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Inauguration of SPEAR3, Dazzling New Light Source

By Heather Rock Woods

Aglow with satisfaction, officials dedicated SPEAR3, a brilliant new synchrotron light source at SSRL, on January 29 in a tent packed with some 850 people.

SPEAR3 generates extremely bright x-ray beams to illuminate long-kept secrets in materials science, chemistry and biology on the sub-microscopic scale.

[See whole story...](#)



8-Pack Team Makes Progress on Linear Collider Technology

By Heather Rock Woods



The Next Linear Collider's (NLC) 8-Pack team surpassed a crucial hurdle last month in the quest to develop a new linear collider to search for the Universe's missing particles.

The project squeezed an incredible 475 megawatts (MW) of energy into a succinct 400-nanosecond (ns) pulse of radio frequency (RF) power. This short-lived peak power (400 billionths of a second) is more than that produced by some nuclear power plants.

SLAC and Caltech Collaborate on New SPEAR3 Beam Line to Read a Molecule's Blueprints

By Neil Calder

Just as astronomers image very large objects at great distances to understand what makes the universe tick, biologists and chemists need to image very small molecules to understand what makes living systems tick.

[See whole story...](#)

Champagne Challenge

By Kate Metropolis

In less than a month last summer, five physicists, led by Roodman, analyzed over 20 million events, found the mere 46 in which a B meson decayed into two neutral pions, and prepared a paper for Physical Review Letters. The group won the Champagne challenge for being the first to submit a paper using data from run 3.

Zoltan Ligeti, a theorist at LBNL, called the results significant.

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10-Year Awards Celebration

35 employees who made their 10-year milestone at SLAC in 2003 were honored at an awards ceremony in January.



[See whole story...](#)

Celebrating Year of the Monkey

By Andrea Chan

Over 50 SLAC'ers gathered at Jing Jing Restaurant in Palo Alto on the first day of Chinese New Year—January 23—for a 10-course banquet. The menu featured egg rolls, braised rock cod, mongolian beef, honey walnut prawns and tea smoked duck. The event was organized by Karena Kong (BABAR).

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Inauguration of SPEAR3, Dazzling New Light Source

By Heather Rock Woods

Aglow with satisfaction, officials dedicated SPEAR3, a brilliant new synchrotron light source at SSRL, on January 29 in a tent packed with some 850 people.

SPEAR3 generates extremely bright x-ray beams to illuminate long-kept secrets in materials science, chemistry and biology on the sub-microscopic scale.

Stanford President John Hennessy, SSRL Director Keith Hodgson and speakers from the project's two funding agencies—the Department of Energy and the National Institutes of Health—symbolically started SPEAR3 by shoveling hundreds of ping-pong size balls (representing electrons) into a hopper.

The 'electrons' disappeared down a chute, then showed up—in a computer simulation displayed on video screens—circling the SPEAR3 ring and emitting blue streaks of synchrotron light.

After the speeches, shoveling and snacks, celebrants took tours of the real ring—a bunker of concrete one quarter kilometer around—filled with state-of-the-art shiny magnets, vacuum systems, beam pipes and 68 miles of cables.

"Today, we are celebrating several things: the successful completion of the upgrade [a complete re-build of an older light source]; the collaboration between DOE and NIH that made it happen; and most of all, we are celebrating the hundreds of staff at SLAC and SSRL who first envisioned the [project] and then worked to complete it on time and within budget," said Patricia Dehmer, Director of the Office of Basic Energy Sciences in the DOE's Office of Science. "Once our oldest light source, SSRL is now our newest and shiniest. And its future is bright indeed."

SPEAR3, which cost \$58 million, marks the first time the DOE and the NIH have joined in funding an accelerator research facility, enhancing the NIH's long history of investments in beam lines and experiments



On the count of three, the 'electrons' leave the injection system for the SPEAR3 'beamline' assisted by: (l to r) SLAC Director Jonathan Dorfan; SPEAR3 Project Leader Tom Elioff; Palo Alto Mayor Bern Beecham; NIH/NCRR Health Scientist Administrator Amy Swain; NIH Protein Structure Initiative Director John Novell; Director of DOE Office of Basic Energy Sciences Pat Dehmer; Stanford University President John Hennessy and SSRL Director Keith Hodgson. (Photo by Diana Rogers)

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at SSRL. About 2,000 scientists from around the country will use the machine.

"We've got lots of work in mind for SSRL," said John Norvell, Director of NIH's NIGMS Protein Structure Initiative. SSRL is one of nine national centers in this initiative to elucidate the structures of thousands of proteins, including those important in medicine.

"SPEAR3 is an investment in our country's biomedical future," said Amy Swain, a Program Director at NIH's National Center for Research Resources.

Thirty years ago, SSRL was the first laboratory in the world to use synchrotron produced x-rays for studying matter at atomic and molecular scales. Originally built for SLAC's particle physics program, the first SPEAR ring yielded two Nobel prizes in particle physics. The synchrotron radiation—a by-product of circling electrons—was a nuisance to particle physicists, but the far-sighted founders of SSRL realized they had the world's most intense x-ray source and became pioneers in synchrotron techniques, technology and science.

"Among SLAC's most important characteristics is its bold, pioneering and collaborative approach to research — a characteristic it shares with the University," Hennessy said.

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Touring the New Facility

By Emily Ball

Over 150 people toured the SPEAR3 tunnel immediately following the Dedication Ceremony. Each tour, led by an SSRL staff member, walked people past wigglers, undulators, bending magnets and more.



Enjoying a SPEAR3 tour given by tour guide Max Cornacchia. (Photo by Diana Rogers)

Thanks to the wonderfully knowledgeable guides, attendees had the chance to experience the magnificence of SPEAR3 machinery. SSRL guides: Harvey Rarback, Dan Harrington, Hiro Tsuruta, Paul Phizackerley, Max Cornacchia, Domenico Dell'Orco, Eduardo Guerra, Hal Tompkins, Bob Hettel, Richard Boyce, Teresa Troxel, Jeff Corbett, Matthew Latimer, Marjorie Widmeyer, James Safranek, Benjamin Scott, Sean Brennan, Ann Trautwein, Roger Carr and Nadine Kurita.

Crowd control and tour logistics were managed with extraordinary help from Barbara Hoddy (PAO), Mika Stratton (EC) and Vickee Flynn (EFD).

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SLAC and Caltech Collaborate on New SPEAR3 Beam Line to Read a Molecule's Blueprints

By Neil Calder

Just as astronomers image very large objects at great distances to understand what makes the universe tick, biologists and chemists need to image very small molecules to understand what makes living systems tick.

Now this quest will be enhanced by a gift of over 14 million dollars from the Gordon and Betty Moore Foundation to the California Institute of Technology, which will allow scientists at SSRL and Caltech to collaborate on the building of a new beam line at SPEAR3 for structural molecular biology.

The beam line is an ultra powerful x-ray machine that will enable scientists from both institutions and around the world to 'read' the blueprints of so-called macromolecules down at the level of atoms. The exceptional quality and brightness of the x-ray light from SPEAR3 is perfectly suited to the study of complicated biological systems. Specially designed instruments will allow fully automated sample manipulation via a robotic system and integrated software controls. Internet-based tools will allow researchers at Caltech or remote locations to control the experiments and analyze data in real time.

Macromolecules, large molecules that include proteins and nucleic acids (DNA and RNA), carry out the fundamental cellular processes responsible for biological life. By understanding their makeup, scientists can glean how they interact with each other and their surroundings, and subsequently determine how they function. This knowledge, while of inherent importance to the study of biology, could also have significant practical applications, including the design of new drugs. Knowing the molecular-scale blueprint of macromolecules will ultimately help answer such fundamental questions as: "How are the chemical processes underlying life achieved and regulated in cells?" "How does a motor or pump work that is a millionth of a centimeter in size?" "How is information transmitted in living systems?"

"I would like to thank the Gordon and Betty Moore Foundation for this generous gift [to Caltech]," said Raymond L. Orbach, Director of DOE's Office of Science. "This grant will advance the frontiers of biological science in very important and exciting ways. It also launches a dynamic collaboration between two great universities, Caltech and Stanford, at a Department of Energy research facility, thereby enhancing the investment of the federal government."

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8-Pack Team Makes Progress on Linear Collider Technology

By Heather Rock Woods

The Next Linear Collider's (NLC) 8-Pack team has surpassed a crucial hurdle in the quest to develop a new linear collider to search for the Universe's missing particles.



One of the new 75 MW klystrons developed at SLAC that will power a '2-pack' RF system this year. (Photo courtesy of David Schultz)

The project squeezed an incredible 475 megawatts (MW) of power into a succinct 400-nanosecond (ns) pulse of radio frequency (RF) power. This short-lived peak power (400 billionths of a second) is more than that produced by some nuclear power plants.

"This was a real challenge," said David Schultz (NLC), the physicist who heads the 8-Pack Project. He added, "No one had pushed power this long, this hard and this high."

This landmark demonstration proves that particle physicists can successfully supply the high power that is needed to accelerate electrons to the tremendous energies required to keep a new linear collider within the 20-mile-long design goal.

The International Linear Collider Technical Review Committee rated the RF supply system as one of the two most critical goals to reach in order to consider building an X-band (so-called "warm") linear collider. The physics community expects to select either an X-band collider or a superconducting collider by the end of this year.

"This is a great step towards the full TeV-energy mission of the linear collider," said David Burke, head of the NLC collaboration.

On December 4, Sami Tantawi (ARDA) announced that the innovative RF supply station delivered the desired 475 MW, 400 ns pulse at a frequency of 11.424 gigahertz (GHz). Days later, the new system began routinely producing 570 MW, which is more than three times the peak RF power and four times the frequency SLAC currently generates to run the world's longest and most powerful linear accelerator.

"There were cheers all around, back-slapping and hand-shaking. This accomplishment was two years in the making," Schultz said.

An X-band collider would need over 2,000 such RF supply stations to add 65 mega-electron volts (MeV) of

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energy to an electron bunch for every meter the bunch travels. SLAC is close to meeting the second technical requirement for an X-band collider: accelerating structures, the pipes the electrons travel in, that can reliably sustain that high accelerating gradient (65 MeV per meter). These two major collider elements will be tested together this spring at the NLC Test Accelerator (NLCTA).

"We're enthusiastic about this next step—using the RF supply station to power the accelerating structures being built at Fermilab, SLAC and KEK," Burke said.

The team designed and assembled the new RF system, originally using a pack of eight klystrons (the tubes that generate RF power). The current 8-Pack station needs only four klystrons, which will be replaced this year with just two klystrons of a new design. These new 75 MW klystrons, a joint project of the Klystron Department and the U.S. industry CPI, recently performed to full specifications for a warm linear collider.

The 8-Pack klystrons are powered by short, high-voltage pulses from a new modulator with pioneering solid-state switches.

The RF power from the klystrons is funneled to the Stanford Linac Energy Doubler (SLED II) system, which triples the power and shortens the pulse by a factor of four. Tantawi and his group designed revolutionary new components for the SLED system, enabling it to operate in dual mode, where the RF power is transmitted in two modes to pack more power into a pulse in a shorter space.

"We were rewarded when all these parts got integrated and operated together in perfect harmony," Tantawi said. "This machine is a beautiful work of art that gave its designers and creators a deep sense of satisfaction."

Tantawi and Schultz are now running a series of performance tests to ensure the RF systems are sustainable and reliable under the operating conditions of a linear collider that runs around the clock.

"We want to understand stability and other factors that are important if you need to build 2,000 of these," said Tantawi.

All together, the RF supply system achieves more power, with the promise of a much longer lifetime than the current systems used at accelerators worldwide.

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10-Year Awards Celebration

35 employees who made their 10-year milestone at SLAC in 2003 were honored at an awards ceremony in January.



Back row (l to r): Leif Eriksson (LCLS), Hans Imfeld (MET), Eric Lundahl (MET), Ron Rogers (MD), Mike Racine (EFD), Knut Skarpaas VIII (REG), Dong Su (EE), Tony Johnson (SLD), Eleanor Mitchell (DO), Kathryn McMillen (KLY), Brenda Eberle (SCS), Perry Anthony (EFD), presenter Jonathan Dorfan (DO), Brian Fuss (MET).

Front Row (l to r): Angie Seymour (ARDB), Yiton Yan (ARDA), Yunhai Cai (ARDA), Tom Rabedeau (ESRD), Frank Topper (BSD), George Kallabis (KLY), Mario Cardoso (KLY). **Not Pictured:** Jim Allan (OHP), Jeraline Counts (PUR), Santa Chatterji (OHP), Stephen Fetzko (MFD), Martin George (ESRD), JoAnne Hewe. (THP), Roger Jurgensen (ESD), Morry Munro (NLC), Lance Nakata (SCS), Michael Neubauer (KLY), Helen Nuckolls (EPR), Tom Rizzo (THP), John Wachter (ASD), Zachary Wolf (MET), Kenneth Yang (SEM).

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The Role of the Division Coordinator in ES&H

By Mike Grissom

The mission of ES&H is to work with the rest of SLAC to:

- Ensure a safe and healthful workplace
- Minimize adverse impact to the general public and the environment
- Comply with all applicable laws, standards and regulations governing environment, safety and health



Key players in this effort are the SLAC ES&H coordinators. These individuals make sure the line organizations have all the support and training needed to accomplish this mission.

Coordinators exist at the division, department and group levels. While most department- and group-level ES&H coordinators have other duties, the divisional coordinators spend the majority of their time ensuring that the Lab operates efficiently and meets the stated ES&H goals. They also provide specific advice on ES&H matters to their Associate Directors. The coordinators are evaluated annually by their supervisors on their performance in helping their divisions meet these goals.

The divisional ES&H coordinators (left to right): Mike Grissom (ES&H), Rick Challman (BSD), Janice Dabney (TD), Sandy Pierson (RD). Not pictured: Ian Evans (SSRL) and Frank O'Neill (RD). (Photo by Diana Rogers)

The Divisional Coordinators:

- BSD: Rick Challman challman@slac.stanford.edu
- ES&H: Mike Grissom mikeg@slac.stanford.edu
- RD: Frank O'Neill fgo@slac.stanford.edu
- RD: Sandy Pierson esp@slac.stanford.edu
- SSRL: Ian Evans evans@slac.stanford.edu
- TD: Janice Dabney dabney@slac.stanford.edu

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Divisional ES&H coordinators help ensure a safe and healthful workplace by:

- Advocating for ES&H improvement SLAC-wide
- Monitoring the completion of employee training assessments (ETAs)
- Monitoring the completion of required employee training
- Conducting periodic walk-throughs of work areas
- Establishing division-level ES&H goals to support lab-wide efforts
- Investigating accidents, illnesses and incidents

Minimize Adverse Impact

They help minimize adverse impact to the general public and the environment by:

- Developing site-wide ES&H programs and policies
- Consulting on major ES&H projects
- Developing programs for their divisions to attain ES&H performance goals
- Helping to prevent the reoccurrence of accidents, illnesses and incidents through lessons learned and near-miss programs
- Staying current in general industry injury/ illness engineering
- Staying current in project-unique safety engineering
- Providing special safety programs for users

Comply with Regulations

The coordinators help ensure that SLAC activities comply with all applicable rules by:

- Advocating for ES&H compliance (through such measures as the "Work Smart" standards)
- Enforcing regulatory compliance in the field
- Enforcing compliance with the ES&H Manual and other SLAC policy in the field
- Staying current with the latest regulations and DOE requirements
- Interfacing with DOE and other regulators for ES&H

Divisional ES&H Coordinators are Key Resources for You

The divisional ES&H coordinators serve as resources for all members of their divisions: supervisors, workers and building managers. They know what people and resources are available from both ES&H and their own divisions.

Project managers will want to contact their divisional ES&H coordinator early in a project's development with any questions they may have. All work supervisors and project managers are encouraged to make their ES&H coordinators aware of their plans.

This way the coordinator can help ensure in as efficient a manner as possible that requirements needed to move the project forward, such as safety-related citizen committee reviews, are met and that the project complies with SLAC ES&H goals.

For further information on the role of the coordinators in the SLAC integrated safety management system (ISMS), see the SLAC Safety Management System description document at: <http://www.slac.stanford.edu/esh/isms/sms.pdf>

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Water Fountain



Photo by Diana Rogers

A geyser of water from a broken water main near the SLAC Guest House was quickly capped, but not before this photo was taken.

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What's going on at SLAC? Check out SLAC Today at:

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

Information is added to SLAC Today daily. On this convenient and comprehensive site are:

Upcoming Events

Seminars, Colloquia and Workshops, Announcements

Community Bulletin Board Physics News Articles

If you are planning a seminar, submit the details on SLAC Today. Want help to submit an event? Give Barbara Hoddy (PAO) a call at Ext. 2204 and she'll walk you through the process.

Handy links include: Interactions (a particle physics magazine),

Guest House information,

Maps, Traffic and much, much more.

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MILESTONES

Award

Teytelman, Dmitry (ARDA), the DPB 2004 Doctoral Research Award, for his dissertation "Architectures and Algorithms for Control and Diagnostics of Coupled-Bunch Instabilities in Circular Accelerators."

Service Awards

5 Years

Bholat, Hanif (ACC), 2/08

10 Years

Jeglum, David (SEM), 2/01

Moore, Craig (SCS), 2/01

Jessop, Colin (EC), 2/01

Bellomo, Paul (ESD), 2/14

Nosochkov, Yuri (ARDA), 2/15

15 Years

Soria, Lorenzo (ESD), 2/06

DiSalvo, Michael (SCS), 2/01

Garami, Lehel (KLY), 2/01

Muller, David (EB), 2/01

Robinson, Liam (SEM), 2/13

Prentiss, Barry (MD), 2/01

20 Years

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Ruth, Ronald (ARDA), 2/01

Heidenreich, Karen (SLD), 2/06

Shelley, David (MFD), 2/07

Lacy, Eamon (MFD), 2/13

25 Years

Ecklund, Stanley (AD), 2/01

30 Years

Kunz, Paul (EK), 2/06

35 Years

Ott, Lanny (ACC), 2/10

Deceased

Cruikshank, George P. (formerly with MFD), age 72, on December 24, 2003

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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Car Wash Policy For GSA Vehicles

Washing and cleaning GSA vehicles is the responsibility of the vehicle custodian. Please note that each vehicle is limited to two washes per month, and the washes should be charged to that vehicle's GSA credit card.

Approved Car Washes close to SLAC are:

Auto Pride Car Wash: 841 El Camino Real, Palo Alto, 324-2634

Ladera Chevron: 104 Le Mesa, Portola Valley, 854-4504

Contact: Lata Fangupo, Transportation Department, Ext. 3185, lata@slac.stanford.edu

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Electric Carts Now Available

Five electric carts were returned to Transportation and are now available. These 3-wheeled vehicles have been inspected and are mechanically sound.



Photo by Diana Rogers

There is a charge of \$112 per month for each electric cart. The cart will be billed to your department account, along with any other vehicles you may have.

To obtain a cart, fill out the New Vehicle Request Form at: <https://www-internal.slac.stanford.edu/sem/SEMForms.htm> and send the signed form to

Transportation.

Contact: Maria Valencia, Transportation Administrator, Ext. 8795, mariav@slac.stanford.edu

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Announcing

2004 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)

The Symposium on Nuclear Power Systems (SNPS)

The 14th International Workshop on Room Temperature Semiconductor X- and Gamma-Ray Detectors (RTSD)

October 16-22

The conference will be held in Rome, Italy at the Ergife Palace Hotel, one of the largest exhibition and conference centers in Europe.

Deadline for Abstract Submission: May 17

For complete details visit the conference Web site at:

<http://nss-mic-rtsd-2004.df.unipi.it>

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Champagne Challenge

By Kate Metropolis

In less than a month last summer, five physicists, led by Roodman, analyzed over 20 million events, found the mere 46 in which a B meson decayed into two neutral pions, and prepared a paper for Physical Review Letters. The group won the Champagne challenge for being the first to submit a paper using data from run 3.

Zoltan Ligeti, a theorist at LBNL, called the results significant. "Most theoretical expectations, none of which was rigorous, were significantly smaller than the BABAR (and Belle) measurements," Ligeti says, "and it will certainly be a challenge for theory to understand the data."

Regulations required that the prize—a bottle of champagne—be presented to the winners off site and after hours, so each physicist received a photograph at the meeting.



Authors (l to r) Carlos Chavez (Univ. of Liverpool), Adrian Bevan (Univ. of Liverpool), Aaron Roodman (Group EC), Markus Cristinziani (Group EC), and Dmytro Kovalskyi (Univ. of Maryland) were honored at the December BABAR Collaboration meeting. (Photo by Diana Rogers)

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Celebrating Year of the Monkey

By Andrea Chan

Over 50 SLAC'ers gathered at Jing Jing Restaurant in Palo Alto on the first day of Chinese New Year—January 23—for a 10-course banquet. The menu featured egg rolls, braised rock cod, mongolian beef, honey walnut prawns and tea smoked duck. The event was organized by Karena Kong (BABAR).



Photo by Rodney Win Wong

This is the Year of the Monkey. If you were born in 1932, 1944, 1956, 1968, 1980, 1992 or 2004 you were born in the year of the monkey and you are very intelligent, well-liked by everyone and will have success in any field you choose. The Chinese Lunar Calendar names each of the twelve years in each cycle after an animal.

Kung Hai Fat Choy!

For more information on Chinese New Year, see:

<http://www.chinapage.com/newyear.html>

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