



No. III/11 - 30 September 2011

PSI photon, neutron and muon user facilities newsletter

Editorial



Stefan Janssen

Dear colleagues,

two weeks ago PSI hosted the second Joint User Meeting JUM@P'11. Two years ago we decided to go for a joint meeting rather than organizing individual user meetings of the PSI facilities.

The idea behind this was to bring together the three user communities of the SLS, SINQ and the μ S and to generate new synergies among the scientists driven by common scientific rather than technical or methodical interests. That decision turned out to be a good one, well documented by the strong interest in the recent meeting. More than 200 participants attended the PSI user meeting 2011, which was again organized in collaboration with the PSI Joint Users' Association **JUSAP** <<http://www.psi.ch/useroffice/users-association>> . JUM@P'11 consisted of a plenary session on the first and seven parallel topical workshops on the second day. During those sessions a total of 81 oral presentations were given. In addition, two poster sessions with totally 76 poster contributions were organized. One special highlight was definitely the award of the second **PSI Thesis Medal** <<http://indico.psi.ch/internal-Page.py?pagelid=0&confid=42>> to Elena Mengotti for her recently finished thesis on "Artificial kagome spin-ice systems". The Thesis Medal is awarded every second year in the framework of the JUM@P meetings for an outstanding PhD thesis that contains substantial scientific results achieved at one or more of the large PSI user facilities,

Next calls for proposals

SLS: PX beamlines

deadline: October 15, 2011

more information

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

SINQ: all beamlines

deadline: November 15, 2011

more information

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

μ S: all beamlines

deadline: December 5, 2011

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

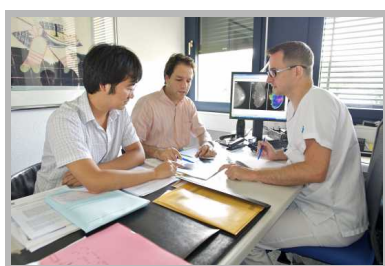
October 4-7 - JCNS work-

SLS, SINQ and SμS. Thanks to our user community and all the staff at PSI, who made this meeting a success. More information about the user meeting is still available **on the Web** <<http://indico.psi.ch/event/jump11>>. The next meeting of the JUM@P series is planned for 2013.

Stefan Jansen on behalf of the organizing committee

Research highlights

SLS - Life Sciences: Diagnosis of Cancer in Breast Tissue



Investigation of a new method for the diagnosis of cancer in breast tissue

M. Stampanoni et al., Investigative Radiology; published online 22 July 2011

The Paul Scherrer Institute (PSI) has developed a new breast cancer diagnostic method, and is now carrying out first tests on non-preserved human tissue in conjunction with the Kantonsspital Baden AG. This new method should be able to reveal structures that cannot be seen using conventional mammography. Standard procedures only determine the extent to which X-rays are attenuated by various tissue structures. In contrast to this, the new method also makes use of the fact that X-rays actually consist of waves, and that their properties change slightly as they travel through tissue. These changes are now measurable and can contribute to the creation of a more meaningful image of the object under investigation. Scientists from the research department at Philips are currently investigating the use of this process as the basis for application in medical practice, and in mammography in particular.

Read the media release <<http://www.psi.ch/media/neue-methode-fuer-die-krebserkennung-mit-brustgewebe-erprobt>> / **Find more scientific highlights** <<http://www.psi.ch/sls/scientific-highlights>>

shop 2011: Neutron instrumentation - from continuous to spallation sources, more information
<http://www.jcns.de/Workshop_2011>

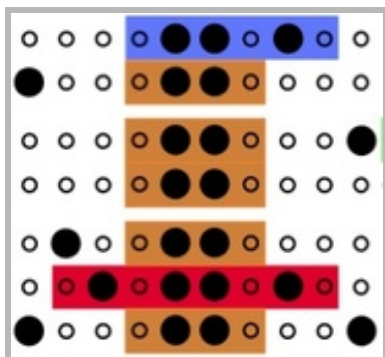
October 10-12 - GISAXS 2011: Grazing Incidence Small Angle X-Ray Scattering, more information
<<https://indico.desy.de/event/4072>>

November 14-18 - EMBO Practical Course: Computational Structural Biology, more information
<http://www.ebi.ac.uk/training/hands-on/course_110912_structures.html>

November 21: PSI Workshop on hard X-ray instrumentation, University of Bern: Scattering and diffraction experiments at the SwissFEL X-ray Free Electron Laser facility more information
<<http://indico.psi.ch/conference-Display.py?confId=1052>>

Facility news

lights#RecentHighlight>

SINQ - High-resolution spectroscopy

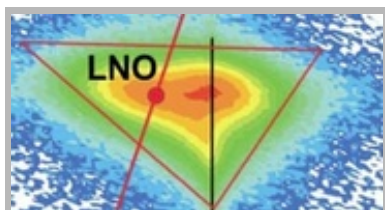
Direct Observation of Local Mn-Mn Distances in the Paramagnetic Compound $\text{CsMn}_x\text{Mg}_{1-x}\text{Br}_3$

A. Furrer et al, Physical Review Letters 107, 115502 (2011)

We introduce a novel method for local structure

determination with a spatial resolution of the order of 0.01 Å. It can be applied to materials containing clusters of exchange-coupled magnetic atoms. We use neutron spectroscopy to probe the energies of the cluster excitations which are determined by the interatomic coupling strength J . Since for most materials J is related to the interatomic distance R through a linear relation $dJ/dR = \alpha$ (for $dR/R \ll 1$), we can directly derive the local distance R from the observed excitation energies. This is exemplified for the mixed one-dimensional paramagnetic compound $\text{CsMn}_x\text{Mg}_{1-x}\text{Br}_3$ ($x=0.05, 0.10$) containing manganese dimers oriented along the hexagonal c axis. Surprisingly, the resulting Mn-Mn distances R do not vary continuously with increasing internal pressure but lock in at some discrete values.

Read the full story <<http://www.psi.ch/num/2011#furrer>>

S μ S - Materials Sciences: Very thin is different

Dimensionality Control of Electronic Phase Transitions in Nickel-Oxide Superlattices

A.V. Boris et al, Science 332, 937 (2011)

SLS: Materials Science**Beamline**

The MS beamline has been undergoing an upgrade from wiggler to undulator radiation. The undulator has been installed and initial tests indicate its brilliance is as expected. The optics, consisting of a double-crystal monochromator (including a sagittal horizontal focussing crystal) and two mirrors (one dynamically bendable for vertical focussing) have been surveyed and commissioned. The first test data of silicon powder at the powder station produced the theoretical linewidths and 2-theta angles. Pilot experiments both at the powder station and the surface diffraction station should commence in October. Normal user operation is expected in the first quarter of 2012.

SINQ: New Webpage

The SINQ webpage has been relaunched. Please **have a look** <<http://www.psi.ch/sinq>> and update your bookmarks!

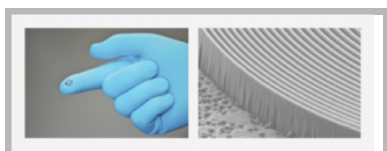
SINQ: School on Multiferroics

PSI staff is co-organizing

The competition between collective quantum phases in materials with strongly correlated electrons depends sensitively on the dimensionality of the electron system, which is difficult to control by standard solid-state chemistry. We have fabricated superlattices of the paramagnetic metal lanthanum nickelate (LaNiO_3) and the wide-gap insulator lanthanum aluminate (LaAlO_3) with atomically precise layer sequences. We used optical ellipsometry and low-energy muon spin rotation to show that superlattices with LaNiO_3 as thin as two unit cells undergo a sequence of collective metal-insulator and antiferromagnetic transitions as a function of decreasing temperature, whereas samples with thicker LaNiO_3 layers remain metallic and paramagnetic at all temperatures. Metal-oxide superlattices thus allow control of the dimensionality and collective phase behavior of correlated-electron systems.

Read the full story <<http://www.psi.ch/num/2011#boris>>

News from the SwissFEL project



Nanofocusing of hard X-ray free electron laser pulses using diamond based Fresnel zone plates

C. David et al., Scientific Reports 1, 57 (2011); DOI

10.1038/srep00057 <<http://dx.doi.org/10.1038/srep00057>>

Already before the building of the planned x-ray Free Electron Laser (SwissFEL), development of the instrumentation for this extremely brilliant light source has started at PSI. The intense, ultrashort pulses of SwissFEL will enable new insights in many different fields of science. A key problem is to provide x-ray optical elements capable of collecting the largest possible fraction of the radiation and to concentrate it into the smallest possible focus. As a key step towards this goal, PSI researchers under the leadership of Christian David demonstrated the first nanofocusing of hard XFEL pulses. They developed diamond based Fresnel zone plates capable of withstanding

ESMF 2012, the 5th European School on Multiferoics from Jan 29 - Feb 3, 2012 at the Centro Stefano Franscini, Monte Verita / Ascona, Switzerland. The application deadline is Oct 15.

More information

<<http://www.esmf.ethz.ch/>> .

µS: Next International Conference on µSR in Switzerland

After a convincing presentation of the Swiss bid to the ISMS executive board by Elvezio Morenzoni, PSI was awarded with the organization of the next µSR conference in June 2014. It will take place in Grindelwald known for its breathtaking panorama of the Eiger, Mönch and Jungfrau mountains and impressive glaciers.

µS: New Spin rotators for High Field µSR and LEM

Three new spin rotators, two for the new high field µSR beamline and one for the Low Energy Muon (LEM) apparatus, have successfully been assembled and tested at PSI. This represents an important milestone for future high transverse (9.5 T) and longitudinal field mea-

the full beam of the world's most powerful x-ray laser. Using an imprint technique, they measured the focal spot size, which was limited to 320 nm FWHM by the spectral band width of the source. A peak power density in the focal spot of 4×10^{17} W/cm² was obtained at 70 fs pulse length, with a total efficiency around 10%.

Read the media release in German <<http://www.psi.ch/media/diamanten-sind-auch-des-forschers-bester-freund-in-german>>

surements at the two instruments respectively.

SwissFEL: JUMP'11 User Meeting Feedback

The topical workshop on „XFEL Experiments in Condensed Matter“ was a great success. The seven talks were given by delegates from different facilities and gave an inspiring view of the existing and planned instrumentation for condensed matter science at different FEL and XFEL facilities. We are grateful for the excellent contributions.

Current Openings

Job opportunities at PSI

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

Announcements

PSI User App for iPhone and iPad

The PSI User App has been upgraded. New features are: iPad support, Proscan status, map of PSI with points of interest. You can download/update the app without charge from the **Apple iTunes store** <<http://itunes.apple.com/us/app/psi-duo/id375328818?mt=8&uo=4>> .

Facility publications

More than 600 publications appeared during the year 2010 based on experiments performed at SLS,

SINQ and SμS! We congratulate all our users on this outstanding performance. To keep track of the publications we urgently ask you to register each publication in the **DUO system** <<https://duo.psi.ch/duo/publications>> and to link them to the respective beamlines and instruments.

Proprietary research

A certain fraction of the beamtime at PSI research facilities is reserved for proprietary use. This is handled by the **PSI Technology Transfer**. The following **directory** 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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