.

Race crews also played an important supportive role. The crew included family and friends who delivered supplies to the checkpoints along the race. Walz's crew chief, Mike Foss from SLD, drove miles through the mountains on logging roads to deliver equipment and support to Walz along the way. Among other items, he delivered about 8.5 gallons of fluids for Walz to drink during the race.

Walz credits the support "of pacer Loren and crew chief Mike, as well as the support of my family during the many months of rigorous training and on race day. Without their help," said Walz, "it would have been very difficult if not impossible for me to successfully complete and experience this adventure into the unknown. I owe all of them a debt of gratitude."



Milo Lewis

Lewis, a veteran of multiple 100-mile races, including the 1993 Western States, knows the value of the people who helped him. Lewis thanks his crew captain, Oprah Reeves, and his two pacers Perry Petschar and Edgar Wilson "for an outstanding job."

Lewis and Walz have run together again since the Western States 100. Along with Loren Godshall, they entered an August 50 K trail race in the East Bay Parks. Indeed, it would seem that there is nothing like an ultramarathon to draw friends, family, co-workers, and competitors together. Walz and Lewis felt this draw, and it carried them one hundred miles all the way to the finish line.

—Jill Mhyre