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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).

LCLS continues to make headline news

An international team led by plasma physicist Justin Wark from Oxford University have used the X-ray laser LCLS to create and probe a solid-density plasma at temperatures in excess of a million degrees in a controlled way for the first time. This feat, reported in *Nature* on 2 February 2012 (p. 59), takes scientists a significant step forward in understanding the most extreme matter found in the hearts of stars and giant planets, and could help experiments aimed at recreating the nuclear fusion process that powers the sun. The experiment was performed at the LCLS soft X-ray materials science instrument (SXR), where a 1.0 mm-thick aluminium foil was irradiated with 80 fs X-ray pulses at photon energies in the range 1.56–1.83 keV (at and above the Al *K*-edge). The experimental results provided insight into the evolution of the charge state distribution of the system, the electron density and temperature, and the timescales of collisional processes. 'The LCLS X-ray laser is a truly remarkable machine', said Sam Vinko, a postdoctoral researcher at Oxford University and the paper's lead author. 'Making extremely hot dense matter is important scientifically if we are ultimately to understand the conditions that exist inside stars and at the centre of giant planets within our own solar system and beyond.'

Scientists have long been able to create plasma from gases and study it with conventional lasers, said co-author Bob Nagler of SLAC, an LCLS instrument scientist. But no tools were available for doing the same at solid densities that cannot be penetrated by conventional laser beams. 'The LCLS, with its ultra-short wavelengths of X-ray laser light, is the first that can penetrate a dense solid and create a uniform patch of plasma, in this case a cube one-thousandth of a centimetre on a side, and probe it at the same time', Nagler said. The resulting measurements, he said, will feed back into theories and computer simulations of how hot dense matter behaves. This could help scientists analyze and recreate the nuclear fusion process that powers the sun. 'Those 60 h when we first aimed the LCLS at a solid were the most exciting 60 h of my entire scientific career', said Justin Wark. 'LCLS is really going to revolutionize the field, in my view.'

PETRA III to open for biology

EMBL Hamburg is building an integrated infrastructure for life science applications using synchrotron radiation on PETRA III, currently the brightest synchrotron radiation source. The original PETRA ring has been converted into a dedicated low-emittance synchrotron radiation facility during the last few years. EMBL is responsible for building and operating three undulator beamlines of which two will be dedicated to macromolecular X-ray crystallography and one to small-angle X-ray scattering applications of biological material. These beamlines are being integrated into advanced facilities for biological sample preparation and characterization as well as for X-ray data processing and evaluation.

Access to these beamlines will be selected and prioritized based on scientific criteria only. The project is open for specific partnerships with other academic organizations and industrial enterprises. The users operation on these beamlines is expected to commence this spring. One beamline (BioSAXS) will serve the needs of small-angle X-ray scattering, while the other two experimental stations (MX1 and MX2) are geared towards the use of very fine beams and energy-tunable X-rays in crystallographic applications.

The PETRA III project is the third reincarnation for the PETRA storage ring, which was built as an electron–positron collider in the 1980s and later became a pre-accelerator for the proton–electron collider HERA. The overall budget of the PETRA III project was EUR 225 million, shared between the German Federal Government (90%) and the City of Hamburg (10%). The particle energy of the storage ring was chosen to be 6 GeV, which is a compromise between achieving a small horizontal emittance and providing high photon flux in the energy range 50–150 keV. PETRA III operates in top-up mode and has a horizontal emittance of 1.0 nm rad being three to four times smaller than that of other high-energy (above 6 GeV) storage rings worldwide. This was achieved by installing 20 damping wigglers, each 4 m long, in two of the long straight sections of the ring (west and north). The radiative power loss of the beam in these wigglers damps the horizontal motion of the stored particles and thus reduces the horizontal momentum spread of the photon beams.

A further extension of the PETRA III project comprises two new experimental halls on either side of the large new PETRA III hall (north and east) making use of the long straight sections and the adjacent arcs. The northern straight section already accommodates one of the 40 m-long damping wiggler arrays producing an extremely hard and powerful X-ray beam, which can also be utilized for experiments. The long straight in the east is available for additional insertion devices. Some very productive beamlines and instruments at DORIS III serve techniques that are not currently implemented at PETRA III. After the DORIS shutdown at the end of 2012 these activities will be transferred to newly built stations at the PETRA III extension, which should become operational in 2014.

SACLA prepares for user operation

At the X-ray free-electron laser facility (SACLA) established next to SPring-8 by RIKEN, user operation is scheduled to start from March 2012. The SACLA is positioned as one of the key technologies of national importance in the 3rd Science and Technology Basic Plan. Based on the Act on the Promotion of Public Utilization of the Specific Advanced Large Research Facilities (Law No. 78, 1994), the SACLA is required to provide a wide range of research opportunities for researchers from home and abroad of industrial, academic and governmental organizations for the promotion of research utilizing the facility. Under the law, the Japan Synchrotron Radiation Research Institute (JASRI) will solicit research proposals from the public, select the most qualified users through a fair and equitable review process, and provide them with technical guidance on how to carry out experiments at the SACLA as the Registered Institution for Facilities Use Promotion in charge of the user support services.

Some 25 proposals have been selected for the first session of scheduled beam time in 2012 attracting users from several Japanese universities such as Osaka, Nagoya, Hokkaido and Tohoku, as well as groups from RIKEN, KEK and Toshiba Corporation. In the tradition of RIKEN's international approach the first batch of users will

Groups from Heidelberg and Liverpool with collaborators from RIKEN at SACLA during the commissioning period.

include groups from UCLA, Denmark, KAST (Korea), Stanford and Shanghai. Prior to the user operation, several RIKEN groups and their international collaborators have been helping to commission the instrument, sharing the excitement of this pioneering facility.

India agrees on cooperation with ESRF and KEK

The ESRF and the Saha Institute of Nuclear Physics (SINP) in Kolkata, India, have agreed to strengthen their scientific and technical collaboration in all fields of synchrotron radiation science. A Memorandum of Understanding (MOU) was signed on 16 January 2012 by Francesco Sette, ESRF Director General, and Milan K. Sanyal, Director of the SINP, at a ceremony held at the SINP Headquarters in Kolkata. The SINP is an Indian governmental research institute with a wide programme of fundamental research in condensed matter and material science, nuclear, high-energy and theoretical physics as well as biophysical sciences. The SINP and the ESRF, in view of their common mission to build and operate high-performance accelerator-based facilities, have agreed to strengthen cooperation between the European and Indian communities in both the scientific and technical fields of synchrotron science. The MOU lays the basis for future access of Indian scientists to public beam time at the ESRF, the exchange of expertise in the fields of accelerator technologies, and the training of young scientists and engineers at the ESRF.

On 23 January 2012, an Indian delegation comprising five high-level officials visited KEK to participate in a DAE–KEK joint meeting. A MOU was signed at the meeting between the Department of Atomic Energy (DAE) and KEK to express the intention of the parties to establish collaborative activities, and to focus on developments in the field of particle physics through KEK's Belle II experiment, detector research and development projects, synchrotron science, and accelerator science. The Indian delegation was composed of Dr Srikumar Banerjee, Chairman of the Atomic Energy Commission and Secretary of the DAE, Dr Parshotam Dass Gupta, Director of the Raja Ramanna Centre for Advanced Technology, Dr Milan K. Sanyal, Director of the SINP, Dr B. Purniah, Head of the International Studies Division, DAE, and Dr C. Sivaji, Counsellor (Science and Technology) of the Embassy of India, Tokyo. The year 2012 marks the 60th anniversary of the establishment of diplomatic relations between Japan and India. The MOU has been signed in this auspicious year. Participants of the meeting agreed to hold annual meetings, and to discuss the details at the collaboration meeting involving Indian institutes and KEK to be held on 8 and 9 February at the SINP, Kolkata, India. After the joint meeting, the Indian delegation visited KEK's facilities, including the Belle experiment facility, the Indian beamline (BL-18B) at the Photon Factory, and the Indian beamline office.

A Memorandum of Understanding is agreed between the Indian DAE and KEK, Japan.