Editorial

Dear colleagues,

Training of the next generation of scientists and increasing the awareness about the vast opportunities that Large Scale Facilities offer, both, to study and solve topical scientific problems or grand challenges, is an important part of our mission. It is thus a great pleasure that about 50% of our facilities' users are either PhD students (30%) or PostDocs (20%) and show a huge interest in our training activities. At our last summer school - the 9th PSI Summer School on Condensed Matter Research – from 7-13 August 2010, the topic was Magnetic Phenomena. 114 participants attended the lectures in Zuoz and 27 of these took part in the subsequent hands on training at PSI, using all three different probes (muons, neutrons and photons).

On August 24, the first part of our planned future user facility – the 250 MeV injector for the Swiss Free electron laser project SwissFEL – was inaugurated at PSI. The Swiss Bundesrat Didier Burkhalter and the PSI Director Joel Mesot jointly switched on the first beam. This was a very important milestone for the project.

In October we will start commissioning the new Ultracold Neutron Source (UCN) at PSI and expect to be able to see the first Ultra Cold Neutrons before the end of the year. The first major components for the High Field µSr project will arrive shortly, and our new 7T horizontal field magnet

New calls for proposals

SLS/PX-beamlines
deadline: October 15, 2010
more information <http://www.psi.ch/sls(px-beamlines-call-for-proposals>

SINQ/all instruments
deadline: November 15, 2010
more information <http://sin-q.web.psi.ch/sinq/sinq_call.html>

SµS/all instruments
deadline: December 2010
more information <http://lmu.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>.

Upcoming events

Next Joint User Meeting
for neutron scattering has arrived at PSI. The 7T magnet will be commissioned in autumn and should be on the user programme for 2011. We have exciting times ahead of us and I look forward to see many of you as users of the PSI facilities.

Kurt Clausen on behalf of PSI

Research highlights

SLS: High-resolution method for computed nano-tomography developed
Martin Dierolf, Andreas Menzel, Pierre Thibault, Philipp Schneider, Cameron M. Kewish, Roger Wepf, Oliver Bunk, Franz Pfeiffer: Nature, September 23, 2010 - DOI: 10.1038/nature09419
A novel nano-tomography method developed by a team of researchers from the Technische Universität München (TUM), the Paul Scherrer Institute (PSI) and the ETH Zurich opens the door to computed tomography examinations of minute structures at nanometer resolutions. The new method makes possible, for example, three-dimensional internal imaging of fragile bone structures. The first nano-CT images generated with this procedure was published in the renowned journal Nature on September 23, 2010. This new technique will facilitate advances in both life sciences and materials sciences.

Read the full story

Please note September 15-16, 2011 as the dates for the next joint user meeting JUM@P11 <http://indico.psi.ch/event/jump11> of the PSI facilities.

5th Int. Symposium Hydrogen and Energy
January 23-28, 2011 organized by the EMPA academy, more information <http://www.empa.ch/plugin/template/empa/22/95818/---/l=2>

Please have a look at the full conference calendar <http://www.psi.ch/useroffice/conference-calendar>

Facility news

SLS: Materials science beamline upgrade The MS beamline actually undergoes a comprehensive upgrade. The wiggler will be replaced by a shortperiod (14 mm) in-vacuum, cryogenically cooled, permanent-magnet undulator, (CPMU, U14), while the front end and optics will completely be redesigned to optimally exploit the characteristics of the U14 source. In addition to providing fundamental
SINQ: Magnetic flux lines in type-II superconductors and the 'hairy ball' theorem
Mark Laver, Edward M. Forgan, Nature Communications 1, 45 (July 2010)
Many prominent phenomena originate from geometrical effects rather than from local physics. For example, the 'hairy ball' (HB) theorem asserts that a hairy sphere cannot be combed without introducing at least one singularity, and is fulfilled by the atmospheric circulation with the existence of stratospheric polar vortices and the fact that there is always at least one place on Earth where the horizontal wind is still. In this study, we examine the consequences of the HB theorem for the lattice of flux lines that form when a magnetic field is applied to a type-II superconducting crystal. We find that discontinuities must exist in lattice shape as a function of field direction relative to the crystal. Extraordinary, 'unconventional' flux line lattice shapes that spontaneously break the underlying crystal symmetry are thus remarkably likely across all type-II superconductors, both conventional and unconventional.
Read the full story <http://num.web.psi.ch/highlights.html#laver_nature>

SINQ: The dedicated SINQ sample environment group is able to offer a wide range of accessible parameters for the user experiments: available temperatures between 50 mK and 1800 K, vertical magnetic fields up to 15 Tesla, horizontal fields up to 11 Tesla, even in combination with the lowest possible temperatures. Even a maximal pressure of 100 kbar may be achieved with the compact Paris-Edinburgh cell, which can be used at temperatures down to 4 K.

SµS: Time-differential µSR measurements in transverse fields up to 5 T are now possible at the ALC spectrometer. The switchover from the standard high intensity time-integral mode with 2 million events per second to the time-differential mode is

Read the MS upgrade newsletter <http://num.web.psi.ch/highlights.html#laver_nature>
SuS: Incommensurate Magnetic Order and Dynamics Induced by Spinless Impurities in YBa$_2$Cu$_3$O$_{6.6}$

We report an inelastic-neutron-scattering and muon-spin-relaxation study of the effect of 2% spinless (Zn) impurities on the magnetic order and dynamics of YBa$_2$Cu$_3$O$_{6.6}$, an underdoped high-temperature superconductor that exhibits a prominent spin pseudogap in its normal state. Zn substitution induces static magnetic order at low temperatures and triggers a large-scale spectral-weight redistribution from the magnetic resonant mode at 38 meV into uniaxial, incommensurate spin excitations with energies well below the spin pseudogap. These observations indicate a competition between incommensurate magnetic order and superconductivity close to a quantum critical point. Comparison to prior data on La$_{2-x}$Sr$_x$CuO$_4$ suggests that this behavior is universal for the layered copper oxides and analogous to impurity-induced magnetic order in one-dimensional quantum magnets.

Read the full story <http://num.web.psi.ch/highlights.html#suchaneck>

SwissFEL: FEL award for outstanding PSI-scientist
At the 32nd International Free Electron Laser Conference in Malmö, Sweden, the Prize Committee decided to award the prestigious 2010 FEL prize to Dr. Sven Reiche for “his outstanding contributions to the advancement of the field of Free-Electron Laser science and technology”. The FEL simulation code, GENESIS 1.3 developed by Dr. Reiche, is used as design tool worldwide, and the anticipated performances of new projects have been very successfully benchmarked with experimental results in the most advanced FEL facilities.

New SwissFEL publication
SwissFEL Conceptual Design Reports have been published in July and August 2010. The documents official designation is „PSI Bericht Nr. 10-04 and 10-05“. The PDF-documents are downloadable from the SwissFEL web page <http://www.psi.ch/swissfel/>. 

News from the SwissFEL project

https://www.psi.ch/science/psi-user-facilities-newsletter-iii2010
Inauguration of the SwissFEL Injector Test Facility

An important milestone for the realization of the new SwissFEL facility was reached on the 24th of August 2010, when the core of the new Swiss Free Electron Laser facility (SwissFEL) was set into operation at Paul Scherrer Institut. Guest of Honour, Federal Councillor Didier Burkhalter, pressed the red button, and the SwissFEL Injector Test Facility produced its first electron beam.

In his welcome PSI Director Joël Mesot appealed to the present political representatives: "With SwissFEL we have the unique opportunity to offer our researchers a competitive advantage, and thus contribute to Switzerland's global leading position in research."

Read the full story

Announcements

PSI annual report 2009

Please download the 2009 PSI annual scientific report <http://www.psi.ch/info/info> .

Facility publications

Obtain a comprehensive list of publications sorted by different criteria:

- SLS publications
- SINQ & SμS publications <http://num.web.psi.ch/publ_all.htm>

iPhone App PSI user facilities

The PSI user office has developed an iPhone App, which summarizes the most important information about the PSI user facilities such as upcoming proposal submission deadlines, accelerator status or direct links to the beamline webpages. As a special feature even the weekly menu of the OASE is in-
cluded. The ‘App’ is compatible with all versions of iPhone and iPod touch and can be downloaded free of charge from the iTunes App Store <http://itunes.apple.com/ch/app/psi-duo/id375328818?mt=8>.

Proprietary research

A certain fraction of the beamtime at PSI research facilities is reserved for proprietary use. This is handled by Technology Transfer PSI <http://www.psi.ch/industry/technology-transfer>.

The following directory <http://www.psi.ch/industry/randd-services> lists services on offer by these facilities.

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>

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