



No. IV/13 - 20 December 2013

PSI photon, neutron and muon user facilities newsletter

Editorial



Dear Colleagues

When I began in 2000 as research director of the SLS project I stood in an almost empty hall. But it filled quickly. In 2001 we had the first four beam lines in place and the number grew steadily to eighteen at the time of our 10th anniversary celebration in

J. Friso van der Veen

2011. But beam lines without people mean nothing. Looking back after almost fourteen years of service I conclude that SLS owes its big success to its users, to the staff at the beam lines and to the fabulous support provided by the colleagues from the Logistics and Accelerator Departments and the Directorate of PSI.

The outcome is truly remarkable. The 'small' SLS now receives yearly ca. 1'800 individual users and registers more than 3'800 user visits. The yearly scientific output resulting from use of the SLS is now ca 530 refereed publications, of which a sizeable number (129 in the year 2012) appears in journals with ISI impact factors higher than 7. The SLS is also relevant for industrial applications. Pharmaceutical companies in Switzerland and abroad use our unique macromolecular crystallography beam lines, and meanwhile four companies have been spun off from the SLS, among them DECTRIS, a world-leading manufacturer of pixelated X-ray detectors.

New calls for proposals

SLS: PX-beamlines

deadline: February 15, 2014

SLS: non-PX beamlines

deadline: March 15, 2014

more information

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

SINQ

deadline: May 15, 2014

more information

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

SLS/SINQ: joint X+N powder diffraction

deadline: February 20, 2014

more information

<<http://www.psi.ch/useroffice/x-plus-n>>

SμS

deadline: June 2014

more information

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

An **overview** about all proposal submission deadlines of the PSI facilities can be

But we should not rest on our laurels, since international competition is strong. So, users, please keep coming with new ideas and challenge us. With the prospect of Swiss-FEL coming soon into existence, I wish you all a bright, flashy future.

J. Friso van der Veen, leaving head of SYN department at PSI

Research highlights

SLS - Material Science: Ptychographic computed tomography of carbon fibers

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Unique insight into carbon fibers on the nanoscale

A. Diaz et al, Carbon (2013), Article in Press, DOI: j.carbon.2013.09.066 <<http://dx.doi.org/10.1016/j.carbon.2013.09.066>>

Novel carbon materials are promising candidates for light and robust low-cost materials of the future. Understanding their mechanical properties benefits from highly resolved three-dimensional (3D) maps of their porosity and density fluctuations in uninterrupted “representative” volumes, but these are difficult to obtain with conventional imaging methods. Scientists at the Paul Scherrer Institut have now succeeded to produce in collaboration with Honda R&D in Germany highly resolved 3D density maps of entire sections of carbon fibers. The technique they used, called ptychographic computed tomography, offers unprecedented insights into the nanomorphology of these materials. Without the need of sectioning the fibers, their porosity can be visualized in 3D as can high-density carbon regions attributed to different degrees of graphitization, indicative of atomic structure differences in the material. Such imaging capabilities are expected to

obtained **here** <<http://www.psi.ch/useroffice/proposal-deadlines>> .

Facility news

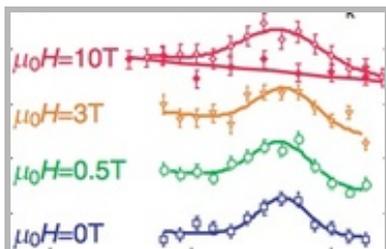
SLS: Appointment of the New SYN Department Head

Professor Gabriel Aeppli will become the new head of the SYN department as of April 2014. Gabriel Aeppli is an internationally recognized solid-state physicist with a broad interest. He is especially known for his spectroscopic work on magnetism of disordered systems and high-temperature superconductors, with a strong focus on neutron and photon diffraction studies as well as scanning tunneling spectroscopy. He has also developed an increasing interest in biological problems and their applications in the field of medicine. In recent years he has expanded his interests to the field of quantum information, where he focused his research on the realization of quantum bits in doped silicon. With the London Centre for Nanotechnology, he has built in a short time a leading science and technology center in the heart of London. For his scientific

prove useful for the systematic study of the mechanical properties of carbon fibers, addressing a crucial point when designing and tailoring novel carbon materials.

Read the full story <<http://www.psi.ch/sls/scientific-highlights>>

SINQ - Thin films to be used as multifunctional devices?



Strain-Induced Ferromagnetism in Antiferromagnetic LuMnO₃ Thin Films

J.S. White et al, *Physical Review Letters* **111**, 037201

(2013), DOI: [10.1103/PhysRevLett.111.037201](https://doi.org/10.1103/PhysRevLett.111.037201) <<http://dx.doi.org/10.1103/PhysRevLett.111.037201>>

Single phase and strained LuMnO₃ thin films are discovered to display coexisting ferromagnetic and antiferromagnetic orders. A large moment ferromagnetism ($\approx 1\mu\text{B}$), which is absent in bulk samples, is shown to display a magnetic moment distribution that is peaked at the highly strained substrate-film interface. We further show that the strain-induced ferromagnetism and the antiferromagnetic order are coupled via an exchange field, therefore demonstrating strained rare-earth manganite thin films as promising candidate systems for new multifunctional devices.

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

S μ S - Spintronics with organic semiconductors

Importance of Spin-Orbit Interaction for the Electron Spin Relaxation in Organic Semiconductors

L. Nuccio et al, *Physical Review Letters* **110**, 216602 (2013), DOI: [10.1103/Phys-](https://doi.org/10.1103/Phys-)

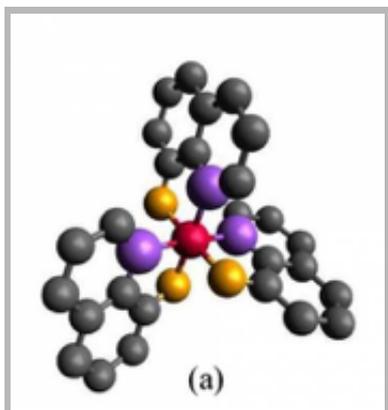
work, he has received several awards, including the Oliver Buckley Prize in 2005 and the Mott Prize in 2008.

SINQ: Large beam time request

The request for the SINQ beamtime is as large as never before: in November 260 new proposals have been submitted by the user community. Together with the submission deadline in spring 2013 this sums up to a total of almost 440 proposals in 2013. In particular, the diffractometers and the imaging beam lines have received many proposals, while the number of requested days is also enormously high for the SANS and reflectometry instruments and the four spectrometers. The proposals are under evaluation now and the users will be informed about the results in February.

S μ S: New name for the high field spectrometer

The new High field And Low temperature μSR facility has been named **HAL-9500** in reminiscence of the famous antagonist of Arthur C.



RevLett.110.216602

<<http://dx.doi.org/10.1103/PhysRevLett.110.216602>>

Despite the great interest organic spintronics has recently attracted, there is only a partial understanding of the fundamental physics behind electron spin relaxation in organic semiconductors. Mechanisms based on hyperfine interaction have been demonstrated, but the role of the spin-orbit interaction remains elusive. Here, we report muon spin spectroscopy and time-resolved photoluminescence measurements on two series of molecular semiconductors in which the strength of the spin-orbit interaction has been systematically modified with a targeted chemical substitution of different atoms at a particular molecular site. We find that the spin-orbit interaction is a significant source of electron spin relaxation in these materials.

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

SwissFEL - Undulator U15



Installation of SwissFEL Undulator Prototype in the Injector Test facility.

Romain Ganter

On December 5th, the 17 tons SwissFEL undulator prototype (In-vacuum Undulator U15)

has been successfully moved from the Undulator lab (SLS) to the SwissFEL Injector Test Facility (SITF). The commissioning of the U15 prototype with electron beam is an important step to validate the U15 design

Clarke's Space Odyssey series. Since the last call in December 2013 the instrument with a maximum field of 9.5 Tesla and a base temperature of 20 mK is now available for the worldwide users community. At that recent deadline in December 169 new proposals have been submitted. That makes a total of 233 in 2013, which is a new all-time high for the SμS facility. In particular, the December request for the instruments GPS (88 proposals), LTF (52) and LEM (37) is enormously high but also the new instrument HAL-9500 received already 16 proposals.

Upcoming events

SUM 2014: SOLEIL Users Meeting <<http://www.synchrotron-soleil.fr/Workshops/2014/SUM2014>>

January 23-24, 2014, Gif sur Yvette, France

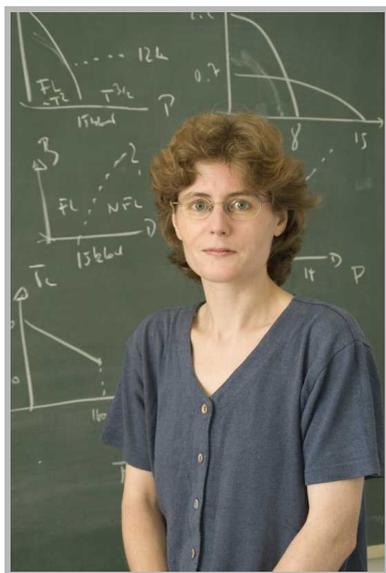
European XFEL Users' Meeting 2014

<<http://www.xfel.eu/2014-users-meeting/>>

and also to detect possible improvements before full series production. At first, the alignment procedure of the U15 segment with the electron beam will be tested. Later, twelve such U15 segments will have to be precisely aligned on a straight line in SwissFEL. Another important step at SITF, will be the detection of free electron laser amplification at 70 nm. Indeed, simulations have shown that with the electron beam parameters within reach at SITF, it should be possible to see the beginning of the SASE (self-amplified spontaneous emission) amplification.

Users Association

JUSAP - The Joint Users Association



Sarah Dunsiger, chair of JUSAP

The board members of **JUSAP** <<http://www.psi.ch/useroffice/users-association>> meet twice a year, together with the Users' office to discuss issues of direct concern to the neutron, synchrotron, μ SR and industrial users of the Paul Scherrer Institute and act as liaison between the PSI management and the user community. Please feel free to e-

mail us with comments, concerns or suggestions.

On September 19-20, 2013, SLS user representative Annick Froideval, together with the chairman of the **European Synchrotron User Organisation (ESUO)** <<http://www.esuo.org>>, Ullrich Pietsch, co-organised the 5th ESUO annual meeting at PSI. Updated information was

January 29-31, 2014, Hamburg, Germany

ESRF Users' Meeting 2014 and Associated Workshops

<<http://www.esrf.eu/home/events/conferences/area-events/esrf-events-list/users-meeting-2014--associated-workshops.html>>

February 3-5, 2014, Grenoble, France

14th REIMEI Workshop on Spin Currents and Related Phenomena

<<http://www.ill.eu/news-events/events/reimei-2014>>

February 10-13, 2014, Grenoble, France

NIBB 2014: Neutrons in Biology and Biotechnology

<<http://www.ill.eu/news-events/events/nibb-2014/>>

February 16-21, 2014, Grenoble, France

HERCULES 2014: Higher European Research Course for Users of Large Scale Experimental Systems

<<http://hercules-school.eu>>

February 23 - March 26, 2014, Grenoble, France

ISIS Neutron training course 2014

<<http://www.isis.stfc.ac.uk/learning/neutron-training-course/>>

February 24 - March 6,

presented including the current users statistics by European countries, the status of the FP7 CALIPSO integrating initiative, as well as that of the FP7 BioStruct- X project. ESUO will prepare a new approach for the continuation of transnational access to national facilities in Europe within the new European Framework Program "Horizon 2020". Participants from 18 European countries attended the ESUO meeting, organised as a **satellite of JUM@P2013** <<http://indico.psi.ch/internalPage.py?pageId=8&confId=2034>> . Ideas for the focus of JUM@P2015 are very much encouraged - it is never too early to think of topics of current interest!

We are pleased to report wireless networking is now available throughout the guesthouse, as well as TVs. There are plans to expand the wireless capability over the whole site. The user office is actively exploring an increase in the capacity of the guesthouse, aiming for 25-35 additional rooms, as well as the provision of catering on weekends.

Best wishes for your experiments in 2014!

Sarah Dunsiger, on behalf of the JUSAP board members

Announcements

2014 PSI Summer School on Condensed Matter Physics

The 2014 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: Exploring time, energy and length scales in condensed matter. 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 9-15, 2014 on the premises of the Institut Montana Zugerberg (international

2014, Didcot, UK

34th Berlin School on Neutron Scattering

<http://www.helmholtz-berlin.de/events/neutron-school/index_de.html>

March 13-21, 2014, Berlin, Germany

more events <<http://www.psi.ch/useroffice/conference-calendar>>

Current Openings

Job opportunities at PSI

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

boarding school), Zug, 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**. <<https://indico.psi.ch/conferenceDisplay.py?confId=2672>>

Future of I3 access programs

The 2014-15 work program of the new EC framework program Horizon 2020 does not contain calls for classical I3 access programs like NMI3 or CALIPSO anymore, which means that the future financial support of our European users is seriously endangered. It is now the time to lobby with the aim to be included into the second work program from 2016 on. Any support by our user community in this matter is highly welcome. For further information please **contact us**.

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** <<http://www.psi.ch/industry/technology-transfer>>. The following **directory** <<http://www.psi.ch/industry/expertise>> lists services on offer by these facilities. For the SLS beam lines industrial use is facilitated by the **SLS Technology Transfer AG** <<http://www.psi.ch/sls-techno-trans-ag/sls-techno-trans-ag>>. If you are not an expert in a particular technique or you are unsure which technique is best suited for your application(s), please **contact us**.

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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