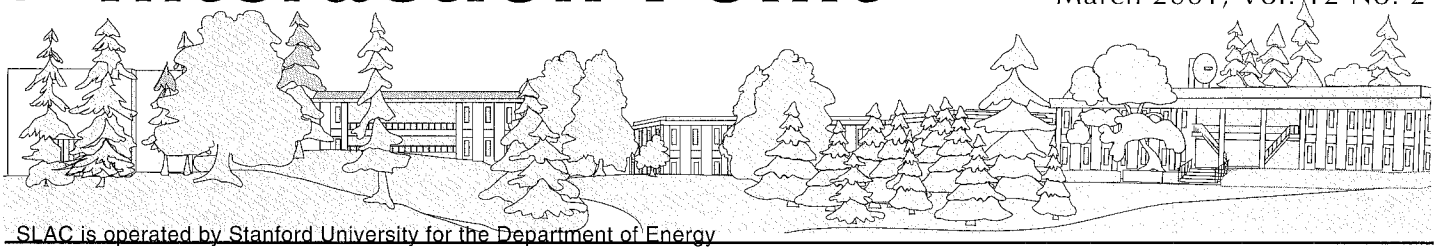
The Interaction Point

Events and Happenings
in the SLAC Community
March 2001, Vol. 12 No. 2



SLAC is operated by Stanford University for the Department of Energy

Physicists Publish First Results from the B Factory

THE INTERNATIONAL *BABAR* COLLABORATION at SLAC has just released initial results on the behavior of subatomic particles known as B mesons. Based on nearly 25 million collision "events" accumulated in 1999 and 2000, these are the most precise results obtained to date on the short-lived particles, which are expected to provide important clues about why our Universe contains far more matter than antimatter.

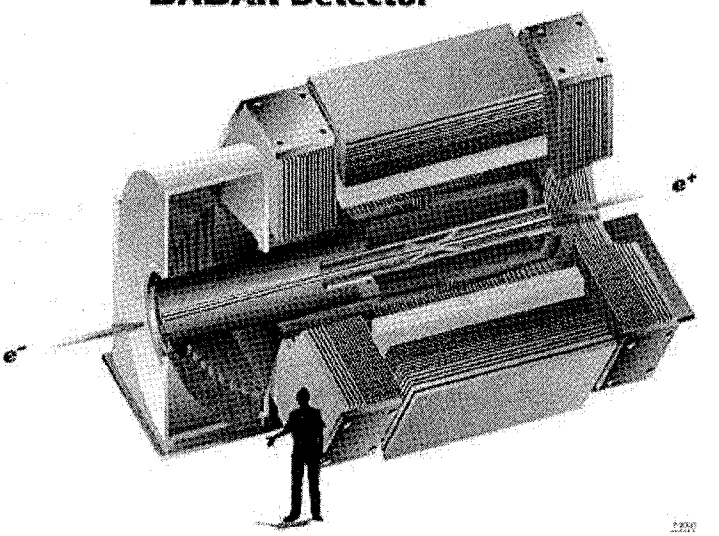
"This is the culmination of more than a decade of efforts by hundreds of scientists and engineers around the world," said SLAC Director Jonathan Dorfan. "Our experiment is beginning to yield tantalizing physics results." Caltech physicist David Hitlin presented the new results last month in a SLAC seminar. In a paper recently sent out for publication in *Physical Review Letters*, *BABAR* physicists provided their best value of an asymmetry parameter known as sine-two-beta (sin 2β), which they determined by comparing how rapidly B and anti-B mesons decay into a set of specific final states. Their result is $\sin 2\beta = 0.34 \pm 0.20$, which is about twice as accurate as previously published values.

"This is the most challenging answer that Nature could have given us," remarked Princeton University physicist Stewart Smith, spokesman of the *BABAR* Collaboration. While it favors a matter-antimatter asymmetry, the result is not yet completely convincing. More data on B and anti-B meson decays will be needed to reach a definite conclusion.

The precision of the *BABAR* result was made possible by the outstanding performance of the PEP-II B Factory. Built in collaboration with Lawrence Berkeley and Lawrence Livermore National Laboratories, this machine collides beams of electrons and positrons of unequal energies. During its first 18 months of operations, the B Factory quickly reached its projected luminosity—a measure of the collision rate between electrons and positrons.

"The B Factory is achieving its promised performance, and it will exceed that promise during the coming year," said Dorfan. The collider has just begun its second experimental run, expected to continue through August. "The B Factory is operating like a fire hose, flooding us with data," said Smith. "*BABAR* physicists are delighted by the opportunities to do great physics that we have been given so early in the game, and we are working extra hard to cope with all the challenges that this embarrassment of riches presents."

BABAR Detector



By accumulating many more millions of events, the *BABAR* physicists will refine their measurements of sin 2β and other key parameters, including another asymmetry germane to studies of CP violation. They will also search for rare events in which B mesons decay into exotic final states that so far have not been observed in other experiments. The *BABAR* Collaboration includes physicists from 73 institutions in Canada, China, France, Germany, Great Britain, Italy, Norway, Russia and the United States. "The foreign contributions, both financial and scientific, have been absolutely crucial to the success of this experiment," noted Smith.

The U.S. Department of Energy's Office of Science funded construction of the B Factory at $177 million and contributed about 60 percent of the cost of the *BABAR* detector, with the remainder coming from foreign sources.

Photographs and illlustrations of the B Factory and *BABAR* detector can be found at: `http://www.slac.stanford.edu/slac/media-info/pressphoto_bfactory.html`.

–Michael Riordan

Letter from the Editor

The Interaction Point doesn't usually publish editorials, so this is an exception. I am leaving SLAC after eight and a half years, five of which have been spent as Public Information Officer (PIO), and as part of that job, editor of *TIP*.

Many of you may not know what a PIO does, so in this space, I will mention some things that I accomplished over the past few years. These accomplishments would not have happened without the contributions of many other people.

A few years ago, a visitor to SLAC asked me what was the most influential impact on my job. "The Web," I replied without hesitation. Because of the Web, we have had to rethink how we deliver news. Because of the Web, I developed special media pages online, so that reporters who were calling for facts about SLAC, or book publishers who needed photos, could download information immediately. Because of the Web we now have announcements, and the flea market and features. All of these items owe a great deal to Kathryn Henniss, past manager of Tech Pubs. Kathryn saw the possibilities and was instrumental in implementing new ideas. The continuation, upkeep and management of the Web media and public facing Web pages are now in the capable hands of Ruth McDunn.

Spreading the news in a short and easy format was the goal behind QuickNews, modeled on Bob Park's weekly "What's New." QuickNews is going into its fourth year of publishing and the website gets about 800 hits a week. I hope that the Lab continues this important news sharing method. My thanks to Roxanne Jones who has put my prose into HTML format each week. Roxanne also now updates the Awards and Honors page as part of our public information functions.

The All Hands hard copy memos that went out of the Director's Office used to be on plain paper, without any distinguishing artwork. That changed in 1996. All Hands email didn't exist until the same year when, thanks to Teresa Downey, we figured out a way to send mail to all SLAC staff and users. The system was too popular in some respects and, thanks to PeopleSoft, we were able to narrow the list and target those on site, instead of sending mail to users around the globe.

SLAC has a new brochure after more than eight years, thanks to a joint effort. Terry Anderson created a new design that will be useful for the tour program, job fairs and the general public. Helen Quinn assisted with the text.

Improved community relations has been another aspect of my job. In the past two years SLAC has been acknowledged by the Menlo Park Chamber of Commerce with an award for being a good neighbor and by the City of Menlo Park for reducing air emissions. Another neighbor is happy about our noise reduction, thanks to the good work of Burl Skaggs, Tom Sherry and others in SEM.

Lastly, I want to acknowledge the fine work of Vickee Flynn, TIP production editor, and Teri Peterson, who does the layout for the newsletter. Each month, these two women work diligently to bring you news about the SLAC community. They need more help and support. If you have news to report, or an article to write, please do so.

There's a lot more about being the PIO at a national lab that could be mentioned. The special tours for reporters and film crews, the comments from neighbors, the campus and community connections, the education donations, the exhibits and displays. All of these are part of a PIO's job. It has been a wonderful experience, with great variety, and I am happy to have played a part in the life of the Lab.

–P.A. Moore

Director's Corner

There is no Director's Corner this month due to Jonathan Dorfan's travel schedule

Work Safe, Work Smart

Two injuries involving days away from work have been reported since the last update according to Sharon Haynes, Worker's Compensation Coordinator. These incidences occurred on 2/2/01 and 2/9/01. The last injury reported involving days away from work occurred on 12/18/00, so SLAC's record number of days between claims remains at 184 days.

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SLAC's Women's Group Celebrates 10th Year

"I THINK THAT FOR a volunteer group to keep going for ten years is quite an accomplishment," said Cherrill Spencer, a planner for the Women's Interchange at SLAC (WIS) since mid-1991.

In January 1991, Janet Dixon, a manager in the Telecommunications Department (now at Cisco Systems) and Valerie Phillips, manager of Travel (since retired), gathered a group of people together to discuss issues of importance to women and how to work on them. The response to Janet and Valerie's invitation was enthusiastic.

The goals of the volunteer group are to:

- Provide an open, informal forum to address issues of interest and concern to women.
- Promote the visibility of women around SLAC.
- Share information among all SLAC departments, cultures, and job classifications.
- Provide mutual support among SLAC employees, regardless of gender.

"We have quite a few men who regularly show up at our monthly seminars," says Spencer.

WIS's mission is to facilitate an understanding of the changes in the world, from our immediate surroundings at SLAC to the world at large, and how these changes affect our families, our futures and us.

WIS has organized nearly 100 monthly lunchtime seminars over the past 10 years reflective of its mission and goals. The seminar speakers come from all over the country with most from the San Francisco Bay Area and quite a few from SLAC. "It may be the oldest SLAC lecture program to address such a wide variety of topics, from astrophysics to career counseling," says Joan Winters, one of the planners. "It takes a lot of teamwork on the part of the planners to not only come up with interesting topics but then to schedule some very busy people for a specific noon hour each month," she continues.

Members of a WIS-organized tour of SSRL (in 1998) look at the protein crystal structure on the screen with 3-D glasses as Aina Cohen, SSRL beamline physicist, explains.

Some WIS planners celebrate WIS's 10th anniversary (l-r) Cherrill Spencer, Ann Trautwein, Janice Dabney, P.A. Moore, Joan Winters.

The seminar topics range from recognition of women's accomplishments, through personal safety and health, work/life balance and money management to cutting edge subjects described by the world's leading experts. "We learned about surfing the Web in January 1994, about Feminist Economics before the newspapers reported on it and about Strings, Fields, and Spacetime from a MacArthur Fellow" says WIS planner Janice Dabney.

To find a complete list of past seminars, which are almost all captured on videotape (stored in the SLAC Library), visit the WIS Web site at `http://www-project.slac.stanford.edu/wis`.

"It was Evelyn Eldridge-Diaz (now at Nokia) who brought up the idea to WIS of SLAC participating in Take our Daughters to Work Day in 1994," said Ann Trautwein, another one of the planners for the group. "That first year we had 109 girls involved and it was a big effort to organize the day with a small number of volunteers." The girls really enjoyed it and TODTW Days occurred in 1995, 1997, 1999, and 2000. The event has now been made a part of SLAC's outreach and is organized through the Human Resources Department.

The Women's Interchange at SLAC is an informal but official SLAC Activity Group. WIS is a resource to upper management on gender issues; it has been consulted by two SLAC Directors on the Lab's working climate and it has contributed to the DOE Annual Review of Programs for Women.

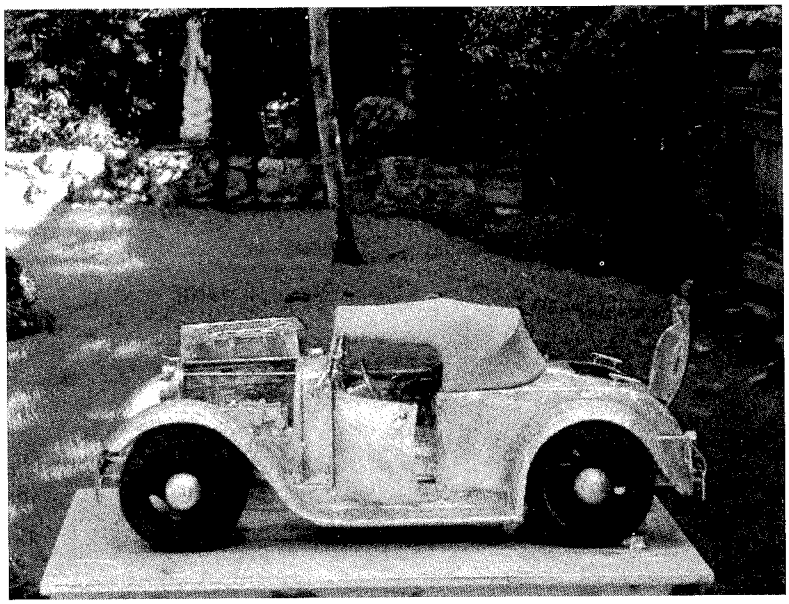
"This is a group that has no officers, no dues, no bylaws and no charter, but we've thrived for ten years," said Spencer. "That says something about the resiliency of women, I think." Those who are interested in joining the WIS planning group can contact Cherrill Spencer at x3474 or Janice Dabney at x3603.

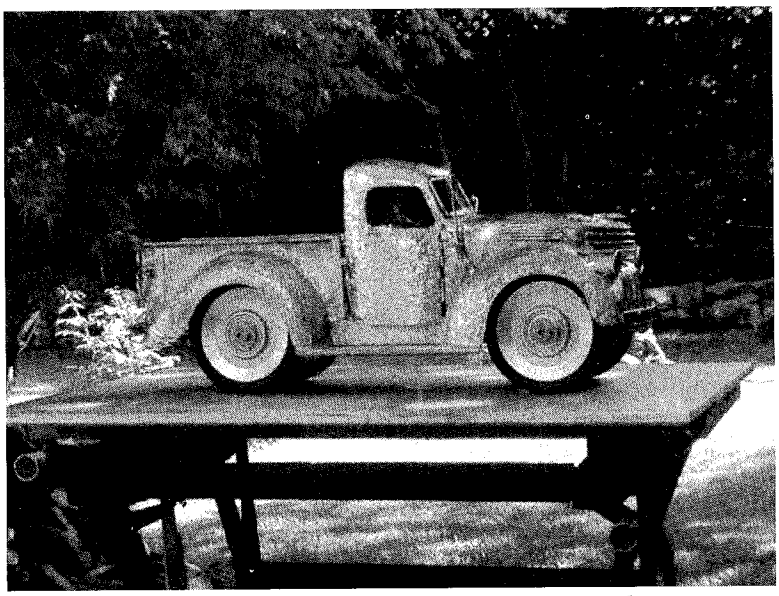
–P.A. Moore

Marcus Hodge: Rigger Turned Artist

OR SHOULD THAT BE artist turned rigger? Both labels fit Marcus Hodge, who works in Site Engineering and Maintenance when he is not in his back yard creating sculptures. "I put in an average of 150 hours per piece," says Hodge. His sculptures are made of scrap metal, some of which he purchases from Salvage. "I use mostly non-ferrous materials, things like tubing, water valves, roof flashing — things like that," says Hodge.

Using a silver solder gas welding process, Hodge creates sculptures of cars, trucks, motorcycles, trains and other mechanical objects. "I live down in San Jose, and I do most of my work in the back yard. My dogs help the creative process," says Hodge. "A small piece like a motorcycle weighs about six pounds and a car can weigh up to about 40 pounds."



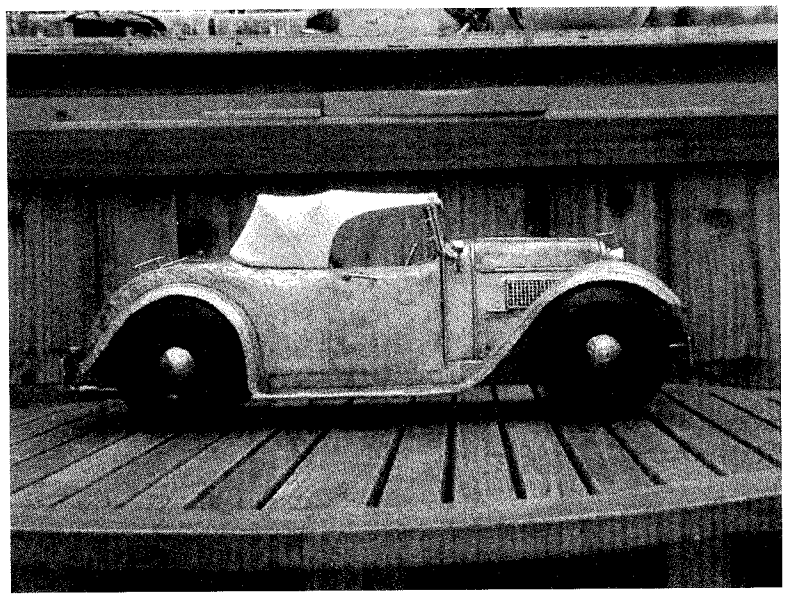


""Pick 'em Up" is a rendition of a 1941 Chevy truck. (27"L x 7"W x 10"H)

Even though he specializes in industrial art right now, Hodge has also done murals. "I was commissioned to do two murals for Western State College in Colorado." Hodge also has work on display at the Skalagard Gallery in Carmel and Art Encounter in Las Vegas (see website `www.artencounter.com/marcus.html` for more information).

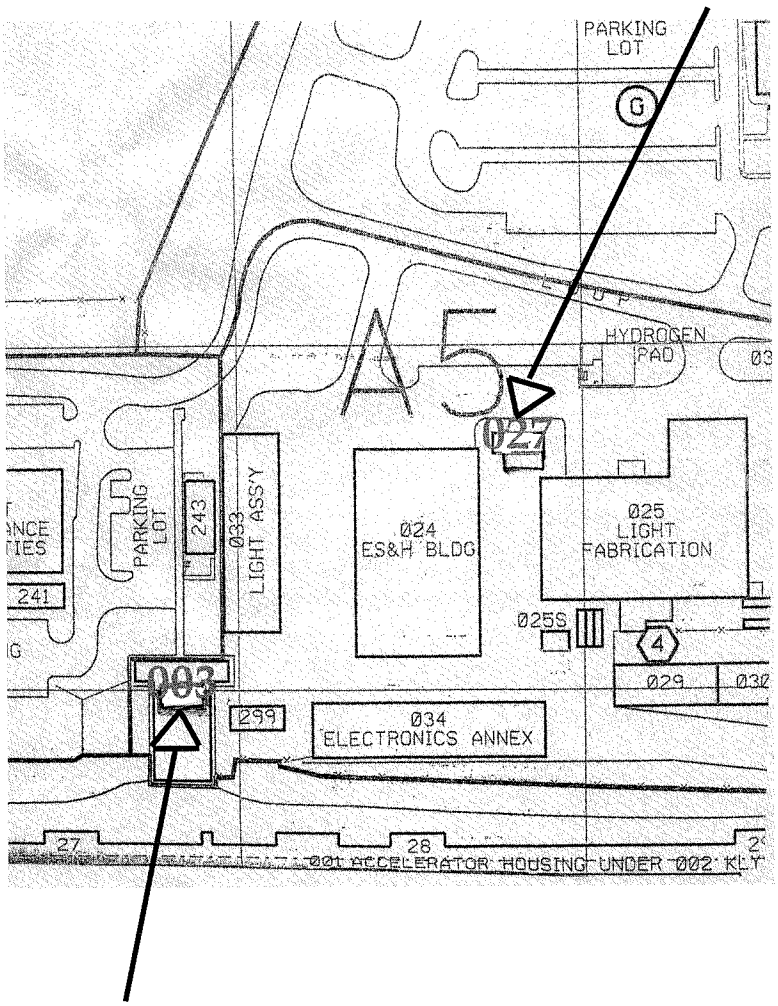
Hodge is a Florida native, but considers himself a traveler since his father was in the Army and Hodge himself went into the Navy. "Thanks to the GI Bill, I got my BA in art." What with one thing and other, Hodge found himself at the Hansen Lab on Campus for four years before coming to SLAC, where he has been for nine years. Hodge has sold several pieces, but he knows he can't quit his day job here at SLAC. "I did take a six-month leave of absence which was great. I got lots done."

–P.A. Moore



Replacement Buildings for the Training & Conference Center

"I'VE LITERALLY SPENT WEEKS talking to people on this topic," says Roz Pennacchi, Space Manager for SLAC. The topic she's referring to is what we do when the Training & Conference Center is removed to make way for the new User Lodging Facility. "Where do the training classes go? Where do the aerobics classes go? What do we do about all the members of the public who have been using those rooms over the past few years?" These questions and more confronted Pennacchi, but she is pleased to report that consensus has been reached. Building 027, the Shop's Dining Room, will be converted to an exercise room and Building 003, the Auxiliary Control Building, will be modified and used as a training room. "I think these buildings provide a cost-effective and practical solution to our problems," says Burl Skaggs, head of SEM.



Two thirds of Building 027 will be expanded by moving the exterior wall to the edge of the patio, and another wall will be built to set off the vending machine area. The people who regularly eat there generously agreed to share the use of this building. The new room's primary use will be for exercise, but it will have a backup use as meeting space. Any chairs that are brought in will be removed after meetings so the cushioned aerobics floor will not be harmed. With these modifications, the exercise room will be about 1000 square feet. "It will sure be a pleasure to have our own room," says Bette Jane Ferandin, a regular attendee of the exercise class on Tuesdays and Thursdays. "After moving chairs, we got plenty of extra weight lifting."

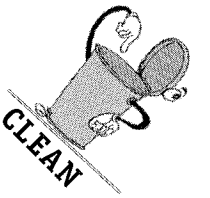
"The Training & Conference Center has a great deal of activity and the building will stay as it is until the end of May," says Pennacchi. After that time, it will be either demolished or sold off. In the meantime, remodeling of Building 003 will be taking place so that training classes can move seamlessly from one venue to the other. "The area that will be used in the Auxiliary Control Building currently has racks of unused equipment. We're going to remove some racks that are no longer needed, and reconfigure the space available for a training room," says Pennacchi. Modular walls will be installed with carpeting and improved lighting to enhance the aesthetics.

Says Burl Skaggs, "We're pleased about re-using Building 003. It's close to the central campus area and it's outside the fence. We hope the funding goes smoothly so that we can be sure the room is ready by the beginning of June." Once the meeting room is remodeled, it will have space for about 40 people. In the past 12 months, the current training Center has been the site for seven conferences (274 hours); 126 ES&H classes (503 hours); and 88 other activities (1046 hours). Those numbers only reflect activities during normal business hours. "When we add the evening and weekend hours, that's another 613 activities for 1280 hours," says Rod Heimstra, ES&H Training Coordinator.

"Many people have asked why we aren't using the Collider Experimental Hall on the PEP Ring Road," says Pennacchi, "At first it seemed like a great location, with plenty of parking, but when we looked at it in detail we found so many problems that it became clear it just wouldn't work."

The timeline for remodeling of these two facilities is being planned and staff members can expect to see activity at these two sites in the near future.

–P.A. Moore



TWC 2001:

Continuing Site-Wide Safety and Environmental Excellence at SLAC

THE SEDAC (SAFETY & Environmental Discussion Assistance Committee) is excitedly planning TWC 2001, this year's Safety and Environmental standdown. The 2001 TWC will be held on Friday, April 20, from 8am-10am. Since last year's TWC event was a success, TWC 2001 will be similar but with some small modifications.

As in previous years, operations will cease during the standdown. Accelerator and critical processes in other areas will go into an appropriate stand-by condition. Like last year, the various teams will have a choice of three methods of action, as outlined in Dr. Dorfan's February 13, 2001 All Hands memo:

- Talk teams will generate two documented safety and environmental concerns and proposed actions.
- Walk teams will use a checklist and walk to determine possible hazards in work areas, buildings or outdoor areas predefined by the teams.
- Clean teams will perform a two-hour housekeeping effort in an indoor or outdoor area pre-defined by the teams.

Teams will choose one of the above methods to address one or more of the safety and environmental Focus Topics.

Talk teams may discuss strains and sprains; slips, trips and falls; hazardous material/waste handling; ergonomics; resource conservation/ environmental performance; or a discussion topic selected by the team.

Walk teams may inspect indoor and outdoor areas for earthquake readiness, electrical and fire safety, abandoned materials, safe management of chemicals, hazardous waste, or compressed gases, storm water contaminants, protection of storm drains, spill readiness, and resource conservation.

Clean teams may perform cleanups to improve safety, workspace utilization, the environment, facility appearance, or increase productivity in the work areas. Clean ups may include organizing for recycling, gathering overdue hazardous material/waste containers, and eliminating potential sources of storm water contamination around storm drains.

As before, Talk teams are encouraged to come up with new ideas, and Walk teams are encouraged to evaluate their work areas to identify points of concern. Clean teams are encouraged to take "before & after" photos. To assist in new ideas, Talk teams may want to consider a new Focus Topic: Resource Conservation/ Environmental Performance in their work areas to meet the concerns of the Director's January 25, 2001 email to conserve energy at SLAC.

A Web site has been developed to help provide more information about TWC 2001: `http://www.slac.stanford.edu/esh/standdown/standdown.html`.

Which Recycling Container to Use

OFTEN I GET QUESTIONS on which of the "green" recycling containers (labeled *White Paper, Mixed Paper,* or *Newspaper*) to use when recycling paper. The questions are appreciated; they indicate how conscientious everyone is about recycling at SLAC.

As an aid to the forthcoming TWC 2001 event, here is a simplified approach to remembering how to recycle paper at SLAC without feeling totally dependent on reading the labels. I call it the deductive approach to recycling.

White Paper: White paper is typically from a photocopying machine or a laser printer. Colored inks and metal clips or staples are OK. White uncoated plotter paper is OK (check with paper manufacturer information to determine if it is uncoated).

Newspaper: Newspaper is fairly straightforward. Color sections of the newspaper are OK too.

Mixed Paper: If it is not white paper and it is not newspaper, then it is likely a paper or cardboard that qualifies as Mixed Paper. All papers from shredders (straight cut only, not cross-cut), white or colored are Mixed Paper. Glossy papers are Mixed Paper. Hardbound books, with covers removed, are Mixed Paper. If one cannot remove the hardbound covers, they are trash. Small scraps of corrugated cardboard are OK, but larger quantities of corrugated cardboard should be managed as described in the Web site on recycling: `http://www-group.slac.stanford.edu/sem/recycling/recycle.html`.

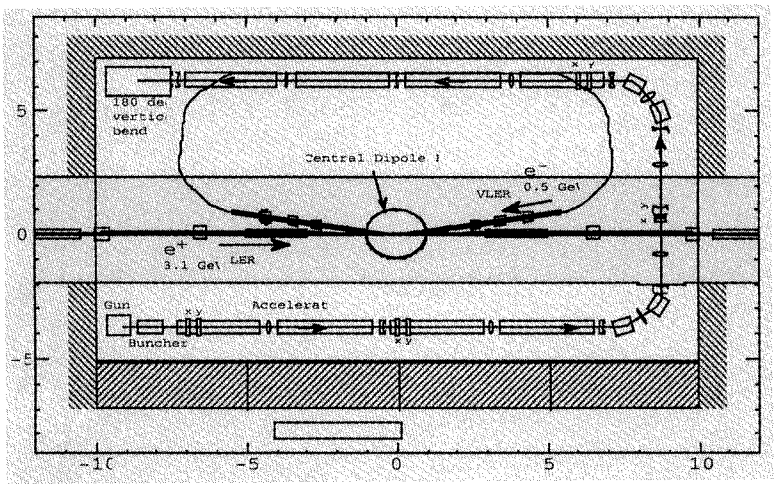
Send the following to trash:

- Papers or cardboards that were in contact with food (e.g., pizza boxes, candy wrappers, coffee cups, etc.)
- Blueprint paper, plastic coated paper, waxed papers, and plastic clips and plastic wrappings.
- Confetti from cross-cut shredders.

–Rich Cellamare

PEP-N: New Collider Facility

A LETTER OF INTENT (LoI-2000.3) was presented at the EPAC meeting held last November at SLAC, regarding a comprehensive physics program at a new e^+e^- asymmetric collider. The LoI consisted of two parts: the physics program and the collider, and both parts included an international group of scientists. Details of the project can be found on the web: `www.slac.stanford.edu/grp/rd/epac/LOI/index.html`. The idea is to use the existing PEP-II low energy ring (LER) for the positron beam and a new, small electron storage ring with a very low energy range (VLER) between 140 MeV and 500 MeV. The small ring would be located in the IR-12 Hall at PEP-II. This new collider facility would be called PEP-N.



Layout of IR-12 with VLER, injector, and LER IR-12 layouts.

The center-of-mass energy range of such a collider would be between 1.4 GeV and 2.5 GeV. This energy range has been inadequately explored in e^+e^- annihilations, and the measurement of various important physics parameters can be significantly improved. The structure of the nucleon is one topic. The nucleon (proton or neutron) is one of the fundamental building blocks of matter. Its structure can be studied in two different ways at an electron accelerator: by scattering a high energy point-like particle, like an electron or a positron, or by producing a nucleon-antinucleon pair in an e^+e^- annihilation. Electron-nucleon scattering started at Stanford almost forty years ago and has led to some of the biggest achievements in understanding the strong force inside the nucleus. On the other hand, nucleon-antinucleon production by electron-positron annihilation is still poorly measured and poorly understood. In particular, the only existing measurement of neutron-antineutron production is several times larger than expected. PEP-N will be able to shed light on this puzzle of one of the fundamental constituents of matter, with 100 times more data than we have now.

An accurate measurement of the total e^+e^- annihilation cross section in this energy range is also something PEP-N can do. The ratio between hadron (quark) and muon production cross sections, so-called R, is poorly measured in this energy region, but can significantly constrain the mass of the Higgs particle in the Standard Model. The Higgs particle has been predicted by theorists but not yet discovered, although it might have been seen at CERN, in Geneva. Similarly, a very precise measurement of R would reduce the errors on the calculated value of the muon magnetic moment (essentially the magnetic field generated by a muon).

In addition, PEP-N will be able to study the excitation of the glue that binds the quarks inside nucleons and mesons (hadrons). The present understanding of hadrons is that they are made of pointlike particles, named quarks, bound by a string made of pointlike particles, named gluons. Theory predicts the existence of mesons in which this string is excited, but no convincing evidence has been obtained at present. In e^+e^- annihilation these events have a clear signature and are expected to be seen in the energy range covered by PEP-N.

A preliminary design has been put together for a small electron storage ring (VLER) that would fit in the PEP-II IR-12 Hall behind the radiation wall. The ring lattice must have enough flexibility to tune the beam emittance, while varying the energy over a very large range, and still maintain a reasonable beam lifetime. The ring circumference, about 40 m, is designed to be a multiple of the LER bunch spacing. The beams would collide head-on and be separated by the detector magnetic field which is part of the interaction region. The electrons would be injected into the small ring from a small local 500 MeV linac.

The expected luminosity at 500 MeV is about 10^{31} cm-2s-1. PEP-N would operate in a "parasitic mode" when PEP-II is running for *BaBar*. It is designed not to interfere with PEP-II/*BaBar* running, as the beam-beam tune shift of the LER beam due to PEP-N would be very low. The intent is to install the PEP-N accelerator and the detector in downtimes which are about two to three months per year. Approximately two downtimes would be needed.

A Workshop will be held at SLAC on April 30-May 2, 2001 to explore the physics potential of this project.

–Marica Enrica Biagini

News from the Web Information Manager
Ruth McDunn, mcdunn@slac

Learn to Search

The web is huge and getting bigger every day. Even the SLAC web is huge. The Infoseek search indexer reports that there are about 250,000 unique URLs in the SLAC web. Organizing this material so every person can "intuit" how to find a particular bit of information is impossible. What is the solution? Use all the tools you have available to you. A well-designed web site should include several ways to find information – consistent and well planned navigation, organized structure, site index, and a search tool.

Although I know where more information is located in the SLAC web than most, I still "search" most of the time to find what I'm looking for. At SLAC we can search:

1. The entire SLAC web (go to `www.slac.stanford.edu/slac/www/search/searchslac.html`)
2. Smaller subsets of the SLAC web (see the check boxes for NLC, SLAC, BaBar and IEMP collections at the top of `www-search.slac.stanford.edu:8765/`), and
3. Individual websites (Search the ES&H website at `www.slac.stanford.edu/esh/search.html` or the TechPubs site at `www.slac.stanford.edu/grp/techpubs/help/search.html`)

A lot of effort has been made to improve the SLAC search tool. If you haven't searched recently, give it a try. Tips on how to search effectively are available (`www-search.slac.stanford.edu:8765/help/`). If you are in charge of a web site and want to add search to your site, contact me. Unless your web site crosses several servers, setting up a site-specific search tool is very easy. Really.

Lightening Your Load

LAST MONTH I MENTIONED gardening as a stress-reducer, and some of you shared your own ways of dealing with stressors. As a past NOW News reported, "Daily minor stress has been linked to changes in blood glucose levels among diabetics, disease activity in rheumatoid arthritis sufferers, and psychological distress." (And an additional hint: a less-stressed person works more safely.)

1. Exercise
2. Peaceful, quiet music
3. A massage
4. A long walk
5. Write a letter with your grievances to the person who caused them...then destroy the letter
6. Make a list of only 5 things that merit real worrying; then back-burner all else
7. Keep a journal
8. Breathe slowly to a count of 10 (in through the nose, out through the mouth)
9. Clear the mind and concentrate on one pleasant thought, word, or image
10. Develop and project a constructive, positive attitude

SLAC's Medical Department is a resource in many of these areas: they sponsor talks and exercise classes, make a masseuse available every Friday, and continue to be your liaison for HELP Center counseling. They also have a related video available for check out: "From Stress to Strength: How to Lighten Your Load and Save Your Life" by Robert S. Eliot M.D.

And just like TV's Frasier Crane, the Operating Safety Committee reminds you that "we're listening" to your safety concerns and questions (`http://www.slac.stanford.edu/esh/committees/committee.html`). Let us be the positive image you envision!

–Janice Dabney, Chair

Milestones

RETIREES

Fowkes, William, Klystron Dept., 2/6/01

DECEASED

Pedersen, Robert, Retiree age 80, 1/26/01
Fish, Joe, Retiree, 2/8/01

AWARDS

Raubenheimer, Tor, a winner of the 2001 USPAS Prize, "For the development of emittance control techniques for high performance electron-positron linear collider and storage rings, and for his leadership role in the development of a second generation linear collider."

Do you have a Milestone you would like published in *TIP*? Just email tip@slac.stanford.edu.