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Current issue online at http://www-als.lbl.gov/als/als_news/

1. WATER SPECTROSCOPY MAKES THE TOP TEN

(Contact: Anders Nilsson, nilsson@ssrl.slac.stanford.edu)

Over the last two years, soft x-ray core-excitation spectroscopy techniques at the ALS and elsewhere have become sensitive and effective tools for probing the electronic structure of hydrogen bonds in liquid water. These relatively "loose" bonds based on attractions between positive and negative electrical charges on different parts of the water molecule are responsible for many of water's unusual properties and its essential role as a solvent in chemistry and biology. We are pleased to note that Science magazine, in its December 17 issue featuring the "Breakthrough of the Year," has recognized this development as one of its top ten breakthroughs of 2004. Specifically, it cites a publication by a group of researchers, led by Anders Nilsson of the Stanford Synchrotron Radiation Laboratory (SSRL), who used the ALS and the Advanced Photon Source (APS) to obtain detailed information about the nearest-neighbor coordination geometry of liquid water: P.H. Wernet et al., "The Structure of the First Coordination Shell in Liquid Water," Science 304, 995 (May 2004).

Said Science in its citation: "After a century of intense scientific study, water still gives researchers much to scratch their heads about. This year, a flurry of papers on the structure and chemical behavior of this familiar substance revealed results that, if they hold up, could reshape fields from chemistry to atmospheric sciences.

"First and most controversial, a team of researchers from the United States, Germany, Sweden, and the Netherlands reported that the 100-year-old picture of the structure of liquid water might be wrong. Theorists thought slight charge differences between oxygen and hydrogen atoms pulled liquid water into an extended network, with each water molecule bound to four others in a tetrahedral pattern. But the team's synchrotron x-ray results suggest that many water molecules are, in fact, bound to only two neighbors. Don't rewrite the chemistry textbooks just yet: More-recent x-ray data back up the original structure, and debate will likely rage through 2005."

2. POLARON BEHAVIOR IN CMR MANGANITES

by Bruce Balfour

(Contact: Norman Mannella, NMannella@lbl.gov)

Spintronic devices manipulate electron spin to sense magnetic fields, store information, or perform logical operations. Colossal magnetoresistive (CMR) manganites are a class of materials under study for future spintronic applications such as nonvolatile magnetic computer memory (MRAM).

Researchers have recently used several soft x-ray spectroscopies at the ALS to study a prototypical CMR manganite as it was heated past its Curie temperature--the point at which the material ceases to be magnetic. They were able to observe the formation of polarons: electrons whose interaction with the lattice creates a deformation (energy well) that traps the electron, as a pocket on a pool table traps a billiard ball. For the first time, this provided a direct look inside polaron formation in a CMR material, indicating that electron localization as polarons is a defining characteristic of all CMR materials.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/95spintronics.html

Publication about this research: N. Mannella, A. Rosenhahn, C.H. Booth, S. Marchesini, B.S. Mun, S.-H. Yang, K. Ibrahim, Y. Tomioka, and C.S. Fadley, "Direct Observation of High-Temperature Polaronic Behavior in Colossal Magnetoresistive Manganites," *Phys. Rev. Lett.* 92, 166401 (2004).

3. NANOPARTICLE/VUV INTERACTIONS AT BEAMLIN 9.0.2

(Contact: Musa Ahmed, MAhmed@lbl.gov)

Nanoscience in the 21st century is thriving--nanoparticles are being studied in unprecedented detail across a broad spectrum of disciplines. Applications for the particles have been found in fields varying from medicine to computers, and the particles themselves are integral to studies ranging from spectral emissions in interstellar space to climate changes in our own environment. Systematic studies with vacuum ultraviolet light (VUV) can contribute to the study of nanoparticle chemistry and physics in new and important ways. In a seminar last week, Musa Ahmed of Berkeley Lab's Chemical Sciences Division described recent developments in the study of nanoparticles at the Chemical Dynamics Beamline 9.0.2. The work encompasses novel studies of production, detection, size measurement and selection, and chemical interactions of nanoparticles. The combination of size-selected intense particle beams and tunable VUV light affords the opportunity to study the optical and electronic properties of substrate-free ultrafine particles in regimes not previously accessible.

Read the full story at

http://www-als.lbl.gov/als/als_news/news_archive/vol.249_012605.html#3

4. BASIC ENERGY SCIENCES REVIEW TO BEGIN NEXT WEEK

(Contact: Neville Smith, NVSmith@lbl.gov)

The ALS has been gearing up over the past few months for an important triennial program review required by the Department of Energy (DOE) Office of Basic Energy Sciences (BES). The review, to be held at the ALS on February 2 - 4, 2005, is one of a series focusing on the four DOE synchrotron light sources. Open sessions will be held in ALS Conference Room 6-2202 starting at 1:00 on Wednesday afternoon. Pier Oddone, Berkeley Lab's Deputy Director for Scientific Programs, will begin the proceedings with a welcome message, followed by Acting ALS Director Janos Kirz with an overview of the ALS strategic plan. ALS Deputies Ben Feinberg, Neville Smith, and Jim Krupnick will address Safety and Operations, User Access Evolution, and Finance and Staffing, respectively.

Scientific highlight topics to be covered include the electronic structure of strongly correlated systems (Alessandra Lanzara), soft x-ray spectroscopy of volatile liquids and their surfaces (Richard Saykally), phase-transition dynamics viewed with femtosecond x-ray diffraction and absorption (Andrea Cavalleri), magnetic materials (Yves Idzerda), atomic and molecular physics (Nora Berrah), ultrafast nanomagnetism (Andreas Scholl), microscopy of polymers (Harald Ade),

x-ray tomography of cells (Carolyn Larabell), and the Molecular Foundry (Paul Alivisatos). The reviewers' agenda also includes time for extensive beamline visits, meetings with ALS staff, and lunch with members of the Users' Executive Committee.

5. TOWN HALL MEETING FOCUSES ON SAFETY

(Contact: Ben Feinberg, B_Feinberg@lbl.gov)

The ALS community convened in a town hall meeting on January 18 to discuss a variety of issues, including the upcoming BES review, safety concerns, the switch to top-off mode, and questions concerning the UC's DOE contract bid.

After Acting Director Janos Kirz briefed the group regarding preparations for the BES review (see Item 4 above), the floor was handed over to Deputy Director for Operations Ben Feinberg, who described the circumstances surrounding a recent accident that occurred at the Stanford Linear Accelerator Center (SLAC). The accident severely injured an electrician and shut down all accelerators at the Lab, including our sister facility, SSRL. SSRL is now beginning to restart operations, over three months after the accident. The SLAC linac is still shut down. Ben stressed the importance of looking at what happened at SLAC with an eye toward examining our own actions here at the ALS. According to the DOE accident report, there were many opportunities to avoid the accident--either by those who were doing the work or those who requested the work--but no one took advantage of them. All members of the ALS community are urged to take a look at the full DOE accident report (<http://www-als.lbl.gov/als/safety/accidentReportA.pdf>) and Ben's brief summary (<http://www-als.lbl.gov/als/safety/townHallSLACSumm.pdf>) presented at the town meeting. The stated ALS mission is "To support users in doing outstanding science in a safe environment." All members of the ALS community--users as well as staff--must pay careful attention to their safety and to that of those working around them. The bottom line: "Stay Vigilant."

Ben next described a few changes in beamline construction and modification procedures expected in anticipation of the switch to top-off injection mode. A review of the top-off upgrade was completed in November and BES has approved funding to commence work starting this year. The ALS is expecting to receive written permission shortly to begin initial testing. Major activity for this upgrade is expected to continue over the next couple of years.

Finally, Randy Scott, head of Berkeley Lab's Human Resources Department, reported that the UC's proposal for the Berkeley Lab management contract is in the final stages of preparation and review. Proposals are to be submitted to DOE by February 9, and announcement of the winner is expected on April 1, with a 60-day transition period during which there will be a smooth and orderly transition from the old to the new contract without interruption of Berkeley Lab programs. Fielding questions from the audience, Randy reported that there are no other known competitors for the contract, that no changes are expected in retirement and benefits programs, and that the terms of the contract are for five years, renewable for up to 20 years, contingent upon performance.

6. OPERATIONS UPDATE

(Contact: David Richardson, DBRichardson@lbl.gov)

For the user runs scheduled between December 20 and January 24, beam reliability was 95.5%. Of the scheduled beam, 87.0% was delivered to completion without interruption. A Lab-wide power outage (extending beyond the city of Berkeley) and the recovery phase that followed resulted in the loss of 12.3 hours of scheduled user beam time.

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html>. Requests for special operations use of the "scrubbing" shift

should be sent to Jan Pusina (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. The Accelerator Status Hotline at (510) 486-6766 (ext. 6766 from Lab phones) features a recorded message giving up-to-date information on the operational status of the accelerator. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

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LBNL/PUB-889 (2005)

Editors: lstamura@lbl.gov, alrobinson@lbl.gov, ejmoxon@lbl.gov

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Current issue online at http://www-als.lbl.gov/als/als_news/

1. EXTRACTING THE ELIASHBERG FUNCTION

by Art Robinson

(Contact: Ward Plummer, eplummer@utk.edu)

A multitude of important chemical, physical, and biological phenomena are driven by violations of the Born-Oppenheimer approximation (BOA), which decouples electronic from nuclear motion in quantum calculations of solids. Recent advances in experimental techniques combined with ever-growing theoretical capabilities now hold the promise of presenting an unprecedented picture of these violations. By means of high-resolution angle-resolved photoemission at the ALS and theoretical calculations, a multi-institutional collaboration that includes researchers from Oak Ridge National Laboratory, the University of Tennessee, Stanford University and the ALS have obtained the first high-resolution spectroscopic images of the specific vibrational modes that couple to a given electronic state.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/88vibration.html

Publication about this research: J. Shi, S.-J. Tang, B. Wu, P. T. Sprunger, W.L. Yang, V. Brouet, X.J. Zhou, Z. Hussain, Z.-X. Shen, Z. Zhang, and E.W. Plummer, "Direct extraction of the Eliashberg function for electron-phonon coupling: A case study of Be(0101)," *Phys. Rev. Lett.* 92, 186401 (2004).

2. A NEW GAP-OPENING MECHANISM IN A TRIPLE-BAND METAL

by Art Robinson

(Contact: Han Woong Yeom, yeom@phya.yonsei.ac.kr)

A "wire" of indium only one or a few atoms wide grown on a silicon surface comprises an ideal test laboratory for studying one-dimensional (1D) metals. A new example comes from a collaboration between researchers from Yonsei University in Korea, the ALS, and the University of Oregon, who have discovered that the phase transition from metal to insulator that occurs at low temperature in indium wires on the silicon (111) surface involves not only the expected shift in the electronic structure (band-gap opening) but also a band restructuring that gives rise to an energy gap in a second band.

Read the full story at
http://www-als.lbl.gov/als/science/sci_archive/93indium.html

Publication about this research: J.R. Ahn, J.H. Byun, H. Koh, E. Rotenberg, S.D. Kevan, and H.W. Yeom, "Mechanism of gap opening in a triple-band Peierls system: In atomic wires on Si," Phys. Rev. Lett. 93, 106401 (2004).

3. INTERNATIONAL LIGHT SOURCES WEB SITE LAUNCHED

On February 17, the international light source community launched the first Web site dedicated to providing the latest news and information on the world's accelerator-driven light sources (synchrotrons and free-electron lasers) and the science they produce. The site, lightsources.org, was developed and is jointly maintained by the Light Source Communicators Group, whose members represent light source facilities in Europe, North America, and Asia. Funding for the project is provided by science funding agencies of many nations. Go to <http://www.lightsources.org> to visit the new site.

4. CHU ANNOUNCES NEW BERKELEY LAB MANAGEMENT TEAM

Berkeley Lab Director Steve Chu has announced the senior management team he will propose when the Lab and the University of California present their partnership vision to the Department of Energy's contract competition panel this week in Chicago. The team includes three new appointments—Physical Biosciences Division Director Graham Fleming to succeed Pier Oddone as the Laboratory's Deputy Director; Paul Alivisatos, Materials Sciences Division Director, to become Associate Laboratory Director (ALD) for Physical Sciences; and Business Services Division Director David McGraw, to become ALD for Operations. They will join three other current scientific ALDs—Joe Gray (Biosciences), James Siegrist (General Sciences) and Horst Simon (Computing) on the senior team. Read Director Chu's memo announcing the new appointments at <http://www.lbl.gov/today/2005/Feb/18-Fri/mngmnt-jump.html> .

5. INTERDISCIPLINARY INSTRUMENTATION COLLOQUIUM KICKS OFF (Contact: Howard Padmore, HAPadmore@lbl.gov)

Front-line science builds on new ideas, but also relies on breakthrough instrumentation. Many activities in the Berkeley scientific community are directed towards developing advanced measurement techniques and instrumentation. Despite very disparate goals, some of these efforts share common problems and could benefit from sharing experience and expertise. As a first step in establishing a forum for information exchange and interdisciplinary collaboration in instrumentation research and development, an Interdisciplinary Instrumentation Colloquium is being launched at Berkeley Lab. The colloquia will be held every second Wednesday at 4:00 P.M. in Berkeley Lab's Building 50 auditorium.

The initial series of talks will be introductions for nonexperts. Bill Moses, of Berkeley Lab's Life Sciences Division, gave the first talk on February 9, entitled "Nuclear Medical Imaging--Techniques and Challenges." Today's talk is being given by Adrian Lee, of UC Berkeley and Berkeley Lab, on "Bolometers and the Big Bang." On March 9, Howard Padmore of the ALS will present "Light Fantastic: The Science and Instrumentation of the Advanced Light Source." Participation from ALS users is encouraged, and suggestions for speakers and topics are welcome. For more information, see the Instrumentation Colloquium Web page at <http://instrumentationcolloquium.lbl.gov/> .

6. RELATED NEWS LINKS FROM AROUND THE WEB

Liquid Carbon Chemistry
<http://www.aip.org/pnu/2005/split/719-2.html>

Spectroscopy for the Real World
<http://www.lbl.gov/Science-Articles/Archive/MSD-real-world-spectroscopy.html>

Senate Unanimously Confirms Bodman as Energy Secretary
http://energy.senate.gov/news/rep_release.cfm?id=231207

Bodman: "Complacency Is Safety's Enemy"
<http://www.lbl.gov/today/2005/Feb/04-Fri/bodman-jump.html>

President Bush Requests Almost Flat FY 2006 R&D Funding
<http://www.aip.org/fyi/2005/015.html>

7. OPERATIONS UPDATE

(Contact: David Richardson, DBRichardson@lbl.gov)

For the user runs scheduled between January 25 and February 20, the beam reliability (time delivered/time scheduled) was 97.9%. Of the scheduled beam, 85.0% was delivered to completion without interruption.

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Current issue online at http://www-als.lbl.gov/als/als_news/

1. UEC CORNER: NOTES FROM THE USERS' EXECUTIVE COMMITTEE

by Greg Denbeaux

(Contact: Greg Denbeaux, GDenbeaux@uamail.albany.edu)

I want to take this opportunity to introduce myself and the other Users' Executive Committee (UEC) members. For 2005, I will be Chair of the UEC, and Clemens Heske will be Vice Chair. Please welcome the newly elected members of the UEC. They are Tony van Buuren, Jinghua Guo, Amanda Hudson, and Simon Morton. I want to thank Dennis Lindle who was Chair of the UEC last year for all of his efforts. The other returning members of the UEC are Dan Dessau, Keith Jackson, Gary Mitchell, Corie Ralston, and Ed Westbrook. We are here to support your needs, so please contact me or anyone else on the UEC with any questions, comments, or complaints. You can read more about the members and get their contact information at the UEC's newly created independent Web site at <http://home.comcast.net/~als-uec/Index.htm> .

I'm pleased to have this opportunity to represent you as Chair of the UEC. I have been a synchrotron user since the mid-1990s. I have spent time at the Duke University Free Electron Laser Laboratory, Lawrence Berkeley National Laboratory at the Center for X-Ray Optics, and now I'm at the University at Albany in the College of Nanoscale Science and Engineering. My research interests include x-ray microscopy, extreme ultraviolet lithography, and nanomagnetism.

It should be a busy year for the UEC. The recurring project of organizing the Users' Meeting is always a large undertaking. I want to give a special thanks to Simon Morton and Jinghua Guo, who have agreed to chair the Users' Meeting. That will take place October 20 - 21, so please save those dates.

2. DIRECTOR'S UPDATE: RECENT MILESTONES AND FUTURE CHALLENGES

by Janos Kirz

(Contact: Janos Kirz, JKirz@lbl.gov)

It has been an honor and a privilege to be Acting ALS Division Director while Daniel Chemla is recuperating from surgery. I am immensely grateful for the division staff, especially the division deputies--Ben Feinberg, Jim Krupnick and Neville Smith--for their dedication and enthusiastic support during this challenging time. The good news is that Daniel is continuing to improve!

I bring unique qualifications to the job: I have been, and continue to be, an ALS user. I have gone through the proposal process, set up an account, stayed in the ALS apartments, and enjoyed the help and support of the staff at every level. Having worked at all four of the Department of Energy (DOE) light sources, I know from experience what a remarkable facility the ALS is. To move it to even greater levels of excellence is my goal.

2004 was indeed another outstanding year for the ALS:

- The number of users hit another all-time record of 1898.
- The number of refereed publications based on work at the ALS also reached a new record.
- The number of new structures deposited in the Protein Data Bank reached a new record as well.
- The Users' Meeting had record attendance and an outstanding set of 10 workshops.
- Preparations for top-off operation made excellent progress, and we received funding from DOE's Office of Basic Energy Sciences (DOE/BES) to move ahead with the project.
- We prepared a new strategic plan, designed to keep the ALS at the forefront of synchrotron radiation based science for the coming decade and beyond.
- We put much effort into maintaining a safe environment, and with the excellent cooperation of the user community we were able to maintain an outstanding safety record.

The latter part of the year was taken up in part by the Division's preparations for our three-year review by DOE/BES and by the University of California's preparations to make a bid for the continued management of Berkeley Lab, both of which took place last month. While the formal reports have not been received as yet, I feel that the review went very well, and that the bid will be accepted by DOE.

While there is much to be proud of, this is no time to celebrate: there are serious clouds on the horizon. The President's budget request for fiscal year 2006 calls for a cut in the budget for the DOE's Office of Science. If this budget is enacted by Congress, the light sources and neutron sources operated by BES are facing significantly reduced operations and the closing of several beamlines. I understand that the ALS UEC is working with the other facilities' user groups to make you aware of the gravity of the situation and to provide you with an opportunity to have your voices heard on this subject.

It has been a pleasure to work with the UEC, chaired in 2004 by Dennis Lindle. In 2005 I am looking forward to working with the UEC chaired by Greg Denbeaux. The ALS is here to support users in doing outstanding science in a safe environment. The input of the user community is critical to our ability to fulfill this mission!

3. ARPES PROVIDES DIRECT EVIDENCE OF SPIN-WAVE COUPLING

by Lori Tamura

(Contact: Joerg Schaefer, joerg.schaefer@physik.uni-augsburg.de)

The electronic properties of a metal are determined by the dynamical behavior of its conduction electrons. Conventional band theory accounts for the interaction of the electrons with the static ion lattice. However, coupling to further microscopic degrees of freedom can alter the electron dynamics considerably. For example, "conventional" superconductivity emerges as a result of the electrons' interaction with lattice vibrations (phonons). In magnetic materials, coupling with spin waves (magnons) is also expected. Such interactions may contribute to high-temperature superconductivity in novel materials. Unfortunately, lattice vibrations and spin waves have similar energy scales, hindering detailed study. Researchers have taken a new approach in analyzing the electron bands of ferromagnetic iron. Angle-resolved photoemission spectroscopy (ARPES) provides direct spectroscopic evidence of altered electron mass and energy (quasiparticle formation) in a magnetic solid due to coupling with spin waves.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/94spin_wave.html

Publication about this research: J. Schaefer, D. Schrupp, E. Rotenberg, K. Rossnagel, H. Koh, P. Blaha, and R. Claessen, "Electronic quasiparticle renormalization on the spin wave energy scale," *Phys. Rev. Lett.* 92, 097205 (2004).

4. PLUTONIUM DECONTAMINATION AGENT CHARACTERIZED AT ALS

(Contacts: Anne Gorden, AEGorden@lbl.gov; David Shuh, DKShuh@lbl.gov;

Kenneth Raymond, KNRaymond@lbl.gov)

In an on-going effort to design and synthesize chemical substances that can safely and effectively remove plutonium and other radioactive materials from the human body or from the environment, scientists at Berkeley Lab have made an important advance. Using the exceptionally bright and intense x-ray beams of the ALS' Small-Molecule Crystallography Beamline (11.3.1), they have determined the crystal structure of a molecular complex that has shown promise as a sequestering agent for plutonium and other members of the actinide family of elements. "This is the first plutonium complex that has been characterized using single-crystal x-ray diffraction with a synchrotron radiation source like the ALS," says Anne Gorden, the Glenn T. Seaborg Center Postdoctoral Fellow with Berkeley Lab's Chemical Sciences Division (CSD), and one of the co-authors of a paper on this work which appears in an upcoming issue of *Chemistry*, a European Journal. Collaborating with Gorden on this research were David Shuh, a senior staff scientist in CSD, plus Bryan Tiedemann, Richard Wilson, Jide Xu, and Kenneth Raymond, all of whom hold appointments with Berkeley Lab's Seaborg Center and/or the Chemistry Department of the University of California at Berkeley.

Read the full story at

<http://www.lbl.gov/Science-Articles/Archive/CSD-Pu-decon-agent.html>

5. REGISTER NOW FOR THE STANFORD-BERKELEY SYNCHROTRON SUMMER SCHOOL

(Contacts: David Attwood, attwood@eecs.berkeley.edu; Anders Nilsson, nilsson@ssrl.slac.stanford.edu)

The fourth Stanford-Berkeley Summer School, to be held June 13 - 17, 2005, will provide basic lectures on the synchrotron radiation process, requisite technologies, and a broad range of scientific applications. The application deadline is Sunday, May 8, 2005. Visits to both the ALS in Berkeley and the Stanford Synchrotron Radiation Laboratory (SSRL) will be included, with opportunities to interact with the professional staff and graduate students at both facilities. The Summer School will be limited to approximately 40 graduate students, with a preference for those pursuing doctoral research in the physical sciences in which synchrotron radiation is expected to play a significant role. The summer school is jointly sponsored by the University of California at Berkeley, Stanford University, Lawrence Berkeley National Laboratory, and the Stanford Synchrotron Radiation Laboratory. Lectures will be presented by professors and scientists from these four organizations and their user communities. The summer school will be housed at the Stanford Linear Accelerator Center. Co-chairs of the summer school are Anders Nilsson and David Attwood.

Details describing the summer school, planned lectures, housing, costs, and how to apply are posted at <http://www-ssrl.slac.stanford.edu/sbsummerschool/>. Applications should include a brief academic record, a statement describing the intended research area and how a knowledge of synchrotron radiation would enhance those studies, a list of publications (if any), and information on how to reach the applicant by email and phone through the period extending to the time of the summer school.

6. ALS-RELATED WEB NEWS AND LINKS

Schmahl, Kirz Receive Compton Award

<http://www.aps.anl.gov/Science/Highlights/2005/20050301.htm>

240 Electrons Set in Motion

<http://www.aip.org/pnu/2005/split/722-1.html>

4th PSI Summer School (Topic: "Spectroscopy/Microscopy") Announcement

<http://sls.web.psi.ch/zuoz2005>

Contractor Completes Structural Steel for the Molecular Foundry

http://www.rsconstruction.com/news/press_releases/05_04_21_nanotech.html

ALS Strategic Plan Posted Online

<http://www-als.lbl.gov/als/ourorg/strategicplan.html>

<http://www-als.lbl.gov/als/ourorg/strategicplan.pdf>

Revised ALS User Advisories Now Available

<http://www-als.lbl.gov/als/user-advis/>

Take a Virtual Tour of Beamline 6.1.2

<http://www-als.lbl.gov/als/aboutals/virtualtour6.1.2.html>

7. OPERATIONS UPDATE

(Contact: David Richardson, DBRichardson@lbl.gov)

For the user runs scheduled between February 24 and March 28 (including two-bunch operation March 15 - 28), the beam reliability (time delivered/time scheduled) was 95.0%. Of the scheduled beam, 87.9% was delivered to completion without interruption. There were no significant interruptions.

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html> . Requests for special operations use of the "scrubbing" shift should be sent to Jan Pusina (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. The Accelerator Status Hotline at (510) 486-6766 (ext. 6766 from Lab phones) features a recorded message giving up-to-date information on the operational status of the accelerator. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

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9. In Memoriam: Joan Minton
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Current issue online at http://www-als.lbl.gov/als/als_news/

1. SAFETY INCIDENTS PROMPT ALL-HANDS MEETING

(Contact: Georgeanna Perdue, GMPerdue@lbl.gov)

Responding to a recent increase in safety incidents, the ALS held a mandatory safety meeting for all ALS staff including those who are matrixed. Acting Director Janos Kirz stressed that the common thread through most of the accidents appears to be carelessness and asked for suggestions to elevate safety awareness, especially with the pending installation shutdown. Many insightful suggestions were made and will be reviewed. As an immediate response, the subproject leaders and section leaders have begun holding briefings at the end of the work day. This will allow them to discuss the safety implications of the plans for the following day and transmit any safety concerns/lessons learned generated by that day's work. First thing the next morning, the section leaders will meet with their staff and go over the safety issues and plans, as well as any safety concerns from the previous day. We believe these meetings will help keep safety in the forefront of everyone's mind, especially during the busy shutdown.

2. ELECTRON TRAPPING BY MOLECULAR VIBRATION

by Lori Tamura

(Contact: Erwin Poliakoff, epoliak@lsu.edu)

In photoelectron spectroscopy experiments performed at the ALS, a group of researchers has found that electronic transitions normally thought to be forbidden can in fact be excited in conjunction with certain types of molecular vibrations. Specifically, they found that when the symmetry of a linear triatomic molecule is broken by asymmetric vibrational modes, photoelectrons can become temporarily trapped by the molecule before ultimately escaping, giving rise to a broad feature in the photoelectron spectrum known as a shape resonance. This process represents a novel type of symmetry-breaking phenomenon that has not been observed previously but appears to be widespread. Such coupling between electronic motion and nuclear motion becomes increasingly important as scientists learn more about the geometry and dynamics of novel chemical structures such as those found in nanodevices and transient chemical species, and the results have implications for studies that use photoelectron spectroscopy as a diagnostic tool.

Read the full story at
http://www-als.lbl.gov/als/science/sci_archive/96vibration.html

Publication about this research: G.J. Rathbone, E.D. Poliakoff, J.D. Bozek, and R.R. Lucchese, "Observation of the symmetry-forbidden $5\sigma_u \rightarrow k\sigma_u$ CS₂ transition: A vibrationally driven photoionization resonance," Phys. Rev. Lett. 92, 143002 (2004).

3. INFLUENCE OF TOPOLOGICAL SPIN FLUCTUATIONS ON CHARGE TRANSPORT by Art Robinson (Contact: M. Zahid Hasan, mzhasan@princeton.edu)

Layered transition metal oxides are the focus of intense research efforts because they might clarify the superconducting mechanism of cuprate high-temperature superconductors (HTSCs). A case in point is Na_xCoO₂ with $x = 0.7$, which is a parent compound for a family of cobaltites that exhibits superconductivity. This class of materials is also thought to be ideal for detecting the long-sought resonating valence bond (RVB) state of matter proposed by Philip Anderson of Princeton University in 1973. Researchers from Princeton and the ALS are the first to use angle-resolved photoemission spectroscopy (ARPES) to demonstrate the strongly electron correlated nature of this material and to provide evidence that charge transport is strongly influenced by topological spin frustration.

Read the full story at
http://www-als.lbl.gov/als/science/sci_archive/97charge_transport.html

Publication about this research: M.Z. Hasan, Y.-D. Chuang, D. Qian, Y.W. Li, Y. Kong, A. Kuprin, A.V. Fedorov, R. Kimmerling, E. Rotenberg, K. Rossnagel, Z. Hussain, H. Koh, N.S. Rogado, M.L. Foo, and R.J. Cava, "Fermi surface and quasiparticle dynamics of Na_{0.7}CoO₂ investigated by angle-resolved photoemission spectroscopy," Phys. Rev. Lett. 92, 246402 (2004).

4. A NEW GUIDE TO EXPLORING THE PROTEIN UNIVERSE by Lynn Yarris (Contact: Sung-Hou Kim, SHKim@lbl.gov)

Proteins are the building blocks of living cells and control the chemical processes that keep those cells alive and functioning. Based on the total number of known life forms on Earth, it is estimated that there are some 50 billion different types of proteins in existence today, and it is possible that the protein universe could hold many trillions more. How, then, does a scientist know where to find the most densely populated (hence most promising) regions of protein space to explore? Help is on the way in the form of a comprehensive new 3-D map that brings order to the protein universe through a manageable organization.

"We have constructed a protein-structure space map (SSM) based on the distribution in 3-D space of the 1,898 known unique protein structures," says Sung-Hou Kim, a chemist who holds a joint appointment with Berkeley Lab's Physical Biosciences Division and University of California, Berkeley's Chemistry Department. "Because proteins with similar structures and functions are clustered together in the SSM, when the structure of a new protein is first identified it can be placed in the appropriate location on the map to reveal its neighbors and its evolutionary history. This information can then be used to predict the protein's function, especially when the prediction is not possible based on the protein sequence alone."

While the construction of the SSM was a computational tour-de-force, the data on which the analysis was based came from the Protein Data Bank, an international repository of protein structure data with substantial contributions from light sources. Says Kim, "the availability of the structures that we borrowed from the Protein Data Bank is largely dependent on synchrotron light sources like the ALS."

Read the full story at

<http://www.lbl.gov/Science-Articles/Archive/sabl/2005/March/02-protein-universe.html>

5. UEC CORNER: NOTES FROM THE USERS' EXECUTIVE COMMITTEE

by Greg Denbeaux

(Contact: Greg Denbeaux, GDenbeaux@uamail.albany.edu)

Thanks to everyone who took a couple of minutes and responded to my recent email to take action and help the ALS. If you have not done so already, please look at the UEC website, <http://www.als-uec.org>, and click on the "Take Action" button.

The next UEC meeting will be held on Friday, May 6th. All interested users are welcome to participate, so please let me know if you want more information about the meeting. Our topics of discussion will include the user housing issue and planning for the upcoming ALS Users' Meeting on October 20 - 21.

6. 2005 SHUTDOWN FEATURES IVID INSTALLATION

(Contact: Steve Rossi, SLRossi@lbl.gov)

The annual ALS shutdown for maintenance and installation work is well underway, having begun on April 11 as scheduled. We have already installed an in-vacuum insertion device (IVID), the first of its kind at the ALS, in Sector 6. The IVID is an undulator whose magnets are inside the vacuum chamber, enabling smaller gap distances and thus, higher magnetic fields. It will be used by the femtosecond beamline (6.0.1), currently under construction. In addition, a newly machined vacuum chamber with elliptically polarizing undulator (EPU) trim coils has been installed in Sector 4, in anticipation of a new EPU for the ultrahigh-energy-resolution MERLIN beamline (4.0.1), currently in the design stage.

A full survey of the storage ring has been performed. It was decided to forgo a girder-based alignment this year, in favor of focusing on correcting long-term misalignment issues with individual sextupole and bend magnets. Also, higher-order-mode (HOM) dampers are being installed in the main rf cavities.

We anticipate handing the accelerator over on time to the Accelerator Physics Group over the weekend of May 7 for them to begin their start-up and tune efforts. Nine shifts of beamline commissioning time are scheduled to follow, with user shifts resuming on May 18.

7. SYNCHROTRON TECHNIQUES ON BES SITE

(Contact: Neville Smith, NVSmith@lbl.gov)

The U.S. Department of Energy's Office of Basic Energy Sciences (BES) has posted on its Web site a summary of the various beamline techniques that are practiced at synchrotron radiation facilities along with some representative examples of research accomplishments using these techniques. The site was assembled in conjunction with a report being prepared by an Interagency Working Group (IWG) for the Office of Science and Technology Policy (OSTP) on synchrotron

light sources in the United States. The ALS was commissioned to condense the large amount of material that had been submitted and to edit it into a form that would be understandable to a lay person with a moderate science background. The final result consists of 44 examples organized under 12 techniques that fall into three basic categories: spectroscopy, scattering, and imaging. I am grateful to all who have contributed, and especially to members of the ALS Technical Information Section who produced the site on the desired short time scale.

Read the technique descriptions and examples at
http://www.sc.doe.gov/bes/synchrotron_techniques/index.htm

8. LATEST PROPOSAL SCORES POSTED ONLINE (Contact: Gary Krebs, GFKrebs@lbl.gov)

The general sciences beam time allocation process for the running period from July through December 2005 is complete. The number of proposals for the cycle was 310, up from 248 in the previous period. The number of eight-hour shift requests for the upcoming cycle was 5932. A total of 2769 shifts, equal to about 46% of the total time requested in the proposals, was allocated. Competition for beam time on insertion-device beamlines was especially keen--general users requesting beam time on the insertion-device beamlines will continue to find the proposal process competitive; excluding protein crystallography, approximately 31% of the requested beam time was allocated. For more detailed results, including beam-time score distributions and cut-off scores, go to the proposal scores at <http://www-als.lbl.gov/als/quickguide/pspscores.html> . The schedule for the upcoming running period has also been posted at http://www-als.lbl.gov/als/schedules/next_itsch.html .

9. IN MEMORIAM: JOAN MINTON

A longtime member of the ALS family, Joan Portello Minton, passed away peacefully at home on March 26, 2005, after a long illness. Joan began her Berkeley Lab career in 1993, when she was hired as an administrative assistant at the ALS. During her tenure here she provided valuable support to both the Experimental Systems and the Scientific Support groups and to ALS Deputies Ben Feinberg and Neville Smith. She was quickly recognized for her exceptional writing ability and received an Outstanding Performance Award for her work on the ALS Users' Guide, a publication that received an international Distinguished Technical Communication Award. In 1999, Joan accepted a new assignment within Berkeley Lab's Physical Biosciences Division, coordinating and developing research and grant proposals. Joan was dedicated to her job, to those she supported at the ALS, and to the ALS as a whole. She was a role model of reliability, work ethic, communication, and willingness to grow and accept new responsibilities. All who knew her were touched by her generosity, creativity, and ability to enjoy life as it comes. A scholarship fund has been set up in Joan's name; contributions may be sent to A.U.H.S.D. / Joan Minton Scholarship Fund, 1212 Pleasant Hill Rd., Lafayette, CA 94549.

10. OPERATIONS UPDATE

(Contact: David Richardson, DBRichardson@lbl.gov)

For the user runs scheduled between March 29 and April 10, the beam reliability (time delivered/time scheduled) was 99.7%. Of the scheduled beam, 97.5% was delivered to completion without interruption. There were no significant interruptions.

The ALS shut down at 8:00 A.M. on Monday, April 11, 2005, for planned installations and maintenance. User operations will resume at 12:00 A.M. on Wednesday, May 18, 2005.

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html>. Requests for special operations use of the "scrubbing" shift should be sent to Jan Pusina (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. The Accelerator Status Hotline at (510) 486-6766 (ext. 6766 from Lab phones) features a recorded message giving up-to-date information on the operational status of the accelerator. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/>.

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ALSNews is a monthly electronic newsletter to keep users informed about developments at the Advanced Light Source, a national user facility located at Ernest Orlando Lawrence Berkeley National Laboratory, University of California. The current and past issues of ALSNews are available on the World Wide Web. Point your browser to the following URL:

http://www-als.lbl.gov/als/als_news/

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LBNL/PUB-889 (2005)

Editors: lstamura@lbl.gov, alrobinson@lbl.gov, ejmoxon@lbl.gov

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Current issue online at http://www-als.lbl.gov/als/als_news/

1. HOW THE MEMBRANE PROTEIN AmtB TRANSPORTS AMMONIA (Contact: Robert Stroud, stroud@msg.ucsf.edu)

Membrane proteins provide molecular-sized entry and exit portals for the various substances that pass into and out of cells. While life scientists have solved the structures of protein channels for ions, uncharged solutes, and even water, up to now they have only been able to guess at the precise mechanisms by which gases (such as NH₃, CO₂, O₂, NO, N₂O, etc.) cross biological membranes. But, with the first high-resolution structure of a bacterial ammonia transporter (AmtB), determined by a team in the Stroud group from the University of California, San Francisco, it is now known that this family of transporters conducts ammonia by stripping off the proton from the ammonium (NH₄⁺) cation and conducting the uncharged NH₃ "gas."

Read the full story at
http://www-als.lbl.gov/als/science/sci_archive/98protein.html

Publication about this research: S. Khademi, J. O'Connell III, J. Remis, Y. Robles-Colmenares, L.J. Miercke, and R.M. Stroud, "Mechanism of ammonia transport by Amt/MEP/Rh: Structure of AmtB at 1.35 angstroms," *Science* 305, 1587 (2004).

2. ENERGETICS OF HYDROGEN BOND NETWORK REARRANGEMENTS IN LIQUID WATER

(Contact: Richard Saykally, saykally@calmail.berkeley.edu)

The unique chemical and physical properties of liquid water are thought to result from the highly directional hydrogen bonding (H-bonding) network structure and its associated dynamics. However, despite intense experimental and theoretical scrutiny, a complete description of this structure has been elusive. Recently, with the help of their novel liquid microjet apparatus, a University of California, Berkeley, group derived a new energy criterion for H-bonds based on experimental data. With this new criterion based on analysis of the temperature dependence of the x-ray absorption spectra of normal and supercooled liquid water, they concluded that the traditional structural model of water is valid.

Read the full story at
http://www-als.lbl.gov/als/science/sci_archive/99water.html

Publication about this research: J.D. Smith, C.D. Cappa, K.R. Wilson, B.M. Messer, R.C. Cohen, and R.J. Saykally, "Energetics of hydrogen bond network rearrangements in liquid water," *Science* 306, 851 (2004).

3. SUBSTRATE RECOGNITION STRATEGY FOR BOTULINUM NEUROTOXIN

(Contact: Axel Brunger, brunger@stanford.edu)

Clostridal neurotoxins (CNTs) are the causative agents of the neuromuscular diseases botulism and tetanus. By inhibiting release of the neurotransmitter acetylcholine, for example, the neurotoxin produced by the bacterium *Clostridium botulinum* interferes with nerve impulses and causes a paralysis of respiratory and skeletal muscles that can cause death. Researchers from Stanford University have now determined the first structure of a CNT in complex with its target. The structure at a resolution of 2.1 angstroms, together with enzyme kinetic data, reveals an array of active sites (exosites) that give the CNT its deadly specificity.

Read the full story at
http://www-als.lbl.gov/als/science/sci_archive/101botulinum.html

Publication about this research: M.A. Breidenbach and A.T. Brunger, "Substrate recognition strategy for botulinum neurotoxin serotype A," *Nature* 432, 925 (2004).

4. CALL FOR GENERAL SCIENCES PROPOSALS: DUE JULY 1

(Contact: alsproposals@lbl.gov)

The User Services Office is accepting general user proposals from scientists who wish to conduct research in the general sciences at the ALS during the running period from January through June 2006. The deadline for submissions is Friday, July 1, 2005. (This deadline does not apply to protein crystallography proposals, which have a separate process and schedule.) To submit a new proposal, go to the online ALS General User Proposal and Request for Beamtime form at http://alsusweb.lbl.gov/4DCGI/WEB_GetForm/Page1P.shtml/Initialize.

If you have an existing proposal for which you would like to receive beamtime during the January through June 2006 cycle, you must submit a Proposal Renewal Form. This new online form replaces the ALS Experiment Report and Request for Beamtime form. Scientists with existing proposals that are eligible for renewal will be sent instructions on how to request a login and password to access their proposal information and forms. Proposals can be renewed for up to three six-month cycles following their initial submission. After three cycles, a new proposal must be submitted. If your proposal is designated ALS-01186 or lower, then you must submit a new proposal.

ALS User Services Administrator
alsuser@lbl.gov

General user proposals
<http://www-als.lbl.gov/als/quickguide/independinvest.html>

ALS online forms

<http://alsusweb.lbl.gov/>

Beamline information

http://www-als.lbl.gov/als/als_users_bl/bl_table.html

Proposal scores for July - December 2005

<http://www-als.lbl.gov/als/quickguide/pspscores.html>

5. SUBSCRIBE TO LIGHTSOURCES.ORG NEWS FLASH

Keep up to date with news from the world light-source community by subscribing to News Flash at lightsources.org, the Web site about and for the international light-source community. News releases about the latest results from light-source research are sent to your e-mail inbox. Subscribing is as easy as going to <http://lightsources.org/cms/?pid=1000069> and filling in a few fields. All information is confidential.

6. SUMMER COURSES IN SYNCHROTRON-RELATED RESEARCH

More than twenty educational opportunities, covering all aspects of synchrotron-related research, are available over the next several months in the US and Europe. An up-to-date listing of the courses and facilities participating is available at lightsources.org (<http://www.lightsources.org/cms/?pid=1000510>).

7. CORRECTION TO ARTICLE ON SAFETY MEETING

Last month's issue of ALSNews included an article about a mandatory all-hands safety meeting held at the ALS in response to a recent increase in safety incidents. Omitted from the article was the fact that the meeting included not only ALS staff, but all Engineering Division personnel assigned to the ALS as well. Kem Robinson, Peter Denes, and Alan Paterson (Engineering Division) played critical roles in the organization and conduct of the meeting. ALSNews apologizes for this oversight.

8. NOTE TO USERS: BE AN ALS BOOSTER!

(Contact: Art Robinson, ALRobinson@lbl.gov)

Support for the ALS and other synchrotron light sources is highly dependent on communicating their innovative and forefront science. News articles in the media based on press releases issued by your research institutions is one way to accomplish this, provided that there is some mention of synchrotron radiation in general and the ALS in particular in the press release and, we hope, the news article that results. Whenever your home institution prepares a press release based on research that you conducted at the ALS, it would therefore be very helpful if you would do your best to ensure that both the ALS and synchrotron radiation are mentioned, preferably prominently but at least somewhere. Finally, if you would notify Art Robinson (ALRobinson@lbl.gov, 510-486-6838) at the ALS when you are aware of an impending press release based on your research, it would also help us in promoting your achievements and in the process ours as well. Thank you for our cooperation.

9. SELECTED RECENT PUBLICATIONS

We cite below a few of the more recent publications that have been generated from work done at the ALS.

Adams, E.J., Y.-H. Chien, and K.C. Garcia, "Structure of a gamma-delta T cell receptor in complex with the nonclassical MHC T22," *Science* 308, 227 (2005).

Blomqvist, P., K.M. Krishnan, and H. Ohldag, "Direct imaging of asymmetric magnetization reversal in exchange-biased Fe/MnPd bilayers by x-ray photoemission electron microscopy," *Phys. Rev. Lett.* 94, 107203 (2005).

Bradley, J., Z.R. Dai, R. Erni, N. Browning, G. Graham, P. Weber, J. Smith, I. Hutcheon, H. Ishii, S. Bajt, C. Floss, F. Stadermann, and S. Sanford, "An astronomical 2175 angstrom feature in interplanetary dust particles," *Science* 307, 244 (2005).

Ghosal, S., J.C. Hemminger, H. Bluhm, B.S. Mun, E.L.D. Hebenstreit, G. Hetteler, D.F. Ogletree, F.G. Requejo, and M. Salmeron, "Electron spectroscopy of aqueous solution interfaces reveals surface enhancement of halides," *Science* 307, 563 (2005).

Kim, C., N.-H. Xuong, and S.S. Taylor, "Crystal structure of a complex between catalytic and regulatory (RI-alpha) subunits of PKA," *Science* 307, 690 (2005).

Lee, T.T., S. Agarwalla, and R.M. Stroud, "A unique RNA fold in the RnaA-RNA-cofactor ternary complex contributes to substrate selectivity and enzymatic function," *Cell* 120, 599 (2005).

Pierce, M.S., C.R. Buechler, L.B. Sorensen, J.J. Turner, S.D. Kevan, E.A. Jagla, J.M. Deutsch, T. Mai, O. Narayan, J.E. Davies, K. Liu, J. Hunter Dunn, K.M. Chesnel, J.B. Kortright, O. Hellwig, and E.E. Fullerton, "Disorder-induced microscopic magnetic memory," *Phys. Rev. Lett.* 94, 017202 (2005).

Reyes, C.L., and G. Chang, "Structure of the ABC transporter MsbA in complex with ADP-vanadate and lipopolysaccharide," *Science* 308, 1028 (2005).

Shin, S., R. El-Diwany, S. Schaffert, E.J. Adams, K.C. Garcia, P. Pereira, and Y.-H. Chien, "Antigen recognition determinants of gamma-delta T cell receptors," *Science* 308, 252 (2005).

Tu, D., G. Blaha, P.B. Moore, and T.A. Steitz, "Structures of MLS[B]K antibiotics bound to mutated large ribosomal subunits provide a structural explanation for resistance," *Cell* 121, 257 (2005).

10. ALS-RELATED WEB NEWS AND LINKS

New head for Structural Biology Group at ALS
<http://www.lbl.gov/today/2005/May/05-Thu/05-05-2005.html>

Accelerator expert wins achievement prize
<http://www.lbl.gov/today/2005/May/09-Mon/05-09-2005.html>

Scientists at Scripps describe protein used by bacteria and cancer cells to resist drugs
<http://www.scripps.edu/news/press/051205.html>

Researchers identify new compounds in flames
<http://www.umass.edu/umhome/news/articles/16943.php>

Making the buckyballs ring
<http://www.lbl.gov/Science-Articles/Archive/sabl/2005/May/06-buckyballs.html>

Neumark wins optical award
<http://www.lbl.gov/today/2005/May/19-Thu/05-19-2005.html>

Alivisatos to step down as 'Foundry' Director
<http://www.lbl.gov/today/2005/May/23-Mon/05-23-2005.html>

11. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

The ALS shut down at 8:00 A.M. on Monday, April 11, 2005, for planned installations and maintenance. User operations resumed at 12:00 A.M. on Wednesday, May 18, 2005.

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html> . Requests for special operations use of the "scrubbing" shift should be sent to Jan Pusina (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. The Accelerator Status Hotline at (510) 486-6766 (ext. 6766 from Lab phones) features a recorded message giving up-to-date information on the operational status of the accelerator. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

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ALSNews is a monthly electronic newsletter to keep users informed about developments at the Advanced Light Source, a national user facility located at Ernest Orlando Lawrence Berkeley National Laboratory, University of California. The current and past issues of ALSNews are available on the World Wide Web. Point your browser to the following URL:

http://www-als.lbl.gov/als/als_news/

To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

LBNL/PUB-889 (2005)

Editors: lstamura@lbl.gov, alrobinson@lbl.gov, ejmoxon@lbl.gov

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1. COMPOSITION AND REACTIONS OF ATMOSPHERIC AEROSOL PARTICLES

(Contact: Lynn Russell, lmrussell@ucsd.edu)

Microscopic aerosol particles in the atmosphere contain carbonaceous components from mineral dust and combustion emissions released from around the world. How long these tiny particles remain in the atmosphere can have a huge impact on the global climate. Measurements based on high-resolution scanning transmission x-ray images obtained at the ALS have revealed chemical reactions on and in atmospheric aerosol particles that caused particle growth while changing organic composition by 13 to 24% per day, an oxidation rate significantly slower than is currently used in atmospheric models. Since oxidation has a strong effect on particle lifetime in the atmosphere, these results will help climate scientists refine the computer models used to predict climate change.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/100aerosol.html

Publication about this research: S.F. Maria, L.M. Russell, M.K. Gilles, and S.C.B. Myneni, "Organic aerosol growth mechanisms and their climate forcing implications," *Science* 306, 1921 (2004).

2. A HOLLOW-ION RESONANCE OF UNPRECEDENTED STRENGTH

(Contact: Rene C. Bilodeau, RCBilodeau@lbl.gov)

A so-called hollow ion is formed when core electrons are removed or excited to higher energy levels, leaving an empty inner shell. Such states can be produced in He⁻, a fundamental three-electron system and prototypical negative ion. The nuclear Coulomb attraction is efficiently screened in negative ions, greatly enhancing the effects that the electrons have on each other and providing an ideal opportunity to verify and further motivate theoretical models of electron correlation. Our understanding of these basic interactions can elucidate processes of importance in many fields, from the interpretation of cosmic spectra to x-ray lasing efforts using inner-shell ionization and hollow-ion formation. At the Ion-Photon Beamline at the ALS, researchers have detected in negative helium ions a resonant simultaneous double-Auger decay of unprecedented strength, evidence of a triply excited hollow-ion state that has eluded observation for 25 years.

Read the full story at
http://www-als.lbl.gov/als/science/sci_archive/102ion.html

Publication about this research: R.C. Bilodeau, J.D. Bozek, A. Aguilar, G.D. Ackerman, G. Turri, and N. Berrah, "Photoexcitation of He⁻ hollow-ion resonances: Observation of the 2s2p[2] [4]P state," *Phys. Rev. Lett.* 93, 193001 (2004).

3. FLAME CHEMISTRY DISCOVERY MAKES COVER OF SCIENCE MAGAZINE (Contact: Craig Taatjes, cataatj@sandia.gov)

Work done using the flame chamber at Chemical Dynamics Beamline 9.0.2 was featured on the cover of the June 24 issue of *Science Magazine*. An international team of researchers was surprised to detect, for the first time, a type of organic compound called enols among the hundreds of intermediate chemical species that form when various types of hydrocarbon fuel is burned. The detection of enols hinges on the ability to distinguish between different isomers--molecules with identical composition but different structure. Enols are less-stable isomers of carbonyl (keto) compounds, which are well-known combustion intermediates. The technique used at Beamline 9.0.2 capitalizes on the fact that different isomers have different ionization energies. Tunable VUV light is used to ionize the molecules emitted by a laminar "flat flame" burner. The photoions are then collected and analyzed using time-of-flight mass spectrometry. The results indicate a rich and previously unsuspected enol chemistry in a wide range of combustion systems. The discovery will have considerable impact on prevailing models of hydrocarbon oxidation and could someday lead to cleaner-burning fuels, more efficient engines, and enhanced modeling of planetary atmospheres and interstellar chemistry.

Publication about this research: C.A. Taatjes, N. Hansen, A. McIlroy, J.A. Miller, J.P. Senosiain, S.J. Klippenstein, F. Qi, L. Sheng, Y. Zhang, T.A. Cool, J. Wang, P.R. Westmoreland, M.E. Law, T. Kasper, and K. Kohse-Hoinghaus, "Enols are common intermediates in hydrocarbon oxidation," *Science* 308, 1887 (2005).

4. ALS COLLOQUIUM: MODERN PHOTOEMISSION--ITS POTENTIAL AND CHALLENGES

by Art Robinson
(Contact: Zhi-Xun Shen, zxshen@stanford.edu)

Valence-band angle-resolved photoelectron spectroscopy (ARPES) with high energy and momentum resolution has become one of the premier spectroscopic tools at synchrotron light sources in general and the ALS in particular for working at the frontier of condensed matter physics. In the latest of an occasional series of ALS Colloquia, Z.-X. Shen of Stanford University explained why ARPES is such an effective technique, illustrated with recent examples what ARPES can do, and looked at the challenges to be overcome in order to bring this technique to the next level, possibly leading to new paradigms of physics. A co-developer and frequent user of the condensed-matter branch of Beamline 10.0.1, Shen's credentials include serving as the leader of a Stanford group that has authored several widely cited publications based on ARPES studies of high-temperature superconductors and other advanced materials and as the mentor of a dozen or so students and postdocs who have moved onto faculty positions at other universities to continue their own ARPES research.

Read the full story at
http://www-als.lbl.gov/alsdev/als_news/news_archive/vol.254_062905.html#4

5. DEADLINE FOR GENERAL USER PROPOSALS EXTENDED TO JULY 5 (Contact: alsproposals@lbl.gov)

The User Services Office is still accepting general user proposals from scientists who wish to conduct research in the general sciences at the ALS during the running period from January through June 2006. The deadline for submissions has been extended through the close of business on Tuesday, July 5, 2005. (This deadline does not apply to protein crystallography proposals, which have a separate process and schedule.) To submit a new proposal, go to the online ALS General User Proposal and Request for Beamtime form at http://alsusweb.lbl.gov/4DCGI/WEB_GetForm/Page1P.shtml/Initialize .

Existing proposals can be renewed for up to three six-month cycles following their initial submission. Scientists with proposals that are eligible for renewal have been sent instructions on how to submit an online Proposal Renewal Form. Send email to alsproposals@lbl.gov if you believe you are eligible for renewal but have not received renewal instructions. If your proposal is designated ALS-01186 or lower, then you must submit a new proposal. The following resources are available for further information:

ALS User Services Administrator
alsuser@lbl.gov

General user proposals
<http://www-als.lbl.gov/als/quickguide/independinvest.html>

ALS online forms
<http://alsusweb.lbl.gov/>

Beamline information
http://www-als.lbl.gov/als/als_users_bl/bl_table.html

Proposal scores for July - December 2005
<http://www-als.lbl.gov/als/quickguide/pspscores.html>

6. DOE OFFICE OF SCIENCE DIRECTOR RAY ORBACH VISITS ALS

Dr. Ray Orbach, Director of the Office of Science for the Department of Energy, made his annual visit to Berkeley Lab on Friday, June 24, for meetings, tours, and program updates. Accompanied by Berkeley Lab Director Steve Chu, Dr. Orbach toured the ALS with Acting ALS Director Janos Kirz. The group stopped at Beamline 7.0.1, where Beamline Scientist Eli Rotenberg discussed recent results obtained with the Electronic Structure Factory. The tour then moved on to Building 10, built in 1944 and recently rated "very poor" from a seismic standpoint. It is currently being used for a variety of ALS activities, but would be replaced by a new User Support Building with additional staging and office space if funding can be secured. Dr. Orbach then spent the lunch hour in discussions with members of the ALS Users' Executive Committee. During this visit, Dr. Orbach also helped to dedicate a new metropolitan area network at the Oakland Scientific Facility, toured the new Potter Street biosciences center in West Berkeley, talked with scientists about optical accelerators, and met with the Lab's safety committees.

7. 2005 ALS USERS' MEETING UPDATE: WORKSHOPS ANNOUNCED

(Contact: alsum@lbl.gov)

General information, meeting deadlines, and online registration for this year's ALS Users' Meeting, to be held at Berkeley Lab October 20 - 22, will soon be available on the Users' Meeting Web site at <http://www-als.lbl.gov/als/usermtg/>. The deadline for abstract submission is August 15, and the early registration deadline is October 1. Jinghua Guo and Simon Morton are the program committee co-chairs. This year, 11 focused workshops will follow the end of the formal Users' Meeting program. The workshop topics and their organizers are as follows:

Forefront AMO Science: Clusters, Ions, Dressed States...

John Bozek and Nora Berrah

Frontiers of Synchrotron-Based X-Ray Microdiffraction

Nobumichi Tamura and B.W. Batterman

Macromolecular Crystallography I: Advanced Experimental Techniques for Getting the Best Data from Difficult Samples

Christine Trame

Macromolecular Crystallography II: New Strategies for Data Processing with Automated Software Tools

James Holton

New Visions in Bandmapping

Eli Rotenberg, Alexei Fedorov, and Zahid Hussain

Novel Approaches to Soft X-Ray Spectroscopy: Scanning Transmission X-Ray Microscopy and Ambient-Pressure X-Ray Photoelectron Spectroscopy

Hendrik Bluhm, Mary Gilles, Simon Mun, and Tolek Tyliczszak

Soft and Hard X-Ray Tomography at the ALS

Alastair MacDowell and Gerry McDermott

Soft X-Ray Photon-In and Photon-Out Spectroscopy: New Frontiers

Jinghua Guo and Zahid Hasan

THz Science and Technology Network: Opportunities and Organization

Michael C. Martin

Ultrafast X-Ray Science at the ALS

Bob Schoenlein and Peter Fischer

XANES and EXAFS Spectroscopy of Materials and Biological Samples: Expanding the Range of Applications at Beamline 9.3.1

Robert Szilagyi and Heinz Frei

Interested participants are encouraged to contact the workshop leaders directly for more detailed information about workshop agendas and speakers.

8. SXR/EUV LECTURES WEBCAST LIVE THIS FALL

(Contact: David Attwood, attwood@eecs.berkeley.edu)

"Soft X-Rays and Extreme Ultraviolet Radiation," a course taught by David Attwood at UC Berkeley, will be Webcast live over the Internet on Tuesdays and Thursdays, 2:00 - 3:30 p.m. (Pacific time), beginning on August 30, 2005. Links to the Webcasts, handouts, and homework problems can be found at <http://www.coe.berkeley.edu/AST/sxreuv> . All lectures and materials are free--just log on.

The course explores modern developments in the physics and applications of soft x rays and extreme ultraviolet radiation. Following a brief review of atomic physics and relevant absorption edges, the lectures consider electromagnetic radiation at short wavelengths, including dipole radiation, scattering, and refractive index using a semiclassical atomic model. Subject matter includes the generation of x rays with synchrotron radiation (bending-magnet, undulator, and wiggler radiation), laser-plasma sources, high-harmonic generation, x-ray/EUV lasers, and black-body radiation. Concepts of spatial and temporal coherence are described, along with applications to interferometry, scattering, and imaging. Topics in x-ray optics include total external reflection, multilayer coatings, Kirkpatrick-Baez focusing, zone-plate (diffractive) lenses, microscopes, and EUV telescopes. Applications include high-resolution (15-nm) soft x-ray microscopy and examples in the life and physical sciences, generally with elemental and chemical sensitivity. Recent progress with three-dimensional imaging of biological samples using high-resolution nanotomography will be presented, as well as studies of magnetic nanostructures and operational electronic devices. EUV lithography for future (2009) 19-GHz nanoelectronic devices with features smaller than 20 nm will also be discussed. Prerequisites: Knowledge of Maxwell's equations, undergraduate modern physics, vector calculus.

9. ALS-RELATED WEB NEWS AND LINKS

Materials scientist gets Vacuum Society award

<http://www.lbl.gov/today/2005/Jun/02-Thu/06-02-2005.html>

Gram-negative bacteria shoot their way into cells

<http://www.lightsources.org/cms/?pid=1000580>

Jim Krupnick to oversee Institutional Assurance, Project Management

<http://www.lbl.gov/today/2005/Jun/17-Fri/krupnick-jump.html>

Scripps research scientists solve structure of a critical innate immune system protein

<http://www.lightsources.org/cms/?pid=1000620>

Stand-down meeting stresses Foundry safety

<http://www.lbl.gov/today/2005/Jun/24-Fri/06-24-2005.html>

10. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs scheduled between May 18 and June 26, the beam reliability (time delivered/time scheduled) was 94.8%. Of the scheduled beam, 85.9% was delivered to completion without interruption. There were no significant interruptions.

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html> . Requests for special operations use of the "scrubbing" shift should be sent to Jan Pusina (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. The Accelerator Status Hotline at (510) 486-6766 (ext. 6766 from Lab phones) features a recorded message giving up-to-date information on the operational status of the accelerator. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

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ALSNews is a monthly electronic newsletter to keep users informed about developments at the Advanced Light Source, a national user facility located at Ernest Orlando Lawrence Berkeley National Laboratory, University of California. The current and past issues of ALSNews are available on the World Wide Web. Point your browser to the following URL:

http://www-als.lbl.gov/als/als_news/

To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

LBNL/PUB-889 (2005)

Editors: lstamura@lbl.gov, alrobinson@lbl.gov, ejmoxon@lbl.gov

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1. ACTING DIRECTOR'S UPDATE: THROUGH A DIFFICULT TRANSITION

by Janos Kirz

(Contact: Janos Kirz, JKirz@lbl.gov)

It is hard to believe that it has only been a few months since my previous report in ALSNews. There is much that has happened, and if I had any hair left, there would be a lot more gray...

Based on the budget projections we were facing in April, I decided that we had to reduce the payroll by 7%, or 15 full-time employees, to balance the budget for the upcoming fiscal year. Going through the reduction-in-force (RIF) process was the most painful activity I have been involved in as an administrator--acting or not. We were fortunate in that we had significant attrition, and we also had several members of the ALS staff who volunteered to resign in order to save the jobs of others. Nevertheless, we could not avoid having to lay off staff and to return to the Engineering Division a number of people who played an important role in bringing the ALS to its current level of excellence. Throughout, ALS management aimed to keep our mission front and center: the ALS is here to support users in doing outstanding science in a safe environment.

With the RIF behind us, there is good news to report on several fronts:

The annual shutdown involved the installation of the first in-vacuum undulator (to serve the slicing source in straight section 6), the installation of higher-order dampers in one of the rf cavities, upgrades to the optics of several beamlines, and a variety of maintenance activities. It all went well, and the storage ring came back to user operations on schedule.

Preparations for the top-off upgrade are in full swing. Installation of the hardware for full-energy injection is planned for next year's shutdown. Implementation of top-off will proceed after that in stages over the better part of a year.

The PEEM-3 beamline (11.0.1) is being commissioned, and the first insertion-device beamline for the slicing source is close to being commissioned.

We just received the report on the Department of Energy's Basic Energy Sciences (BES) review of the ALS that took place in February. Each reviewer commented enthusiastically on the quality of the science and the productivity of the facility. In his cover letter, Pedro Montano, Director of the BES Scientific User Facilities Division, stated that the ALS "is in the forefront of soft X-ray and VUV source(s) in the United States" and that "Daniel Chemla is to be praised for transforming ALS into

a world-class facility..." In his conclusion, Montano emphasized that "BES feels ALS serves as a model for how a user facility should operate." It would be hard to ask for a better report!

Yet, there were three concerns expressed in the BES report:

- 1) The general-user proposal review system is overloaded and needs to be overhauled. This is something we have been planning to do, and the new system will be announced shortly.
- 2) Our beamline staff is spread too thin. We are aware of this problem and hope to alleviate it as the budget permits.
- 3) While "recognizing the enormous contributions of Daniel Chemla," it is very important to begin a search for a full-time Division Director. In response to this concern, Berkeley Lab Director Chu went to see Daniel. Daniel agreed with the need expressed in the report. A search committee for a permanent director is being assembled.

Congressional action to date indicates that our fiscal year 2006 budget may be better than had been indicated by the President's budget proposal. Efforts by the Users' Executive Committee (UEC) and our users, as well as the users of other facilities, have been important in getting us to this point. Clearly, if we do receive a more adequate budget, we will be in a position to add beamline staff, as recommended. We will have to be careful, though, not to get into the situation where, in the following year (which is expected to be a difficult one), the budget cannot cover the payroll. If we are in a position to add staff, we will be looking for excellent candidates, especially women and members of other underrepresented groups. Please send applications and/or recommendations. I hope to have a good collection of files when the opportunity arises.

There are several important issues facing us. We need to secure funding for the Guest House and for the User Support Building and we need to implement the ALS Strategic Plan. I hope to give you a progress report on each of these at the time of the Users' Meeting, October 20 - 22. UEC representatives Simon Morton and Jinghua Guo have put together an exciting program, including 10 workshops. Please plan to attend!

2. ENOL INTERMEDIATES UNEXPECTEDLY FOUND IN FLAMES (Contact: Craig Taatjes, cataatj@sandia.gov; Terrill Cool, tac13@cornell.edu)

For those studying flame chemistry and the properties of combustion intermediates by means of molecular beam mass spectrometry, the addition of tunable vacuum ultraviolet (VUV) from a synchrotron to photoionize the beam for mass spectrometry makes for a powerful technique capable of differentiating between isomers with the same molecular weight and composition. With the help of a unique experimental apparatus, an international team of American, Chinese, and German researchers has exploited this selectivity to identify chemical compounds known as enols as apparently ubiquitous intermediates in flames burning a variety of fuels. This surprising observation will require combustion modelers to revise their models to account for the presence of these compounds.

Read the full story at
http://www-als.lbl.gov/als/science/sci_archive/104flame.html

Publication about this research: C.A. Taatjes, N. Hansen, A. McIlroy, J.A. Miller, J.P. Senosiain, S.J. Klippenstein, F. Qi, L. Sheng, Y. Zhang, T.A. Cool, J. Wang, P.R. Westmoreland, M.E. Law, T. Kasper, and K. Kohse-Hoinghaus, "Enols are common intermediates in hydrocarbon oxidation," *Science* 308, 1887 (2005).

3. FADLEY WINS HIGHLY PRESTIGIOUS WELCH AWARD

Longtime ALS user Charles S. Fadley has been awarded the highest honor bestowed by the American Vacuum Society (AVS), the Medard W. Welch Award. The citation reads: "For the development of novel techniques based on photoelectron spectroscopy and synchrotron radiation, and their application to the study of the atomic, electronic, and magnetic structure of surfaces and buried interfaces." The award confers \$10,000, a gold medal, a certificate, and an honorary lectureship at a regular session of the society's International Symposium. The award was established in 1969 in honor of M.W. Welch, founder of the AVS, to recognize and encourage outstanding research in the fields of interest to the society.

Fadley received his Ph.D. in Chemical Physics from UC Berkeley in 1979 under the guidance of former Berkeley Lab Director David A. Shirley. He is currently a Distinguished Professor of Physics at UC Davis and a Senior Faculty Scientist in Berkeley Lab's Materials Sciences Division, holding one of three joint UC - Berkeley Lab ALS Professorship appointments. Recent projects undertaken by his research group include the use of standing x-ray waves to probe the properties of buried interfaces [Synchrotron Radiation News 17, 24 (2004)], the analysis of photoelectron diffraction patterns as holograms for depicting atomic or magnetic structure [J. Phys. Cond. Mat. 13, 10517 (2001)], and the spectroscopy of strongly correlated spintronic materials (http://www-als.lbl.gov/als/science/sci_archive/95spintronics.html). Fadley is the author or co-author of over 250 journal articles and over 30 review articles of book chapters, has served on numerous national and international scientific committees, and has mentored scores of students and young scientists over the course of his career. Congratulations to Chuck; the ALS is proud to count him among its many distinguished users!

4. ALS USERS' MEETING: CALL FOR ABSTRACTS AND NOMINATIONS (Contact: alsum@lbl.gov)

ABSTRACTS. All ALS users, including students and postdocs, are invited to submit abstracts describing research they've done at the ALS over the past year. From these abstracts, the Users' Meeting program committee will select oral presentations for the science highlights sessions; other submissions will be presented as posters. A special student poster competition will be held in conjunction with a reception for exhibitors on Thursday, October 20. To be considered for an oral presentation and/or the student poster competition, you must submit an abstract by Monday, August 15.

AWARDS. Each year, the ALS UEC presents awards to scientists and staff who have made significant contributions to the ALS scientific and user support programs. Nominations may be for an individual or a group, and a brief rationale for each nomination is required. The nominations can be submitted online via the Users' Meeting Web site (see below), and are requested by Friday, September 30.

If you haven't done so already, check out the 2005 ALS Users' Meeting Web site at <http://www-als.lbl.gov/als/usermtg> for the latest program and registration information as well as important upcoming deadlines. In addition, a 2005 UEC Election Web site has been set up at <http://www-als.lbl.gov/als/uec/vote/index.html> to provide information about the UEC election process and schedule. Voting will take place online via this site later this year.

5. SCIENTIFIC ADVISORY COMMITTEE CONVENES AT ALS (Contact: Neville Smith, NVSmith@lbl.gov)

Members of the ALS Scientific Advisory Committee (SAC) met at Berkeley Lab on Monday, July 11, to discuss a wide array of issues concerning the ALS. The committee has been consistent in providing ALS and Berkeley Lab management with sage advice on a range of critical issues, from the allocation of beamlines and approved programs to strategic planning, and from organizational and budgetary issues to broad policy matters. Berkeley Lab Director Steven Chu and Deputy Director Graham Fleming were on hand to welcome the attendees. Acting ALS Director Janos Kirz then brought the committee up to date on recent developments, reporting on, among other things, the BES review of the ALS that took place in February and on progress being made toward the transition to top-off operation. Ben Feinberg gave a short talk about the budget outlook and Gary Krebs briefed the members on plans for a Berkeley Lab Guest House.

Zahid Hussain provided a brief report on a recent nanoscience workshop in Washington, and this served as an introduction to a report by Chris Jacobsen (Stony Brook University) on the workshop that he and Steve Kevan (University of Oregon) had organized to specify a new beamline dedicated to coherent diffraction imaging and scattering. Following the lunch and tour, Stephen Cramer (Physical Biosciences Division) described his approved program in biological spectroscopy, and SAC member Yves Idzerda then led a general discussion of other approved-program matters. Gary Krebs took the floor once more to discuss upcoming changes to the general-user proposal review process, and Neville Smith wrapped up the open-session agenda with a short talk about SAC terms and responsibilities. Current members of the advisory committee are listed online at <http://www-als.lbl.gov/als/ourorg/sac.html>.

6. ALS-RELATED WEB NEWS AND LINKS

A Sharper Focus for Soft X-Rays
Zone Plate Lenses Capable of Better than 15-Nanometer Resolution
<http://www.lbl.gov/Science-Articles/Archive/ALS-soft-x-rays.html>

Tight Budgets Force Lab Layoffs
<http://www.sciencemag.org/cgi/content/full/309/5733/366a>

U.S. Gets More Asian Air Pollution Than Thought
http://www.news.ucdavis.edu/search/news_detail.lasso?id=7415

Amazing Light: Visions for Discovery
An International Symposium in Honor of the 90th Birthday Year of Charles H. Townes
<http://www.foundationalquestions.net/townes>

7. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

The beam reliability and completion statistics for the user runs scheduled between June 28 and July 25 were unavailable as of the publication deadline, but will be posted online as soon as they become available. Please check the ALSNews Web page at http://www-als.lbl.gov/als/als_news/news_archive/vol.255_072705.html for the latest information.

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html> . Requests for special operations use of the "scrubbing" shift should be sent to Jan Pusina (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. The Accelerator Status Hotline at (510) 486-6766 (ext. 6766 from Lab phones) features a recorded message giving up-to-date information on the operational status of the accelerator. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

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http://www-als.lbl.gov/als/als_news/

To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

LBNL/PUB-889 (2005)

Editors: lstamura@lbl.gov, alrobinson@lbl.gov, ejmoxon@lbl.gov

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1. DANIEL CHEMLA STEPS DOWN AS ALS DIRECTOR

Daniel Chemla, who in his 15 years of senior management at Berkeley Lab transformed the ALS into a major international research center, will step down from his division director position. In a memo to ALS staff, Berkeley Lab Director Steve Chu cited Daniel's "visionary" and innovative work in materials sciences, nanoscience, and synchrotron source science. "I am in awe of his record and grateful for his legacy," Chu stated. Daniel came to Berkeley from Bell Labs in 1990 to head the Materials Sciences Division. In 1998, he also took on the role of ALS division director and continued to serve as director of the two large divisions for four years. In this dual role, he was instrumental in bringing the Molecular Foundry to Berkeley Lab as part of the Department of Energy's Nanosciences Initiative. As ALS director, Daniel oversaw the groundbreaking installation of superbends in the storage ring and the realization of a five-year strategic plan for building out the straight sections with a full complement of insertion-device beamlines. The six years of Daniel's tenure saw a tripling in both the number of beamlines and the number of users at the ALS. Plans are currently underway for a celebration in honor of Daniel to be held later this year. Acting ALS Division Director Janos Kirz will continue to head the facility until a nationwide search, led by Associate Laboratory Director for Physical Sciences Paul Alivisatos, concludes. Read Director Chu's memo at <http://www.lbl.gov/today/2005/Aug/23-Tue/chemla-jump.pdf>.

2. PHOTOEXCITATION OF A VOLUME PLASMON IN BUCKYBALLS

(Contact: Ronald Phaneuf, phaneuf@unr.edu)

For molecules made from a single element, buckyballs (carbon-60) are very large. They mark the transition from atoms to solids. In atoms and small molecules, the behavior of electrons is accounted individually; in bulk materials, a sea of innumerable electrons behaves en masse, yielding a very different description of electronic structure. Buckyballs perch on the cusp between these states, as evidenced by the discovery in the early 1990s that, when subject to excitation energy of about 22 eV, the four valence electrons belonging to each of the 60 carbon atoms in a buckyball, 240 in all, act collectively, resulting in a "surface plasmon." This collective motion is a back-and-forth oscillation of the whole cloud of valence electrons, relative to the effectively rigid cage of carbon cores. Now, the latest results from a U.S. - German collaboration on the electronic structure

of photoexcited buckyball ions show an additional resonance near 40 eV, characterized as a volume plasmon made possible by the special fullerene geometry.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/103plasmon.html

Publication about this research: S.W.J. Scully, E.D. Emmons, M.F. Gharaibeh, R.A. Phaneuf, A.L.D. Kilcoyne, A.S. Schlachter, S. Schippers, A. Mueller, H.S. Chakraborty, M.E. Madjet, and J.M. Rost, "Photoexcitation of a Volume Plasmon in C60 Ions," Phys. Rev. Lett. 94, 065503 (2005).

3. NEW ZONE PLATE FOR SOFT X-RAY MICROSCOPY AT 15-NM SPATIAL RESOLUTION

(Contact: Weilun Chao, WLChao@lbl.gov)

Analytical tools that combine spatial resolution with elemental and chemical identification at the nanometer scale along with large penetration depth are indispensable for the life and physical sciences. The XM-1 soft x-ray microscope at the ALS produces images that not only reveal structures but can identify their chemical elements and measure magnetic and other properties as well. Now a new method for creating optical devices with nanoscale accuracy has allowed researchers in Berkeley Lab's Center for X-Ray Optics, which built and operates the XM-1, to achieve an extraordinary resolution of better than 15 nm, with the promise of even higher resolution in the near future.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/105zone_plate.html

Publication about this research: W. Chao, B.D. Harteneck, J.A. Liddle, E.H. Anderson, and D.T. Attwood, "Soft x-ray microscopy at a resolution better than 15 nm," Nature 435, 1210 (2005).

4. WEILUN CHAO RECEIVES WERNER MEYER-ILSE MEMORIAL AWARD

Weilun Chao of Berkeley Lab's Center for X-Ray Optics (CXRO) has been honored with the Werner Meyer-Ilse Memorial Award for Excellence in X-Ray Microscopy. The award was announced at the 2005 International X-Ray Microscopy meeting, held last month in Himeji, Japan. An international selection committee confers the award during the triennial meeting to a young scientist whose work over the preceding three years represents an outstanding contribution to the development of x-ray microscopy through either technical advances or applications. The award was established in honor of Werner Meyer-Ilse, who built and led the x-ray microscopy program at Beamline 6.1.2 and served as chair of the ALS Users' Executive Committee in 1998.

Weilun Chao received his B.S. degree in physics and B.Eng. degree in electrical engineering from Stony Brook University in 1999. He then entered the graduate program of UC Berkeley's Department of Electrical Engineering and Computer Sciences and joined David Attwood's group at CXRO the same year, working toward the quantification and enhancement of the optical performance of soft x-ray zone-plate microscopy. Recently, he and his colleagues developed a new zone-plate nanofabrication technique, enabling the achievement of sub-15-nm spatial resolution at the XM-1 microscope at Beamline 6.1.2, a significant breakthrough that was published in Nature (see Item 3 above). Weilun obtained his Ph.D. degree earlier this year and plans to remain in CXRO to extend the new fabrication technique to even higher-resolution optics and other zone-plate designs.

5. SECRETARY OF ENERGY SAMUEL BODMAN VISITS ALS

U.S. Department of Energy (DOE) Secretary Samuel Bodman visited Berkeley Lab on August 4 as part of a regional tour of Bay Area Labs. The visit included a stop at the ALS, where Acting ALS Division Director Janos Kirz described the facility's general organization. As the tour group walked over the top of the storage ring, the Secretary noted the magnet yoke left over from Lawrence's cyclotron, and Ray Orbach (Director, DOE Office of Science) pointed out the beamlines emanating from the bending magnets and undulators. The Secretary also visited the new PEEM-3 beamline (11.0.1), viewed displays about correlated-electron studies using angle-resolved photoelectron spectroscopy, and listened to a description of the femtosecond slicing project. He was also interested in hearing about the planned top-off upgrade that will lead to higher brightness and an effectively constant beam current. Physical Biosciences Division members Carolyn Larabell and Paul Adams talked about projects involving tomography and macromolecular crystallography, respectively.

Accompanying Bodman and Orbach were Aundra Richards (Manager, DOE Berkeley Site Office), M.R.C. Greenwood (UC Provost and Senior Vice President for Academic Affairs), Robert Foley (UC Vice President for Laboratory Management), Berkeley Lab Director Steve Chu and Deputy Director Graham Fleming, and a small host of others. In addition to touring the ALS, Secretary Bodman visited the Molecular Foundry construction site and the National Center for Electron Microscopy and heard presentations on the Supernova Acceleration Probe and computer visualization. During his comments at an all-hands meeting that preceded the tour, the Secretary emphasized his personal commitment to safety and the need to pay continuing attention to this aspect of all operations.

Read more about it at

<http://www.lbl.gov/Publications/Currents/Archive/Aug-19-2005.html>

6. GOVERNOR SCHWARZENEGGER HOLDS PRESS CONFERENCE AT ALS

California Governor Arnold Schwarzenegger made his first official visit to Berkeley Lab on August 19, taking a brief tour of the ALS before holding a press conference outdoors with the ALS dome as a backdrop. The Governor was accompanied by Lab Director Steve Chu, UC President Robert Dynes, and UC Berkeley Chancellor Robert Birgeneau, all of whom also gave brief remarks at the press conference, which emphasized the importance of scientific research to the California economy. The Governor's hour-long visit included discussions with UC and Lab officials in the ALS conference room and a walking tour over the storage ring. Paul Adams (Physical Biosciences Division) was on hand to brief the Governor at the protein crystallography beamlines and showed how solving protein structures is of great importance to the development of new drugs. Paul Alivisatos (Associate Laboratory Director for Physical Sciences) talked about the wonders of nanotechnology and gave a demonstration of multihued fluorescence from quantum dots suspended in fluid. In his remarks at the press conference, Schwarzenegger praised the work done at the ALS and throughout Berkeley Lab as "absolutely incredible" and urged the DOE to renew the UC contracts, currently up for bid, for Lawrence Livermore and Los Alamos National Laboratories.

Read more about it at

<http://www.lbl.gov/today/2005/Aug/22-Mon/gov-visit.html>

http://www.berkeley.edu/news/media/releases/2005/08/19_als.shtml

7. 2005 ALS USERS' MEETING UPDATE

(Contact: alsum@lbl.gov)

General information, meeting deadlines, and online registration for this year's ALS Users' Meeting, to be held at Berkeley Lab October 20 - 22, is available on the meeting Web site at <http://www-als.lbl.gov/als/usermtg/>. The early registration deadline is Saturday, October 1. Information about accommodations for meeting participants in local hotels is available on the Web at <http://www-als.lbl.gov/als/usermtg/lodging.html>. The deadline for abstract submissions for poster presentations, including submissions for the student poster competition, is Friday, September 30. Instructions for submitting abstracts can be found online at <http://www-als.lbl.gov/als/usermtg/abstracts.html>. This year, eleven workshops will follow the end of the formal meeting program on Friday and Saturday, October 21 - 22. Workshop topics are listed below, with links to further information, if available.

Forefront AMO Science: Clusters, Ions, Dressed States...

<http://www-als.lbl.gov/als/usermtg/amo.html>

Frontiers of Synchrotron-Based X-Ray Microdiffraction

<http://www-als.lbl.gov/als/usermtg/microdiffraction.html>

Macromolecular Crystallography I: Advanced Experimental Techniques for Getting the Best Data from Difficult Samples

Macromolecular Crystallography II: New Strategies for Data Processing with Automated Software Tools

http://www-als.lbl.gov/als/usermtg/crystall_2.html

New Visions in Bandmapping

http://www-bl7.lbl.gov/ALSUM_Workshop/

Novel Approaches to Soft X-Ray Spectroscopy: Scanning Transmission X-Ray Microscopy and Ambient-Pressure X-Ray Photoelectron Spectroscopy

<http://www-als.lbl.gov/als/usermtg/softxray.html>

Soft and Hard X-Ray Tomography at the ALS

<http://www-als.lbl.gov/als/usermtg/tomography.html>

Soft X-Ray Photon-In and Photon-Out Spectroscopy: New Frontiers

http://www-als.lbl.gov/als/usermtg/photon_in.html

THz Science and Technology Network: Opportunities and Organization

http://www-als.lbl.gov/als/usermtg/thz_network.htm

Ultrafast X-Ray Science at the ALS

<http://www-als.lbl.gov/als/usermtg/ultrafast.html>

XANES and EXAFS Spectroscopy of Materials and Biological Samples: Expanding the Range of Applications at Beamline 9.3.1

8. WORKSHOP: SOFT X-RAY SCATTERING FROM NANOSTRUCTURED MATTER (Contact: Jeff Kortright, JBKortright@lbl.gov)

A workshop on soft x-ray scattering from hard and soft nanostructured matter, co-sponsored by the Molecular Foundry and the ALS, is being held on Friday, September 30, at Berkeley Lab. Resonant soft x-ray scattering has emerged as a powerful tool for studying nanometer-scale structure and functionality in a broad range of magnetic and other hard condensed-matter systems and is emerging with unique capabilities to study compositional heterogeneity in soft matter. These capabilities result primarily from the sharp core resonances of many elements in the 250- to 2500-eV range, whose high sensitivity to bonding and spin-resolved electronic structure means that heterogeneity in these properties yields strong contrast in scattering measurements with spatial resolution down to half a wavelength. Such sensitivity to chemical and functional structural organization will be valuable to research projects at the Molecular Foundry as well as to the broader scientific community, and yet instrumentation to fully exploit these capabilities is lacking. This workshop will develop the scientific case for a dedicated undulator-based soft x-ray scattering facility at the ALS to study structural organization in a broad range of nanostructured matter.

Topics to be discussed include

- Opportunities in hard condensed matter
- Early results and opportunities in soft condensed matter
- Coordination with Molecular Foundry needs
- Optimized instrumentation and sample environments
- Complementary microscopy and coherent scattering approaches

Preliminary speakers include

- Sunil Sinha (UC San Diego and Los Alamos National Laboratory)
- Eric Fullerton (Hitachi Global Storage Technologies)
- Gary Mitchell (Dow Chemical Company)
- Nitash Balsara (UC Berkeley and Berkeley Lab)

For more information, contact one of the workshop's co-organizers:

- Harald Ade (Harald_Ade@NCSU.edu)
- Jeff Bokor (JBokor@eecs.berkeley.edu)
- Jeff Kortright (JBKortright@lbl.gov)

9. ALS-RELATED WEB NEWS AND LINKS

A first peek inside the Foundry

<http://www.lbl.gov/Publications/Currents/Archive/Jul-22-2005.html#story3>

AFRD division director to head physics school

<http://www.lbl.gov/today/2005/Jul/28-Thu/07-28-2005.html>

It came from outer space: Learning what the solar system is made of

<http://www.lbl.gov/Science-Articles/Archive/sabl/2005/August/03-it-came.html>

New discovery blurs distinction between human cells and those of bacteria

<http://www.lightsources.org/cms/?pid=1000751>

Researchers develop technique to use dirty silicon, could pave way for cheaper solar energy

http://www.berkeley.edu/news/media/releases/2005/08/15_solar.shtml

Engineering is key to silence at new nanotechnology lab
http://enr.ecnext.com/free-scripts/comsite2.pl?page=enr_document&article=nebuar050815b

Regent Blum gets look at Berkeley Lab science
<http://www.lbl.gov/today/2005/Aug/29-Mon/08-29-2005.html>

10. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs scheduled between July 27 and August 29 (including two-bunch operation August 10 - 21), the beam reliability (time delivered/time scheduled) was 95.6%. Of the scheduled beam, 91.2% was delivered to completion without interruption. A storage-ring vacuum problem resulted in the loss of approximately 13 hours of scheduled user time.

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html> . Requests for special operations use of the "scrubbing" shift should be sent to Jan Pusina (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. The Accelerator Status Hotline at (510) 486-6766 (ext. 6766 from Lab phones) features a recorded message giving up-to-date information on the operational status of the accelerator. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

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ALSNews is a monthly electronic newsletter to keep users informed about developments at the Advanced Light Source, a national user facility located at Ernest Orlando Lawrence Berkeley National Laboratory, University of California. The current and past issues of ALSNews are available on the World Wide Web. Point your browser to the following URL:

http://www-als.lbl.gov/als/als_news/

To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

LBNL/PUB-889 (2005)

Editors: Istamura@lbl.gov, alrobinson@lbl.gov, ejmoxon@lbl.gov

This work was supported by the Director, Office of Science, Office of Basic Energy Sciences, of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.

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Current issue online at http://www-als.lbl.gov/als/als_news/

1. GENERAL-USER PROPOSAL EVALUATION PROCESS TO BE OVERHAULED (Contact: Neville Smith, NVSmith@lbl.gov)

With more than a hundred new general-user proposals every six months, our present proposal evaluation mechanism is overwhelmed and in need of overhaul. Our present system requires all members of our nine-member Proposal Study Panel (PSP) to read and score all proposals, a heavy workload for panel members. This has been somewhat alleviated by assigning one or more "primary" reviewers to each proposal. Even so, the workload is severe. We propose to alleviate the workload further by augmenting the PSP evaluations with external reviews done entirely through the Web. The idea would be to establish pools of reviewers focused on either a beamline, a set of beamlines, a technique, a scientific discipline, or some other common thread. Each cycle, batches of proposals would be sent to a small number of members of each pool for evaluation and scoring. The PSP would be reconstituted as a "reconciliation" committee that would do the apples-and-oranges comparisons and deliver for each beamline a rank ordering of new and still-active proposals. A pilot experiment of the batch-review approach was performed recently on two beamlines and generated encouraging results.

We seek input from the user community to optimize this proposal review process. It should be fair, but it should not impose an unnecessarily large burden on our reviewers or our administrative staff. We are particularly receptive to accounts of best practices at other facilities. Please contact Neville Smith (NVSmith@lbl.gov, 510-486-5423) with your comments and suggestions.

2. DIRECT IMAGING OF ASYMMETRIC MAGNETIZATION REVERSAL (Contact: Kannan M. Krishnan, kannanmk@u.washington.edu)

The phenomenon of exchange bias has transformed how data is read on magnetic hard disks and created an explosion in the information storage density of magnetic hard disks. However, it remains poorly understood, and even the fundamental mechanism of magnetic reversal for exchange-biased systems in changing magnetic fields is unclear. By using x-ray photoemission electron microscopy at the ALS to directly image the magnetic structure of an exchange-biased film, a team from the

University of Washington and the Stanford Synchrotron Radiation Laboratory has identified separate magnetic-reversal mechanisms in the two branches of a hysteresis loop. This advance in fundamental understanding will provide new insights for developing the next generation of information storage and sensing devices where exchange bias is expected to play a critical role.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/107exchange_bias.html

Publication about this research: P. Blomqvist, K.M. Krishnan, and H. Ohldag, "Direct imaging of asymmetric magnetization reversal in exchange-biased Fe/MnPd bilayers by x-ray photoemission electron microscopy," *Phys. Rev. Lett.* 94, 107203 (2005).

3. TIME-RESOLVED STUDY OF BONDING IN LIQUID CARBON

(Contact: Steve Johnson, steve.johnson@psi.ch)

We are accustomed to observing carbon in its elemental form as a solid, ranging from the soft "lead" in pencils to the precious gemstone in diamond rings. While considerable attention has been focused on solid forms of carbon, the properties of liquid carbon are much more difficult to measure accurately. The very strong bonding between carbon atoms that gives diamonds their hardness also makes carbon very difficult to melt, requiring temperatures above 5000 K at pressures above 100 bar. Maintaining such conditions in a laboratory is a challenge that has hampered efforts to fully understand the chemical bonding properties of this biologically, industrially, and environmentally important element. At the ALS, researchers have found a way to rapidly heat a carbon sample and contain the resulting liquid long enough to perform picosecond time-resolved x-ray absorption spectroscopy. The technique provides a way to measure the bonding properties of liquid carbon at near-solid densities that can then be compared with results from molecular dynamics simulations.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/108carbon.html

Publication about this research: S.L. Johnson, P.A. Heimann, A.G. MacPhee, A.M. Lindenberg, O.R. Monteiro, Z. Chang, R.W. Lee, and R.W. Falcone, "Bonding in liquid carbon studied by time-resolved x-ray absorption spectroscopy," *Phys. Rev. Lett.* 94, 057407 (2005).

4. FEMTOSECOND NEXAFS OF PHOTOINDUCED INSULATOR-METAL TRANSITION IN VO₂

(Contact: Andrea Cavalleri, a.cavalleri1@physics.ox.ac.uk)

The grand goal motivating femtosecond studies of condensed-matter dynamics is to directly measure the structural pathways that connect different crystallographic, electronic, and magnetic phases of solids, as well as the short-lived transition states between reactants and products in chemical and biochemical reactions. Researchers from Berkeley Lab and the Universite du Quebec have taken a big step forward by adding femtosecond x-ray spectroscopy to the experimental toolkit with their first use of the laser-slicing technique to study the photoinduced metal-insulator phase transition in vanadium dioxide (VO₂).

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/110ultrafast.html

Publications about this research: A. Cavalleri, H.H.W. Chong, S. Fourmaux, T.E. Glover, P.A. Heimann, J.C. Kieffer, B.S. Mun, H.A. Padmore, and R.W. Schoenlein, "Picosecond soft x-ray

absorption measurement of the photoinduced insulator-to-metal transition in VO₂," Phys. Rev. B 69, 153106 (2004). A. Cavalleri, M. Rini, H.H.W. Chong, S. Fourmaux, T.E. Glover, P.A. Heimann, J.C. Kieffer, and R.W. Schoenlein, "Band-selective measurement of electronic dynamics in VO₂ using femtosecond near edge x-ray absorption," Phys. Rev. Lett. 95, 067405 (2005).

5. UEC CORNER: NOTES FROM THE USERS' EXECUTIVE COMMITTEE (Contact: Greg Denbeaux, GDenbeaux@uamail.albany.edu)

Please join us for our annual ALS Users' Meeting, scheduled for October 20 - 22. The meeting co-chairs Jinghua Guo and Simon Morton have put together an exciting program (see Item 5 below for a quick overview). For the latest detailed information, go to the Users' Meeting Web site at <http://www.als.lbl.gov/als/usermtg/index.html> .

Nominations are due on Friday, September 30, for the David A. Shirley, Klaus Halbach, and Tim Renner awards, which will be presented at the Users' Meeting, so please send your nominations in. More information about the awards and the nomination process can be found online at <http://www-als.lbl.gov/als/usermtg/nominations.html> .

Also, it is time for the annual election of new members to the Users' Executive Committee. Please take a moment to look at the UEC Election Web site at <http://www.als.lbl.gov/als/uec/vote/nominations.html> and nominate suitable candidates who would be willing to serve.

As usual, if you have any questions, comments or issues, please contact me or any other UEC representative. We are here to help.

6. 2005 ALS USERS' MEETING UPDATE: REGISTER NOW AND SAVE! (Contact: alsum@lbl.gov)

REGISTRATION: Saturday, October 1, is the last day to take advantage of the discounted early-registration fees of \$150.00 (regular) and \$60.00 (student). After that date, fees rise to \$175.00 and \$75.00, respectively. Registering early also gives Berkeley Lab's Conference Services time to process all the paperwork necessary for visitor security passes at the entrance to the Lab and prevents long lines at the on-site registration desk. Register now at <http://www-als.lbl.gov/als/usermtg/registration.html> .

ABSTRACT SUBMISSION: Abstracts for both the regular poster session and the student poster competition are due by October 1. The poster session will be held from 4:30 p.m. to 7:00 p.m. on Thursday, October 20, in conjunction with a reception for exhibitors.

USERS' MEETING AWARDS: The deadline for submission of nominations for awards recognizing outstanding user service, scientific research, and innovative instrumentation at the ALS is September 30. The UEC invites ALS users and staff to submit nominations for any or all of the awards:

- David A. Shirley Award for Outstanding Scientific Achievement at the Advanced Light Source
- Klaus Halbach Award for Innovative Instrumentation at the Advanced Light Source
- Tim Renner User Services Award

The nominations may be for an individual or a group, and a brief rationale for the nomination(s) is required. Past award winners, along with a representative from the UEC and the ALS, will serve on the award selection committee. To submit a nomination, go to the Award Nominations Web page at <http://www-als.lbl.gov/als/usermtg/nominations.html> .

PUBLIC SCIENCE LECTURE: In honor of the World Year of Physics, the Users' Meeting Program Committee is delighted to announce that Dr. Joachim (Jo) Stohr (Professor and Director, Stanford Synchrotron Radiation Laboratory) will present a public lecture titled, "The Magic of Magnetism: From Physical Attraction to Spin Doctors," on Thursday evening, October 20. All meeting participants, users, and staff are invited to attend. Information about Dr. Stohr and his current research interests is available at <http://www-ssrl.slac.stanford.edu/stohr/> . The location of the talk will be announced shortly.

Agenda and workshop updates and accommodation and general meeting information are all available on the 2005 ALS Users' Meeting Web site at <http://www-als.lbl.gov/als/usermtg/> .

7. ALS DOCTORAL FELLOWSHIP WINNERS ANNOUNCED (Contact: Zahid Hussain, ZHussain@lbl.gov)

The ALS is extremely pleased to announce this year's winners of ALS Doctoral Fellowships: Yulin Chen (Stanford University), Ileana Dumitriu (Western Michigan University), Amanda Hudson (University of Las Vegas, Nevada), Timothy Learmonth (Boston University), Zhiqiang Li (University of California, San Diego), Zhihui Pan (Boston College), John Paul Strachan (Stanford University), and Michelle Weinberger (University of California, Los Angeles). These exceptional Ph.D. students have been selected to perform a major part of their thesis work at the ALS during a one-year appointment covering the 2005 - 2006 academic year. For Chen, Learmonth, Strachan, and Weinberger, this will be a continuation of their fellowship grants from last year. Congratulations to all eight! The selection committee consisted of SAC Chair Samuel Bader (Argonne National Laboratory), UEC Chair Gregory Denbeaux (University at Albany, SUNY), Erwin Poliakoff (Louisiana State University), Zahid Hussain (ALS), and Neville Smith (ALS). Detailed information about the fellowships can be found at <http://www-als.lbl.gov/als/fellowships/index.html> .

8. HELP WANTED: RAISING THE PROFILE OF SYNCHROTRON SCIENCE (Contact: Art Robinson, ALRobinson@lbl.gov)

Support for the ALS and other synchrotron light sources is closely linked with successful communication of the innovative and important science carried out by you and your colleagues at light sources. News articles based on press releases from user institutions are a highly effective way of communicating with the broadest possible audience. We encourage you to talk about your research with the public affairs office at your home institution, and whenever your home institution prepares a press release based on research that you conducted at the ALS, we hope you will do your best to insure that synchrotron radiation research in general, the ALS, Lawrence Berkeley National Laboratory, and the Department of Energy are mentioned. Since the ALS relies on you to inform us whenever you have exciting news and research results about to be published, we also ask you to notify Art Robinson (ALRobinson@lbl.gov, 510-486-6838) at the ALS when you become aware of an impending press release based on your research. It will help us in promoting your achievements as well as ours. We look forward to working with users and their home institutions to promote user research to a broader audience.

9. TRANSITION TO TOP-OFF MODE SET TO BEGIN IN FALL 2006

(Contact: David Robin, DSRobin@lbl.gov)

There is no plan for an extended shutdown of the ALS during the spring of 2006. Rather, the ALS is planning for an extended shutdown (in the neighborhood of six to eight weeks) in the fall of 2006 to upgrade the ALS injector for full-energy operation in preparation for top-off operation. The exact date and duration of the shutdown will be determined next spring. During this shutdown, we will be upgrading the radio frequency systems, the magnet power supplies, the radiation protection system, and other systems necessary for top-off operation. We plan to operate the ALS with full-energy injection immediately after the installation shutdown and slowly migrate to full top-off operation during the following six months. Upgrading the ALS injection system to enable full-energy injection and top-off operation is the highest-priority machine upgrade currently planned. It will result in significant improvements in brightness and stability and keep the ALS competitive with newer light sources for the next decade.

10. SXR/EUV TEXTBOOK NOW AVAILABLE IN PAPERBACK

(Contact: David Attwood, attwood@eecs.berkeley.edu)

An affordable (\$17) paperback version of "Soft X-Rays and Extreme Ultraviolet Radiation: Principles and Applications" by David Attwood is now available for a limited time through the UC Berkeley online book store. The book is being offered as a "reader" in conjunction with the author's course of the same name, being Webcast this Fall (co-listed at UC Berkeley as AST 210 and EECS 213). The course runs from August 30 through December 8. More information about the author, book, and course can be found on the course Web site at <http://www.coe.berkeley.edu/AST/sxreuv>.

11. ALS-RELATED WEB NEWS AND LINKS

Ultrafast X-Ray Program Created; McCurdy Leads

<http://www.lbl.gov/today/2005/Aug/31-Wed/08-31-2005.html>

Lab Physicist Gets Hired by Florida A&M

<http://www.lbl.gov/today/2005/Aug/31-Wed/08-31-2005.html>

Berkeley Lab to Host Scientists Impacted by Hurricane Katrina

<http://www.lbl.gov/publicinfo/releases/press-release-09-07-05.html>

DOE's Office of Science Sets up Program to Aid Scientists Displaced by Hurricane Katrina

http://www.energy.gov/engine/content.do?PUBLIC_ID=18734&BT_CODE=PR_PRESSRELEASES&TT_CODE=PRESSRELEASE

Learning How SARS Spikes Its Quarry

<http://www.lightsources.org/cms/?pid=1000828>

Slicing X-Rays by the Millionths of a Billionth of a Second

<http://www.lbl.gov/Science-Articles/Archive/sabl/2005/September/02-femtosecond-spectroscopy.html>

12. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs scheduled between August 30 and September 25, the beam reliability (time delivered/time scheduled) was 95.7%. Of the scheduled beam, 88.9% was delivered to completion without interruption. There were no significant interruptions.

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html> . Requests for special operations use of the "scrubbing" shift should be sent to Jan Pusina (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. The Accelerator Status Hotline at (510) 486-6766 (ext. 6766 from Lab phones) features a recorded message giving up-to-date information on the operational status of the accelerator. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

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To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

LBNL/PUB-889 (2005)

Editors: lstamura@lbl.gov, alrobinson@lbl.gov, ejmoxon@lbl.gov

This work was supported by the Director, Office of Science, Office of Basic Energy Sciences, of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.

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Current issue online at http://www-als.lbl.gov/als/als_news/

1. ANOTHER USERS' MEETING, ANOTHER RECORD ATTENDANCE

by Art Robinson

Thanks to a surge in eleventh-hour registrations, an overflow crowd of more than 400 users, staff, and vendors materialized to enjoy a successful ALS Users' Meeting, with a program chock full of science highlights and a dozen workshops, all spread over three days from October 21 - 22.

Berkeley Lab Director Stephen Chu started off the proceedings with encouraging words about the planned onsite user lodging facility and promised his support for keeping the ALS a top user facility in all categories, from accessibility to scientific output. Acting ALS Director Janos Kirz began his report on the state of the ALS by pointedly reiterating the ALS mission: to support users in doing outstanding science in a SAFE ENVIRONMENT. He then reviewed progress on the accelerator, beamline, and science fronts, highlighting an outstanding report card from the 2005 Basic Energy Sciences (BES) review of the ALS.

Michael Lubell (City College of New York and American Physical Society) reviewed the outlook for the federal science budget, including both positive and negative factors; the bottom line to users: get politically active. In her annual "View from Washington" report, Department of Energy (DOE) Associate Director of Science for BES Pat Dehmer summarized her efforts to convince federal budget makers that, if light sources are to remain competitive, they cannot continue to operate on flat funding. At the end of her talk, she presented retiring ALS Director Daniel Chemla with a DOE Distinguished Associates Award, and the audience saluted him with a standing ovation.

Read the full story at

http://www-als.lbl.gov/als/als_news/news_archive/vol.258_102605.html#1

2. DISORDER-INDUCED MICROSCOPIC MAGNETIC MEMORY

(Contact: Michael S. Pierce, hatter@u.washington.edu)

The magnetic-recording industry deliberately introduces carefully controlled disorder into its materials to obtain the desired magnetic properties. But as the density of magnetic disks climbs, the size of the magnetic domains responsible for storage must decrease, posing new challenges. Beautiful theories based on random microscopic disorder have been developed over the past ten years. To directly compare these theories with precise experiments, an American - European team, led by researchers from the University of Washington, Seattle, first developed and then applied coherent x-ray speckle metrology to microscopic magnetic domains in a series of thin multilayer perpendicular magnetic materials of varying disorder. Their results, at odds with all previous theories, have set a new reference point for future theories.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/109magmemory.html

Publication about this research: M.S. Pierce, C.R. Buechler, L.B. Sorensen, J.J. Turner, S.D. Kevan, E.A. Jagla, J.M. Deutsch, T. Mai, O. Narayan, J.E. Davies, K. Liu, J. Hunter Dunn, K.M. Chesnel, J.B. Kortright, O. Hellwig, and E.E. Fullerton, "Disorder-induced microscopic magnetic memory," *Phys. Rev. Lett.* 94, 017202 (2005).

3. CRYSTAL STRUCTURE OF A PROTEIN KINASE A COMPLEX

(Contact: Susan Taylor, staylor@ucsd.edu)

Protein kinase A (PKA) is an enzyme that regulates processes as diverse as growth, memory, and metabolism. In its unactivated state, PKA exists as a tetrameric complex of two catalytic subunits and a regulatory subunit dimer, but when the intracellular signaling molecule cyclic adenosine monophosphate (cAMP) binds to the regulatory subunit, it facilitates dissociation and activation of the catalytic subunits. While separate structures of these subunits were previously known, a group from the University of California, San Diego, is the first to determine (to a resolution of 2.0 angstroms) the structure of the PKA catalytic subunits bound to the regulatory subunit. The structure of the complex clarifies the mechanism for PKA inhibition, and its comparison with the structure of cAMP bound to the regulatory subunit hints at how cAMP binding drives its activation.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/111pka.html

Publication about this research: C. Kim, N.-H. Xuong, and S.S. Taylor, "Crystal structure of a complex between catalytic and regulatory (R[alpha]) subunits of PKA," *Science* 307, 690 (2005).

4. ENGINEERING METAL IMPURITIES IN MULTICRYSTALLINE SILICON SOLAR CELLS

(Contact: Andrei A. Istratov, istratov@berkeley.edu)

Transition metals are one of the main culprits in degrading the efficiency of multicrystalline solar cells. With a suite of x-ray microprobe techniques, a multi-institutional collaboration led by researchers from the University of California, Berkeley, and Berkeley Lab studied the distribution of metal clusters in a variety of multicrystalline solar cells before and after processing. Their discovery that the size, spatial distribution, and chemical binding of metals within clusters is just as important as the total metal concentration in limiting the performance of multicrystalline silicon solar cells led to the concept of defect engineering by optimizing growth and processing sequences to trap metals in their least harmful state.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/112solarcells.html

Publications about this research: T. Buonassisi, A.A. Istratov, M.A. Marcus, B. Lai, Z. Cai, S.M. Heald, and E.R. Weber, "Engineering metal-impurity nanodefects for low-cost solar cells," *Nature Materials* 4, 676 (2005); T. Buonassisi, A.A. Istratov, M. Heuer, M.A. Marcus, R. Jonczyk, J. Isenberg, B. Lai, Z. Cai, S. Heald, W. Warta, R. Schindler, and E.R. Weber, "Synchrotron-based investigations of the nature and impact of iron contamination in multicrystalline silicon solar cell materials," *J. Appl. Phys.* 97, 074901 (2005); T. Buonassisi, M.A. Marcus, A.A. Istratov, M. Heuer, T. F. Ciszek, B. Lai, Z. Cai, and E.R. Weber, "Analysis of copper-rich precipitates in silicon: Chemical state, gettering, and impact on multicrystalline silicon solar cell material," *J. Appl. Phys.* 97, 063503 (2005).

5. PROTEIN FLIPS LIPIDS ACROSS MEMBRANES

(Contact: Geoffrey Chang, gchang@scripps.edu)

Found ubiquitously in both bacteria and humans, membrane proteins of the adenosine triphosphate (ATP)-binding cassette (ABC) transporter family have been implicated in both antibiotic and cancer-drug resistance. The mechanisms used by these proteins to expel toxins from cells therefore represent key targets for the development of drugs designed to combat the growing problem of multidrug resistance. Toward this end, researchers from The Scripps Research Institute have succeeded in crystallizing MsbA--an ABC transporter protein--together with a substrate (the molecule to be transported) and a hydrolyzed (spent) form of the nucleotide ATP, the transporter's source of chemical energy. The resulting molecular complex is caught at a moment following the transporter's "power stroke," the force-generating part of the transport cycle. This snapshot suggests a mechanism by which the substrate molecule gets flipped head-over-tail from one side of the membrane to the other, on its way out of the cell.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/113flippase.html

Publication about this research: C.L. Reyes and G.A. Chang, "Structure of the ABC transporter MsbA in complex with ADP-vanadate and lipopolysaccharide," *Science* 308, 1028 (2005).

6. FIRST LIGHT AT SOFT X-RAY FEMTOSECOND BEAMLIN

(Contact: Bob Schoenlein, RWSchoenlein@lbl.gov)

The soft x-ray (0.2- to 1.8-keV) branch of the new Ultrafast X-Ray Facility at Beamline 6.0.1.2 saw first light on October 4 and is currently undergoing commissioning. Its complementary hard x-ray (2- to 10-keV) branch is still under construction and is on schedule for commissioning in the spring of 2006. Designed for x-ray spectroscopy and diffraction with 200-femtosecond temporal resolution, Beamline 6.0.1.2 will fill a critical need for the growing ultrafast x-ray research community at the ALS. Interest in time-resolved, ultrafast science spans the fields of physics, chemistry, and biology. Examples of studies that will be possible at Beamline 6.0.1.2 include solution-phase molecular dynamics, photoinduced phase transitions in complex materials, bonding properties of matter at high energy densities, x-ray/laser ionization dynamics in atomic and molecular systems, and nonlinear laser/x-ray mixing in solids.

Beamline 6.0.1.2 is an in-vacuum insertion-device (IVID) version of the bend-magnet laser-slicing source currently in use at Beamline 5.3.1. The permanent-magnet, dual-mode (undulator/wiggler) IVID will radiate soft and hard x rays from 120 eV to 10 keV in both normal and laser-slicing

modes. The device, with 50 3-cm periods and a peak magnetic field of 1.5 T, together with the addition of a new laser with a higher repetition rate, will result in a thousandfold increase in flux and brightness over the bend-magnet source. A variable-line-spacing (VLS) grating spectrograph on the soft x-ray branch will allow a complete spectrum to be recorded at once, and a streak camera will serve as the detector for measurements on picosecond time scales. Future plans call for chicaneing straight section 6 to add a half-length, small-gap, elliptically polarizing undulator (EPU), resulting in a doubling of capacity as well as the ability to use polarized x rays.

Based on a proposal by principal investigators Bob Schoenlein (Berkeley Lab's Materials Sciences Division) and Roger Falcone (University of California, Berkeley), the Ultrafast X-Ray Facility is the fruit of many years of effort by Howard Padmore, Phil Heimann, Ernie Glover, and others in the Experimental Systems Group, as well as Christoph Steier and many collaborators in the Accelerator Physics and Engineering Groups. The concept of laser slicing was developed by Alexander Zholents and Max Zolotarev of Berkeley Lab's Center for Beam Physics. The beamline is funded by DOE BES.

7. 2006 DAVISSON-GERMER PRIZE AWARDED TO LEW COCKE

The American Physical Society has announced that the 2006 Davisson-Germer Prize has been awarded to ALS user C. Lewis Cocke, University Distinguished Professor in Physics and Director of the James R. MacDonald Laboratory at Kansas State University. The prestigious Davisson-Germer prize was established in 1965 by AT&T Bell Laboratories to recognize and encourage outstanding work in atomic or surface physics. Lew's citation reads: "For a sustained record of novel experimental developments and new insights into interactions of ion and photon beams with atoms and molecules." The ALS offers Lew its heartiest congratulations on this well-deserved honor.

Lew received his bachelor's degree in physics from Haverford College in 1962 and his Ph.D. from the California Institute of Technology in 1967. He has received numerous awards, including the Alexander von Humboldt award and the Max Planck Research Award. He is a Fellow of the American Physical Society, serving as Secretary-Treasurer of the Division of Atomic, Molecular and Optical Physics. Lew's research interests focus on collisions involving multiply charged ions interacting with electrons, atoms, surfaces, and clusters, as well as the interaction of intense laser pulses with ion beams, atoms, and molecules. At the ALS, Lew and his collaborators have used a "momentum spectrometer" to measure the simultaneous momentum of charged particles ejected when a beam of ALS photons interacts with a beam of gas molecules. Highlights of this work can be found at the links below.

Gas-Phase Molecules Illuminated from Within

http://www-als.lbl.gov/als/science/sci_archive/46gasXPD.html

Explosive Experiment Explores Escaping Electrons

http://www-als.lbl.gov/als/science/sci_archive/90electron_emission.html

8. REMINDER: PLEASE SUBMIT YOUR 2004 - 2005 PUBLICATIONS (Contact: Jeff Troutman, JPTroutman@lbl.gov)

In preparation for the 2005 ALS Facility Report to DOE, we are asking ALS users to submit their publications of ALS-related work for the years 2004 - 2005. Excellent numbers may help DOE justify increased funding for our facility. Therefore we need to ensure that all published work--especially theses--undertaken in full or in part at the ALS is included in our report. We very much appreciate your efforts--it is imperative that the publications information that we present be accurate and inclusive.

To submit publications, go to the ALS Reporting Publications Web page at <http://www-als.lbl.gov/als/quickguide/userpubs.html> and follow the instructions there. Be sure to search the database first to make sure your publication hasn't already been entered. When submitting a publication, if you don't have a certain piece of information (e.g., page number or month published), type "n/a" in the field. The User Services Office will attempt to track it down. Be sure you are using an up-to-date Web browser--Netscape 6 or 7 or Microsoft Internet Explorer 5.0 or greater. If you don't, you will lose data when you hit the "Back" key.

Remember, if it's on your CV, and all or part of the work was done at the ALS, it should be in our database!

9. ALS-RELATED WEB NEWS AND LINKS

Tainer, Banfield Receive DOE Grants: Energy Department Awards \$92 Million for Genomics Research
http://www.energy.gov/engine/content.do?PUBLIC_ID=18904&BT_CODE=PR_PRESSRELEASES&TT_CODE=PRESSRELEASE

Can an Electron be in Two Places at the Same Time? Work by Former ALS Doctoral Fellow Daniel Rolles Highlighted by Max Planck Society
<http://www.mpg.de/english/illustrationsDocumentation/documentation/pressReleases/2005/pressRelease20051011/index.html>

Quality, Not Quantity, Determines Fracture
<http://www.dailycal.org/article.php?id=19929>

ALS/NCEM Workshop: Micromagnetic Imaging at Nanometer Resolution
<http://www-als.lbl.gov/micromag/index.htm>

10. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs scheduled between September 27 and October 23, the beam reliability (time delivered/time scheduled) was 97.7%. Of the scheduled beam, 85.7% was delivered to completion without interruption. There were no significant interruptions.

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html> . Requests for special operations use of the "scrubbing" shift should be sent to Jan Pusina (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. The Accelerator Status Hotline at (510) 486-6766 (ext. 6766 from Lab phones) features a recorded message giving up-to-date information on the operational status of the accelerator. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

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ALSNews is a monthly electronic newsletter to keep users informed about developments at the Advanced Light Source, a national user facility located at Ernest Orlando Lawrence Berkeley National Laboratory, University of California. The current and past issues of ALSNews are available on the World Wide Web. Point your browser to the following URL:

http://www-als.lbl.gov/als/als_news/

To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

LBNL/PUB-889 (2005)

Editors: lstamura@lbl.gov, alrobinson@lbl.gov, ejmoxon@lbl.gov

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Current issue online at http://www-als.lbl.gov/als/als_news/

1. WORKSHOP HELD IN HONOR OF DANIEL CHEMLA'S 65TH BIRTHDAY

A Molecular Nanoscience Workshop was held at Berkeley Lab on November 21st to honor retiring ALS Director Daniel Chemla on the occasion of his 65th birthday. In welcoming the attendees, Lab Director Steve Chu remarked that, even at Bell Labs (where their paths first crossed), Daniel always seemed to have a really good sense of where things were going. Underlining this point, Associate Director Paul Alivisatos shortly thereafter directed attention to stage left, where the auditorium's window shades were retracted to reveal a panoramic view of the Molecular Foundry building, now nearly complete on the adjacent hillside. Daniel was then presented with a plaque bearing his name and likeness, which will grace the Foundry's "Chemla Seminar Room."

Joseph Zyss of Ecole Normale Supérieure (ENS) in Cachan, France, a close friend and colleague since 1975, presented Daniel with an honorary doctorate and medal from that institution on behalf of all his French colleagues in honor of his many accomplishments. Slides from a talk and reception held in Cachan the previous week showed many of said colleagues, as well as Daniel's sister, Annie, who attended for Daniel. Former Lab Director Chuck Shank then took the podium to announce the publication of a special issue of the journal *Chemical Physics* on the topic of "Molecular Nanoscience--In honour of Daniel S. Chemla on his 65th birthday" (*Chem. Phys.* 318, Issues 1-2, 15 November 2005). The issue is divided into three sections reflecting the major areas Daniel helped pioneer and where his contributions stand out as landmarks to this day: (1) Single-molecule and nanoscale photonics in organics and biosystems, (2) Semiconductor-based nanoparticles and nanoprobe, and (3) Physics of quantum-confined excitations, localization, and wave-packet dynamics.

Daniel, accompanied by his wife, Berit, and son Yann, who spoke for him, thanked his students, colleagues, and the organizing committee. And, admitting that he is not much for pomp and ceremony, proposed to let the scientific talks begin. The speaker list included representatives recalling all phases of Daniel's remarkable career, from his early work in France, to his highly productive years at Bell Labs, to his tour de force leading two major divisions at Berkeley Lab. The spectrum of science ranged from laser-slicing of synchrotron radiation to microtesla magnetic resonance imaging to photosynthetic complexes as nature's nanodevices. A common thread throughout was Daniel's personal and institutional impact as a scientist, teacher, and administrator. The workshop closed with a reception and dinner at the Berkeley Faculty Club, where master of

ceremonies Wayne Knox (Director, Institute of Optics, University of Rochester) gave a retrospective of Daniel's career, capped off by cake and a rousing rendition of "Happy Birthday."

While attendance at the workshop and dinner was necessarily limited for logistical reasons, everyone is invited to visit the workshop Web site at <http://ssg.als.lbl.gov:16080/chemla65/>. The site's "Daniel Chemla Gallery" will be updated in the coming weeks with photos, presentations, and video from the workshop. The organizers also welcome any additional contributions, including photos, science highlights, and messages for Daniel, from friends, colleagues, students, co-workers, and well-wishers in general, for posting on the site. Simply send an email to chemlabirthday@lbl.gov to participate in the celebration of the distinguished career of our friend and colleague, Daniel Chemla.

2. BIOLOGICAL IMAGING BY SOFT X-RAY DIFFRACTION MICROSCOPY (Contact: David A. Shapiro, DAShapiro@lbl.gov)

Electron and x-ray microscopes are a valuable tool for both the life and materials sciences, but they are limited in their ability to image with nanometer-scale resolution in three dimensions nonperiodic objects that are several microns in size. To fill this gap, the technique of coherent x-ray diffraction imaging now under development takes advantage of the penetrating power of x rays while simultaneously removing the limitations imposed by lens-based optical systems. Researchers from Stony Brook University, in collaboration with scientists at the ALS and Cornell University, have taken a large step in this direction by using a lensless x-ray diffraction microscope to image a freeze-dried yeast cell to better than 30-nm resolution. Images were made at several angular orientations of the cell.

Read the full story at
http://www-als.lbl.gov/als/science/sci_archive/114biolensless.html

Publication about this research: D. Shapiro, P. Thibault, T. Beetz, V. Elser, M. Howells, C. Jacobsen, J. Kirz, E. Lima, H. Miao, A.M. Neiman, and D. Sayre, "Biological imaging by soft x-ray diffraction microscopy," *Proc. Nat. Acad. Sci. USA* 102, 15343 (2005).

3. STRUCTURAL BASIS FOR ACTIVATION OF CHOLERA TOXIN (Contact: Wim G.J. Hol, wghol@u.washington.edu)

Cholera is a serious disease that claims thousands of victims each year in third-world, war-torn, and disaster-stricken nations. The culprit is the bacterium *Vibrio cholerae*, which can be ingested through contaminated food or water and colonizes the mucous membrane of the human small intestine. There, it secretes cholera toxin (CT), a protein whose A1 subunit (CTA1) triggers a series of events that culminates in the massive efflux of electrolytes and water into the intestinal cavity, causing the watery diarrhea characteristic of cholera that, if left untreated, can lead to severe dehydration and death. Crystal structures of the CTA1 subunit in complex with its activator molecule (ARF6) reveal that binding of the ARF6 "switch" elicits dramatic changes in CTA1 loop regions, exposing the toxin's active site. The extensive CTA1-ARF6 interface mimics recognition of ARF6's normal cellular protein partners, which suggests that the toxin has evolved to exploit the molecular switch's promiscuous binding properties.

Read the full story at
http://www-als.lbl.gov/als/science/sci_archive/115cholera.html

Publication about this research: C.J. O'Neal, M.G. Jobling, R.K. Holmes, and W.G.J. Hol, "Structural basis for the activation of cholera toxin by human ARF6-GTP," Science 309, 1093 (2005).

4. HELMHOLTZ-HUMBOLDT AWARD FOR CHARLES FADLEY

ALS Professor Charles S. Fadley has won one of this year's Helmholtz-Humboldt Awards from the Alexander von Humboldt Foundation. Each year, the German-based Helmholtz Association of fifteen government research laboratories and the Alexander von Humboldt Foundation jointly grant up to six research awards to internationally acknowledged scientists from abroad in recognition of their achievements in research to date. The awards come with cash and an invitation to undertake research in Germany with government laboratory and university partners. Fadley is a leading authority on photoelectron spectroscopy. While in Germany, he will collaborate with various scientific groups on standing-wave studies of nanostructures and spin-polarized and dichroic holography. For more information about the award, go to the Humboldt Foundation Web site at <http://www.humboldt-foundation.de/en/programme/preise/helmholtz.htm>.

Fadley is currently a Distinguished Professor of Physics at the University of California (UC), Davis, and a Senior Faculty Scientist in Berkeley Lab's Materials Sciences Division, holding one of three joint UC - Berkeley Lab ALS Professorship appointments. The Helmholtz-Humboldt Award comes on the heels of an American Vacuum Society M.W. Welch Award that Fadley received earlier this year "for the development of novel techniques based on photoelectron spectroscopy and synchrotron radiation, and their application to the study of the atomic, electronic, and magnetic structure of surfaces and buried interfaces." Congratulations once again to Chuck on receiving this prestigious award!

5. CALL FOR GENERAL SCIENCES PROPOSALS: DUE JANUARY 4, 2006 (Contact: alsproposals@lbl.gov)

The User Services Office is accepting general-user proposals from scientists who wish to conduct research in the general sciences at the ALS during the running period from July through December 2006. The deadline for submissions is Wednesday, January 4, 2006. (This deadline does not apply to protein crystallography proposals, which have a separate process and schedule.) To submit a new proposal, go to the online ALS General User Proposal and Request for Beamtime form at http://alsusweb.lbl.gov/4DCGI/WEB_GetForm/Page1P.shtml/Initialize.

If you have an existing proposal for which you would like to receive beam time during the July through December 2006 cycle, you must submit a Proposal Renewal Form. Scientists with existing proposals that are eligible for renewal have been sent instructions on how to request a login and password to access their proposal information and forms. Proposals can be renewed for up to three six-month cycles following their initial submission. After three cycles, a new proposal must be submitted.

The numeric rating for each proposal will be communicated to the user along with any comments that might have been added by the Proposal Study Panel. The cutoff rating for each beamline in the previous proposal cycle is published on the Web (see Item 6 below). The following resources are available for further information:

ALS User Services Administrator
alsuser@lbl.gov

General-user proposal process

<http://www-als.lbl.gov/als/quickguide/independinvest.html>

ALS online forms

<http://alsusweb.lbl.gov/>

Beamline information

http://www-als.lbl.gov/als/als_users_bl/bl_table.html

6. LATEST SCORES FOR GENERAL-USER PROPOSALS POSTED

(Contact: Gary Krebs, GFKrebs@lbl.gov)

User proposals for the general sciences submitted on July 5, 2005, have been reviewed by the Proposal Study Panel (http://www-als.lbl.gov/als/ourorg/proposal_panel.html) and scored on a scale of one (highest) to five. Beam time for the running period from January through June 2006 has been allocated based on each proposal's ranking in relation to all other proposals for a given beamline. In cases where proposal requests for a specific beamline exceeded available beam time, a cutoff score was assigned after which no beam time was allocated. The number of proposals for the cycle was 302, down from 310 in the previous period. The number of eight-hour shift requests for the upcoming cycle was 5236. A total of 2935 shifts, equal to about 56% of the total time requested in the proposals, was allocated. For more detailed results, including beam-time score distributions and cut-off scores, go to the proposal scores Web page at <http://www-als.lbl.gov/als/quickguide/pspscores.html>. The schedule for the upcoming running period has also been posted at http://www-als.lbl.gov/als/schedules/next_itsch.html.

7. ALS USERS' EXECUTIVE COMMITTEE ELECTION: MEET THE CANDIDATES

The ALS Users' Executive Committee (UEC) invites users and staff to take a look at the nine candidates running in this year's UEC election. A short biography and photograph of each nominee can be viewed at <http://www-als.lbl.gov/als/uec/vote/biographies.html>. Three candidates will be elected to replace retiring UEC members Dan Dessau (University of Colorado), Keith Jackson (Center for X-Ray Optics), and Gary Mitchell (Dow Chemical Company). Online voting will begin shortly; users and staff will be notified by email when voting begins. All users and staff wishing to participate in the election must have a valid email address on file with the ALS User Services Office in order to vote.

8. ALS-RELATED WEB NEWS AND LINKS

ALS Division Director position posted

<http://cjo.lbl.gov/LBNLCareers/details.asp?jid=18488&p=1>

Water: Dissolving the controversy

<http://www.lbl.gov/Science-Articles/Archive/sabl/2005/October/03-water-controversy.html>

Lab scientists join AAAS as Fellows

<http://www.lbl.gov/today/2005/Nov/01-Tue/11-01-2005.html>

Ratcheting, swiveling, opening the groove: Highest resolution yet of the intact ribosome

<http://www.lbl.gov/Science-Articles/Archive/sabl/2005/November/ribosome-groove.html>

New x-rays of cell's ribosome could lead to better antibiotics
http://www.berkeley.edu/news/media/releases/2005/11/03_xr.shtml

Nominations sought for Lawrence Award
<http://www.sc.doe.gov/lawrence/html/Nominations.htm>
[http://www.sc.doe.gov/lawrence/lawrence_brocure\(oct2005\).pdf](http://www.sc.doe.gov/lawrence/lawrence_brocure(oct2005).pdf)

Basic Energy Sciences Team Leader Bill Oosterhuis dies
<http://www.lbl.gov/today/2005/Nov/22-Tue/11-22-2005.html>

9. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs scheduled between October 25 and November 22, the beam reliability (time delivered/time scheduled) was 96.2%. Of the scheduled beam, 81.6% was delivered to completion without interruption. There were no significant interruptions.

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html> . Requests for special operations use of the "scrubbing" shift should be sent to Jan Pusina (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. The Accelerator Status Hotline at (510) 486-6766 (ext. 6766 from Lab phones) features a recorded message giving up-to-date information on the operational status of the accelerator. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

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http://www-als.lbl.gov/als/als_news/

To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

LBNL/PUB-889 (2005)

Editors: Istamura@lbl.gov, alrobinson@lbl.gov, ejmoxon@lbl.gov

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Current issue online at http://www-als.lbl.gov/als/als_news/

1. VACANCY-INDUCED NANOSCALE WIRE STRUCTURE IN GALLIUM SELENIDE LAYERS

(Contact: Taisuke Ohta, TOhta@lbl.gov)

Low-dimensional materials have gained much attention not only because of the nonstop march toward miniaturization in the electronics industry but also for the exotic properties that are inherent in their small size. One approach for creating low-dimensional structures is to exploit the nanoscale or atomic-scale features that exist naturally in the three-dimensional (bulk) form of materials. By this means, a group from the University of Washington has demonstrated a new way of creating one-dimensional nanoscale structures (nanowires) in the compound gallium selenide. In short, ordered lines of structural vacancies in the material stimulate the growth of "one-dimensional" structures less than 1 nanometer in width.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/116nanowire.html

T. Ohta, D.A.Schmidt, S. Meng, A. Klust, A. Bostwick, Q. Yu, M.A. Olmstead, and F.S.Ohuchi, "Intrinsic vacancy-induced nanoscale wire structure in heteroepitaxial Ga₂Se₃/Si(001)," *Phys. Rev. Lett.* 94, 116102 (2005).

2. ASSEMBLY OF A MOLECULAR NEEDLE, FROM THE BOTTOM UP

(Contact: Natalie Strynadka, natalie@byron.biochem.ubc.ca)

Many pathogenic bacteria use a specialized secretion system to inject virulence proteins directly into the cells they infect. The injected proteins, by mimicking host-cell mechanisms, can then subvert normal cellular function, resulting in diseases ranging from bubonic plague to traveler's diarrhea. The type III secretion system (TTSS) is a sophisticated protein complex with an overall shape similar to a hypodermic needle. More than twenty unique types of proteins are required for its assembly, most of which are found among a wide variety of animal as well as plant pathogens. Electron microscopy (EM) has provided the broad outlines of TTSS structure, but does not have sufficient resolution to reveal the details required to understand, and eventually inhibit, the needle's function. At the ALS, researchers from Canada and the U.S. performed crystallographic studies of

EscJ, the protein that makes up the needle's ring-shaped base. Their analysis of the EscJ ring not only presents an atomic snapshot of one of the earliest structures generated in the TTSS assembly process, but also reveals features indicative of a role as the molecular platform for subsequent construction of the secretion apparatus.

Read the full story at
http://www-als.lbl.gov/als/science/sci_archive/117needle.html

Publication about this research: C.K. Yip, T.G. Kimbrough, H.B. Felise, M. Vuckovic, N.A. Thomas, R.A. Pfuetzner, E.A. Frey, B.B. Finlay, S.I. Miller, and N.C.J. Strynadka, "Structural characterization of the molecular platform for type III secretion system assembly," *Nature* 435, 702 (2005).

3. SHIELDING CONTROL PROCESS TO UNDERGO REVIEWS (Contact: Ben Feinberg, B_Feinberg@lbl.gov)

The ALS employs redundant layers of protection to shield personnel from x rays, including engineered controls (e.g., concrete shielding, hatches, interlocks) as well as administrative controls (e.g., safety training, procedures, signage). Recently, the ALS has experienced several incidents in which proper administrative control procedures for removing shielding were not followed. Although in each case there was no radiation in the beamlines and no personnel exposure was possible, the pattern of the incidents has created a great deal of concern. Immediate corrective actions were taken to resolve each incident, but it is apparent that outside reviews are needed to reevaluate the entire ALS shielding control process.

The first review is already underway: the Berkeley Lab Radiation Safety Committee has formed a subcommittee to review and investigate the recent incidents. The charge of the subcommittee is to "assess the effectiveness of current shielding control procedures, engineering controls, training, EH&S staff support, and management oversight as needed to develop proposed corrective actions to prevent the likelihood of recurrence." That review began on December 2, and a draft report is to be completed by early January. The ALS has also requested that the Laboratory Director initiate an external review, bringing in safety experts from other synchrotrons to review the radiation protection program at the ALS, with particular attention to the shielding control policies, procedures, and practices. This review is expected to take place in January.

4. SAC SURVEYS PROGRESS AND CONSIDERS FUTURE (Contact: Neville Smith, NVSmith@lbl.gov)

Members of the ALS Scientific Advisory Committee (SAC) met at Berkeley Lab on December 12 and 13 to hear about the latest ALS initiatives and advise management on a range of issues, from recommendations on approved programs to long-range strategic planning for "ALS II." In welcoming the attendees, Berkeley Lab Director Steve Chu and Deputy Director Graham Fleming reiterated their support for future waves of ALS development and reported that progress was being made in the search for a new director and on plans for a guest house at Berkeley Lab. Acting ALS Director Janos Kirz then brought the committee up to date on recent developments, reporting on, among other things, the Users' Meeting/workshops, safety issues, and progress toward facility improvements and beamline development. ALS Scientific Director Neville Smith then gave a short talk on a proposed new metric for assessing Department of Energy light sources. Progress reports on the PEEM3 and slicing source beamlines were given by Howard Padmore (Experimental Systems Group Leader), Andreas Scholl (ALS), and Bob Schoenlein (Materials Sciences Division).

The first afternoon session was devoted to presentations on "Wave 1" initiatives from the ALS Strategic Plan: Eli Rotenberg (ALS) described plans for a nanoARPES beamline and Jeffrey Kortright (Materials Sciences Division) presented the case for a soft x-ray scattering capability. The second afternoon session focused on protein crystallography, with Paul Adams (Berkeley Center for Structural Biology) on the future of protein crystallography at the ALS and John Spence (University of Arizona) introducing "serial crystallography," a complementary approach that diffracts x rays from beams of droplets containing the macromolecules under study. Proposal Study Panel (PSP) chair Yves Idzerda (Montana State University) rounded out the first day's agenda with the PSP's recommendations on several candidates for approved-program status. The meeting continued the second day with talks on theory at the ALS by Zahid Hussain (Scientific Support Group Leader) and on interactions between the Center for X-Ray Optics (CXRO) and the ALS by David Attwood (CXRO). Howard Padmore rounded out the open-session agenda with a thought-provoking exploration of options for "ALS II," with improvements in brightness, pulse length, and beyond. Current SAC members are listed online at <http://www-als.lbl.gov/als/ourorg/sac.html>.

5. UEC CORNER: NOTES FROM THE USERS' EXECUTIVE COMMITTEE

by Greg Denbeaux

(Contact: Greg Denbeaux, gdenbeaux@uamail.albany.edu)

The UEC is here to represent you, so please take the time to look over the candidate bios and place your vote for the next three UEC members.

http://www-als.lbl.gov/als/uec/vote/mysqlvote_auth.php

The voting will be open until December 31st.

Thank you for giving me this opportunity to represent your interests as chair of the ALS Users' Executive Committee. My term expires soon, but next year, you'll be well represented by the new Chair, Clemens Heske (Heske@unlv.nevada.edu) and new Vice-Chair, Tony van Buuren (vanbuuren1@llnl.gov)

Since budget issues in Washington are likely to become more important in the future, the Users' Associations at the light sources across the country have formed a group to work on outreach and education to help ensure that people understand the importance of the science that happens within these facilities. Corie Ralston has agreed to represent the ALS UEC in this activity. Please contact her at cyrystalston@sff.net if you have any questions or suggestions.

6. REMINDER: GENERAL USER PROPOSALS DUE JANUARY 4

(Contact: alsproposals@lbl.gov)

The User Services Office is still accepting general user proposals from scientists who wish to conduct research in the general sciences at the ALS during the running period from July through December 2006. The deadline for submissions is Wednesday, January 4, 2006. (This deadline does not apply to protein crystallography proposals, which have a separate process and schedule.) Users with existing proposals who wish to receive beam time during the July through December 2006 cycle must submit a Proposal Renewal Form. Scientists with existing proposals that are eligible for renewal have been sent instructions on how to request a login and password to access their proposal information and forms. Proposals can be renewed for up to three six-month cycles following their initial submission. After three cycles, a new proposal must be submitted. The following resources are available for further information:

ALS User Services Administrator
alsuser@lbl.gov

General user proposal process (new proposals)
<http://www-als.lbl.gov/als/quickguide/independinvest.html>

ALS online forms
<http://alsusweb.lbl.gov/>

ALS Experiment Report and Request for Beamtime (renewals)
http://www-als.lbl.gov/als/quickguide/experiment_report.doc

Beamline information
http://www-als.lbl.gov/als/als_users_bl/bl_table.html

Proposal Study Panel (PSP) scores
<http://www-als.lbl.gov/als/quickguide/pspscores.html>

7. LATEST ACTIVITY REPORT NOW POSTED ONLINE (Contact: Lori Tamura, LTamura@lbl.gov)

A PDF version of the 2004 ALS Activity Report has been posted online (go to <http://www-als.lbl.gov/als/actrep>). The Activity Report is published annually and illustrates the depth and breadth of the ALS scientific program with a selection of research results. The 2004 edition contains a feature science article on ultrafast x-ray science at the ALS and a facilities feature outlining the ALS strategic plan. The report also summarizes operations, ongoing R&D, educational outreach efforts, and special events. Printed copies are being mailed to staff and active users in the ALS database. Others can request a copy by sending email to alsuser@lbl.gov. Be sure to include your name, complete mailing address, and the name of the publication being requested.

8. HOLIDAY CLOSURE SCHEDULE

Berkeley Lab will close on the evening of December 22 and reopen on the morning of January 2. During the closure, the Lab will shut down as much heating and ventilating equipment as possible to reduce costs. (The ALS experiment floor will remain at normal temperature to prevent damage to sensitive equipment.) The first user run of 2004 will be January 6 - 9. The next issue of ALSNews will be published on January 25. From all of us at the ALS, have a safe and happy holiday season, and we'll see you next year!

9. ALS-RELATED WEB NEWS AND LINKS

ALS Division Director position posted
<http://cjo.lbl.gov/LBNLCareers/details.asp?jid=18488&p=1>

Accelerator Expert Joins Physical Society Fellows
<http://www.lbl.gov/today/2005/Dec/02-Fri/12-02-2005.html>

Lab Assures Berkeley Foundry Will Be Safe
<http://www.lbl.gov/today/2005/Dec/08-Thu/12-08-2005.html>

A Theoretical Breakthrough Inspired by Experiment: Calculating Electron Correlations in the Hydrogen Molecule
<http://www.lbl.gov/Science-Articles/Archive/ALS-electron-correlations.html>

10. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs scheduled between November 30 and December 18, the beam reliability (time delivered/time scheduled) was 97.1%. Of the scheduled beam, 92.6% was delivered to completion without interruption. There were no significant interruptions.

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html>. Requests for special operations use of the "scrubbing" shift should be sent to Jan Pusina (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. The Accelerator Status Hotline at (510) 486-6766 (ext. 6766 from Lab phones) features a recorded message giving up-to-date information on the operational status of the accelerator. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/>.

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ALSNews is a monthly electronic newsletter to keep users informed about developments at the Advanced Light Source, a national user facility located at Ernest Orlando Lawrence Berkeley National Laboratory, University of California. The current and past issues of ALSNews are available on the World Wide Web. Point your browser to the following URL:

http://www-als.lbl.gov/als/als_news/

To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

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<http://www-library.lbl.gov/teid/tmRco/howto/RcoBerkeleyLabDisclaimer.htm>

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