Journal of
Synchrotron
Radiation
ISSN 0909-0495

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).

Lasing achieved at SACLA, Japan's X-ray free-electron laser facility

The Japanese hard X-ray free-electron laser (XFEL), SACLA (SPring-8 Angstrom Compact free-electron LAser), reached laser amplification at 10 keV photon energy on 7 June. This is the world's second hard X-ray laser after the LCLS of the SLAC National Accelerator Laboratory in California, USA.

SACLA has pushed through a novel concept of a self-amplified spontaneous emission (SASE) XFEL. A thermionic electron gun of single-crystal cathode followed by several RF cavities with increasing frequency for velocity bunching replaced the conventional laser–RF electron gun, used in both LCLS and the softer X-rays laser FLASH at DESY, to obtain the high-density electron bunch required by the SASE operation. A high-gradient accelerator using C-band RF (5.712 GHz) curtails the total length of the linear accelerator in comparison with the S-band (2.856 GHz) for LCLS and the L-band (1.3 GHz) for FLASH. However, the biggest difference between SACLA and the LCLS and FLASH lies in the type of undulator used.

The SACLA project started from a discussion of 'what will happen when we use in-vacuum undulators developed at SPring-8 instead of conventional out-of-vacuum undulators used in both LCLS and FLASH'. Since there is, in principle, no limit to the gap of the magnetic poles of an in-vacuum undulator, one can reduce the magnetic period of the undulator. This reduction enables the reduction of the electron beam energy required to obtain laser photons of a particular wavelength from the undulator, because the wavelength of photons that undulators emit is proportional to the magnetic period of the undulators and is inversely proportional to the square of the electron beam energy.

SACLA was designed to be composed of an 8 GeV linear accelerator of length 400 m and a 90 m-long undulator with 18 mm magnetic period. With additional space for user experiments, the total facility length is as short as 700 m, which is much more compact in comparison with LCLS and the European XFEL, which is currently being built in Hambury, Germany. Located on the same site as the 8 GeV SPring-8 synchrotron radiation facility, the SACLA linear accelerator will be used as a low-emittance electron beam injector to the SPring-8 storage ring, and both the SACLA XFEL beam and SPring-8 undulator X-rays can be guided onto the same sample to conduct, for example, XFEL-pump and SPring-8-probe type experiments.

The SACLA team recording the moment at which it lased at 1.25 Å X-ray wavelength.

A view of the SACLA accelerator.

All of the hardware of SACLA was assembled in February 2011, followed by the initial electron beam commissioning which resulted in the confirmation of 0.8 Å X-rays from the undulator with 8 GeV electron beam in March 2011. The fact that the team has reached lasing after only three months of electron beam commissioning indicates (i) the validity of the basic design concept of the SPring-8 Compact SASE Source (SCSS) as well as the experience accumulated during the operation of the SCSS prototype machine, (ii) the certainty of the components' development, design, fabrication, installation, alignment and tune-up and (iii) the adequacy of the beam commissioning strategy.

The team is continuing commissioning of SACLA in order to deliver higher intensity and a shorter-wavelength X-ray laser with greater stability. SACLA is expected to open for international public users by March 2012. A call for proposals will be announced soon.

Gerd Materlik elected Fellow of the Royal Society

Gerd Materlik, Chief Executive Officer (CEO) of Diamond Light Source in Harwell, Oxfordshire, UK, has been elected a Fellow of the Royal Society (FRS). Appointed CEO at the launch of the Diamond Light Source project in 2001, Professor Materlik successfully led the complex project to construct and operate the UK's national synchrotron. In 2007, after Diamond welcomed its first users and was formally opened by Her Majesty the Queen, he was awarded an honorary Commander of the British Empire (CBE).

Today, Diamond has 20 operational beamlines with two more nearing completion, providing facilities for thousands of researchers. The British government recently confirmed funding for Diamond Phase III, and work has begun to design and construct ten new beamlines by 2018.

On the occasion of receiving this latest honour, Gerd Materlik said 'This is a tremendous honour. I feel very fortunate to have been involved in such a fascinating area of science, and throughout my career I have had the support of wonderful teachers and colleagues. Diamond is a very exciting project and a real team effort. I am grateful to everyone who has been involved in contributing to its success, and look forward to the next stage of the development and operation of this world-class research facility.'

Keith Nugent becomes director of the Australian Synchrotron

The Australian Synchrotron has announced the appointment of Professor Keith Nugent as Director of the Australian Synchrotron. Keith Nugent, Research Director of the ARC Centre of Excellence for Coherent X-ray Science and Laureate Professor of Physics at the University of Melbourne, will replace Dr George Borg who has been Acting Director of the Australian Synchrotron. He will combine the position with his existing responsibilities. Dr Borg will take on the new role of Chief Operating Officer and will be responsible for the day-to-day management of the facility. Keith Nugent will focus on and be responsible for the Australian Synchrotron's scientific leadership and strategic development. The Board paid tribute to the outstanding work Dr Borg had done as Acting Director. It also expressed its appreciation to the University of Melbourne, which had made Professor Nugent's appointment possible.

Keith Nugent, the new director of the Australian Synchrotron.

Canadian Synchrotron and Diamond agree to collaborate

Making the power of synchrotron light available to more businesses, building new experimental equipment and developing new capabilities are three of the areas of collaboration in a trans-Atlantic memorandum of understanding (MOU) signed between the Diamond Light Source and Canadian Light Source (CLS) in Saskatoon, Canada. The agreement paves the way for the two synchrotron light sources to work together on joint projects related to their industrial science programmes, such as exchanges of staff, marketing materials, and coordinating access for clients to capabilities that are available at one synchrotron but not the other.

'Diamond and the CLS have been working closely together for some time', said Josef Hormes, Executive Director of the CLS. 'Now that we have this formal agreement, I am looking forward to a very bright future where the expertise of both our facilities can be combined to accomplish momentous things for fundamental and industrial science.'