

July 2003

NSLS 2003 Annual Users' Meeting Highlights Scientific Successes, Exciting Future Plans

Karen McNulty Walsh, BNL Science Writer

A spirit of optimism pervaded the 2003 annual meeting of National Synchrotron Light Source (NSLS) users, held at BNL May 19-21, 2003, with presentations on scientific successes and plans for new facilities.

"A lot of good things have happened at BNL in the last year," said Doon Gibbs, BNL's Interim Associate Laboratory Director for Basic Energy Sciences, as he welcomed NSLS users from around the country and the world to the Tuesday morning main meeting, chaired by Tony Lanzirotti of the University of Chicago, Chair-Elect of the Users' Executive Committee (UEC). Gibbs pointed out that BNL had made "great strides" toward establishing a new Center for Functional Nanomaterials (CFN) and toward significantly upgrading the NSLS. He also noted that several highly qualified people

had been brought into BNL leadership positions, including Praveen Chaudhari, the new Laboratory Director.

In introducing Peter Paul, Deputy Di-

rector for Science & Technology, Gibbs also took the opportunity to thank Paul for his steadfast leadership as Interim Director during the past two years. Paul, whose task was to give an overview of BNL, echoed a statement made by Chaudhari at the previous week's RHIC & AGS Users' Meeting, that DOE program managers take a great risk when they build new facilities with the hope that users will come and do good science.

"Fortunately it has always seemed to work out, but we can't take it for granted," Paul said, emphasizing how important it is to have an active user community, such as that at the NSLS, to keep a facility strong. With such involved users and the new leadership at the Lab — including Chaudhari, Gibbs, James Misewich as Materials Science Department Chair, Robert Hwang as CFN Director, and Alex Harris as Chemistry Department Chair — "We are all set to move forward," Paul said.



Among speakers and attendees at the Annual National Synchrotron Light Source Users' Meeting are: (from left) Tony Lanzirotti, University of Chicago; Steven Dierker, BNL; Patricia Dehmer, DOE; Doon Gibbs, BNL; Pedro Montano, DOE; Peter Paul, BNL; Leemor Joshua-Tor, Cold Spring Harbor Laboratory; and Chi-Chang Kao, BNL.

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After describing improvements in support services, housing, and other facilities for users, Paul spoke of the CFN, recent findings at the Relativistic Heavy Ion Collider, and the proposed NSLS-II, a third-generation light source ring that would be the future center of synchrotron activity at BNL and in the Northeast. "The Laboratory will commit all the resources we can muster to make this a reality," he said.



Robert Hwang, Director of the Lab's new Center for Functional Nanomaterials (CFN).

Bob Hwang then presented details of the CFN, recognizing that "the current excitement in nanoscience is based on work that has been going on for decades at synchrotrons like the NSLS, and you, the users, are a big part of that." He asked NSLS users for help in shaping the new center, noting that the CFN, like DOE's four other nanoscience research centers, was co-located within an existing DOE research facility, in this case the NSLS, to build on existing strengths.

Like the NSLS, the CFN will be a user facility, with a similar process for reviewing proposals. With a range of complementary facilities focused on six scientific areas, the CFN will address the goal of tailoring materials' responses to achieve specific functionality based on an understanding of nanoscale phenomena.

Offering one example of what nanoscience might yield, Phaedon Avouris of IBM's T.J. Watson Research Center then



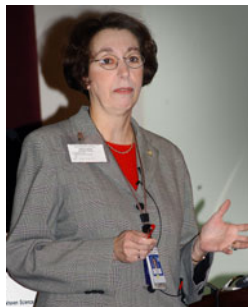
Keynote speaker at the meeting was Phaedon Avouris of IBM's T.J. Watson Research Center.

gave the meeting's keynote address on "Carbon Nanotube Electronics."

With a break from science to focus on funding, UOP's Simon Bare, lobbying coordinator for the UEC, then urged all NSLS users to learn about the federal funding process and to get involved.

Users could help to "educate" their own legislators and the congressional committee members vital to science funding – via letters, phone calls, office visits, and even op-ed articles in newspapers – about the importance of research sponsored by DOE's Office of Science. Several bills that propose increased funding for the Office of Science are pending, he said, so to take action now is vital. For more information, see: <http://www.nslsuec.org>.

The meeting's next session was chaired by Ron Pindak, Head of Science Program Support for the NSLS. Patricia Dehmer, Associate Director of Science for Basic Energy Sciences (BES) within DOE's Office of Science, started the session. "After hearing this morning's talks," she said, "it strikes me that this is the beginning of a transition period for the Lab, and I'm very optimistic about the future of this institution."



Pat Dehmer, Associate Director of Science for Basic Energy Sciences (BES), gives her "Totally Unsanctioned Safety Seminar."

Long-range planning within BES has resulted in a recommendation for a general upgrade to provide a full return on capital investments at existing light sources, Dehmer explained. Another recommendation was for the NSLS-II upgrade. "This rated very high," she said, encouraging the spontaneous applause that erupted, adding, "You can thank Steve [Dierker, NSLS Chair] for doing such a good job at the presentation."

Referring to the five DOE Nanoscale Science Research Centers, she said, "We

are extremely happy that one of those is at Brookhaven. These [nanocenters] are going to be a very, very important component of the BES family of facilities."

Dehmer then gave her "Totally Unsanctioned Safety Seminar," drawing partly from her own lab experience. The bottom line: "It is possible - and required - to run your laboratory safely, and Pat will become a pest [with investigations and possible cuts in funding] if you mess up."



NSLS Chair, Steve Dierker, describes successes of the past year and plans for a NSLS upgrade in the future.

Following Dehmer, Steve Dierker gave an overview of recent NSLS successes, including Roderick MacKinnon's "spectacular piece of work" on voltage-dependent potassium ion channels, featured on the cover of the May 1 issue of Nature; studies of materials that expand under pressure; and a paper on cell membrane fusion that explains "one of the most basic processes" of cell division. "This has been an action-packed year, with a lot of exciting developments," he said.

Dierker gave credit to the NSLS's support staff, saying, "None of these advances would have been possible if we could not deliver the photons to the end of the beamline. It takes a dedicated and talented staff and a determined effort to keep both rings running reliably."

Dierker then reviewed the many beamline and instrumentation improvements of the past year, and talked about the proposed NSLS-II.



UOP's Simon Bare, lobbying coordinator for the UEC, urges all NSLS users to learn about the federal funding process and to get involved.



Twenty-five vendors had displays at the Users' Meeting. Seen above is Andy Broadbent of Oxford Danfysik with Kumi Pandya (SFA-NRL-SRC) and Zugen Fu (Stony Brook University).



Approximately 40 of the 55 posters at the NSLS Annual Users' Meeting poster session were the work of students and postdocs.

This \$350 million upgrade, featuring a new x-ray storage ring three times larger than the current NSLS, would be constructed on Brookhaven Avenue, across from the existing structure, featuring 21 superconducting undulator beamlines and providing the highest brightness of any existing light source, with much shorter pulses.

"Our goal is to build the ultimate medium-energy storage ring," Dierker said. "We would see a huge impact from these enhanced capabilities, especially in the areas of nanoscience and protein crystallography, as larger cells and smaller crystals could be analyzed."

The meeting continued with scientific talks on nanoscience, thin films, x-ray crystallography, and new x-ray sources. During the afternoon session chaired by Lisa Miller, Coordinator of the NSLS's Information & Outreach Office, the UEC Community Service Award was presented to Michael Sullivan, Chief Beam Line Engineer for Albert Einstein College of Medicine, for service, innovation and dedication to NSLS users (see the complete story on page 7). The winners of the Student/Postdoc Poster Contest were also announced.

Users were then invited to hear more about the BNL nanocenter and encouraged to meet with CFN scientific and facility leaders before adjourning for the meeting's Western-theme banquet in Berkner Hall.



Poster prizewinners at the 2003 NSLS Users' Meeting were: (from left) Ally S.-Y. Chan, Rutgers University; David Linkous, George Mason University; Hidenori Tashiro, University of Florida; Henrik Loos, BNL; Daisuke Kawakami, Stony Brook University; and V.G. Alexandratos, Stony Brook University.



Enjoying the "Western" flavor banquet are the NSLS User Office staff, past and present: (standing, from left) Gretchen Cisco, Eileen Pinkston, Susan Hatzel, Liz Flynn; (seated, from left) Lydia Rogers, Nancye Wright, Brian Bindert, Mary Anne Corwin, and Melissa Abramowitz.

NSLS Chairman, Steve Dierker, Appointed Associate Lab Director for the Light Sources Directorate

On June 5, 2003, BNL Laboratory Director, Praveen Chaudhari, announced the appointment of NSLS Chairman, Steve Dierker, as the Associate Laboratory Director for the Light Sources Directorate. Steve will retain his present role as Chairman of the current NSLS.

During the last two years, Steve has led the NSLS through a restructuring and subsequent growth phase, while at the same time helping to develop and lead the efforts to propose a new light source, NSLS-II.

The NSLS-II Project represents the next major step in BNL's long history of building and operating world-



class scientific facilities. Its outstanding capabilities are expected to have enormous impact in the life sciences, materials and chemical sciences, nanoscience, geoscience, environmental science, and other areas. "The success of the NSLS-II Project is vital to the continuing prosperity of synchrotron science at the Lab and in the Northeast," Chaudhari said. "I am, therefore, pleased to announce the creation of a new science directorate at the laboratory, the Light Sources Directorate, devoted to operation of the current NSLS and the development and construction of NSLS-II."

CHAIRMAN'S INTRODUCTION

Letter from the Chairman

Steve Dierker, NSLS Chairman

Recently, I issued a new set of Environment, Safety, and Health (ESH) rules which affect all users and staff working on the NSLS experimental floor (<http://nslsweb.nsls.bnl.gov/nsls/esh/temp/prtreq.htm>). The changes have their origin in a number of reviews that took place last year following a series of incidents on the experimental floor. These events should be well known since they have received considerable attention in the NSLS Newsletters and at our User Town Meetings.

The incidents were significant in that

important ESH rules were disregarded, in some cases quite blatantly. On a number of occasions, I have made it clear that I expect nothing less than excellent safety performance at the NSLS. At our recent Annual User Meeting, Pat Dehmer also made it quite clear that she has the same expectations. We need to do better, and the new rules will help.

By the time this Newsletter comes out, the implementation date (August 1, 2003) for the new rules will be close. However, I am sure that continued discussion over the next several months will

help in understanding and implementation of them. The three major categories of the new rules are reviewed below.

Roles and Responsibilities

Safety is a shared responsibility on the experimental floor. While the NSLS has the ultimate responsibility for the facility and many ongoing day-to-day safety responsibilities, our PRTs and general users play a vital role in the safety program. The PRTs operate and maintain many of the beamlines; schedule activi-

ties; and train, support and provide oversight to users working at their beamline. The general users have responsibilities to define and characterize the safety issues associated with their research and to work closely with the PRT and NSLS staff in ensuring that the work is conducted safely and in compliance with NSLS requirements. Because of this shared nature, it is very important that the individual roles and responsibilities are clearly understood. The roles and responsibilities for PRTs, short-term users and NSLS staff are available at the NSLS ESH web home page. (<http://nslsweb.nsls.bnl.gov/nsls/esh/>)

Training

Training requirements have been expanded for all PRT staff that have an ongoing responsibility for operations and support at the beamline. Knowledge and understanding of safe work practices and BNL ESH requirements is an important element of the safety program. Previously, we had depended on the NSLS facility-specific training to provide key elements of the BNL training that apply to work on the experimental floor. As a result of that approach, two deleterious effects took place: the facility specific training became quite lengthy overall, and important issues were sometimes simplistically addressed. We decided it was time to ask the responsible staff at the

beamlines to take the BNL training that applies to their work. This decision was made easier by the migration of almost all BNL training to the web, providing the opportunity for training to be conducted based on individual schedules, either at BNL or at home institutions.

Training requirements for short-term users remain unchanged in most cases - the principal training continues to be the NSLS facility-specific courses and BLOSA (BeamLine Operations and Safety Awareness). However, all users should take note that some activities they may wish to conduct will require additional training. All of the additional training courses are available on the web at: <http://nslsweb.nsls.bnl.gov/nsls/training/>.

The BLOSA training provided by the PRT is a very important requirement for our visiting users, and should provide the most immediate and practical understanding of what it takes to work safely on the experimental floor. It is very important that this training be of high quality and directed to the important operational and safety issues at each beamline. To help ensure that important issues are being addressed when the training is provided; we have provided a revised BLOSA template, and asked that the PRT designate experienced personnel to deliver the training. We believe these steps will improve the consistency and quality of this training.

Work Planning

Work planning is another important element in every safety program. We are in general very satisfied with the planning that is done for research through the Safety Approval Form (SAF) process. However, planning for routine work needs improvement.

Fortunately, requirements for formal work planning (i.e. work permits) are strongly tied to training and experience. Many activities can be defined as "skill of the worker" providing the person has the associated training. Additional review is not required in such cases. "Skill of the worker" based on training has been defined for users and is available at the NSLS ESH web home page (<http://nslsweb.nsls.bnl.gov/nsls/esh/>). Keep in mind that some activities will require formal work planning regardless of the level of training. In many cases, the planning can be accomplished before a user arrives through the experimental review process.

Conclusion

There may be other details that need discussion to clarify. Please let me or other NSLS ESH staff know if you have questions. We welcome your feedback and we will work with you to make these rules effective. Thank you for your cooperation in addressing these issues.

Current UEC Members and SpIG Representatives

Term May 2003-2004

Users' Executive Committee

Chair	Antonio Lanzirotti (Univ. of Chicago)
Past Chair	Leemor Joshua-Tor (Cold Spring Harbor)
Member	Fred Dyda (NIH)
Member	Daniel Fischer (NIST)
Member	Anatoly Frenkel (Yeshiva Univ.)
Member	Dean Hesterberg (N.C. State Univ.)
Member	Lawrence Shapiro (Columbia Univ.)
Ex-Officio	Chi-Chang Kao (BNL-NSLS)
Ex-Officio	Mary Anne Corwin (BNL-NSLS)
Ex-Officio	Lisa Miller (BNL-NSLS)

Special Interest Groups

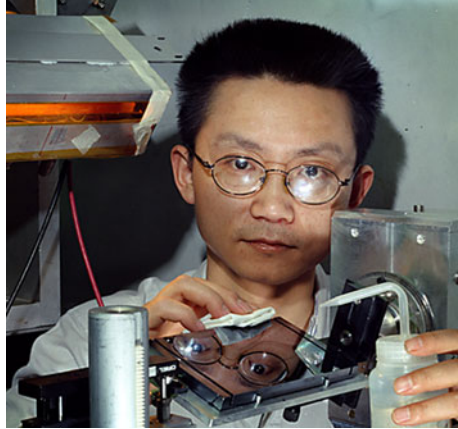
Bio. Scattering	Vivian Stojanoff (BNL-NSLS)
Imaging	Jerry Delaney (Rutgers Univ.)
Industrial	Simon Bare (UOP LLC)
Infrared	Larry Carr (BNL-NSLS)
Nuclear Phys.	Mahbub Khandaker (TJLab)
Students/Postdocs	Aaron Celestian (Stony Brook Univ.)
Time Resolved	John Sutherland (BNL-Biology)
Topography	Michael Dudley (Stony Brook Univ.)
UV Photo	Daniel Fischer (NIST)
XAFS	Kumi Pandya (N.C. State Univ.)
X-Ray Scattering	Peter Stephens (Stony Brook Univ.)

Scientists Image Soft Tissues With Novel X-Ray Technique

Karen McNulty Walsh, BNL Science Writer

Scientists at Brookhaven National Laboratory, in collaboration with researchers at Rush Medical College, have demonstrated the effectiveness of a novel x-ray imaging technology to visualize soft tissues of the human foot that are not visible with conventional x-rays. The technique, called Diffraction Enhanced Imaging (DEI), provides all of the information imparted by conventional x-rays as well as detailed information on soft tissues previously accessible only with additional scanning methods such as ultrasound or magnetic resonance imaging (MRI). This study appears in the May 2003 issue of the *Journal of Anatomy*.

"We've previously shown that this technique can visualize tumors in breast tissue and cartilage in human knee and ankle joints, but this is the first time we have shown it to be effective at visualizing a variety of soft tissues, such as skin, cartilage, ligaments, tendons, adipose pads, and even collagen and large blood vessels," said physicist Zhong Zhong, who works at the NSLS, where the current work was done. "The ability to visualize such a range of soft tissues as well as bone and other hard tissues with just one technique has many potential applications in



Zhong Zhong

diagnosis," Zhong said.

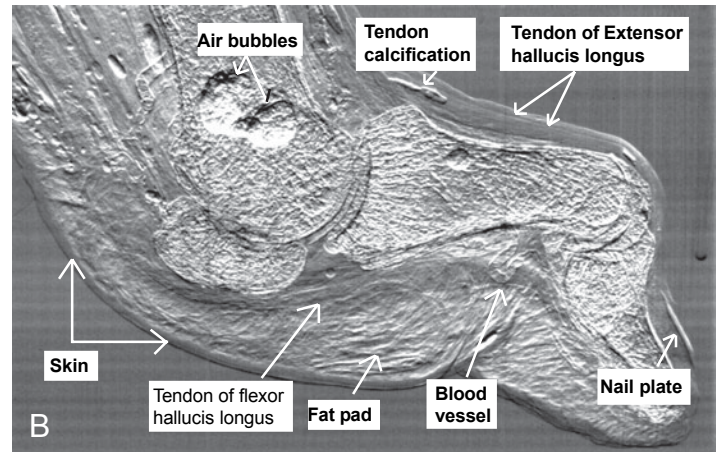
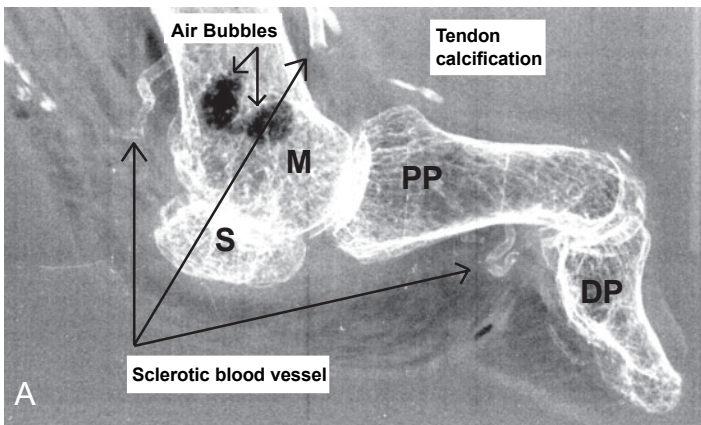
The technique makes use of the intense beams of x-rays available at synchrotron sources such as the NSLS. These beams are thousands of times brighter than those produced by conventional x-ray tubes, and provide enough monochromatic x-ray flux for imaging even after selection of a single wavelength.

In conventional x-ray images, the various shades of gray are produced because different tissues *absorb* different amounts of x-ray energy. "This works great in imaging bones and other calcified tissues," said Zhong, "but less satisfactorily in imaging soft-tissues that have

similar and low x-ray absorption." In DEI, the scientists are more interested in the x-rays that *pass through* the tissue and how they bend and scatter as they do, because these properties vary more subtly between different types of tissue.

To analyze a specimen with DEI, the scientists place a perfect silicon crystal between the sample and the image detector. As x-rays from the synchrotron go through the sample, they bend, or refract, and scatter different amounts depending on the composition and microscopic structure of the tissue in the sample. Then, when the variously bent rays exit the sample and strike the silicon crystal, they are diffracted by different amounts according to their angular spread. So the silicon crystal helps convert the subtle differences in scattering angles produced by the different tissues into intensity differences, which can then be readily detected by a conventional x-ray detector. This results in extremely detailed images that are sensitive to soft tissue types.

For example, in the current study, a conventional radiograph of a human toe shows bones and a calcified blood vessel; except for the faint "shadow" of the surrounding soft tissues and calcification



A conventional synchrotron radiography of a foot (A) and the same foot show with Diffraction Enhanced Imaging (B). Note the greater variety of soft tissues visible within the DEI frame.

within a tendon, no other structures are visible. The DEI scan of the same specimen in the same position clearly shows skin, the fat pads beneath the bones, the blood vessel, the nail plate, and some tendons, which are clearly distinguishable from the surrounding connective tissue. Within one of the fat pads, even the organizational architecture of the collagen framework is visible. Moreover, the bones take on a three dimensional appearance because of the detail available in the scans.

In the current study, the DEI images were produced with a lower x-ray dose than that used for diagnostic x-rays and no contrast agent was needed, making the technique viable as a potential screening tool, said Zhong.

The scientists are still working on how to scale down the DEI design so that it can be used in a clinical setting. But they say this should be feasible and that the technique may eventually greatly enhance mammography and become increasingly important in the detection of

other soft tissue pathologies such as osteoarthritis, breast cancer, and lung cancer.

Collaborators at Rush Medical College include Carol Muehleman, Jun Li, and Klaus Kuettner. This research was funded by the National Institutes of Health, GlaxoSmithKline, Inc., and the U.S. Department of Energy, which supports basic research in a variety of scientific fields.

AWARDS

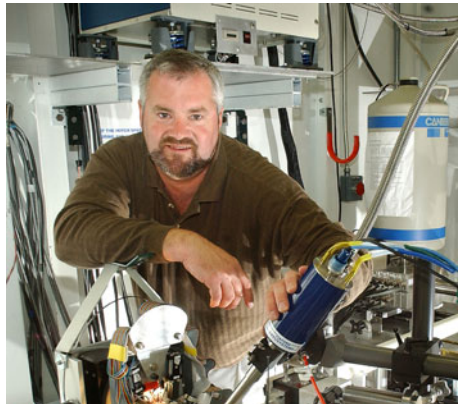
UEC Community Service Award Presented to Michael Sullivan

*Leemor Joshua-Tor, Users' Executive Committee Past Chair
Cold Spring Harbor Laboratory*

Congratulations go out to Michael Sullivan, Chief Beamline Engineer for Albert Einstein College of Medicine. Mike is the second recipient of the NSLS Users' Executive Committee (UEC) Community Service Award. This award is given for service, innovation and dedication to users of the NSLS.

Members of the NSLS user community nominated Mike for this award. Here are some of the comments that users sent about his wonderful contributions:

- "Mike is admired as a tireless, creative force dedicated to the principle of delivering user service."
- "In my opinion Mike is one of the most knowledgeable and extremely helpful engineers at NSLS floor, with very long experience [19 years] with dealing with all technical aspects of many different kinds of X-ray synchrotron research conducted at NSLS. He is a person who made it possible for very many staff and visitors to obtain top quality research results."
- "On several occasions, he has come in on weekends to help us salvage an experiment gone awry, or to bail us out of a technical problem. On one occasion, we reached him via his cell phone on his boat



at sea, and he was able to come in and fix the problem to keep us running."

- "Mike is undoubtedly a gold standard of service, innovation and dedication to users. Moreover, during this winter's biggest blizzard, I remember walking by the NSLS parking lot when Mike turned his car into a tow truck in order to help his users pull their car out of a huge pile of snow."

Leemor Joshua-Tor, the Chair of the NSLS UEC, presented the award to Mike at the NSLS Users' Meeting banquet on the evening of May 20th. Mike received a \$250 gift certificate and his name was engraved on the plaque that is on display in the lobby of the NSLS.

Identification and Tagging of Equipment

The Department of Energy requires that all non-expendable property at BNL have bar codes or tags to indicate ownership. If your organization does not have tags (logo's, etc.) we will supply blank tags (see sample at right).

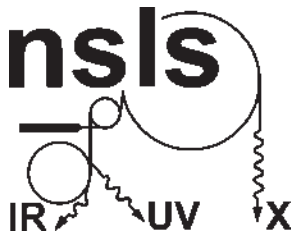
Tags are available at the NSLS stockroom free of charge. Please obtain tags, fill in your organization in the space provided, and apply to all unidentified equipment belonging to your organization. The serial numbers on the blank tags are for

your optional use in recordkeeping.

BNL's Supply & Materiel Division will be conducting periodic inspections to ensure proper identification of all equipment.

If you have any questions or need assistance, please call Wendy Spaeth at 344-4884.





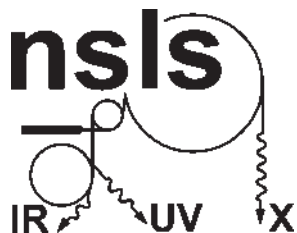
X-Ray Ring Long Range Schedule

September 2003						
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VUV Ring Long Range Schedule

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A User's Perspective

Tony Lanzirotti, Users' Executive Committee Chair

The University of Chicago

The NSLS Annual meeting is always a time of transition and change for the NSLS and the Users' Executive Committee (UEC). Every year the UEC says goodbye to its current roster of Special Interest Group (SpIG) representatives and three of our committee members. This year we say goodbye to Michael Becker, Sue Wirick, Paul Stevens, Laszlo Mihaly, Udupi Ramagopal, Peter Johnson, Bruce Ravel, and Steve Almo. I wish to thank them all warmly for their service to the user community. I also wish to welcome our newly elected UEC members, Dean Hesterberg, Larry Shapiro, and Dan Fischer, and also welcome our new SpIG representatives. Everyone associated with the UEC is listed on our website at <http://www.nslsuec.org>.



You can read about the NSLS Annual meeting that was held in May on page 1, but I wanted to take a moment to thank all that attended. This year we had a record turnout, with 396 registered attendees. The record attendance reflects our strong optimism about the future of the NSLS and synchrotron science at BNL. I assure you that this did not go unnoticed.

For this newsletter, my first as UEC Chair, I wanted to highlight three policy changes you'll be seeing as NSLS users beginning this summer...giving the users' perspective. Since the primary function of the UEC is to provide an organized framework to communicate the needs of you, the users, to the NSLS management, I wanted to review these changes and

encourage you to let the UEC and NSLS management be aware of your opinions and concerns so that they can be addressed effectively. All three topics will be addressed at our next UEC/Town Meeting, which is scheduled for July 21, 2003.

Environmental, Safety, and Health

At this year's Users' Meeting, the UEC asked Pat Dehmer, Director of the DOE Office of Basic Energy Sciences, to give a brief presentation on safety. There have been several safety incidents at the NSLS within the past year that have caught the attention of DOE, and we felt users would benefit from her perspective. The UEC is strongly supportive of the need to make the NSLS a safe place for all of us to work. One of the recent policy changes with regard to safety is a clarification of the roles and responsibilities of those operating and using beamlines on the experimental floor (see Bob Casey's article on page 14 for details). For beamline users, principle investigators, PRT members, and staff, this means that our obligations are more rigorously defined. I encourage everyone to familiarize themselves with these responsibilities and understand what is required. For beamline staff, there are also specific training requirements that will help establish a more uniform level of training more specific to BNL and the NSLS. Being required to take these training modules myself, I can testify that most of this training is available online and can be easily accomplished in an afternoon. As the UEC, we want to know if you have

concerns and issues about your ability to implement these changes and are eager to hear your suggestions on what the UEC can do to help improve safety at the NSLS.

PASS

The NSLS has been developing an online based *Proposal, Allocation, Scheduling, and Safety* (PASS) system that will dramatically change how requests for beamtime at the NSLS are submitted, reviewed, allocated, scheduled, and accounted for. User Administrator, Mary Anne Corwin, has assembled a large team of staff and users to help develop this system. The UEC is taking an active role to maximize convenience and efficiency for the users. The goal is to implement testing of this new system by this fall and general use by next year. So what does this mean for you as a user? Mary Anne will give more details as it approaches completion, but for example, plans include having proposals submitted electronically, changing the role and makeup of the Proposal Studies Panels, having a uniform online scheduling system common to all beamlines, improving and simplifying Safety Approval Forms (SAFs), and having allowances for rapid access to beamtime for time critical experiments. The team Mary Anne has assembled is very broad, so I am confident that user concerns are being adequately addressed. But



Call for Science Highlights

Do you have a recent publication that you would like highlighted by the NSLS?

- on the NSLS homepage
- in the Annual Activity Report
- in the NSLS Newsletter
- in assorted brochures and posters

To apply:
Just send the publication reference and abstract to NSLSinfo@bnl.gov

if you have comments, opinions, and suggestions, now is the time we really need to hear from you by contacting either Mary Anne Corwin directly, or through the UEC.

User Access Policy

This term often confuses users. It has nothing to do with how you physically access BNL. The User Access Policy refers to a re-definition of the modes of access to beamtime at the NSLS. We are all familiar with General Users (GU) and Participating Research Teams (PRT) as modes of access to beamtime at the NSLS, but the new policy introduces some new modes of access, which I am sure you have heard the NSLS Chairman, Steve Dierker, discuss. For example, Contributing or Partner Users are added as groups that

contribute to the beamline in terms of funding, instrumentation, or operations, but do not operate beamlines fully, like PRTs. The UEC has had extensive discussions with NSLS management regarding the policy change and I believe the goal is to have this in place by this fall. As UEC chair, it is clear that many PRT members have questions about the policy that relate specifically to their current and future beamline operations. There are also many questions about how the transition from the existing policy to the new policy will occur. If you do have questions I urge you to ask them. The UEC has had a number of very productive discussions with users, PRT members, and Light Source management about this, but I've found these discussions are generally more fruitful if we have specific examples

based on your experiences. Both NSLS management and the UEC are eager to hear your comments and concerns regarding this issue. I promise we will make every effort to see they are addressed.

Although the UEC is engaged in many activities, I have chosen to focus on these three issues for this newsletter because I feel they require the most immediate attention of the user community. But again, anyone that is interested in the UEC's activities should visit our webpage at <http://www.nslsuec.org>. You will find articles on our lobbying activities, Town Meetings, student and postdoc outreach, NSLS funding issues, etc. Many of these issues I plan to discuss in future articles.



USER ADMINISTRATION UPDATE

PASS System and Web-Based Training Courses

Mary Anne Corwin, NSLS User Administrator

Proposal, Access, Safety and Scheduling (PASS) System

A team of 33 NSLS users and staff members has been actively involved over the last few months in assisting the NSLS in designing a new proposal, safety approval and scheduling system. The PASS System will allow Principal Investigators to submit proposals through a web-based form for review, rating and allocation. The system will combine redundant information currently requested in the proposal form and the safety approval form, and will include a component for scheduling beam time.

Goals for the system include:

- A paperless system with online submission, review, rating, and allocation
- Providing rapid access to the facility
- Increased facility productivity
- Reducing lead time between proposal submissions and experiment start up

- Elimination of requests for redundant information
- Improvements in reporting capabilities
- Incorporating the Center for Functional Nanomaterials Department
- Accommodating experiments requesting multiple techniques and/or departments (including those performed back-to-back)



The PASS Team and its subcommittees address various issues related to proposals, safety and scheduling. The team will make recommendations on policy, procedures, and system flow preferences to NSLS Management over the next couple

months. I invite all users and staff to review and comment on the questions currently being address by the team. The bulletin board for comments can be found at <http://nslspass.bnl.gov>.

User and Staff Training

User Administration would like to remind our users and staff that the training room located in the User Administration Office is available for completing BNL web-based courses. Electrical Safety, Compressed Gas Safety, Cryogen Safety, Emergency Response, Forklift Operator, Hazardous Waste Generator, Laser Safety, Lock Out/Tag Out, Overhead Crane Operator, and Transportation of Hazardous Materials are among the many courses available. Challenge exams for General Employee Radiological Training (GERT) and Radiological Worker I may also be taken in the training room.

NSLS Accelerator Complex Update

Erik Johnson, Associate Chair for Operations and Engineering

Great news! In May of 2003 we delivered 18 hours more operation of the x-ray ring than in May of 2002. *Bad news:* it was still almost 4 days less than I led



you to believe you would get when I made up the schedule. More on that later but first let's look at recent operations and the work accomplished during the May maintenance.

From January through May, the VUV ring ran at least 95% of the scheduled operations time (reliability) every month. The overall reliability for the X-ray ring for the same period was 81%, exceeding 95% reliability only in February and March. In January significant time was lost on x-ray due to the sextupole repair (see the April 2003 Newsletter), and in April almost 4 days overall were lost due to a leak that was developing in the vacuum chamber. It began to impact operations with reduced lifetime and beam dropouts around April 20th. The operations and vacuum groups worked hard to make temporary repairs hoping to hold it together until the May shutdown. By April 28th the situation had deteriorated sufficiently that we held an emergency users meeting where we discussed the situation, and at the request of those present, we agreed to run (even with a 6 hour lifetime!) over night to allow people to bring their experiments to an orderly, albeit 2 day early, close.

In a way, the time provided by the creeping nature of the vacuum failure was beneficial. Contingency plans for permanently repairing the stripline chamber

leak were developed, and implementing the repair became the first item addressed when we brought the machine down for maintenance. As it happened, the first line approach of cleaning up and rewelding the failing chamber joint was successful, so we were able to direct our attention to the planned installations.

An RF circulator was installed in system 1 in the x-ray ring. This splendid object, weighing in at over a ton, provides isolation for the RF transmitter so it does not 'see' reflected power from the RF cavity. This is beneficial both from the standpoint of loading and lifetime of the transmitter tube. Over the long haul this should translate into gains in reliability for our user community.

Another major project was the installation of the X29 Mini Gap Undulator (MGU) *between* the RF cavities in the X29 straight section. Although we have built several in-vacuum small gap insertion devices before, this is the first to actually be placed between cavities. This increases the number of available insertion devices at NSLS and represents an important milestone in the development of small gap insertion device technology, which will be an important aspect of the NSLS-II.

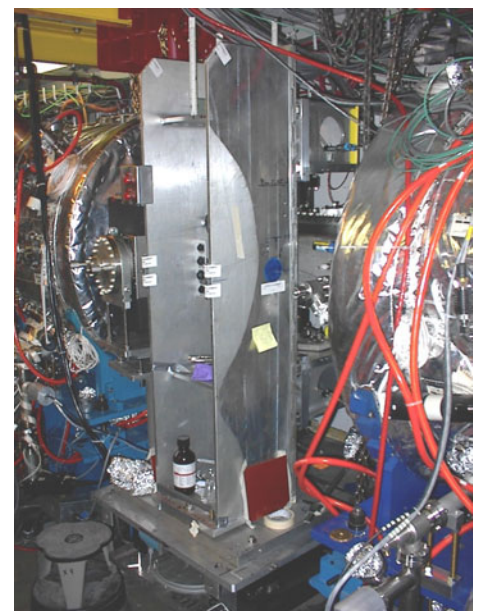
In addition a number of less visible, but no less important routine maintenance and equipment upgrade activities (notably interlocks) were successfully undertaken. On the VUV ring, the major activity was the replacement of a water-cooled mask on U14, which required venting of half of the ring.

Return to operations on the VUV ring was actually ahead of schedule, but the x-ray ring proved more difficult. Between the gas that had entered the ring from the vacuum leak and the new MGU installed between the cavities in the same general area of the ring, conditioning was

slow. In the end we returned the machine to operations two days late (May 23rd), but for most of a week after that the maximum injected current was low due to relatively poor (but steadily improving) vacuum. By the beginning of June, we returned to fills of 300 mA and normal operating conditions.

So returning to where I started, what happened? We actually provided (slightly) more beam this year than last, but it was not up to expectations. With the restructuring of the department I have taken on responsibility for the creation of the operations schedules. This spring was actually my first, so I sought broad input that included a significant user contingent that, for a variety of reasons, wanted to start up during the Users Meeting.

Since the start of the shutdown was fixed by a previous schedule, and the Users Meeting was already scheduled the length of the shutdown was set. It looked possible, but it left no room for contingency, like an unexpected vacuum leak



The new MGU between the RF cavities in the X29 straight section.

and the ripple in schedules that it caused, particularly in commissioning. People expected beam and didn't get it, and were understandably disappointed. The staff worked like mad to try and bring the machine up on time, and as a result, were put under a lot of stress. So what to do? I'll continue to develop the schedules for the foreseeable future, but I'll make every effort to disappoint people

up front (if necessary) by making shutdowns longer than they would like, rather than run the risk of having users waiting around for beam, or being uncertain about when it will come up.

Looking ahead to the next shutdown the beginning of the winter 2003 maintenance is already set. The major planned installation is another RF cavity, and commissioning of the new ID beamline at X29.

The length of that shutdown will be set this *September*, when the next schedule is released, which will also establish the beginning of the next spring shutdown as well! I'll continue to seek and welcome input regarding the structure and timing of the schedule to make it work for as many people as possible, but as you can see, it has to come pretty early to be implemented.



FACILITY UPDATE

NSLS Facility Report

Gerry Van Derlaske, NSLS Building Manager

Many new faces have arrived on the NSLS staff during the past few months — please remember to check the NSLS directory in the main lobby for directions to staff members' offices and other contact information. Listed here are just a few of the many new individuals we recently welcomed to the NSLS: Melissa Abramowitz and Susan Hatzel to the User Administration Office; Ken Pedersen to the RF Group; Lynn Ribaud, Peter Abbamonte and Ken Evans-Lutterodt to the NSLS User Services Division. Lydia Rogers has moved to the NSLS Administrative Services Group. Lisa Morello recently joined the Administrative Group as a Budget Specialist. Safety Engineer Bob Chmiel has joined the NSLS ES&H Division and Bob's vacancy in the Control Room was filled by Phil Marino. Best wishes to all in their new endeavors.



New, comfortable furniture can be found in the Main Lobby in close proxim-

ity to the Plasma Screen Video Wall. Staff and Users have been caught sitting and relaxing in the oversized sofas and chairs while enjoying cookies and coffee during the weekly staff and users' gathering, which takes place in the NSLS lobby each Wednesday at 3:30 pm. Good banter occurs during these lively afternoon exchanges as both staff and users informally meet to discuss topics covering a wide variety of issues — both work and non-work related. For the uninitiated, consider this an open invitation to join us and partake in the festivities.

The RF Penthouse has undergone an upgrade performed to increase the output cooling, which will help reduce the heat load on power supplies. In the past, they exhibited tendencies to trip out due to high temperatures on warm and sunny days. Additional cooling is planned for the near future; new ducts will dump cold air directly onto certain power supplies located within the RF Trailer.

As a joint venture between Plant Engineering and the NSLS, a new overhead manual trolley crane was installed in MER "A" to allow the Utilities Group to remove large experimental water pump and electric motor assemblies in case maintenance, repair or replacement of the motors becomes necessary.

Construction of the new undulator beamline, X29, is well underway. This beamline is located in the area of the VUV transport line cross-over. Caution should be utilized when traversing through this area, as some construction equipment will be found in use at certain times during the course of this project.

Lastly, I would remind both staff and users to pay extreme attention to your surroundings, whether in or near your office or on the experimental floor. Many activities are conducted simultaneously and seamlessly during the average workday. Custodial services, carpenters, electricians, HVAC mechanics, and other building trades and craftsmen are working alongside of the staff and users on a daily basis. Postings and warnings are placed where deemed to be the most efficient and effective. We ask each individual to be aware of the conditions of their surroundings. If floors are being mopped, or material-moving equipment is being utilized, or ladders are in use to replace light bulbs. These are just a few examples of the many everyday activities occurring within the NSLS that are necessary to keep the facility maintained, while providing a safe working environment for everyone.

What is a PAAA Non-Compliance and How Does it Apply to an Accelerator?

Bob Casey, Associate Chair for ESH/Q

There has been considerable discussion in recent months about non-compliances at the NSLS with Part 835 and the Price Anderson Amendment Act (PAAA).



Despite the frequent use of these terms, I suspect that many people in the NSLS community may not understand their meaning and their importance to our programs. Perhaps a few questions and answers will clarify these issues:

What is the Price Anderson Amendment Act?

The 1988 Price-Anderson Amendments Act (PAAA) is an amendment to the Atomic Energy Act of 1954 which provided indemnification of DOE contractors from costs related to public liability from nuclear accidents. It differed from the original act in two important ways:

(1) It made Price-Anderson coverage mandatory for a DOE contractor such as BNL and its subcontractors and suppliers conducting nuclear activities for DOE. For the purposes of the statute, "nuclear" includes "radiological." Therefore the PAAA requirements apply to the NSLS because of our use of ionizing radiation in our programs.

(2) It mandated that DOE change its methods of managing nuclear activities at contractor-operated sites by requiring enforcement actions against a contractor like BNL for violations of nuclear safety requirements.

Therefore, for a facility like the NSLS,

DOE has the authority to issue Notices of Violation when noncompliances with nuclear safety requirements are identified. While the Atomic Energy Act of 1954 as amended does not provide for civil penalties (fines) arising from violations involving accelerator produced radiation, a DOE Notice of Violation may incur very significant costs to the NSLS and the Laboratory, including loss of reputation, facility shutdown, contract termination etc.

What are the nuclear safety rules that apply to the NSLS?

Because the NSLS is an accelerator facility and does not contain large amounts of radioactive material, not all nuclear safety rules established by the DOE apply. But one very important rule does apply: 10 CFR 835, "Occupational Radiation Protection".

Part 835 establishes the requirements for radiation protection that apply to all NSLS staff, users and guests during work within the facility. It covers all radiological issues relating to work at the NSLS and ranges from dosimetry to training to work practices. Any non-compliance with a NSLS radiological requirement becomes a non-compliance with Part 835, and thereby becomes a PAAA non-compliance.

What is our responsibility for addressing PAAA non-compliances?

NSLS management is responsible for timely self-identification and reporting of PAAA noncompliances, and for prompt and comprehensive corrective actions to address non-compliances. BNL has established a PAAA Coordinator to evaluate potential non-compliances and to follow all BNL PAAA issues. DOE provides rigorous oversight of this program through its

local PAAA Coordinator and through its Office of Price Anderson Enforcement located in Washington D.C. The DOE has not hesitated to take strong actions when it believes that the responsible managers have not adequately addressed program weaknesses. Additional information about the Office of Price Anderson Enforcement and its follow-up actions is available at the following:

<http://tis-nt.eh.doe.gov/enforce/>.

Conclusion

Safe operation and research that is in full compliance with the NSLS radiological requirements is very important to our mission and program. All users and staff are expected to adhere to our requirements while working in our facilities. Such adherence is necessary for your individual safety, as well as for the NSLS and BNL reputation.

The PAAA violations that we have experienced in the past year have involved basic issues such as wearing a TLD dosimeter while on the experimental floor and maintaining radiological training current. Make sure that you always wear your radiation badge when entering the Controlled Area and that you requalify when you receive notices that your training is about to expire. However, all the radiological issues addressed in NSLS training require respect and attention - if you have any questions regarding the applicability of a requirement to your work, please contact a member of the NSLS ESH staff.

The NSLS Newsletter is printed on paper containing at least 25 percent recycled materials, with 10 percent post-consumer waste.



NSLS's Youngest Scientists Learn from Light on "Take Our Daughters and Sons to Work" Day

On April 24, 2003, about 30 daughters and sons learned about some of the scientific programs at the NSLS, and even performed their own scientific experiments. The one-day visit was part of the national "Take our Daughters and Sons to Work Day."

At the NSLS, the children learned that the facility produces many types of light, from microwaves to x-rays, which have many applications in many fields, including electronics, catalysis, microscopes, and medicine. NSLS scientists, Marc Allaire, Steve Hulbert, Lisa Miller, and Vivian Stojanoff, offered a tour of the experimental floor to the boys and girls, who discovered how synchrotron light is used to design non-stick coatings for aluminum pans, study bone diseases like osteoporosis, and develop new drugs using protein crystallography.

After the tour, the daughters and sons had the chance to perform their own scientific experiments. Marc Allaire dem-



onstrated simple reflection of light from a mirror and contrasted that with the process of diffraction, which was illustrated by reflecting red laser light from a CD-ROM – the world's most popular diffraction grating. But perhaps the most exciting moment was when the boys and girls discovered that they could create their own rainbow patterns by diffracting visible white light from the CD-ROM.

The boys and girls then had the opportunity to learn from Lisa Miller about the wonders of liquid nitrogen. By immersing an inflated balloon in liquid ni-

trogen, they discovered that the air inside of the balloon contracts, and then re-expands when warmed up. Much to the amazement of the entire crowd, the balloon survived dozens of repeated freeze-thaw cycles without bursting. But perhaps one of the most memorable experiments involved freezing natural versus artificial daffodils in liquid nitrogen. Both the children and their parents learned that it is much more fun to freeze and crumble a living flower than to take it home as a souvenir.

Weekly NSLS Activities

TUESDAYS

Bi-Monthly Symposia: 10:30 to 11:30 a.m., Seminar Room

See URL below for schedule:

<http://www.nsls.bnl.gov/newsroom/events/seminars.htm#12>

WEDNESDAYS

Joint VUV and X-Ray Users' Meeting: 11:30 a.m., Conference Room A. Experimenters and staff meet weekly to decide on any proposed short-term schedule changes, to make announcements, and to discuss issues of relevance to operations. To subscribe to the email list for meeting minutes and schedules, follow the instructions at the URL below:

http://www.nsls.bnl.gov/newsroom/events/weekly_meetings.htm

Coffee for Users and Staff: 3:30 p.m., NSLS Lobby. The NSLS hosts a coffee break as an opportunity for users to meet one another and NSLS staff.

FRIDAYS

Student/Postdoc Pizza Get-Together: Every other Thursday, 4:00 p.m., NSLS x-ray ring kitchen (across from vending machines). Funded by the Users' Executive Committee (UEC). All local and visiting students and postdocs are invited to attend.

Friday Lunch Seminars: 12:00 to 1:00 p.m., Seminar Room. Learn about the exciting research being done at the NSLS. Two unannounced, informal, half-hour presentations are made weekly by experimenters. Attendees can bring their own lunch or can place a sandwich order by contacting Lydia Rogers at (631)344-4746 or lrogers@bnl.gov by 10:00 a.m. on Friday. Orders must be paid upon delivery.

Journal Club: 3:00 to 4:00 p.m., Conference Room B. Students, postdocs, and staff present hot new research publications of their choice for group discussion. Everyone is invited to attend and volunteers are always welcome. For more information, contact Cecilia Sanchez-Hanke, (631)344-5699 or hanke@bnl.gov.

NSLS Information and Outreach Office
Brookhaven National Laboratory
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P.O. Box 5000
Upton, NY 11973-5000

Call for NSLS General User Proposals

For Beam Time in Cycle
May - August 2003

Deadline
Tuesday, September 30, 2003

General User Proposal and Beam Time Request Forms including instructions can be found at:
http://www.nsls.bnl.gov/users/procedures/proposals/general_user.htm

Proprietary Proposal Forms including instructions can be found at:
<http://www.nsls.bnl.gov/users/procedures/proposals/proprietary.htm>

Safety Approval Forms

Safety Approval Forms (SAFs) are required for every experiment. Your SAF must be submitted online **at least one week before** your scheduled beam time. To submit, go to:

<http://130.199.76.84/safety/default.asp>

NSLS User Administration Office

User Information, Registration, and Training:
Phone: (631) 344-user Fax: (631) 344-7206

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The *NSLS Newsletter* is published triannually by the Information and Outreach Office, National Synchrotron Light Source Department, Brookhaven National Laboratory

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For additional information about the NSLS (including this Newsletter in electronic format) see the NSLS Home Page on the World Wide Web at:

<http://www.nsls.bnl.gov/>