



No. I/13 - 28 March 2013

PSI photon, neutron and muon user facilities newsletter

Editorial



Rafael Abela

Dear colleagues,

important milestones for the realization of the new SwissFEL facility were reached in 2012. In September the Swiss Parliament approved the federal program for education and research for the 2013-16 period, which

includes the mandate for PSI to build SwissFEL. On the 14th of December 2012 the budget for federal building construction was approved including the funding for the SwissFEL building. The legally valid building permit for SwissFEL arrived at the end of January 2013. The preparation of the site in the «Würenlingen Wald» is almost finished. The connections of the site to the PSI infrastructures are still ongoing.

A consortium of three Swiss companies named «EquiFEL Suisse» was awarded the exclusive contract as full service general contractor for the construction of the SwissFEL Building and its technical infrastructure. Signing of the contract took place on the 7th of February 2013. First works for the building and its technical infrastructure will start in April 2013. End of 2014 the finished building will be delivered to the Paul Scherrer Institut. The installation of the accelerator and the experimental stations will follow in 2015 and 2016. The first beam is foreseen for the end of 2016. Pilot experiments should start in spring 2017.

In order to prepare for SwissFEL and to start work in the

New calls for proposals

SLS: PX-beamlines

deadline: June 15, 2013

SLS: non-PX beamlines

deadline: September 15, 2013

more information

<<http://www.psi.ch/sls/calls>>

SINQ

deadline: May 15, 2013

more information

<<http://www.psi.ch/sinq/call-for-proposals>>

SμS

deadline: June 2013

more information

<http://imu.web.psi.ch/facilities/next_call.html>

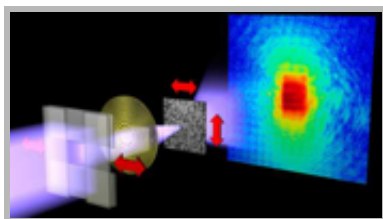
An **overview** about all proposal submission deadlines of the PSI facilities can be obtained **here** <<http://www.psi.ch/useroffice/proposal-deadlines>> .

exciting area of ultra-fast spectroscopy and nanocrystallography, several teams from Swiss universities and PSI are using the few existing facilities worldwide to do first experiments, among others: group of S. Johnson (ETHZ) and P. Beaud / U. Staub (PSI), group of G. Schertler (PSI/ETHZ) and B. Pedrini (PSI), group of J. van Bokhoven (PSI/ETHZ), J. Dousse (U Fribourg), and B. Patterson (PSI), group of C. David (PSI).

Rafael Abela, on behalf of the SwissFEL team, PSI

Research highlights

SLS - Life Science & Material Science: Imaging fluctuations with X-ray microscopy



Microscopy using X-rays offers unique three-dimensional insights for the life and material sciences

P. Thibault et al, Nature 494, 68 (2013)

A schematic of the setup employed for the experimental demonstration. X rays are focused and scatter off a test sample that can be displaced laterally with nanometer precision. The diffraction pattern produced by the scattered X rays is collected by a detector. The sample is reconstructed on a computer from the diffraction data (see other images). X-rays allow an inside look at structures that cannot be imaged using visible light. They are used to investigate nanoscale structures of objects as varied as single cells or magnetic storage media. Yet, high-resolution images impose extreme constraints on both the X ray microscope and the samples under investigation. Researchers at the Technische Universität München, Germany, and the Paul Scherrer Institut in Villigen, Switzerland, now showed how to relax these conditions without loss of image quality. They further showed how to image

Upcoming events

MaMaSELF status meeting

2013 <<http://indico.psi.ch/event/mamaself2013>>

May 21-24, 2013, Rigi Kulm, Switzerland

ESS symposium: neutrons for future energy strategy

<<http://indico.psi.ch/event/scisymp>>

May 27-29, 2013, PSI Villigen, Switzerland

The Zurich School of Crystallography 2013

<<http://www.oci.uzh.ch/group-pages/linden/zsc/>>

June 9-22, 2013, Zurich, Switzerland

Gordon research conference on Electron Distribution and Chemical Bonding

<<http://www.grc.org/programs.aspx?year=2013&program=elecldist>>

July 2-7, 2013, Les Diablerets, Switzerland

ICNS 2013: International Conference on Neutron Scattering

<<http://www.icns2013.org/home>>

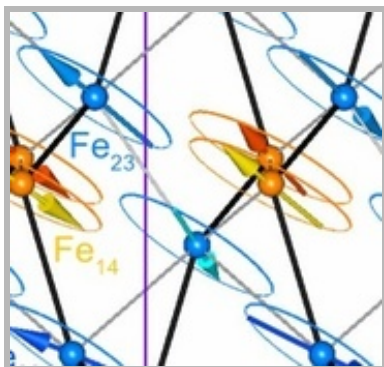
July 7-11, 2013, Edinburgh, UK

12th PSI Summer School on Condensed Matter Physics

objects featuring fast fluctuations, such as the rapid switching events that determine the life time of data storage in magnetic materials. They demonstrated their method with an experiment at the Swiss synchrotron SLS and with computer simulations. The results have been published in the science journal Nature.

Read the full story <<http://www.psi.ch/media/imaging-fluctuations-with-x-ray-microscopy>>

SINQ - Magnetism: Useful frustration



Persistent Spin Dynamics Intrinsic to Amplitude-Modulated Long-Range Magnetic Order

M. Pregelj et al, Physical Review Letters 109, 227202 (2012)

An incommensurate elliptical helical magnetic structure

in the frustrated coupled-spin-chain system $\text{FeTe}_2\text{O}_5\text{Br}$ is surprisingly found to persist down to 53(3) mK ($T/T_N \approx 1/200$), according to neutron scattering and muon spin relaxation. In this state, finite spin fluctuations at $T \rightarrow 0$ are evidenced by muon depolarization, which is in agreement with specific-heat data indicating the presence of both gapless and gapped excitations. We thus show that the amplitude-modulated magnetic order intrinsically accommodates contradictory persistent spin dynamics and long-range order and can serve as a model structure to investigate their coexistence.

Read the full story <<http://www.psi.ch/num/2012#pregelj>>

SμS - Material Science: Tailoring of electronic and magnetic properties

<<http://www.psi.ch/summer-school>>

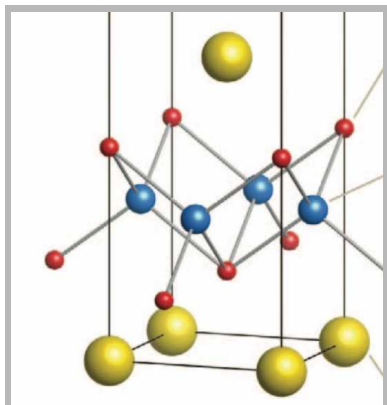
August 17-25, 2013, Zuoz, Switzerland

3rd Joint User Meeting at PSI: JUM@P 2013 <<http://indico.psi.ch/event/jump13>>
September 18-20, 2013, PSI Villigen, Switzerland

Facility news

SLS: Combining Scanning Probe and X-Ray Microscopy for Nanoanalytics, NanoXAS

SLS-NanoXAS is a novel x-ray microscope combining x-ray spectroscopy with scanning probe microscopy. While the first one gives access to chemical information, the second reveal the sample topology or other physical properties accessible by SPM. The instrument uses Fresnel zone plates to focus x-rays (down to 40nm spot @ 270 – 1800 eV) onto a semi-transparent sample which is raster scanned through the beam. A scanning probe microscope (SPM) is looking on the down stream side of the sample. In complement to the material contrast arising from the x-ray transmission



New diluted ferromagnetic semiconductor with Curie temperature up to 180 K and isostructural to the '122' iron-based superconductors

K. Zhao et al, Nature Communications 4, 1442 (2013)

Diluted magnetic semiconductors have received much attention due to their po-

tential applications for spintronics devices. A prototypical system (Ga,Mn)As has been widely studied since the 1990s. The simultaneous spin and charge doping via hetero-valent ($\text{Ga}^{3+}, \text{Mn}^{2+}$) substitution, however, resulted in severely limited solubility without availability of bulk specimens. Here we report the synthesis of a new diluted magnetic semiconductor ($\text{Ba}_{1-x}\text{K}_x$)($\text{Zn}_{1-y}\text{Mn}_y$) $_2\text{As}_2$, which is isostructural to the 122 iron-based superconductors with the tetragonal ThCr_2Si_2 (122) structure. Holes are doped via ($\text{Ba}^{2+}, \text{K}^{1+}$) replacements, while spins via isovalent ($\text{Zn}^{2+}, \text{Mn}^{2+}$) substitutions. Bulk samples with $x = 0.1-0.3$ and $y = 0.05-0.15$ exhibit ferromagnetic order with T_C up to 180 K, which is comparable to the highest T_C for (Ga,Mn)As and significantly enhanced from T_C up to 50 K of the '111'-based Li(Zn,Mn)As. Moreover, ferromagnetic (Ba,K)(Zn,Mn) $_2\text{As}_2$ shares the same 122 crystal structure with semiconducting BaZn_2As_2 , antiferromagnetic BaMn_2As_2 and superconducting (Ba,K) Fe_2As_2 , which makes them promising for the development of multilayer functional devices.

Read the full story <<http://www.psi.ch/num/2013#zhao>>

Events

Foundation stone ceremony of the SwissFEL building

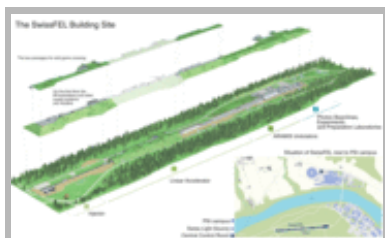
The groundbreaking cere-

chemical sensitivity, topology, magnetic forces, elasticity, friction, conductivity may be successively assessed using the SPM. Furthermore scanning transmission x-ray microscopy (STXM) images have been recorded using the AFM tip to measure the transmitted x-rays allowing the record of the topological image in parallel (**N. Pilet, et al., Nanotechnology 23 (47), 475708 (2012)**) <<http://dx.doi.org/10.1088/0957-4484/23/47/475708>> .

SINQ: New SAC chairman

Prof. Peter Böni from the Technical University of Munich has been appointed as new chairman of the SINQ Scientific Advisory Committee from summer 2013. He will follow Prof. Andrew Boothroyd from the University of Oxford, who acted as chairman of the SINQ SAC since 2006. The Paul Scherrer Institut, the PSI NUM department and the whole SINQ team thank Andrew for his outstanding contributions and the highly efficient and fruitful collaboration over the last years.

S μ S: New LEM spectrome-



many of the SwissFEL building will be organized at PSI on July 3rd 2013, with participation of representatives from the scientific community, political authorities, of the local community as well as from academic groups.



CRISP 2nd annual meeting at PSI

From 18 to 21 of March 2013 the CRISP annual meeting was held at PSI. The meeting was a great success. The talks given by experts from different facilities gave an inspiring view of progress made within the different collaboration topics of the CRISP project. More than 100 participants from the different CRISP partner facilities participated at the meeting. We are grateful for the excellent contributions which were made.

ter based on G-APDs

A new low energy muon spectrometer for the use of external field directions parallel to the sample surface has recently been taken into operation. It is based on Geiger-mode Avalanche Photodiodes (G-APD) coupled to plastic scintillators which allows a much more compact design than with the traditionally used photomultipliers leaving space for more complex sample environments. In addition, the new detector system is segmented in the forward/backward direction allowing more flexible measuring conditions.

Current Openings

Job opportunities at PSI

<<http://www.psi.ch/en/pa/offenstellen/>>

Announcements

2013 PSI Summer School on Condensed Matter Physics

The 2013 edition of the PSI Summer School on condensed matter physics is being dedicated to some of the main topics addressed at large-scale user facilities, such as neutron and muon sources or synchrotron photon sources: Materials - structure and magnetism. International experts and PSI staff members will introduce and deepen your knowledge not only about these scientific topics but also

about the main methods applied to understanding the phenomena which are presently at the forefront of modern solid-state physics and chemistry. The school will be organised from **August 17-23, 2013** at the Lyceum Alpinum in Zuoz, Switzerland. Following the school, practical training is being offered at PSI to allow a limited number of participants to obtain hands-on experience with state-of-the-art instrumentation using photons, neutrons, and muons. More information can be obtained from the **school's webpage** <<http://www.psi.ch/summerschool>> .

Joint User Meeting JUM@P 2013 at PSI

The 3rd edition of the **JUM@P user meeting** <<http://indico.psi.ch/event/jump13>> from **September 18-20, 2013** is open for registration now. The aim of the PSI Joint User Meetings is to bring together the three user communities for SLS, SINQ and S μ S and to generate new synergies among these scientists driven by common scientific, rather than technical, interests. JUM@P '13 will be a users-for-users meeting. Organizers of the meeting are PSI and its Users Association **JUSAP** <<http://www.psi.ch/useroffice/users-association>> The meeting will consist, on the first day, of a plenary session with invited lectures as well as information about PSI and its user facilities. The second day is being reserved for three **topical parallel workshops** <<http://indico.psi.ch/internalPage.py?pageId=4&confId=2034>> . Poster sessions and the award of the third PSI thesis medal will complete the programme. The 2013 annual meeting of the European Synchrotron User Organisation **ESUO** <<http://www.esuo.org>> will be organized as a JUM@P satellite event.

ICNS 2013: International Conference on Neutron Scattering

The next International Conference on Neutron Scattering **ICNS2013** <<http://www.icns2013.org>> will take place in Edinburgh, capital city of Scotland, at the Edinburgh International Conference Centre, from **July 8-12, 2013**. ICNS 2013 will bring together scientists from a wide range of disciplines including: biology, chemistry, earth science, engineering, materials science and physics. The conference is still open for registration until July 2, 2013.

Imprint

PSI Facility News addresses the users of the PSI large facilities and appears quarterly in English. Any feedback is highly welcome! **More information.** <<http://www.psi.ch/imprint>>

Contact: PSI User Office, Phone: +41-56-310-4666, Email: useroffice@psi.ch