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BABAR's New Leadership: A Cosmic Coincidence

By Heather Rock Woods

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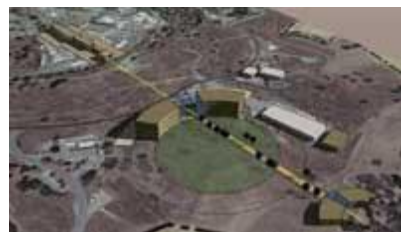
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By Shawne Neeper

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"It's a conspiracy," Hearty joked.

"It's just a cosmic coincidence," MacFarlane said.

The 600-person collaboration works hard to ensure smooth continuity by training new leaders before their terms start. MacFarlane's family has relocated here for his two-year term, and Hearty has frequent travel plans during his one-year term to see his wife, who teaches near Vancouver.

The first order of business was to celebrate BABAR's success at the formidable International Conference on High Energy Physics (ICHEP) in Beijing last August, where the collaboration presented some 64 conference papers—an unusually high number—and participated with 22 parallel session talks and one plenary session talk.

"It's very satisfying to us that we were able to bring so much new physics and new data to the table," MacFarlane said. "The conference summary speaker noted that the results from both B-factories (BABAR and Belle in Japan) were the highlight of the conference."

The results reflect a broad range of contributions, including a doubled data set in the last year, a new method for storing data to more quickly reach the physics analysis groups, a new data quality group, a very active physics analysis community and an efficient internal review process.

A high spot was BABAR's presentation on the discovery of direct CP violation in the B meson particle, announced by the collaboration weeks earlier (see <http://www.slac.stanford.edu/slac/media-info/20040802/>). Physicists found a large asymmetry, or CP violation, in how frequently B particles perished into a particular set of particles compared to the frequency for the antimatter anti-B particles. Picture a cookie jar with equal numbers of white cookies with chocolate chips (matter) and chocolate cookies with white chips (antimatter). When you go to eat these unusual cookies that started with one chip each, you count 900



Chris Hearty (shown left), new BABAR physics analysis coordinator, and David MacFarlane, new BABAR spokesperson. (Photo by Diana Rogers)

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chocolate chips but only 700 white chips. This behavior difference may be part of the reason we are made of matter instead of antimatter.

“Belle presented their results at the conference and confirmed our result. This was a real milestone for the B-factories,” MacFarlane said.

Another conference highlight is the search for asymmetry in penguin modes, a rare class of decay from B mesons to other particles. The BABAR experiment is pursuing intriguing hints that penguin modes reveal new physics that are unaccounted for in the Standard Model, the bible of known particles and interactions.

“This is clearly going to be a hot topic over the next year,” Hearty said.

If the Standard Model is correct, penguin modes should have the exact same amount of asymmetry as the now well-studied decay process involving what are called charmonium states. Experimental data from both B experiments, presented in Beijing, show the penguin modes appear to have less asymmetry than the charmonium modes.

“The data are continuing to hint there may be new physics here, perhaps supersymmetry,” MacFarlane said. However, the current measurement lacks enough statistical significance to be sure. He hopes the experiments will accumulate enough data to be convincing in time for ICHEP 2006 in Moscow.

Another mystery that remains is the existence of pentaquarks, particles made of five quarks—not the usual two or three. Two nuclear physics experiments claimed to have seen pentaquarks last year. Since then about half of the world’s big particle physics experiments, including BABAR, have not seen signals for pentaquarks at that mass, while the other half have.

“The jury’s still out at this point,” MacFarlane said. “We have a huge data set, we should be producing pentaquarks.”

The BABARians will also be looking for other new particles using spectroscopy, a way of analyzing data based on the mass of particles. This method has already turned up two new particles in the past 18 months at both BABAR and Belle.

“Theorists give us a lot of input in where to look for new particles,” Hearty said.

Pinning down the alpha angle will also be an important goal for the next run, to get a more precise measurement and better understanding of this complicated quantity. Alpha, beta and gamma are the three angles in the unitarity triangle, which summarizes what is known about electroweak interactions with bottom quarks. Comparing new direct measurements of alpha with indirect measurements of alpha could again open a window on new physics. (see <http://www2.slac.stanford.edu/tip/2004/jun04/babar.htm>).

During the current accelerator downtime, BABAR is making major upgrades to the detector, replacing one third of the muon system. Failures in the old muon system degraded the detector’s ability to efficiently identify muons. The remainder of the muon system will be replaced during next summer’s downtime.

“We’re unbuilding the detector and rebuilding it. It’s a big deal,” Hearty said.

The next run is scheduled to begin October 15 and run to July 1, 2005. "We're hoping to record another 100 inverse femtobarns or more," MacFarlane said. "That would be a substantial increase in our data sample."

Hearty hopes to make analyzing those reams of new data easier and faster by providing the core tools and data that the analysis groups need including central schedules so groups can complete their work and get it through the review process in time to present at major conferences.

"We'd like to have a good show of new physics analyses at the Lepton Photon conference in June," he said.

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When the weather is nice, the Green becomes the scene for volleyball, soccer and other healthy activities. (Photo by Diana Rogers)

"We really do offer a lot," said physician's assistant and personal trainer Raylene Blandino (SHA). "People just don't take advantage of it." Blandino writes Options for Wellness, a bi-monthly newsletter which announces the latest programs and activities for SLAC employees.

To encourage fitness participation, the medical department offers a free, one-year Health Promise program, which provides a health screen, goal setting and a full physical exam every three months to track progress. They hope to increase participation this year. "[SLAC employees] work passionately," said physician Maria Gherman (MED). "It's amazing. But they need to take care of their bodies. Besides, it's a source of fun."

People looking for relief from stress, tight shoulders and back pain can contact certified massage therapist Mer Baldoza (ESD), Ext. 2009. Baldoza offers half hour (\$25) and hour-long massages (\$50). His combination of Shiatsu, sports, Swedish

and deep tissue massage is popular. He is booked through October, but it is worth calling anyway. "When a new client calls, I put them on my waiting list," Baldoza said. "If there's any cancellation, I call them."

Employees can also build some muscle at SLAC's air-conditioned gym, located in the exercise room in the northwest corner of Bldg. 34. For any-time access to the equipment, contact Diane Jenkins (MFD), Ext. 2215 and join for \$25 per year. There are adjacent locker rooms and showers, which are open to everyone.

Exercise With Others

Group aerobics and fitness classes are held in Bldg. 27, SLAC's exercise studio. Aerobics classes taught by Cecilia Glower are offered for a nominal fee, and the first class is free. Ziba Mahdavi (BLS) has been teaching free fitness classes here for six years. "It's fun," Mahdavi said. "I really do it because people like it." Drop in any Monday or Wednesday at 4:30 p.m. for step aerobics, or any Tuesday or Thursday at noon for body

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sculpting. Wear tennis shoes and comfortable clothes. Come on time—classes do fill up.

Other classes such as Pilates and Yoga are offered through Stanford's Health Improvement Program (HIP). Fall classes will begin the week of September 20, so sign up now.

Get Some Fresh Air

To get some outdoor time, drop by for volleyball or soccer on The Green. "Anybody is welcome to play [volleyball]," said Nicolas Berger (EE), Ext. 3434, who maintains the volleyball e-mail list. "Volleyball is easy to pick up and many of our current players—myself included—came in with little or no experience."

Maybe soccer is your game. "It's very light soccer—no pressure," said Raphael Miranda (KLY), who helped launch the lunchtime soccer program. Join the game Mondays and Thursdays at noon on The Green. Contact Tu Ly tuly@SLAC.Stanford.EDU to join the e-mail list.

For up to date information about the SLAC wellness program and classes being offered, visit: <http://www-group.slac.stanford.edu/esh/medical/now>

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Due to start operations in 2009, the \$315 million project will be SLAC's largest development since the SLC—and the world first x-ray free electron laser.

"The EIR [External Independent Review] was a major review because it established a baseline for the entire project," says LCLS chief engineer Mark Reichanader.

The review was conducted by Burns and Roe Enterprises, Inc. (BREI), an engineering firm that specializes in large construction projects such as power plants. The 12-strong BREI team spent seven weeks reviewing the project and one week on the SLAC site, checking every aspect of the LCLS organization and preliminary design, cost and schedule.

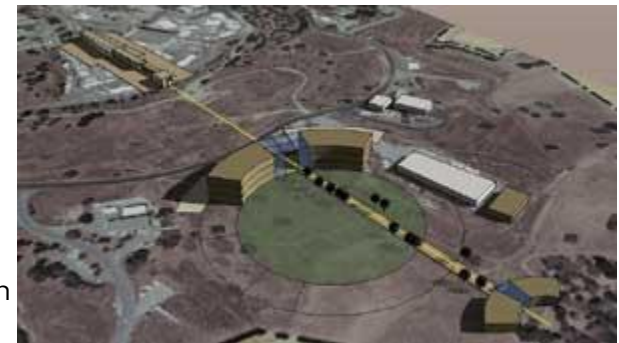
The report contains a few recommendations about the LCLS management structure and the need for a detailed ES&H analysis, but it found the overall project baseline 'complete and reasonable.' BREI's report was a crucial step towards the Critical Decision 2 [Approve Project Performance Baseline] expected later this year, and the next step in DOE's formal project review process.

A concern raised in the EIR is the prospect for ramping up next year to a full staff of 125 at the three national labs participating in the LCLS construction. This is up from the 50 staff members (35 of them at SLAC) presently involved in the project, since the necessary budget increase is subject to congressional approval.

The president's budget for the next fiscal year slates \$54 million for the LCLS—\$4 million for research and development, \$20 million for engineering design and \$30 million for advanced procurements. The House has approved the funding as part of the energy bill which now awaiting confirmation in the Senate.

Meanwhile, the LCLS team is celebrating the good news from the EIR. "It was great the way all partner labs teamed to present the LCLS effectively to the EIR. It was a wonderful preview of what it's going to be like working together," said John Galayda, who heads the newly established LCLS division at SLAC.

For more information on LCLS, see: <http://www-ssrl.slac.stanford.edu/lcls/>



The future Linac Coherent Light Source complex will be located on SLAC grounds extending from the Research Yard eastward. (Image courtesy of LCLS)

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Annual Safety and Security Briefing

The Integrated Safeguards and Security Management (ISSM) program and the ES&H Integrated Safety Management System (ISMS) have been combined into this single session that deals with supporting world class research in a safe and secure environment.

Expo in the Breezeway

More information about the programs will be available at the Expo tables set up in the Auditorium Breezeway. Get to know your safety and security protection systems areas. Subject matter experts will be on hand to answer questions about counter-intelligence, physical security, computer security, safety, and emergency preparedness.

If you have questions about this event, contact Doug Kreitz at Ext. 4550, dougkr@slac.stanford.edu.

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Maintaining Outstanding Linac Performance

By Shawne Neeper

After its six-week shut down, the linear accelerator (linac) is back on line and ready for another year of record-pushing luminosity. The linac's electrical, cooling and control systems stay in top form thanks to a hard-working cadre of unsung heroes in Site Engineering and Maintenance (SEM). This August, while physicists around the world celebrated new discoveries in beta particle decays, the SEM utilities and operations groups worked around the clock to complete a flurry of upgrades and repairs during the all-too-brief downtime.



Michael Strittmatter (SEM), working on a control panel in Sector 20. (Photo by Diana Rogers)

The downtime provides a rare window of opportunity to maintain systems that are inaccessible during the linac's near-continuous operation over the rest of the year, explained Utility Support Group leader Forrest Brown. His team is responsible for all high-voltage operations on site, and they run the heavy digging equipment and dump trucks that service campus utilities, from sewers to natural gas lines. Since the linac shut down on August 1, the utilities group has worked in tandem with the operations team, putting in long hours to complete a carefully-planned schedule of maintenance and upgrades.

As part of preventive maintenance, utility support technicians combed the length of the Klystron Gallery for potential electrical problems, and made repairs to prevent unpleasant surprises. For example, by pulling out the linac's circuit breakers—each weighing several hundred pounds—Brown's team discovered a burned-up breaker serving linac sectors zero, one and two, threatening power to the injector gun and damping rings. Left alone, the breaker could eventually melt or catch fire. The team replaced the breaker, and averted a potential shut down of one week or more.

It is impossible to complete 100 percent of the desired work during each downtime—even with the utilities group putting in long days and weekends, and the operations group running three shifts per day, seven days a week. "But we know what it takes to get the machine up and running," said Mechanical Operations Group leader Bernie Romero. His team maintains the gas, air pressure and water cooling systems that help keep the linac and research yard in business.

This year's downtime projects included upgrades to Sector 20's cooling system pumps, valves, heat exchangers and instrumentation to boost performance beyond previous standards. To update cooling systems for the beam stopper—served by the massive, corrugated steel cooling tower that dominates the research

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yard—they replaced original equipment with custom designed pneumatic controls. They also updated the computer system that monitors the accelerator, to help control the water temperatures for the coming long run.

Keeping Cool

A jungle of pipes and valves fills a large gallery inside the linac building at Sector 29. Nearby, several yellow, scuba-style tanks process water through ion exchange resins to produce ultra-pure low conductivity water (LCW). Green-tinted copper pipes labeled 'LCW' use the purified water to carry heat away from the linac's klystrons, wave guides and accelerator structure. A 20 foot length of 18-inch steel pipe houses a 'tube and shell' heat exchanger that brings the hot LCW alongside water from a nearby cooling tower. The system's precisely-tuned mixing valve adjusts continuously to ensure that the LCW returns to the linac at 113 degrees Fahrenheit. The constant temperature helps ensure a stable accelerator beam.

As part of August's downtime maintenance, Romero's group flushed the water systems in every sector of the linac and around the PEP ring with a mild detergent to remove copper oxide and other build-up that could hamper performance. Then they disassembled, cleaned and reassembled the heat exchangers. As final preparation for linac re-launch, they calibrated and tested the controls that will maintain temperature within 0.2 degrees Fahrenheit of optimal throughout the year.

It's Under Control

In a small office within Building 35, instrumentation technicians Craig Butler and Mike Strittmatter demonstrate the Distributed Control System (DCS), which they and others use to monitor the accelerator and storage ring systems. The DCS is the group's first and best source of input, according to Butler.

Strittmatter launched the DCS, and a map of the linac and PEP-II appeared on his screen. With a click, he zoomed in to view temperature, valve settings and other operations in one of the sectors. Another click brought up a chart of cooling system function over time. A plot of temperature over the spring months is smooth and steady, with only small fluctuations. "[Linac scientists] ask for temperature control within plus or minus a half degree," Strittmatter said. "We aim for better." With linac systems newly checked, repaired and upgraded, Strittmatter and his colleagues are ready to meet that aim.

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Travel Rates Change Oct. 1

The Federal domestic travel per diem (FTR) rates are reviewed and adjusted annually by the General Services Administration (GSA). These rates establish the maximum amount of lodging, meal and incidental (M&IE) expenses that may be reimbursed by SLAC for any one geographical area. These rates become effective October 1 and apply to travel performed on or after that date.

Some examples of lodging rate changes are:

Standard Rate

FY04 \$55
FY05 increased to \$60

Washington, DC

FY04 \$150
FY05 reduced to \$143

Los Angeles, CA

FY04 \$106
FY05 reduced to \$100

Ithaca, NY

FY04 \$69
FY05 increased to \$100

Please note that the cities/counties listed on the GSA tables are areas that have been determined to be high cost areas. If the location you are traveling to is not on the GSA tables, then the standard rate applies.

The FTR rates do change periodically throughout the year as the expense of travel is determined by GSA to cost more or less. Please review the rate for the area you are traveling to before you depart on your trip.

The FY05 rates are posted at: <http://policyworks.gov/org/main/mt/homepage/mtt/perdiem/perd05d.html>

Contact: Alison Twombly, Ext. 4346, atwombly@slac.stanford.edu

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Traffic Tips

By Rick Yeager

All SLAC employees, users and contractors...

Construction Zone Concerns

With construction by the Main Gate underway, we REALLY need everyone to be alert. Pay attention to blocked off road and parking lot areas, and be sure to follow any posted directions.

Stop Sign Means Full Stop

A stop sign means come to a complete stop at intersections. Look both ways and be aware of pedestrians before proceeding. Remember—they have the right of way.

Blind Corners

Always be aware of your surroundings. When exiting parking lots on blind corners or approaching a sharp curve such as those along the PEP Ring Road, use caution whether in a vehicle or on foot. Particular caution should be used around slow moving heavy equipment or other roadway blockages.

Headphones

Wearing headphones which reduce or restrict hearing while operating a vehicle, walking, jogging, bicycling or rollerblading is not permitted at SLAC. Headphones can be worn slightly forward of the ear on the temple so approaching vehicular traffic can be heard.

Check for more traffic safety tips in the next Interaction Point!

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Fish Don't Smoke and Other Rainy Season Reminders

By Judy Fulton

Summer is winding down and along with it the dry season. That means it's time again to start preparing for rain.

Remember, rainwater flows untreated into drains and then directly into the Bay. That means any material or trash left outside during the rainy season can end up polluting the environment by washing into drains.

Look Around Your Work Area

So take a look around your work area. Have materials piled up outside that should be brought back in or covered? Are the catch basins full of debris or sediment and in need of cleaning? How is the general cleanliness of your area? Is there debris, litter, packing peanuts or cigarette butts waiting for the next rain to wash them down the drain?

Cigarette butts are a problem that we can readily do something about. During our annual stormwater evaluation we observed piles of cigarette butts left around buildings—sometimes just a few feet away from ash trays and butt cans. They are a threat to water quality and wildlife. Cigarette litter isn't a problem that goes away quickly either—it can take over 15 years for a filter to disintegrate.

Fish Don't Smoke

Cigarette filters have been found in the stomachs of fish, birds, whales and other marine creatures that mistake them for food. While being smoked, the cigarette filter absorbs hazardous compounds such as cadmium, arsenic and lead. Animals not only eat the filter, but ingest these toxic compounds as well.

Cigarette butts should be extinguished and placed in a trash receptacle, not on the ground. Your building manager can make sure that proper receptacles are available in outdoor smoking areas.

If you have questions about how to prepare your area for the rainy season, or if you need help with housekeeping arrangements, please contact Judy Fulton (Ext. 4538, jfulton@slac.stanford.edu).



Please do not throw your cigarette butts on the ground. Dispose of cigarettes butts properly. (Photo courtesy of Sharon Burns)

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Quinn Meets President of Vietnam



Photo courtesy of Helen Quinn

Helen Quinn (THP), APS President, shook hands with Vietnam President Tran Duc Luong (shown center) on the steps of the Presidential Palace in Hanoi. The photo session followed a visit by a group of physicists attending the 5th Rencontres du Vietnam, an international science meeting organized by physicist Tran Thanh Van, University of Paris, Sud (shown left). After speeches were given, President Luong expressed his support for science, research and development and acknowledged their importance to the future of the country.

For information on the 5th Rencontres du Vietnam, see: <http://opserv.obspm.fr/confs/Vietnam/>

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Sara Lowe Wins Olympic Medal

Cindy Lowe's (LC) daughter Sara has brought home Olympic bronze from the 2004 Summer Games in Athens. Lowe is the youngest member of the U.S. National Synchronized Swimming Team (See [TIP, June 20, 2003](#)). The team took the bronze medal in the overall team competition. The U.S. Team scored a final composite 97.418.



Photo by Dean Lowe

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SLAC Today

Make it your homepage.

Get all the latest news, announcements, events and more at:

<http://today.slac.stanford.edu>

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MILESTONES

Service Awards

5 Years

Dalby Jr., Thomas (TIS), 9/27

10 Years

Copeland, Michael (MD), 9/16

Woodcock, Gary (ASD), 9/27

15 Years

Bjorken, James (THP), 9/18

Decker, Franz-Josef (ACC), 9/28

Hall, Nenita (PUR), 9/18

Trinh, Hien (SCS), 9/16

20 Years

Dungan, David (SSRL), 9/25

30 Years

Dunwoodie, William (EB), 9/16

35 Years

Alvarado Sr., Eugenio (SEM), 9/17

Retired

Perl, Martin (EE), 8/31

To submit a Milestone, see:

<http://www.slac.stanford.edu/pubs/tip/milestoneindex.html>

See Awards and Honors at <http://www.slac.stanford.edu/slac/award>

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SLAC Family Day

Saturday, September 18

11 a.m. - 3 p.m.

Everyone Welcome!

<http://www-project.slac.stanford.edu/familyday/Default.htm>

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17th Annual DOE Golf Challenge

Monday, October 18

11 a.m. Shotgun

Roddy Ranch, Antioch

Registration Deadline: September 28

Cost: \$62 (covers green fee, cart, range balls & prize fund)

To register or for more information, contact Ben Smith, Ext. 2638, MS 17, bens@slac.stanford.edu

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Educating Scientists in Synchrotron Radiation Techniques

By Serena DeBeer George

SSRL hosted the fourth annual structural molecular biology (SMB) summer school August 16-20. The school focused on synchrotron-based techniques and their application to biological problems. This year's co-chairs were staff scientists Hiro Tsuruta, Serena DeBeer George and Clyde Smith (all SMB).



SSRL Summer School participants (Photo by Frances Liu)

The summer school opened with introductory talks on synchrotron radiation and beam line optics. Three days of lectures included an introduction to x-ray absorption spectroscopy, small angle x-ray scattering and macromolecular crystallography, as well as covering basic theory, experimental considerations and applications.

A day and a half of rotating practical sessions followed, giving the students hands-on experience in data collection and analysis. This year's summer school was attended by 23 students and was led by a team of 19 tutors, all of whom are recognized experts in their fields.

The lectures and practical sessions were enthusiastically received by the participants, and we hope to build on the success of this year's summer school to make next year's an even bigger success.

For more information, see: <http://smb.slac.stanford.edu/SR-School/SMB2004/index.html>

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Dixon Butler Visits SLAC

Dixon Butler (second from right), staff member of the House Subcommittee on Energy and Water Development, visited SLAC. He is seen here in the FFTB with members of the E164 and E163 teams.



Photo by Diana Rogers

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Welcome New Employees!

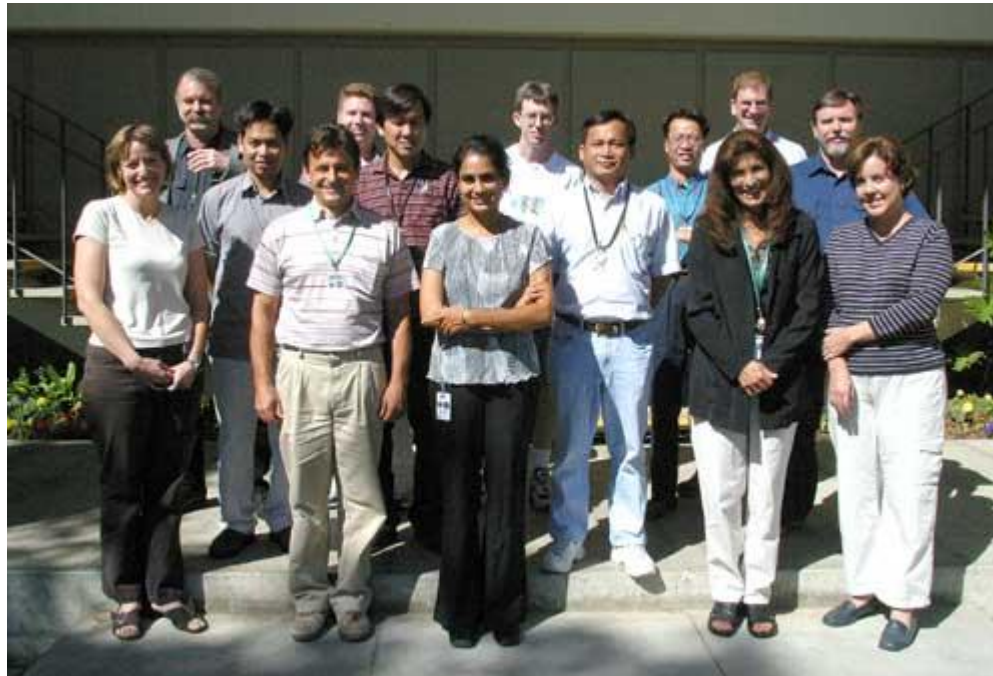


Photo by Diana Rogers

The New Employee Orientation on September 2 included (left to right): Martha Siegel (KIPAC), Mark Barnes (PUR), Phuc Hoang (REG), Igor Kouzmenko (REG), Jeffrey Ludvik (REG), Toan Le (REG), Shantha Condamoor (REG), Seth Digel (GLAST), Thanson To (REG), Tan Huynh (REG), Robert Cameron (GLAST), Donna Hernandez (BABAR), Randy Aguilera (MFD) and Wendy Sisson (LCLS).

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