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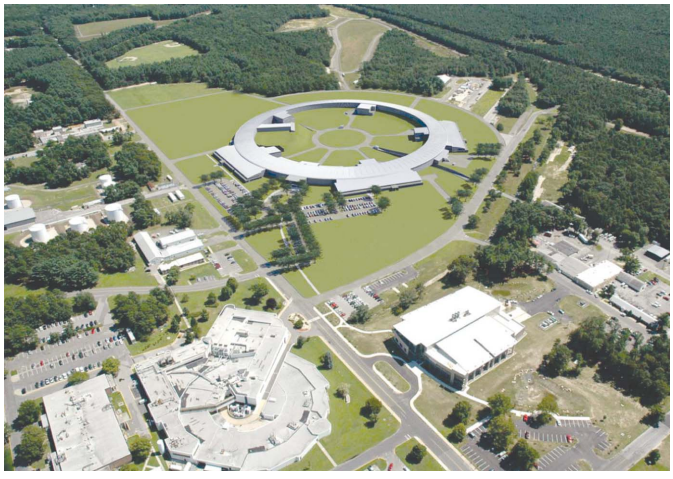
current events

This section carries events of interest to the synchrotron radiation community. Works intended for this section should be sent direct to the Current-Events Editor (s.s.hasnain@liverpool.ac.uk).

Department of Energy approves construction start of NSLS-II project

The US Department of Energy (DOE) has approved the construction start of NSLS-II at the Brookhaven National Laboratory. DOE has granted 'Critical Decision 3' (CD-3) status to the NSLS-II, approving the start of construction in fiscal year (FY) 2009 and scheduling completion in FY 2015. DOE has approved a total project cost for NSLS-II of USD 912 million. 'NSLS-II is the largest capital project under construction at any of the ten national laboratories throughout the country that are owned by the Department of Energy's Office of Science', said DOE's Brookhaven Site Office Manager Mike Holland. "This represents a major investment by the Department of Energy in Brookhaven National Laboratory and ensures the scientific vitality of Brookhaven, one of the nation's premier research laboratories, for at least 25 years into the future."

NSLS-II will be a 3 GeV storage ring with a circumference of 791.5 m and as such will be the largest medium-energy storage ring in the world. NSLS-II is designed to deliver photons with average spectral brightness in the 2 keV to 10 keV energy range exceeding 10^{21} photons mm^{-2} mrad^{-2} s^{-1} (0.1% bandwidth)$^{-1}$. The spectral flux density should exceed 10^{15} photons s^{-1} (0.1% bandwidth)$^{-1}$ in all spectral ranges. This cutting-edge performance requires the storage ring to support a very high current electron beam (I = 500 mA) with sub-nm rad horizontal emittance (down to 0.5 nm rad) and diffraction-limited vertical emittance at a wavelength of 1 Å (vertical emittance of 8 pm rad). The optimized storage-ring lattice consists of 30 DBA cells, with straight sections alternating in length between 6.6 m and 8.6 m, with low and high values of horizontal β-functions, respectively. A fully damped horizontal emittance of 0.55 nm rad is the performance goal for the NSLS-II storage ring when operating with a full complement of eight 7 m damping wigglers. "NSLS-II will provide the world's finest capabilities for X-ray imaging, with unprecedented spatial and energy resolution and the ability to detect single atoms", said Steven Dierker, Associate Laboratory Director for Light Sources. 'It will provide advanced tools for discovery-class science in condensed matter and materials physics, chemistry and biology, science that ultimately will enhance national and energy security and help drive abundant, safe and clean energy technologies. The scientific advances resulting from research at the new facility will support technological and economic development in multiple sectors of the economy, from next-generation energy technologies to new drugs for fighting disease', Dierker said.



Rendering of the NSLS-II as it will appear on the Brookhaven campus. In the foreground on the left is the current NSLS. The Center for Functional Nanomaterials is on the right. (Courtesy of Brookhaven National Laboratory).

CD-3 is the fourth of five critical decisions for the accomplishment of the project. A CD-3 approves the start of construction and signifies that a final design review has been performed, that all environmental and safety criteria have been met, all security concerns addressed and the project is ready to begin construction. CD-3 authorizes the project to commit all the resources necessary to execute the project, within the funds provided. CD-2, approving the facility's performance baseline, was announced in December 2007, and CD-1, siting the facility at DOE's Brookhaven and approving its cost range, was announced in July 2007. NSLS-II will replace the existing NSLS, which began operations in 1982. NSLS provides essential scientific tools for 2300 scientists each year from more than 400 academic, industrial and government institutions.

Obama picks Berkeley Lab Director Steve Chu for Energy Secretary

President Barack Obama has nominated Steve Chu, Director of the Lawrence Berkeley National Laboratory (Berkeley Lab), to be Secretary of Energy. Chu, 60, is a Nobel laureate physicist and a Professor of Physics and Molecular and Cell Biology at the University of California (UC), Berkeley. He has called the twin problems of global warming and the need for carbon-neutral renewable sources of energy 'the greatest challenge facing science' and has rallied many of the world's top scientists to address it. Since assuming the Directorship of Berkeley Lab in August 2004, Chu has put his words into action by focusing the Laboratory's considerable scientific resources on energy security and global climate change, in particular the production of new fuels and electricity from sunlight through non-food plant materials and artificial photosynthesis. 'Steve Chu came to our lab with a vision for how our community could have an impact on the greatest scientific and technological challenges of our times', said Deputy Berkeley Lab Director Paul Alivisatos. 'Berkeley Lab has been transformed under his leadership so that we now have programs that bring together scientists from diverse disciplines to work on biofuels, soft X-ray science, solar energy, carbon management and battery technologies, just to

Steve Chu. [Photograph credits: R. Kaltschmidt (LBL).]

mention a few.' Chu was instrumental in bringing to the Bay Area the Joint BioEnergy Institute (JBEI), a USD 135 million DOE-funded bioenergy research centre operated by a multi-institutional partnership under the leadership of Berkeley Lab. He also played a major role in the creation of the Energy Biosciences Institute (EBI), which is funded by a USD 500 million grant from BP.

In 1997 he shared the Nobel Prize in Physics with Claude Cohen-Tannoudji and William D. Phillips for developing methods to cool and trap atoms with laser light. Chu was born in Saint Louis, Missouri, on 28 February 1948. Chu earned undergraduate degrees in mathematics and physics from the University of Rochester in 1970, a PhD in physics from the University of California at Berkeley in 1976, and was a postdoctoral fellow at UC Berkeley from 1976 to 1978, when he joined the Bell Laboratories. He moved to Stanford University in 1987, where he was a professor of physics and applied physics, and where he received high academic honours including the Nobel prize and held a number of administrative posts before joining Berkeley Laboratories in 2004.

First electrons stream through the LCLS

LCLS, the Linac Coherent Light Source, at Stanford took a significant step when a series of electron beams zipped down the full length of the source for the first time before the year 2008 end. In an exciting round of first-ever tests, bunches of electrons travelled from the injector, down the final third of SLAC's linac into the beam transport hall and through the undulator hall, ending their journey in the electron beam dump. The first shot of electrons tripped an improperly configured shut-off monitor in the beam transport hall and caused a 5 h delay. But once the situation was rectified, subsequent attempts to reach the beginning of the undulator section took only 10 min. Once final preparations were made to complete the test and send the beam into and through the undulator hall, the beam reached its target in only two shots, confirming the predictions of Paul Emma, head of the LCLS accelerator physics group. The control room erupted in cheers.

"This is a major milestone, and one that we've been working toward for quite some time", said lab Director Persis Drell. "Congratulations to everyone who made this test a success. I'm looking forward to the start of LCLS operations next year!"

When the LCLS is completely up and running, the electrons will encounter undulators as they travel through the undulator hall. Where now the electron beam travels unimpeded through the undulator hall, these magnets will force the beam to wiggle ever so slightly side-to-side. These wiggles cause the beam to emit X-rays, which then travel with the electron beam into the beam dump where they are separated from the electrons and sent to experimental stations further downstream. Guiding and preserving the precisely formed electron beam is no small feat. Everything between the injector gun, where the electron beam first enters the linac, and the beam dump, where the electrons end their lightning-quick journey, must be perfectly aligned. LCLS is expected to be the first source of coherent X-ray radiation for which physicists to biologists are waiting to discover the new horizons that this type of source will allow them to explore.

LCLS staff in the control room.

Liverpool University and RIKEN SPring-8 Centre in Japan join forces

Liverpool University has signed a Memorandum of Understanding (MoU) with the RIKEN SPring-8 Centre, where world-leading scientists carry out experimental and theoretical research in a wide range of fields, including physics, chemistry, material science and biological sciences. The agreement builds on an existing relationship forged by Professor Samar Hasnain, Max Perutz Professor of Molecular Biophysics in the School of Biological Sciences at the university. RIKEN is currently working with the Japanese Synchrotron Radiation Institute (JASRI) to build a new free-electron laser facility for the creation of X-ray laser beams, which will make it a global centre of excellence for photon science. JASRI and RIKEN have worked together to establish the world's largest storage-ring synchrotron radiation facility, SPring-8. The X-ray laser facility is due to be completed in 2010, four years ahead of a similar European project; the University's agreement will provide staff and students with access to these world-class facilities. As well as collaborating on joint research projects in areas such as protein crystallography and X-ray scattering, it is anticipated that research students at the university will be able to spend significant periods at the SPring-8 Centre and that scientists from RIKEN will visit Liverpool, which was the European Capital of Culture in 2008. Professor Stephen Holloway, Pro-Vice-Chancellor of the University, said "the globalization of activity in the university is not only with partner universities but also with the very best research centres in the world. I am delighted to establish this important agreement with one of the premier research institutes in Japan covering both physical and biosciences. This will provide unique access opportunities to Liverpool's researchers."

Professor Stephen Holloway and Dr Tetsuya Ishikawa signing the MoU.