

Collaboration at Work: NLC Accelerator Structure Arrives

By Tom Mead

A two-foot long linear particle accelerator section from Fermilab recently arrived at SLAC. It is one of the first fruits of the collaboration between these two high energy physics labs working to design and build the Next Linear Collider (NLC). Moreover, it is a visible sign of Fermilab's increasing role in the NLC and evidence of closer collaborative ties between Fermilab and SLAC.

This collaboration is focused on learning to build accelerator sections in a manner consistent with efficient industrial methods and practices. Since the NLC will need tens of thousands of these structures, it will be necessary to contract them out to industrial manufacturers for fabrication.

The Fermilab structure is a single section of the proposed NLC accelerator. It, and the dozen that follow, will be integrated into the Next Linear Collider Test Accelerator (NLCTA) as a test and demonstration of the basic linac accelerator system unit.

SLAC physicist Marc Ross explained, "The goal for the NLC is to attain

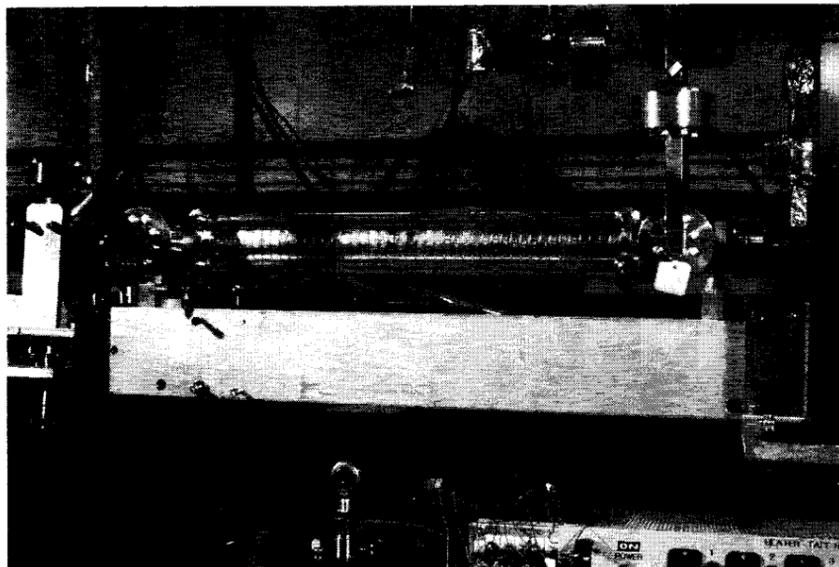
record-high accelerating fields in these structures so we can make the NLC more compact and try to understand the limits of this type of technology, which was pioneered at Stanford many years ago."

While each accelerator structure is made to SLAC specifications for the NLC design, some of the Fermilab assembly processes differ from the methods used at SLAC. The big difference between the two processes is in the cleaning and brazing.

At SLAC, the copper components of the completed structure are cleaned and brazed together by bathing them in hydrogen within an 800-degree Centigrade flame. The hydrogen and the heat attack the surface of the copper and clean it.

At Fermilab, the structures are cleaned and brazed in a vacuum furnace. The object is placed inside a vacuum furnace that is heated to about 900 degrees Centigrade. The radiant heat drives the contaminants out of the copper.

(See COLLABORATION, page 3)



The first two-foot long linear particle accelerator section.

Photo by Diana Rogers

Physics Data Goes on the Grid

By Shawna Williams

A Grid system currently in the works will distribute data from the BABAR detector to five computing centers in the U.S. and in Europe. This system will crunch the numbers and deliver results up to ten times faster than the current system.

Some BABAR physicists already use computers at other sites, but "they have to know more things, and to know more people to call when things go wrong," said Richard Mount, Director of SLAC computing services (SCS). "The aim is to make it more simple, as if you're working on only one computer center."

To do that, software designers must find a way to coordinate computing centers running on different systems, in a way that's most useful for the physicists who will use the Grid. Mount said one of the Grid's major accomplishments so far has been



Graphic by SciArts Media

to get high-energy physicists and computer scientists, who "regard each other as Martians," to effectively exchange ideas. Another key to the project has been good communication between potential Grid users worldwide, whose participation will ensure they'll use the software once available.

"We're understanding the challenges of working with communities, not only in Europe but also increasingly in Asia, in a way where we try to

(See GRID, page 3)

Nominations for Third Annual 'Globie' Awards Due by March 21

By Joni White

Do you know someone who goes out of their way to help others, is always pitching in when needed, volunteers for SLAC activities not directly related to their job, or shows unusual grace under pressure?

The SLAC Employee Award Program recognizes those who consistently promote a positive, respectful and harmonious work environment by doing a variety of things to make the workplace more inviting. World Class People make a World Class Laboratory!

All SLAC and University employees assigned to SLAC are eligible to receive an Employee Recognition Award—the 'Globie.' You may nominate up to 3 people. This award is for good citizenship. Outstanding

work performance will continue to be recognized through the annual performance evaluation and salary setting process.

Submit your nominations by March 21. Either complete the form sent to your mail stop and send it to Employee Recognition Awards MS 11 or see the online form at <https://www-internal.slac.stanford.edu/hr/er/eap/empaward.html>.

Please use a separate form for each person nominated. The nominations will be reviewed by a selection committee representing a cross-section of all SLAC divisions.

If selected, the employee will receive the Globie Award Trophy, a certificate of recognition, a letter from the Director for their personnel file and lunch at the Faculty Club. ●

Come to the Kavli Institute Inauguration

By Neil Calder

Fred Kavli will unveil a large glass disk at the site of the future Kavli Institute for Particle Astrophysics and Cosmology during the inauguration ceremony and reception to be held Monday, March 17 at 4:00 p.m. on The Green. All staff are invited.

Roger Blandford, Institute Director and first holder of the Pehong and Adele Chen Chair of Particle Astrophysics and Cosmology, will deliver a short speech, as will Kavli, Research Director Persis Drell, and Stanford Provost John Etchemendy.

The Institute's focal point, a 25,000 square-foot building that includes workspace, laboratory space and an auditorium, will be completed in 2005.

For more on the Kavli Institute, see: <http://www.slac.stanford.edu/slac/media-info/20030115/> ●



Photo courtesy of the Kavli Foundation

Physicist Fred Kavli (shown above) and the Kavli Foundation have pledged \$7.5 million to establish the Kavli Institute for Particle Astrophysics and Cosmology.

Check out the
**Interaction Point
Online Edition**
<http://www2.slac.stanford.edu/tip>

E142 Research Helps Clear Stormy Lung Images

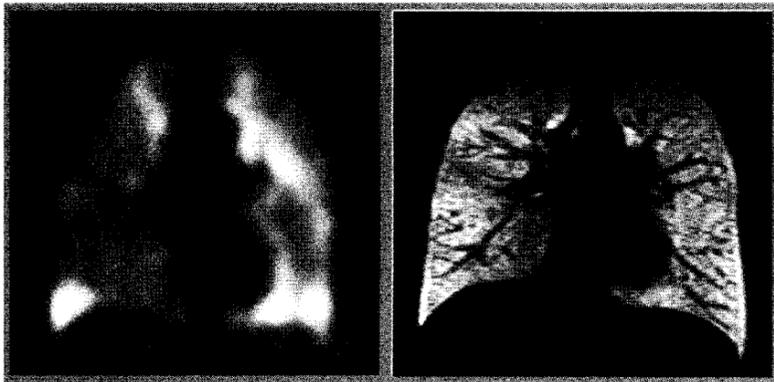
By Tom Mead

Making medical images of the interior of the body has improved astonishingly over the last few decades. But imaging of the lungs — getting a clear x-ray or Magnetic Resonance Imaging (MRI) picture — is still a murky business at best. To the untrained eye, current lung images look more like storm clouds than anything else.

However, fundamental physics research begun in 1992 at SLAC may soon have the unexpected benefit

nuclei in water). In the patients' body, the intense magnetic field produced in a MRI machine makes the protons in the water line up like tiny compass needles turned in the direction of the magnetic field. Since there is so little water in healthy lungs, there are few water protons to be seen by the MRI. A readable, but fuzzy, MRI picture is created. A way to produce better lung images was needed. Enter polarized helium.

Laser techniques are used to make about 50 percent of the nuclei in Helium line up in the same direction,



Images courtesy of Univ. of Virginia Radiology

Comparing the two images above shows how nuclear medicine will benefit from noble-gas imaging. The left image shows a scan in which a patient inhales radioactive gas and an image is made using a gamma camera. In the image at right, the scan uses magnetic resonance imaging (MRI) where the signal source is laser-polarized ^3He .

of dramatically improved medical images of human lungs.

Gordon Cates, a professor in the Department of Physics, University of Virginia, is one of three co-inventors of the medical use of a SLAC technique for producing large volumes of polarized noble gasses. Cates was at SLAC recently to speak about the last eight years of work on the medical use and to point out its origins at SLAC.

As Cates explained, "Part of SLAC Experiment E142 needed large quantities of polarized helium-3 (^3He) as a target for electrons in End Station A. However, at that time the specialized gas could be made only in ping-pong-ball-sized quantities. The SLAC researchers had to learn how to make basketball-sized volumes of the gas. They did learn." And what they learned may soon be used world-wide to produce superior medical lung images.

MRI machines 'see' water (actually, they see the protons in the hydrogen

like little bar magnets. The ^3He is about 100,000 times more polarized than the protons that are used in conventional MRI. The inhaled helium is less dense than water, but even so the ^3He delivers an MRI-readable signal, or image, of the gas space of the lung that is about 100X more detailed and informative has ever been possible with conventional MRI.

The image is clearer because the ^3He defines the gas space of the lung, not because it penetrates and more clearly defines the tissues. CAT-scan images of the lung tissue can be quite sharp, but they provide little information about how the lung is functioning.

MRI, using laser-polarized noble gasses, has been an expanding area of research for the last eight years. Dozens of groups around the world have been using the technique experimentally, and commercial applications are currently in U.S. Food and Drug Administration trials. ●

SSRL Co-Chairing International Meeting on Synchrotron Radiation Instrumentation

By Cathy Knotts

The Eighth International Conference on Synchrotron Radiation Instrumentation (SRI 2003) will be held August 25-29, at the Yerba Buena Center for the Arts in San Francisco.

The conference, sponsored by SSRL and the ALS, will feature an exciting and comprehensive program covering new developments in synchrotron radiation sources and free electron lasers at photon energies from infrared to hard x-rays, beamline instrumentation, and

experimental techniques.

March 3 was the deadline to submit abstracts from which oral presentations will be selected.

Register before Tuesday, June 3 for the early registration discount.

To register or find out more information, visit the conference Web site at: <http://www.sri2003.lbl.gov>

For more information on SSRL, see: <http://ssrl.slac.stanford.edu/welcome.html> ●

SLAC Dose Monitoring Program Receives DOE Accreditation

By Tom Mead

The DOE Office of Worker Protection Policy and Programs granted accreditation last December to the SLAC external dose-monitoring program in accordance with the DOE Laboratory Accreditation Program (DOELAP) for Personnel Dosimetry. That accreditation is now in hand. The accreditation is due to the efforts of the SLAC Operational Health Physics Department (OHP), with administrative support from OAK/NNSA.

The accreditation process includes stringent performance testing and assessment of dosimeter performance, quality assurance, and calibration programs.

The new dosimeter uses a laser-based technology that yields a much clearer reading of the radiation that produced the dose, clearer than any other dosimeter. The Luxel can be



Photo by Diana Rogers

Shown at the DOELAP accreditation document presentation (left to right): Steve Frey (OHP), John Muhlestein (DOE SSO), Henry Tran (OHP) and Greg Loew (DO).

re-read up to 50 times and is more accurate, rugged, and lighter than the old dosimeter. It also provides a durable photon dose record and a permanent neutron dose record, both of which are improvements over the dosimeter it replaces here at SLAC.

"The Luxel not only reports dose, it helps tell how the dose was acquired and from what direction it came," said Steve Frey, SLAC Radiological Control Manager. ●

New Committee Focuses on Building Knowledge for the Future



Photo by Diana Rogers

The Continuity of Knowledge Committee participants (clockwise from upper left): Frank Topper (BSD), Lee Lyon (HR), Linda Ahlf (HR), Herman Winick (SSRL), Neil Calder (COM), Dick Blankenbecler (TP), Kim Sutton (TIS), Janice Dabney (TD) and Jean Deken (TIS)

By Shawna Williams

Personnel build up an incredible amount of knowledge here at SLAC—from physics to facilities, accelerator operations, computer systems and more. But what happens to all that know-how when someone leaves the Lab?

A new Continuity of Knowledge Committee is working to ensure that information is captured and continues to be available to future staff.

The idea for setting up a committee came from staff feedback. "Three to four suggestions came in that all related to the general subject of how do we pass knowledge on at SLAC," explained Lee Lyon, Director of Human Resources. "So the Suggestion Committee thought we should address the larger issue, rather than just dealing with individual situations."

One problem the new committee will tackle is making sure retiring employees pass on knowledge they've gained over the years. "We're trying to determine how to document

it in some way," said Lyon. Another issue is recording how systems work in a way that ensures accessibility decades from now, to avoid disasters like hitting a power line while digging a trench.

In the next few weeks the committee will ask about 30 SLAC employees to participate in a focus group, where they will answer questions like, "How much operational knowledge was available from your predecessor or from the lab to help you ramp up when you were hired?"

"We're trying to get a cross-section of the SLAC community, and ask them how big a problem they think this is, what they're doing about it, and what ideas they have to do it better," Lyon explained. The committee will use this information, along with suggestions employees have submitted individually, to make recommendations, probably within six months.

For more information on the Continuity of Knowledge Committee, see: Lee Lyon, Ext. 2283, lyon@slac.stanford.edu ●

Collaboration

(continued from page 1)

Last November, the Fermilab unit was wrapped in heater tape, covered with aluminum foil and baked to 220 degrees Centigrade to rid it of most residual contaminants introduced by post-production handling in the air. The unit was recently powered up to see how it functions as a high gradient accelerator. Its general behavior should be known by January and feedback will be given to the Fermilab group that built it.

In the next 18 months, different pieces from laboratories all over the world will be collected in the NLCTA—enough for about a dozen complete accelerator structures.

When assembled, the pieces provided by the international collaborators will form a basic test module and will comprise about 1/10th of 1 percent of the full NLC linac. Thus, the assembly and performance of the completed accelerator unit can be seen as a test bed for the success of the international NLC collaboration.

For more on the NLC, see: <http://www-project.slac.stanford.edu/lc/nlc.html>

Grid

(continued from page 1)

continuously reestablish convergence in what we're doing, while at the same time not stifling innovation," Mount said.

Some of the people at SLAC involved in setting up the Grid are Adil Hasan, who is in charge of data management for the BABAR Grid; Booker Bense, who deals with the software that controls task distribution among the computing centers; Bob Cowles, Computer Security Officer, who

deals with strategic planning and security aspects of the Grid; and Andy Hanushevsky, who works with European Grid projects to coordinate Grid design.

"I've had the idea for 20 years that this is something we'd like to do," Mount explained. "About four years ago we got small amount of funding, which allowed us to build a collaboration between high energy physicists and computer scientists." If all goes well, he said, "in six months' time we can say BABAR physics is truly being done on a Grid." ●

WIS Event: Developing Profitable Relationships

Jaclyn Zoccoli

"Spontaneous Combustion, Developing Profitable Relationships"

Tuesday, March 25, 12-1 p.m.
Panofsky Auditorium

Whether it's to get a job, to find more resources, or even to find funding, we all must talk to strangers. For many that's a forced necessity. Since meeting strangers has to happen to begin a profitable relationship, why not enjoy the process?

Jaclyn Zoccoli is the originator of 35 networking groups, and has interfaced with over 500 businesses. Her approach is a unique way to build profitable relationships. During her talk on March 25, she will discuss simplified techniques in self-promotion and show resources for women wishing to grow professionally and personally. She will also provide tools for making connections last.

As an active member of the American Business Women's Association, Zoccoli received her chapter's Woman of the Year award as well as the entire Bay Area's recognition as one of three Outstanding Women in 2002. She has been critical in the formation of a new express network in the Tracy area.

Zoccoli's book—*Spontaneous Combustion, Developing Profitable Relationships*—will be on sale after the talk. This book grew out of 32 years of experience in building alliances.

For more on WIS events, see: <http://www-project.slac.stanford.edu/wis/>



Some of the many SLAC staff involved in development of the Grid (left to right): Adil Hasan, Booker Bense, Richard Mount, Andrew Hanushevsky (all SCS)

Photo by Shawna Williams

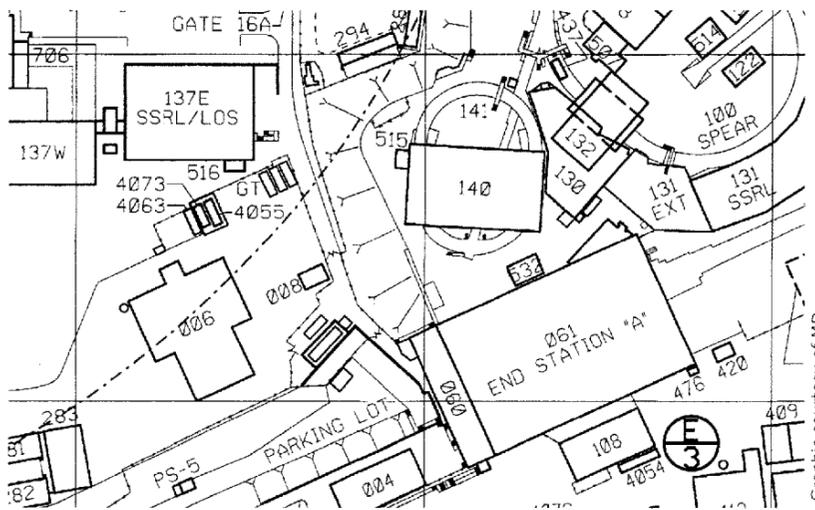
Updated Site Plan Available

By Rosalind Penacchi

Thanks to the efforts of the Mechanical Design Group, the latest version of the SLAC Site Plan (GP-581-721-49 rev 4) is now available at Document Control located in Building 41 (A&E Bldg.), Room 105. The Site Plan can be ordered in a variety of sizes.

An electronic version of the Site Plan is also available on the SLAC Web site at: <http://www.slac.stanford.edu/grp/md/dcon/draw/draw.html>

For more on the Mechanical Design Department, see: <http://www.slac.stanford.edu/grp/md/mdhome.html>



This section of the Site Plan shows a view of the SSRL and End Station A areas.

Graphic courtesy of MD

SLAC Scientists Help Set Data Transfer Speed Record

By Shawna Williams

When it comes to computing, physicists can be more power-hungry than a 16-year-old with a souped-up car. Which is why, in early February, SLAC teamed up with three other academic institutions to break the internet land-speed record. The four organizations transmitted data from Sunnyvale to Amsterdam at 3,500 times the speed of a typical home broadband connection.

"The record itself is mostly to get people's attention," says Les Cottrell, Assistant Director of SLAC Computing Services (SCS). "The important message is it's now possible to transmit more data than a physicist needs."

How much data is that? SLAC now transmits about one terabyte (a million million bytes) of data a day, and Cottrell expects that number to double annually. The Lab communicates at a speed of about half a terabyte per hour, so, "we're ahead of the game but not very far," said Cottrell. All this

communication is necessary so that groups such as BABAR and GLAST can work effectively with colleagues throughout the world.

Recognizing the need for speed, Cottrell and other computing experts from Caltech, Starlight in Chicago, the National Institute for Nuclear Physics and High Energy Physics (NIKHEF) in Amsterdam, and the Faculty of Science of the Universiteit van Amsterdam, originally teamed up to compete in the Bandwidth Challenge at the Super Computing 2002 conference in Baltimore. The team came in second place, but continued communicating afterward and decided to try for the Internet2 Speed Record, an ongoing competition. Cottrell, Charley Granieri, and Gary Buhrmaster (all SCS) contributed by installing and configuring equipment in Sunnyvale, and worked with Cisco to get a router. Cottrell also helped to get the fiber optic path from Sunnyvale to Chicago and the space in the building in Sunnyvale.

On February 7, the team transmitted 6.7 gigabytes of data—the equivalent



of a four-hour DVD—over 6,800 miles in 58 seconds.

Internet2, the consortium that recognized this achievement, is devoted to developing the "next generation Internet" to connect and serve research and educational institutions with high transmission speeds. Lightning-fast connections will be useful not only to high energy physicists, but also to doctors, who will be able to confer over

long-distances on the meanings of diagnostic images. Internet2 is also working on potential applications for distance learning.

For now, the collaboration is focusing on the next step: beat the land-speed record again. In the process they hope to break past the gigabyte-per-second rate, which is to computing what the sound barrier once was to human flight. ●

Waste of Energy Through Vampire Devices

By Luda Fieguth

Electronic equipment and small appliances often consume electricity even when they are not being used. This situation is commonly called standby power. Executive Order 13221, issued by President Bush in July 2001, calls for Federal agencies to purchase products that use less than one watt of standby power when such products are available and are cost effective.

Standby power supplies are responsible for electricity consumption in idle mode and these devices come in two forms—those that are external and those that are internal to the other electronics.

The external devices have earned the name vampires because they have two teeth (the prongs of the plug) and suck electricity. They are also known as low voltage transformers, adapters and power supplies.

The external devices (the plug-in black boxes) represent approximately 20 percent of the market while internal devices, those that are built into the product, represent the overwhelming majority (80 percent) of the market.

Some of the products that use energy

while in the standby mode include: cell phones, telephones, laptop computers, desk top computers, computer monitors, television sets, VCRs, DVDs, cable boxes, fax machines, copiers, printers, scanners, cordless power tools and walkie-talkies.

New technologies make it possible to substantially reduce standby power use without affecting any of the services that consumers have come to expect of the product. Limiting standby energy can save money and decrease carbon emission into the environment.

Please consider the low standby power criteria when purchasing new electronic devices and appliances that have standby power.

For more information about the devices and to obtain access to the product database, see the SLAC Energy Management Web site (<http://www.slac.stanford.edu/slac/energy/>) under Standby Power Data or go directly to the Federal Energy Management Program Web site: http://www.eere.energy.gov/femp/resources/standby_power.html

POLICIES AND PROCEDURES

New SLAC Purchase Card—Bank One MasterCard—to Replace Bank of America VISA on March 21

As a way of providing better customer service functions to purchase card (P-Card) holders, SLAC will be changing to Bank One from Bank of America on March 21st. Over the past several months, Purchasing and Accounting have been working closely with Bank One to prepare for this switch.

Recently, a Bank One Commercial Card Representative introduced the purchase card to a sample of 'power users,' showing them the new system and its benefits. All current cardholders and their approving officials have been given the opportunity to see and hear about the new internet-based card management system.

General training and discussion of the program enhancements were presented to P-Card holders and their approvers on March 6 and 7.

Benefits of the new P-Card:

- Provides each cardholder and his/her approver real-time access to P-Card activity from any computer.
- Will enhance our ability to extract data on how and where P-Cards are being used.

Cardholders will be migrated to the online system, division-by-division, during late spring and early summer.

During the week of March 10th, time will be set aside for current Bank of America VISA cardholders to pick up their new Bank One MasterCard.

On March 21, all P-Card cardholders will begin using MasterCard and all VISA card accounts will be deactivated.

The Business Services Division (BSD) is making every effort to transition cardholders seamlessly. We hope you will value the enhancements to the program available through Bank One.

Current cardholders and approvers will be contacted directly with more specific information.

Contact: Gail Gudahl, Purchasing Department, Ext. 2616, gudahl@slac.stanford.edu

MILESTONES

Service Awards

5 Years

Bentson, Lynn, TD, 3/9
Castillo, Francisco, SEM, 3/2
Cuadrado, Raimond, SEM, 3/2
Gutierrez, Jesus, MFD, 3/23
Hollenbeck, William, ASD, 3/23
Johnson, Brent, SEM, 3/2
Kau, Ricardo, SCS, 3/20
Toews, David, SEM, 3/2
Weaver, Paul, OHP, 3/29

10 Years

Lundahl, Eric, MET, 3/16
Seymour, Angie, ARDB, 3/1

15 Years

Foundoulis, Christos, TD, 3/21
Hoang, Frank, ESD, 3/23
Nuhn, Heinz, ASD, 3/7
Tiscareno, Anthony, ESRD, 3/28

20 Years

Chao, Alexander, ARDA, 3/1
Hilliard, Crash, ESD, 3/16

25 Years

Fuller, Robert, ESD, 3/23

35 Years

Fitch, Joel, ESD, 3/1

40 Years

Smith, Vernon, ESD, 3/25

Retirees

Blankenbecler, Richard, THP, 01/31
Fisher, Larry, PUR, 02/03
Robert, Leendert, MFD, 02/06

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/>

Many New Computer Courses Available

For scheduling and registration information, see: <http://www.slac.stanford.edu/comp/edu/calendar.html>

Upcoming Events

Tues. March 11, 12:30 p.m.
SLAC, Orange Room
SLAC EXPERIMENTAL SEMINAR
Boris Kayser, Fermilab
"The Neutrino World: Present and Future"

Tues. March 11, 4:00 p.m.
SLAC, Green Room
SLAC PHYSICS MEETING
Lab Community, SLAC and more
Scientific Discussion Hour

Tues. March 11, 4:15 p.m.
Stanford, SEQ 201, (Refreshments-4:00, Physics Coffee Rm)
STANFORD APPLIED PHYSICS/PHYSICS DEPT COLLOQUIUM
Cumrun Vafa, Harvard U
"Matrix Models and Gauge Theories"

Fri. March 14, 3:00 p.m.
SLAC, Panofsky Auditorium, NOTE DAY/TIME/ROOM!
SLAC JOINT ASTROPHYSICS/EXPERIMENTAL SEMINAR
Ned Wright, UCLA
"MAPping the Universe"

Tues. March 18, 4:00 p.m.
SLAC, Green Room
SLAC PHYSICS MEETING
Lab Community, SLAC and more
Scientific Discussion Hour

Fri. March 21, 3:30 p.m.
SLAC, Panofsky Auditorium, (Refreshments-3:00), NOTE DAY/TIME!
SLAC DEPARTMENTAL COLLOQUIUM
David Spergel,
Title to be announced...

Tues. March 25, 12:30 p.m.
SLAC, Orange Room
SLAC EXPERIMENTAL SEMINAR
Scott Dodelson, Fermilab
"Dark Energy in the Universe"

Tues. March 25, 4:00 p.m.
SLAC, Green Room
SLAC PHYSICS MEETING
Lab Community, SLAC and more
Scientific Discussion Hour

Tues. April 1, 12:30 p.m.
SLAC, Orange Room
SLAC EXPERIMENTAL SEMINAR
Martin Cooper, LANL
"A New Search for the Neutron Electric Dipole Moment"

Please send additions to: seminars@slac.stanford.edu

For complete event listings, see: <http://www.slac.stanford.edu/grp/pao/seminar.html>

CalTrain Announces Scheduling Changes

CalTrain has announced that they will be changing their schedules effective March 3. You can pick up a new schedule, or check their website at <http://www.caltrain.com/schedule.html>

The Marguerite shuttle that serves SLAC will remain the same. See <http://bontemps.stanford.edu/transportation/marguerite/MargueriteSched.shtml#slac> for the schedule.

The Interaction Point

Editorial Team

Neil Calder
Nina Adelman Stolar
Katherine Bellevin
Vickie Flynn

Contributing Editors

Ziba Mahdavi
Linda DuShane White

Writers

Tom Mead
Shawna Williams

Photography/Graphics

Diana Rogers
Michael Hyde

Distribution

Crystal Tilghman

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