JULY 1996 NSLS NEWSLETTER

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IMPORTANT UPCOMING DATES

August 22, 1996

Town Meeting

August 23, 1996

UEC Meeting

September 23, 1996

Deadline for General User Proposals

September 30, 1996

Deadline for General User Proposals

October 21-23, 1996

Workshop on X-ray Analytical Characterization

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July 1996 NSLS NEWSLETTER

VUV Beamline Upgrade Status: U7A, U5UA, and U4B

Steve Hulbert
NSLS Beamline Support/R&D

The NSLS is in the midst of a significant project to upgrade various soft x-ray beamlines which can no longer provide the desired combination of energy resolution, flux, and spot size on sample. The first phase of this project, begun in 1993, consists of upgrades to beamlines U7A and U5UA, and replacement of U4B What follows is a brief description of each of these three new beamlines and their present status, including up-to-date photographs. Each of these beamlines will be the subject of future Newsletter articles.

BEAMLINE U7A

The U7A bending magnet toroidal grating monochromator (TGM) beamline has been converted into a variation of the now-standard spherical grating monochromator (SGM) type: The U7A variant begins with a single toroidal collecting and focusing mirror, instead of the "standard" Kirkpatrick-Baez mirror pair. Dubbed the TSGM (toroidal mirror, SGM) beamline design, its resolution is identical to the standard SGM design (e.g. at beamlines U4B and X1B). The U7A TSGM can accept up to 10mrad horizontally, whereas the standard SGM can accept as large a horizontal fan as one can afford (15mrad is typical). The major driving force in the design of the new U7A beamline was to maximize the number of beamline components which could be reused (recycling of beamline components). By choosing the TSGM design, all of the vacuum chambers, mirror mounts, and grating chamber mechanism were reused; only the optical elements were replaced (ones with state-of-the-art figure and finish).

The TGM-to-TSGM upgrade was completed in June 1995. Commissioning demonstrated a resolving power equal to that of the U4B "Dragon" SGM and slightly greater flux (the flux comparison was made using an experimental apparatus which had used U4B previously). Two tandem end stations optimized for operation in the Carbon K-, Oxygen K-, and transition metal L-edge ranges, each with its own refocusing mirror, are in the process of being constructed and commissioned. When both are operational, they will be able to share beam time by simply removing the first refocusing mirror from of the beam path when the second station needs to operate.

The first end station, provided by a collaborative team from Dow Chemical (Ben DeKoven, *et al.*) and NIST (Daniel Fischer), has been operating in an un-refocused position immediately downstream of the monochromator exit slit for nearly one full year. This end station utilizes soft x-ray absorption spectroscopy to study the structure and chemical nature of diverse materials that are strategically important to U.S. industry. Electron and fluorescence signals are both acquired, providing

surface-sensitive (5nm) and bulk-sensitive (200nm) structure and chemistry information simultaneously. Practical industrial problems in areas such as model catalyst systems and polymer surfaces and their interfaces are currently being investigated.

The second end station, provided by DOE Chemical Sciences Division, will be used by a cooperative team from the BNL Chemistry Dept. (Jan Hrbek and Jose Rodriguez) and U. Michigan (John Gland). The first spectrum from this end station was taken on June 7, 1996. A large, kinematically-mounted support and 25"-travel z-stage will permit the refocused synchrotron radiation to enter at either level of a two-level experimental chamber dedicated to the investigation of complex surface intermediates important in catalysis. The upper level is a high pressure chamber equipped with a fluorescence yield detector for near edge x-ray absorption fine structure studies of surface species present in an ambient background of reactive gas. The lower level will use high resolution soft x-ray photoemission to measure the transient behavior of known spectroscopic features in well-characterized adsorbed species (e.g. simple molecules [NO(sub)x, O(sub)2, S- and Cl-containing species] on metals [Ag, Ru, Pd and Pt]) to determine the kinetics and mechanism of surface reactions.

BEAMLINE U5UA

A new beamline based on a Spherical Grating Monochromator (SGM) has been constructed and installed at undulator beamline U5UA during the winter 1995 shutdown. In addition to the inherent advantages of the SGM design (good photon energy resolution and high flux), the new U5UA beamline features increased photon energy range (10-250eV) and much better (100-fold) refocusing capability of the final mirror, compared to the previous (TGM-based) beamline. Commissioning, by Elio Vescovo and Steve Hulbert, began in February 1996 and is nearly completed (June 1996). Elio joined the Beamline R&D Group in July 1995 and shouldered more than 90% of the commissioning work; he also will head the U5UA experimental program in spin-polarized photoemission.

The new beamline will significantly enhance the capability of the spin-polarized valence band photoemission program at U5UA, the only such facility in the USA. The experimental program in spin-polarized photoemission will resume in July 1996, with 40% General User allocation.

In the next year or two, a conceptual design study will be take place to determine the best type of circular polarizer to use for the photon energy range covered by the U5UA beamline (15-270eV). This should lead to implementation of such a polarizer at U5UA, thereby enabling "complete" spin-polarized photoemission experiments (polarization selection of the exciting photons and spin-sensitive detection of the photo-emitted electrons) to be performed.

The U5UA endstation, originally built by BNL Physics Dept. with help from the original U5U IDT members, is a unique national resource for valence-band angle-resolved spin-polarized photoemission spectroscopy. In addition to Elio, each of the U5UA IDT members [Peter Johnson (BNL Physics), Jim Erskine (U. Texas, Austin), Sam Bader and Dongqi Li (ANL)] leads an ongoing program using this endstation to investigate a particular aspect of surface or interface magnetism.

BEAMLINE U4B

All of the "Dragon" beamline components downstream of the collecting and focusing mirrors (M0 and M1) were shipped to SRRC in March 1996. In order to maintain the U4B scientific program (mostly soft x-ray MCD) with as little downtime as possible, all of the U13UA beamline components downstream of the entrance slit (this includes the grating chamber, exit slit, and I0 chamber) were moved from U13UA to U4B in April 1996. Two more supporting reasons for this move are: (1) the U13UA gratings are not water cooled (retrofitting water cooling to the grating chamber would not be efficient) and the SiC soft x-ray gratings deform or move slightly, but significantly, under the rather large heat load from the U13 wiggler when it operates at maximum field (K=7.7). Thermal problems from the U4B bend magnet source will be negligible. (2) the new U13UB high resolution low energy (5-30eV) NIM beamline, which will arrive and be commissioned during summer 1996, will need a large fraction of the U13U beam time for at least three years, in order to develop the new scientific programs planned for this beamline.

A postdoc (Jaehoon Park, who conveniently just spent two years as an AT&T Bell Labs postdoc stationed at U4B) has been hired for one year to commission the new U4B beamline and to run its General User program (as well as to continue his own scientific work in high-resolution photoemission of heavy Fermion systems). Commissioning is expected to be completed by August 1996. The U4B scientific program will resume in July 1996 under the PRT leadership of Yves Idzerda (NRL) who will be represented locally by postdocs Varoujan Chakarian and John Freeland. The NRL program at U4B will continue their ongoing magnetic circular dichroism (MCD) studies of magnetic thin film materials and their interfaces.

Acknowledgments: All three of these beamlines were assembled, installed, leak tested, and mechanically debugged by three technical members of the Beamline R&D Group: Gary Nintzel, Dennis Carlson, and Skip Thomas. The following components were provided by McPherson, Acton, MA: both U7A refocusing mirror manipulators/chambers/stands, U5UA entrance (cooled) and exit slits/slides/stands, U4B entrance slit/slide/stand and U4B refocusing mirror manipulator/chamber/stand. The U5UA grating chamber was provided by Oxford Instruments, Osney Mead, UK.

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July 1996 NSLS NEWSLETTER

Introduction by the NSLS Chairman

Michael Hart

Just prior to the annual Users' Meeting the Science Advisory Committee held its first meeting of the year. Some members were able to stay on for parts of the Users' Meeting.

The inset lists the external members of the Science Advisory Committee. In addition, the ex-officio members include the Director, Deputy Director, and Associate Director for Basic Energy Sciences of BNL, the Chairman, Deputy Chairman and Associate Chairman of the NSLS and the Chairman of the Users Executive Committee.

Much of the discussion centered on the current and future prospects for the NSLS user program in a funding climate which has changed dramatically during the lifetime of the present system. Priorities for projects within the purview of the NSLS must be ever more closely related to the opportunities available to the PRTs through their normal funding routes; cooperation and collaboration are the buzz words of our times. As a matter of urgency the SAC agreed to restart the cycle of tenure reviews for the PRTs which will commence at the end of September and that will be followed by an examination of both the accelerator and beamlines R&D programs. Requests for information were mailed to PRT Spokespeople and Local Contacts and it is anticipated that the reviews which will start in the Fall will involve oral presentations by some PRTs.

In 1995 the AUI Visiting Committee called for a "White Paper" from the NSLS which was presented to them during their meeting at the end of April. It summarizes the achievements of the program so far, describes the opportunities which exist now, and outlines the changes which we believe are necessary to ensure the quality and productivity of photon based science from the Brookhaven NSLS into the 21st century. The Visiting Committee asked for the paper to be in a form suitable for wide distribution. If you were unable to attend the Users' Meeting last month and wish to receive your copy, please send a request to the User Administration Office (wright1@bnl.gov, or fax to 516-344-7206). I shall be very pleased to receive your comments and support in securing the productive scientific future which is foreseen.

NSLS Scientific Advisory Committee

- Chairman: Boris W. Batterman (CHESS)
- Stephen Harrison (Howard Hughes Medical Inst., Harvard U.)
- Franz Himpsel (University of Wisconsin)
- Jochen Schneider (HASYLAB)
- Albert J. Siever (Cornell University)
- Paul Sigler (Yale University / Howard Hughes Medical Institute)
- Sunil Sinha (Argonne National Laboratory)

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A User's Perspective

Peter Stephens
SUNY Stony Brook
Users' Executive Committee Chairman

The 1996 Annual Users' Meeting was an opportunity to reflect on the scientific and technical accomplishments of the last year, to give a formal welcome to Michael Hart as the new NSLS Chairman, to hear about the progress of the 1996 Scientific Facilities Initiative, and to see some old friends again. However, it was also an occasion to recognize that clouds are gathering on the horizon for the support of our facility (and others). The May 9 issue of Nature magazine carries a news article which includes the statement, "In the view of some congressional staff, these machines [the Advanced Light Source and Advanced Photon Source] ought to replace the existing radiation synchrotrons [such as the NSLS]..."

I believe that the NSLS has a very productive future, and will continue to play an important scientific role in the years ahead. We have to bring this case to the people who support us through the funding agencies, and to the lawmakers who write the budgets. For example, last year, the user community at all of the DOE-supported scientific facilities made our voices heard, and the Scientific Facilities Initiative (SFI) was passed by Congress in the fiscal 1996 budget. This increased the money available to the facilities themselves for operating and capital expenses, and also funded the construction of new instrumentation by university-based groups.

As I write this, Congress is starting to consider the FY'97 budget. The Users' Executive Committee recently sent letters explaining the importance of continuing the SFI to all of the members of the Energy and Science subcommittees of the House and Senate Appropriations Committees. (I'll send my mailing list to anybody who drops me an e-mail: pstephens@sunysb.edu. If your senator or representative is on one of those committees, it would be particularly useful for you to express your opinion to him or her.) The NSLS is one of the worldÕs foremost research facilities. Its chairman has a strong vision for the future, judging from his remarks at the Users' Meeting and from the White Paper, "NSLS Into the 21st Century" prepared under his stewardship. The latter has just been released (available from the User Administration Office; send your request with name and mailing address to wright1@bnl.gov or fax # 516-344-7206), and I urge everyone interested in the facility to read it carefully.

Another form of communication worth improving is that from the users to the NSLS. The initiatives undertaken by the NSLS on our behalf require up to date information about the PRTÕs, and in many cases, this information is simply not available. For example, I was surprised to learn that several PRT's applied to the DOE for SFI '96 money without even informing the NSLS of their requests. If we want the NSLS to do the best possible job of helping us run our research programs, we have to tell them exactly what we are trying to do. Accurate and timely PRT annual reports to the NSLS are very important for their planning, and for documenting the high productivity of this facility. Include the appropriate acknowledgment of support ("Research carried out in part at the .."). Users whose data remain

unpublished (e.g., proprietary data) also need to find a way to recognize publicly the utility of the NSLS to their efforts.

As a user, I urge the entire community to keep the facility up to date on our progress, as well as our specific wishes and plans. As the Chairman of the UEC, I hope to promote communication in both directions between the facility and the users. Comments? Questions? Suggestions? Please contact me at pstephens@sunsyb.edu.

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VUV Ring Status

Stephen Kramer
VUV Ring Manager

During the Winter 95-96 shutdown of the VUV Ring, a major upgrade of the beam ports was accomplished. One quarter of the dipole magnet beam chambers in the Ring were replaced, in order to accommodate two new infrared beam ports. The U12IR beam port is a new beam port, similar in construction to the U4IR beamline that has operated so successfully for many years. The main improvement over U4IR will be the planned multiple beamlines that will allow rapid switching of the beam between two or more experimental facilities. The U10IR beam port replaces the conventional U10 beam port, with a larger aperture (100H X 48V mrad.) port that will provide greater flux for the diffraction limited infrared beam. This beam is also planned to be switched between two or more experimental facilities. These new beam ports will double the number of infrared beam ports on the Ring and increase the number of switched infrared beam lines by a factor of three. This will reduce the backlog of users waiting to run infrared beam experiments and will provide the resource for greater user investment in new infrared experimental facilities.

The effort to replace these vacuum chambers on an operating facility is significant even if the accelerator was designed for easy access to the magnets and beam chamber. However, the VUV Ring was designed with a minimum of radiation shielding and additional shielding was installed as the loss points were identified. Needless to say the added shielding was not installed in a way that made this access to the ring components any easier. In order to accomplish this major reconstruction effort in a two month shutdown (including the Thanksgiving, Christmas and New Year Holidays), careful planning by the Mechanical and Vacuum Groups was essential. This was even more critical, due to the uncertainty of the availability of the front-end components for the U10IR beam port which were being manufactured outside and were not scheduled to be delivered until near the end of the shutdown. By well defining the tasks and the effort involved, the schedule was easily adjusted to compensate for unforeseen problems and delays in receiving the U10IR components.

The vacuum chamber replacement, though simple in principle, required: the removal of massive amounts of lead and concrete shielding, removal of four quadrupole, two sextupole and four trim magnets, the installation of four new beam position monitor electrodes and the installation of the photon beam defining apertures for five beam ports (two new and three existing ports). All of this, plus the existing dipole magnets, had to be realigned to better than a 0.2 mm resolution, without the access to two of the original survey monuments installed when the ring was constructed. The trickiest part of the whole operation was the in situ welding of the two new chambers to the existing chamber in between the two dipole magnets. This was a hand machining and welding operation performed by the craftsmen from the Central Shops and the NSLS Mechanical Group. These four welds had to be vacuum tight and remain tight during the bake out and subsequent beam loading. The ring was back under vacuum by January 4,1996 and after a three day bake and final survey, injection was achieved by January 12,1996.

During initial operations there was difficulty in getting sufficient current into the ring at the old vertical betatron tune. This appeared to be the result of an ion induced tune spread which caused the tune to lock on the 1.25 resonance. Previously the vertical tune had always been significantly lower, avoiding this disastrous resonance. However, several years ago the tune was raised to 1.24, in order to avoid a coupling resonance which induced a vertical size change in the beam as the current induced tune shift allowed the tune to pass through this coupling resonance. By shifting the vertical tune above the 1.25 resonance both problems were avoided and currents up to 900 mA were rapidly achieved first in 5 bunches and then in 7 bunches. After a weekend of beam conditioning of the vacuum chamber (integrated current 20 Amp-hours), the beam induced desorption was back to within a factor of five of pre-shutdown values. By Thursday January 18th the vacuum desorption was back to within a factor of two of the pre-shutdown values and both U9B and U10B were able to open up to beam and verify that the vertical beam position was back to within 50 microns of the pre-shutdown orbit. By the weekend (2 days ahead of schedule) the VUV Ring was declared operational with additional injections during the night time hours to increase the synchrotron radiation scrubbing. Aside from the vertical tune change, no changes in the VUV Ring parameters were observed. In fact previous attempts to change the vertical tune to a higher value had always met with poorer injection efficiencies. The new vertical tune of 1.26 has the advantage of greater freedom from resonance problems and was a desirable change.

These changes to the capabilities of the VUV Ring continue to expand the resources of this second generation light source in the areas that the brighter beams but lower current third generation light sources donÕt compete as well. The success of the well planned and orchestrated upgrade of a major portion of the accelerator clearly demonstrates the importance of maintaining a highly skilled support staff for the continued development of the research potential of these mature light sources well into the 21st century.

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Synchrotron X-Ray Computed Tomography at the NSLS

B.A. Dowd
NSLS

Computed tomography was first developed by Oldendorf and Hounsfield in the 1960's for clinical use in radiology. By 1973, the first x-ray transmission computed tomography system was built and tested by Hounsfield. Today, X-ray transmission Computer Assisted Tomography is a routine diagnostic test in medical radiology.

The availability of synchrotron x-ray radiation to the scientific community sparked new developments in the field of x-ray tomography. The advantages offered by synchrotron radiation over x-ray tubes have been exploited by scientists in both medical and non-medical applications. With the high fluence and energy tunability of the nearly collimated synchrotron source, monochromatic measurements are possible. This is especially important in medical applications, such as the Multiple Energy Computed Tomography project for cerebral and vascular imaging at X17, which is being carried out by Dr. Avraham Dilmanian of the BNL Medical Department. The use of monochromatic energy in MECT allows higher signal to noise and contrast compared to conventional tomography using the same absorbed dose to the subject.

Recently, the implementation of Charge Coupled Device(CCD) area detectors in synchrotron x-ray computed tomography has facilitated the development of a new class of micron resolution 3-D imaging, microtomography. The use of the CCD array offers the potential for higher resolutions and faster acquisition times for samples on the order of a few mm. This configuration has been used at the NSLS by both Exxon at X2B, and by BNL, Mobil Corp., and GTE at X27C to study the pore geometries of oil reservoir rocks for oil recovery predictions. The efforts in nondestructive three-dimensional imaging using synchrotron x-ray computed tomography by the three groups at the NSLS, Exxon, the BNL Medical Department, and BNL/Mobil/GTE, have progressed in parallel with detector, CCD and computing technology over the last several years. The following is a summary of some of the more recent work by these groups in x-ray Computed Tomography at the NSLS.

X-Ray Microtomography: Beamline X2B

In 1988, Exxon constructed the first dedicated microtomography facility in the U.S. at Beamline X2B at the NSLS. This work was headed by D'Amico, Deckman, Dunsmuir, Flannery and Roberge of Exxon and continues on today. This facility employs a CCD array in order to collect multiple slices simultaneously in a third-generation CMT scheme. Over the past year, Exxon's team, led by J.H. Dunsmuir, used the x- ray microtomography station at X2B to characterize 1-5 mm oil reservoir rocks, with 1-10 microns resolution. The pore geometries obtained from several reservoir rocks were imported

into geometric and diffusive transport models and used to calculate rock properties such as porosity, permeability and formation factor. Good agreement between model calculations and laboratory measurements has consistently been obtained.

Recently, Exxon has joined with David Sarnoff Research Center(DSRC) in evaluating the use of x-ray microtomography and real time digital subtraction microradiography(DSR) for the characterization of micromachines. The study resulted in a joint proposal to ARPA. DSRC's imaging and parallel computing technology will be applied to CMT data acquisition, processing, analysis and visualization to significantly advance the capabilities of X2B. Exxon has also been involved with the Mayo Foundation in an effort to apply CMT to biological microstructures. To date, three dimensional data sets have been acquired for rodent organs including the cardiovascular tree, the liver vascular and bilary duct systems, bone haversian network and the structure of the lung. The rodent organs are scanned using a conventional x-ray source, identifying small portions to be scanned at high resolution at X2B. The local reconstructions are then performed on the X2B data using region of interest reconstruction techniques. The Mayo foundation has been awarded NIH and NSF funding for a three year research program to continue this work.

X-ray microtomography at X2B has also been used by NIST recently, in the study of the structure and properties of concrete specimens before and after sulphate attack. The data shows three dimensional aggregate and mortar distribution as well as internal cracks and small crystal formation due to the sulphate attack. Structural relationships obtained from CMT are to be used to compare calculated with measured mechanical properties.

X-Ray Microtomography of Porous Media: Beamline X27C

The first computed micro-tomography measurements at NSLS by BNL staff were performed by Keith Jones and Per Spanne (presently at ESRF). They used first generation scanning methods, capable of producing images with resolutions on the order of microns. The speed of acquisition, however, was very slow and eliminated the possibility of in-situ fluid-flow measurements. The present CMT station was assembled by a team of BNL scientists in collaboration with Mobil Corp. and GTE Corp. as part of an Advanced Computational Technology Initiative(ACTI). The BNL team of Peter Siddons and Betsy Dowd (NSLS), Keith Jones (Applied Sciences), and Arnie Peskin and Ballard Andrews, (CCD), built the data acquisition apparatus, optimized the necessary reconstruction algorithms, and built a 3-D stereo viewing theater for virtual reality viewing of the reconstructed volumes.

The data collection apparatus implements a CCD array in a third generation design, that enables the acquisition of large three-dimensional volumes with 3 microns resolution, in a fraction of the time needed using the first-generation scheme. A fiber optic link from the data acquisition computer to the 3-D theater facilitates rapid data transfer.

A block diagram of the CMT apparatus in use by Mobil Corp. and BNL at X27C is shown in Figure 1. Beam energy optimization for each sample is controlled by a set of filters placed in the white beam. The detector array is a cooled CCD with 1317 x 1035 small pixels (6.8 microns square). Each row of pixels constitutes a single 2-D slice of the sample in the reconstruction. Subsequently, over 1000 horizontal slices can be recorded simultaneously. A thin YAG scintillator placed behind the sample converts the X-ray transmission map to a visible image, which is then magnified and re-imaged onto the CCD array.

A sample of a North Sea Brent sandstone acquired at 3 microns resolution is shown in Figure 2. The three-dimensional volume is comprised of the stacked slices, reconstructed from the data. From this data, the intergranular porosity in a 3-D pore network can be derived and used to predict the recovery efficiency of oil in a water flood. These kinds of models help determine where and how much oil is left in a field after various recovery methods are employed.

A significant number of reservoir samples have been analyzed over the past year. In addition, Mobil Corporation has used the CMT station to study the pore structure of oil reservoir seal rock and of various catalysts. Other materials that have been imaged recently with x-ray microtomography at X27C include meteorites, synthetic rock, electrode material, wood cells and various insects. The planned addition of a monochromator to the configuration will add even more flexibility to the types of samples that can be imaged successfully.

Multiple Energy Computed Tomography (MECT): Beamline X17B

A monochromatic computed tomography (CT) system is being developed at the X17B beamline for imaging the human head and neck. The project, Multiple Energy Computed Tomography (MECT), has been funded by the Office of Health and Environmental Research (OHER), U.S. Department of Energy. The rationale of the program is to establish the performance of a monochromatic CT, and to apply the system to clinical research. Narrow-energy-band x-ray beams are ideal for computed tomography (CT), not only because they eliminate beam hardening effects, but also because they allow choice of the optimal beam energy for a subject's size. This maximizes the monochromatic-image signal-to-noise ratio for a lesion that differs in its mean atomic number from the surrounding normal tissue, given the same radiation absorbed dose. In particular, such a gain in the signal (i.e image contrast) results from the fact that a) one can afford using the monochromatic beam at a lower effective beam energy; and that b) the attenuation coefficient curve as a function of the atomic number of the absorber is steeper at lower x-ray energies.

In contrast imaging, the advantage of the narrow-energy-band beam stems from a different effect. The entire energy spectrum can be concentrated immediately above the K-edge of the contrast element, thus maximizing image contrast. Further, it can maximize the signal-to-noise ratio if the K-edge of the selected contrast element is close to the optimal beam energy for that subject's size. As an example, simulation results indicate that in imaging a Shepp and Logan Head Phantom (oval), with a 16 cm longer diameter, CT with polychromatic x-rays of 80 kVp has 24% larger image noise than that with monochromatic x-rays of 42 keV (i.e. the mean energy of the polychromatic beam) and the same subject dose. A simulation code is being developed to compare MECT and CCT in endogenous imaging. MECT is being compared with conventional CT (CCT) in contrast imaging with Iodine(I) and Gadolinium(Gd). The following experiment was designed to compare the efficacy of MECT and CCT in contrast imaging with I and Gd.

An 18-cm acrylic cylinder with thirty 11-mm diameter paraxial channels containing aqueous solutions of 25 to 1600 micrograms Gd/ml, of 50 to 1200 micrograms I/ml, or water only were imaged. MECT (50.4 keV, i.e., above Gd's K-edge) and CCT (120 kVp, mean energy divided by 50 keV) images were acquired each at 3 mm slice height with approximately 2.0 cGy entrance absorbed dose. Figure 3 shows the image-contrast results as a function of concentration of the contrast agent. In particular, the image contrasts for 1600 microgram Gd/ml were 138 HU for MECT and 64 HU for CCT, while that for 1200

micrograms I/ml was 41 HU for CCT. Thus, for the same volume of Gd- and I-containing agents reaching a target organ, there should be 147 or 316 mg Gd/ml of agent for MECT and CCT, respectively, to match the image contrast from 370 mg I/ml of agent using standard CCT. These results demonstrate the efficacy of the monochromatic CT for contrast imaging. They also indicate that Gd is more suitable than I for CT of an 18-cm subject. MECT's first clinical studies will be: a) imaging the composition of carotid artery plaques using dual-photon absorptiometry; and b) CT angiography using I or Gd.

The author gratefully acknowledges the contributions to this article from A.Dilmanian (Med. Dpt.,BNL), J.H. Dunsmuir (Exxon), Randy Hazlett (Mobil), and Peter Siddons (NSLS).

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Focus on.....NSLS Operations Group

Richard Heese
Operations Section Head

The charge to the NSLS Operations Group is to produce the maximum number of photons on the user experiments, smooth the way for all users to have the most efficient access to these photons, be a clearing house and problem solver for all unanticipated conditions encountered by the large and varied NSLS user community, oversee, and, if necessary, enforce safe operation of all NSLS activities, coordinate response to any unusual condition from lost safety approval forms through a malfunction of one of the innumerable components of the NSLS accelerator complex to life threatening emergencies. In addition, the Operations Group looks after the building security system, coordinates the setup of operational and maintenance scheduling, organizes the weekly user meetings, compiles accelerator statistics and last, but not least, has the responsibility of monitoring the LEGS hydrogen target. The control room is staffed 24 hours every day of the year; exceptions are simultaneous shutdowns of both storage rings for more than a week and the Independence Day weekend.

To accomplish these wide ranging and varied tasks, the Operations Group consists of dedicated and talented personnel, starting with the Control Room staff: the Operations Coordinators (OpCo's) and Accelerator Operators Mike Buckley, George Jahnes, Billy Jew, John Klug, Leonard Pharr, Pete Ratzke, Tony Rodrigues, Mike Santana, Gary Weiner, Ed Zeitler, OpCo Leadman and Maintenance Coordinator Steve Kemp and Control Room Supervisor Randy Church. Other members of the group are Injection System Manager Eric Blum, X-Ray Ring Manager and Beam Line Liaison Manager Roger Klaffky, VUV Ring Manager Steve Kramer, Operations Group Engineer Jeff Rothman, and Operations Section Head Richard Heese.

The Control Room staff deals basically with two areas. The OpCo's are primarily occupied with the technical and administrative concerns of the approximately 80 user beamlines. For safety reasons, beamline operation involves a large number of interlocks and security systems to prevent injury to personnel and damage to complex and expensive equipment. The OpCo's are the NSLS' "front line troops" in assuring a safe and effective stay for the over 2200 yearly NSLS users. The OpCo's not only know the "secrets" of beamline operations (each of which is slightly different from the others), but are also trained in the large number of regulations and procedures required (from DOE, BNL, and NSLS) to safely operate the facility.The OpCo's are further trained in emergency procedures and response, and also cheerfully deal with the many unanticipated details and help with problems that may be experienced by our large user community. It is a challenging, satisfying, sometimes frustrating and entertaining job.

The Accelerator Operators have the task of running the three synchrotrons (VUV, X-Ray, and Booster) and the linear accelerator. The major effort is to refill the storage rings with electrons at specified intervals, measure and correct the orbits, adjust insertion devices and monitor machine performance. Injection must take place as quickly as possible to maximize the beam time available and this involves

"tuning" the accelerators - a skill not easy to acquire due to the complexity of the systems and the many hundreds of parameters that can affect accelerator performance. Although we are moving toward more automatic system adjustment and tuning procedures, a skilled Operator will always be an asset. The Operators are also called on to diagnose accelerator problems and must make decisions about whom to contact if there is a difficulty with the machines. Because of the matrix NSLS organization, the Operations Group can draw on the personnel of other NSLS groups to repair or clear up trouble encountered during facility operations and is empowered to call on these staff members at any time of the day. OpCo's and Accelerator Operators are "cross-trained" to a considerable degree and can perform most of the routine functions of the other group.

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DOE Survey of NSLS Users

Eva Z. Rothman
NSLS User Administrator

I would like to thank everyone who took the time to respond to the survey that the NSLS was asked to perform at the end of April. The results have already been sent to DOE, and NSLS Management has also studied the responses.

Of the approximately 2900 active users, only about 2200 come to the NSLS during a one-year period. 2000 of you have provided e-mail addresses and this is the group which was targeted in the survey. We felt that we would probably receive a bigger and faster response if the respondents were tempted with the convenience of e-mail. Of the 2000 recipients of the survey, 380 returned answers for a response rate of 19%. 347 of those responses were received within the first week. 319 of the 380 respondents voluntarily identified themselves; the other 61, whose identities were of course revealed on the e-mail header, remain known only to myself. All were users who had come to the facility within the calendar years 1994 through 1996.

The survey consisted of seven questions devised by the DOE plus questions 8 and 9 added on by the NSLS. In the first 4 questions, respondents were asked to use ratings of 1 through 5, with 5 being the best. In answer to "How satisfied are you with the schedule or service (was the beam delivered on schedule)?", more than 92% of the responses ranged from "satisfied" to "very satisfied". In answer to "How satisfied are you with the service (was it close to specifications)?", 96% responded as "satisfied" to "very satisfied". A similar fraction, 91%, were "satisfied" to "very satisfied" with the support for users. On the whole the NSLS users seem to be pleased with the facility and its efforts in providing reliable beam and good services, which is consistent with the DOE Customer Satisfaction Survey conducted in 1994 by an independent contractor. Questions 5 and 6 elicited a wide range of feedback on many topics. They were: "Within a constant budget, what would you like the facility to do differently?" and "Other comments?". Although the responses were as individual as the users, there were three major themes that I could identify:

IMPROVING LIVING CONDITIONS ON THE EXPERIMENTAL FLOOR, INCLUDING LIGHTING, SEATING, AND FOOD

What the NSLS is doing about your living conditions:

The feedback you have given us in all these areas has provided good "ammunition" for us to approach the other BNL divisions and offices on which we depend.

1. Food: We are already meeting with the new cafeteria/food service provider at BNL whose contract began on May 1, 1996 about improvements to the vending machines. Unfortunately, not much can be

done about on-site restaurant hours, but for those of you who can't get away from the beamline there are a number of delicatessens and pizza shops that have delivered to NSLS. The User Administration Office has a list of those that we know are familiar with the BNL site.

2 . Noise: There have been attempts to identify the sources of and reduce the noise on the UV floor but the results were not as dramatic as hoped for and have so far discouraged implementation on the X-Ray floor.

3. Dirt/Trash: The NSLS has little or no control over the number of custodial staff it receives - in fact, the custodial staff throughout the BNL site has been reduced and this has affected our services both on the experimental floor and in staff offices. Larger or additional trash cans should be distributed around the beamlines to accommodate the increased amount of trash on weekends.

4. Library/Computers: Michael Hart has charged a committee composed of two NSLS staff members and two users to examine the NSLS Library - what its function is and should be - and make recommendations about its future. This would include the types of materials that should be available and what resources should be dedicated to maintaining them, including a librarian actually stationed in the library. There are already plans to upgrade the printer, and to replace the current PC with a more powerful model. The addition of a workstation is also being considered. In a prompt response to a request made by the Users' Executive Committee, analog phone lines have been installed in both the Library and Conference Room C so that laptops could be used conveniently.

5. Chairs: The NSLS intends to supply the beamlines with a number of comfortable new chairs and is currently trying to determine how many are needed, and where. Delivery can be expected by late summer/early fall.

MORE BEAM TIME, ACCESSIBLE IN MORE FLEXIBLE WAYS, SHOULD BE AVAILABLE

What the NSLS is doing about beam time:

1. There are a number of beamlines which are oversubscribed and which give the impression that General User time is a scarcity, yet there are other beamlines which are infrequently requested by General Users. The preferences are due to many factors, including the support provided by the PRT, the state of the beamline, and what it was designed to do. The Scientific Advisory Committee, re-formed by Michael Hart this year, is charged with reviewing the scientific programs at the NSLS and reviewing Beamline Tenure. This is not with the intent of "tossing out unwanted PRTs" or mandating an increase of the General User fraction, but to help the NSLS prioritize its resources (such as Facilities Initiative funds) to maximum benefit and assist PRTs in any way it can.

2. A new Proposal Database has been designed to replace the large WordPerfect file in use over all these years. The new Database is flexibly designed to allow future tracking of many types of proposals with different turn-around times and processing paths.

3. Studies and Maintenance will always be necessary for testing and installing improvements to the storage rings and supporting systems, and really can not be further reduced or eliminated. Over the past few years, as funding to the NSLS has leveled off and declined somewhat, the NSLS has always chosen to provide operations year-round at the expense of some equipment and beamline upgrades. The Studies

and Maintenance time we do use is scheduled carefully but should it end early, then beam is brought up and the extra operations time is always made available to the PRTs.

4. Beamline Confederations or "Super-PRTs": The NSLS has proposed and encourages the formation of "super-PRTs" or beamline confederations that could share resources to their mutual benefit. Some ideas: Within such a confederation, beamlines could be dedicated to specific techniques so that less operations time is lost in changing over between experiments. The confederation arrangement could guarantee all members PRT-mode access to all the beamlines in the group, thereby actually expanding the techniques available to each PRT. Beamlines with similar capabilities could retain a floating "free period" that could be used for rapid access experiments either for PRT or General User time, or both.

REVITALIZING THE PRT SYSTEM

Under this category came a number of suggestions and requests:

- More standardized software and hardware, to make both using and supporting a group of beamlines more cost efficient.
- Equipment pools - more of them, better maintained, more equipment.
- Beamlines optimized for particular measurements instead of having switching back and forth between modes - as long as that PRT can still be guaranteed making those other measurements somewhere.
- More different types of General User Proposals, including a "rapid access" mechanism.

What the NSLS is doing about the PRT system:

All of the above can be addressed by a cooperation among several beamline PRTs. The NSLS has already proposed such "confederations" of PRTs in the areas of structural biology, powder diffraction, and EXAFS, and the suggestion was greeted favorably by the user community and the Scientific Advisory Committee. The NSLS can and will not mandate the formation of such confederations, nor does it have the resources to fully support and fund such arrangements for the PRTs. However, should a group of PRTs join together and develop a plan or formalized relationship, the NSLS may be able to assist in certain areas and contribute some specific resources to the effort. In the area of EXAFS the NSLS already supports an equipment pool and NSLS staff has been helping to explore common beamline software. Also, the Scientific Advisory Committee will be evaluating the vitality and scientific output of each PRT as part of the tenure review - again, this process will help the NSLS identify and prioritize the areas that require attention.

In the current budget climate, and especially with the latest DOE trend of "customer satisfaction surveys", NSLS users may occasionally be asked to respond to questionnaires from the Department of Energy, the NSLS, or even their own institutionÕs management about their experience at the NSLS. Again, we thank those of you who have responded to these surveys in the past as well as those who participate in the future. I wish to emphasize to the user community that the NSLS does pay attention to your comments and suggestions and that, however long some improvements make take to implement, we are constantly trying to use our resources wisely to provide the best possible facility for both NSLS users and staff.

This document is maintained by the NSLS User Administration Office.

DISCLAIMERS : Revised Date : August 6, 1996

July 1996 NSLS NEWSLETTER

Chemical Safety: Not a Matter of Luck

Andrew Ackerman
NSLS Environment Safety and Health (ES&H)

Your help is needed in improving chemical use and storage at the NSLS. Two recent incidents underscore the need for renewed attention to this issue: a bottle of acid burst in the hazardous waste storage shed, and several bottles of old ethers and furans were abandoned in storage cabinets and had to be removed from the building with great care and expense. In both cases we were forced to proceed with incomplete information, adding risk to personnel which we would have preferred to avoid. No one was injured but we had to rely a good deal on luck and we're afraid our supply of luck may be running low.

The acid bottle that burst received considerable attention and renewed our respect for the reactivity of nitric acid. That bottle was in our hands the day before it broke! It was placed in the hazardous waste storage shed as part of a sweep through cabinets on the Experimental Floor aimed at disposing old chemicals. We eventually learned that the bottle contained a mixture of nitric acid and some reduced material that must have been oxidized over time, released CO2, and developed sufficient pressure in the sealed bottle to break the glass and spray acid over a good portion of the waste shed. We needed help from the BNL Emergency Services Group to collect the spilled liquid, and were all a little nervous about how to proceed as there was no indication on the bottle of its contents or its owner. We certainly used up some luck on that one.

The old ethers and furans were also found during the chemical clear out sweep. Over time, old ethers and furans tend to form peroxides that when disturbed could react violently with the solvent and explode. Since, once again, there was no owner's name on the bottles we were forced to guess how old they were. These bottles had not exploded, but no one volunteered to open them. An outside contractor was brought in to remove the bottles from the building and set up a pneumatic device to remotely remove the caps as we watched from a distance. It was interesting to watch the operation but once was enough and we figure we used up a little more luck.

So, what should we do to improve things? The Environment Safety & Health (ES&H) group at the NSLS feels it is our responsibility to make it as easy as possible for NSLS Users to do the right thing. We have no interest in becoming a police force; we much prefer to establish guidelines, supply advice and support, and ask that you follow our suggestions. (How to do your part) For the chemical storage problem, we want to improve labeling and ask that you not plan on storing any chemicals at the NSLS for an extended period. Plan ahead - ship what you need before you arrive, and discard or ship any excess materials back to your home institution. It is easy to dispose of wastes at BNL: the Hazardous Waste Management Group will take any wastes you supply at no charge. All they ask is that you complete their forms so they know what they're taking and can direct it to the appropriate disposal.

The NSLS has some storage capacity but it is limited. There are a number of flammable and corrosive

storage cabinets distributed throughout the Experimental Floor and in the support laboratories. We would like to restrict storage in these cabinets to routine solvents and laboratory reagents and avoid storing unusually reactive materials or materials that become reactive with age. We have placed secondary containment trays in all the cabinets and have put signs on their doors that indicate what materials may be placed in each. Additional signs on the doors explain how to label your containers and indicate the location of all the cabinets in the building. Each cabinet now has a supply of labels attached to the door so you can easily label your materials before placing them in the cabinet. Labeling is easy to do and could make a big difference if a situation arises. We do need your name on your bottles - not to affix blame but to ask for help or information when a bottle becomes a problem.

Don't let your materials become a dangerous and expensive problem for the NSLS and your fellow Users. Go through your cabinets and label all the existing containers. Help us reduce our dependence on luck with our chemical storage.

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DISCLAIMERS : Revised Date : August 6, 1996

July 1996 NSLS NEWSLETTER

X-Ray Ring Manager

R.W. Klaffky
X-Ray Ring Manager

Since the last X-Ray Ring status report in the March 1996 Newsletter, significant progress has been achieved in studies periods that will lead to improved operations in the future. Also, a number of important tasks have been completed in preparation for the December shutdown. Finally, there have been steps taken to reduce downtime and to minimize the amount of time required for pre-fill tests of the active interlock system. Studies on a lattice with a reduced horizontal emittance continue to progress. During midnight shifts there have been several successful trial runs of the digital orbit feedback system in either the horizontal or vertical planes, and also in both planes simultaneously. This system is close to an operational state. The resolution of the orbit measuring pick-up electrodes (PUEs) has been increased from 14 to 16 bits, improving the orbit position resolution from 2 microns to 0.5 microns. The improved resolution will become operational the end of this month. Studies have shown that the effect on the horizontal and vertical orbit of running the Elliptically Polarized Wiggler (EPW) at 100 Hz have been compensated so that 100 Hz operation could begin in the next few months. Operation at 100 Hz will result in a significantly improved signal-to-noise ratio for MCD experiments so that a sensitivity of 1 part in 10,000 will be achievable in chirality measurements. There have been continued studies on horizontal chamber motion caused by the variable synchrotron radiation thermal loading over each 12 hour fill. Sensor stands are being fabricated so that chamber motion can be mapped out around the ring as a function of ring current. This information will be used to remove the horizontal orbit changes caused by the PUEs moving with the chamber. Studies of the effect of 2.8 GeV operation on different beamlines are underway at X1A and X19A, and will continue on other beamlines.

In preparation for the December shutdown, water lines have been installed that will bring BNL Central Chilled Water Facility (CCWF) water to the NSLS experimental water system in Mechanical Equipment Room A. The control valve/controller installation for this system in underway with completion expected before December. This system will significantly improve temperature regulation with the present NSLS system providing redundancy in case the CCWF goes down for maintenance. Since tuning of the new control system requires operational beamlines, there will be variations in the experimental water temperature when operations first resume in January.

A major effort during the December shutdown will be the installation of 20 new beryllium windows to enable 350 mA operation in January. New windows will be installed on the following beamlines:

X3A, X4A, X6A, X12A, X12B, X12C, X13, X14A, X14B, X15A, X19C, X20A, X20C, X21, X22A, X23A, X23B, X25, X26A and X26C.

Brazing and welding of the windows will be done by Brush Wellman Electrofusion with the pieces being fabricated by BNL Central Shops. The NSLS will pay for these windows and for any adaptor flanges

required to fit the windows to the above beamlines. Delivery of the windows is expected in October or November. The second wave of 22 windows will be delivered in 1997 and will include the remaining windows required for 438 mA operation and at least one spare window for each assembly type. Before these spares are delivered, the old window assemblies being removed in December will serve as short-term spares for 350 mA operation. Since the new windows have 5 mm vertical openings, there will have to be commissioning shifts in January devoted to window alignment and, if necessary, orbit corrections for beamlines where adjustment is not feasible.

All parts have been ordered for the dual hybrid RF power amplifier slated for installation on RF System 2 in December. Two 120 kW amplifiers will be combined in this system to enable 400 mA operation and to prevent a beam dump if one of the other three RF systems drops out. Efforts continue to reduce machine downtime. Front end compressed air solenoid valves are being moved to the outside of the X-Ray Ring tunnel to permit replacement without dumping the ring. A task force has been set up to specifically examine problems with VME controllers, circuit breakers, and other components occurring after power outages. Finally, the pre-fill test has been modified to test 6 different active interlock chains simultaneously so that only one injection is required for the test. This has reduced the testing time from 15 minutes to 2 or 3 minutes. The number of pre-fill test failures has also been reduced by accounting for the non-linear response of the orbit to the trim strengths.

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DISCLAIMERS : Revised Date : August 6, 1996

CALL FOR EXPERIMENTAL SUMMARIES FOR THE 1996 NSLS ACTIVITY REPORT (Oct.1, 1995 through Sept. 30, 1996)

Before August 14:

NSLS and the Information Services Division are working to enhance the Electronic Submission System. Thanks to the many suggestions and comments from the authors who submitted the 471 (!) abstracts last year, we were able to identify areas that need attention:

1. The PostScript file viewer, Ghostview, was difficult to use. It took a lot of time to load the large images, did not function on all platforms, and we eventually found out there was a corrupted version being distributed by one of the FTP sites. Also, being a public domain item there was no user support from the makers. This year, we will not only find, test, and distribute a version of Ghostview which works, but we will offer the option of viewing your submission as a PDF file. The browser needed for this, Adobe's Acrobat Reader, works on all platforms, provides user support through a major company, and is FREE. We are trying to arrange it so this browser can be retrieved from the NSLS anonymous FTP site as well.

2. The Help information will be improved so that the whole submission procedure is clearer.

3. One of the major discoveries was that all EPS files do not work equally well. We are compiling a list of software that generates EPS files which we know work well with our system, as well as a list of those to stay away from. If there is any doubt about whether your figure file will work, we are, as always, happy to accept hard copy of figures that we can scan in.

Between Aug. 15 and Aug. 30:

The ESS will open for submissions starting on August 15, 1996. Authors should try out our "new and improved" ESS and decide how they will submit their experimental summary this year. Anyone who decides not to use the ESS for whatever reason can still submit a via E-mail or on disk (WordPerfect, Mac or PC Word file, or ASCII text). The catch is that your submission must be post-marked no later than August 30, 1996. We would like to accommodate those who prefer submitting without the ESS, but because it introduces extra processing, we must limit the submissions to this time period.

Between Sept. 1 and Oct. 31:

Submissions will be accepted via the ESS only. Detailed information and instructions can be found on the Web in the ESS pages (http://www.nsls.bnl.gov, under "Electronic Submissions"). Please bear in mind that many people like to submit at the last minute and the system may be quite busy and slow the last week of October. Try to submit earlier!

After November 1: We can not offer any extensions of the deadline this year because it causes the entire Activity Report production schedule to slip. October 31 is a hard deadline. Although the system will

remain open, any submissions entered after October 31 will be automatically rolled over into the 1997 Activity Report. The November Newsletter will have information about when the abstracts will be available to the beamlines, and for viewing on the Web.

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DISCLAIMERS : Revised Date : August 6, 1996

July 1996 NSLS NEWSLETTER

CALL FOR PUBLICATION REFERENCES

Please send a list of articles, based on work at the NSLS, which were (or will be) published in journals, proceedings, and books between October 1, 1995 and December 31, 1996. You may include those "submitted" and "in press" as long as they are identified as such. NOTE: If the list is is more than about 8 references, please use e-mail or send an ASCII, WordPerfect or Word (Mac or PC) file on disk. Publication list format (each element separated by a comma): authors' initials and last names

- "article title in quotes"
- journal name in italics OR conference proceedings underlined
- **journal number in bold**
- page number
- (publication year in parentheses), or indicate "submitted" or "in press/accepted"

Example: D. B. McWhan, C. Vettier, E.D. Isaacs, G.E. Ice, D.P. Siddons, J.B. Hastings, C.J. Peters, and O.Vogt, "Magnetic X-Ray Scattering Study of Uranium Arsenide", *Phys. Rev.*, **B42**, 6007, (1991).

Send your information to Nancye Wright in the NSLS User Administration Office (telephone, address, fax, and e-mail on back of this Newsletter). We are accepting your references throughout the summer and until October 31, 1996 for the 1996 Activity Report. References received after October 31 will be held for the 1997 Activity Report.

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DISCLAIMERS : Revised Date : August 6, 1996

JULY 1996 NSLS NEWSLETTER

CALL FOR GENERAL USER PROPOSALS

Deadline for proposals and requests for beam time on the NSLS X-Ray and VUV Rings is Monday, September 30, 1996 for scheduling January through April 1997

Prior to Submitting a Proposal

You must contact the beamline personnel responsible for the beamline(s) selected in order to verify technical feasibility on the beamline(s) and discuss any special arrangements for equipment. Your chance of getting beam time is improved by being able to use more than one beamline.

Preparing Your Proposal

The same form is used for new proposals and for beam time requests against existing proposals. Follow the instructions on the proposal information sheet. All information must be typed or printed legibly. Be sure all of the required sections are completed and submitted at the same time. MAIL OR FAX ONE COPY of the proposal form, Safety Approval Form, and any attachments to the NSLS User Administration Office. Only one copy is required - do not mail a hard copy or fax a second if you have already faxed one.

Proposal Deadline

The complete proposal package must be received by the User Administration Office on or before 5:00 pm Eastern Time Monday, September 30, in order to be considered for the January - April cycle. The fax machine is always extremely busy on the deadline date; please do not rely on faxing the proposal successfully on September 30. We encourage submitting new proposals by mail prior to the deadline. Beam time requests for active proposals will be accepted after the deadline, but will be allocated beam time only after requests received on time have been allocated. Late requests are not eligible for a rating upgrade if beam time could not be allocated to them.

Each proposal will receive a prompt preliminary review to verify that it is complete and legible. If there is a problem with the proposal, you will be contacted immediately. Submitting your proposal well in advance of the deadline date assures that the User Administration Office has time to reach you and that you will have enough time to correct any deficiencies.

Additional Information and Forms

Blank proposal forms and instructions, a guide to the NSLS beamlines, and more information about the General User Program are available by contacting the General User Program Coordinator. Office hours are Monday through Friday, 8:00 am to 5:00 pm Eastern Time.

NSLS Home Page..... BNL Home Page.....

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DISCLAIMERS : Revised Date : October 17, 1996

July 1996 NSLS NEWSLETTER

Airport Security: Transporting Equipment and Supplies

Due to the staging of the Olympics in Atlanta this summer, U.S. airports are operating on heightened security. When travelling to and from the NSLS with any type of equipment or samples, all users are urged to verify ahead of time with their airline that the packaging and paperwork will be acceptable. Failure to do this may result in airport departure delays or refusal to allow transport on the plane.

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DISCLAIMERS : Revised Date : August 6, 1996

July 1996 NSLS NEWSLETTER

BNL Chauffeur Service to Train Station

A BNL driver meets the 7:30am train from Penn Station , NY which arrives at Ronkonkoma at 8:57am. Passengers should meet the driver on the NORTH side of the tracks by the brick ticket office. The driver will wait for only 10 minutes after the train arrives. For additional information about this service, please call Juanita Beatty in BNL Staff Services at (516) 344-2535.

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DISCLAIMERS : Revised Date : August 6, 1996

July 1996 NSLS NEWSLETTER

Analog Phone Lines for Lap-Top Computers

Analog adapters have been added to the telephones in the NSLS Library and in Conference Room C (Room 1-164, near beamline X8). These adapters satisfy the needs of laptop users with occasional need for a modem hookup. The adapter fits in a slot underneath the phone deskset. It has two modular jacks; one labeled "phone" and another labeled "modem". These two jacks serve slightly different needs. The "phone" jack is useful if your host machine uses a "callback" security system, but it is of lower quality than the "modem" jack interface, so you may not be able to connect at full speed. The "modem" jack is of higher quality, but it can only make outgoing calls. For most systems this is the better choice. Note that the number used by the "modem" jack is different from that used by the phone itself, and the number used by the "phone" jack is the same as that used by the phone! This is for complicated reasons to do with the cost of the service, but should not affect most users.

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