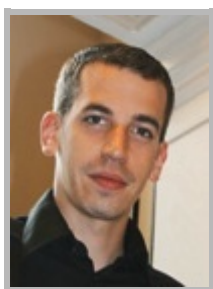




No. II/11 - 30 June 2011

PSI photon, neutron and muon user facilities newsletter

Editorial



Christian Rüegg

Dear colleagues,

During the first two months of user operation of SINQ in 2011 a large number of experiments could be completed successfully. This is due to the exciting science proposed by the users of our wide range of state-of-the-art instrumentation, but also due to highly motivated teams operating and optimizing an immensely complex system, starting at the Cockcroft-Walton preaccelerator and ending e.g. with a plot of high-resolution neutron diffraction data on a computer screen and ultimately with a scientific breakthrough. This year's restart has been extremely smooth after an extended period of tuning of the high-current proton accelerator, which recently culminated in a World Record in average proton beam power of 1.42 MW with SINQ operating in the 1 MW range. Profiting also from progress in the optimization of the solid-state spallation-target design, the continuous increase in the performance of SINQ enables not only a larger number of experiments but also new science, exploring e.g. materials for future devices, energy supplies and health care solutions. We are now targeting other key components at the front end and especially of the neutron guide system, whose pioneering use of neutron super-mirror technology may in the future be extended to include also advanced focusing concepts for small samples and thin films.

Next calls for proposals

SLS: non-PX beamlines

deadline: September 15, 2011

more information

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

SINQ: all beamlines

deadline: November 15, 2011

more information

<http://sin-q.web.psi.ch/sinq/sinq_call.html>

SμS: all beamlines

deadline: early December, 2011

more information

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

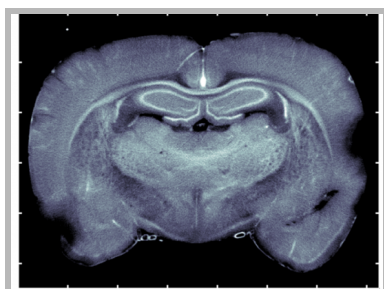
An **overview** about all proposal submission deadlines of the PSI facilities can be obtained **here** <<http://www.psi.ch/useroffice/proposal-deadlines>> .

Upcoming events

Looking beyond borders, in Europe there are many examples for highly successful and efficient multi-national research facilities with ILL, ESRF and CERN being among the most important for researchers also performing experiments at PSI. The benefits are very obvious for countries collaborating to build and run infrastructure, which serves and expands the scope of their strong national communities. In the field of neutron scattering there is a new such facility on the horizon: the European Spallation Source ESS, which currently is in planning phase in Lund, Sweden. This 5 MW next-generation spallation neutron source will supply neutrons for research beyond the periods of operation of some of the present European installations and starting from 2019 will provide unprecedented performance of its instruments for imaging, diffraction and spectroscopy. The ESS has the clear potential to be among our prime future research tools and deserves enthusiastic support by the European countries including Switzerland.

Christian Rüegg on behalf of the Laboratory for Neutron Scattering PSI

Research highlights



SLS - Life Sciences: New X-ray Method

Molecular X-ray computed tomography of myelin in a rat brain

T.H. Jensen et al, NeuroIm-

age, 2011

An international team of researchers from Denmark, Germany, Switzerland and France has developed a new method for making detailed X-ray images of brain tissue, which has been used to make the myelin sheaths of nerve fibres visible. Damage to these protective sheaths

July 10-15 - FEMTO10: The Madrid Conference on Femtochemistry: Frontiers of Ultrafast Phenomena in Chemistry, Physics and Biology Madrid, Spain. **More information** <<http://www.femto10.com>>

July 17-22 - ECNS 2011: 5th European Conference on Neutron Scattering, Prague, Czech Republic. **More information** <<http://www.ecns2011.org>>

August 13-22 - 10th PSI summer school on condensed matter research: phase transitions / Zug, Switzerland.



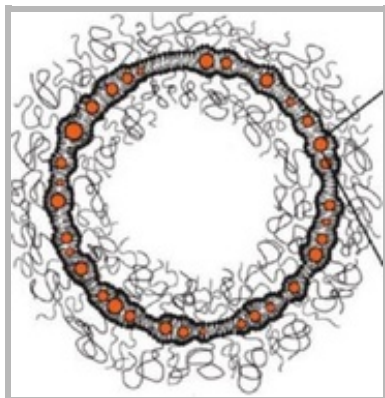
Registration deadline has been extended to July 10. More information <<http://indico.psi.ch/conferenceDisplay.py?confid=258>>

September 12 & November 21 - Two Workshops on Hard X-ray Instrumentation at the SwissFEL / University of Bern, Switzerland

September 12 & November 21 - Two Workshops on Hard X-ray Instrumentation at the SwissFEL / University of Bern, Switzerland

The SwissFEL team of the

can lead to various disorders, such as multiple sclerosis. The facility for creating these images of the protective sheaths of nerve cells is being operated at the Swiss Light Source (SLS), at the Paul Scherrer Institute. The research team has reported on its work in the online version of the scientific journal *NeuroImage*. **Read the full story** <<http://www.psi.ch/sls/scientific-highlights#RecentHighlight36>>

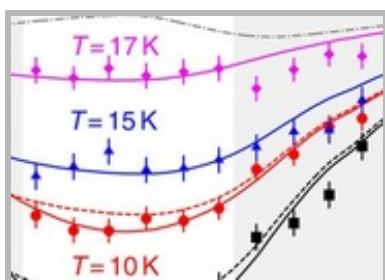


SINQ - Life Sciences: Drug Delivery

Triggered Release from Liposomes through Magnetic Actuation of Iron Oxide Nanoparticle Containing Membranes

E. Amstad et al, *Nano Letters* 11, 1664 (2011)

The ideal nanoscale drug delivery vehicle allows control over the released dose in space and time. We demonstrate that this can be achieved by stealth liposomes comprising self-assembled superparamagnetic iron oxide nanoparticles (NPs) individually stabilized with palmityl-nitroDOPA incorporated in the lipid membrane. Alternating magnetic fields were used to control timing and dose of repeatedly released cargo from such vesicles by locally heating the membrane, which changed its permeability without major effects on the environment. **Read the full story** <<http://www.psi.ch/num/2011#amstad>>



SμS - Materials Sciences: Observation of a New Phenomenon

The Meissner effect in a strongly underdoped cuprate above its critical temperature



Paul Scherrer Institute invites you to attend two workshops

on hard X-ray instrumentation at the SwissFEL X-ray Free Electron Laser facility. The present workshops will assist in the planning of the ARAMIS beam lines and experimental stations.

- Workshop 1: September 12, 2011: Spectroscopic experiments
- Workshop 2: November 21, 2011: Scattering and diffraction experiments

Registration and details are available on **SwissFEL** <<http://www.psi.ch/swissfel/>> or by contacting **silvia.bacher@psi.ch**

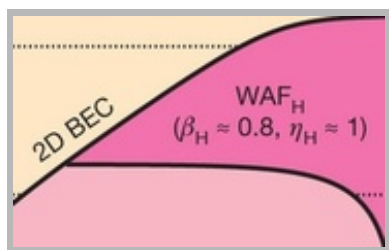
Facility news

SLS: Materials science beamline upgrade

The MS beamline actually undergoes a comprehensive upgrade. In addition to providing fundamental improvements to both powder and SXR experiments, the upgrade should allow new experimental setups previously excluded to the beam-

E.M. Morenzi et al, *Nature Communications* **2**, 272 (2011)

The Meissner effect and associated perfect 'bulk' diamagnetism together with zero resistance and gap opening are characteristic features of the superconducting state. In the pseudogap state of cuprates, unusual diamagnetic signals and anomalous proximity effects have been detected, but a Meissner effect has never been observed. Here we probe the local diamagnetic response in the normal state of an underdoped $\text{La}_{1.94}\text{Sr}_{0.06}\text{CuO}_4$ layer ($T_c \leq 5$ K), which is brought into close contact with two nearly optimally doped $\text{La}_{1.84}\text{Sr}_{0.16}\text{CuO}_4$ layers ($T_c \approx 32$ K). We show that the entire 'barrier' layer of thickness, much larger than the typical c axis coherence lengths of cuprates, exhibits a Meissner effect at temperatures above T_c' but below T_c . The temperature dependence of the effective penetration depth and superfluid density in different layers indicates that superfluidity with long-range phase coherence is induced in the underdoped layer by the proximity to optimally doped layers, but this induced order is sensitive to thermal excitation. **Read the full story** <<http://www.psi.ch/num/2011#morenzi>>



SμS - Materials Sciences: Driving Through Quantum States

Magnetic and non-magnetic phases of a quantum spin liquid

F.L. Pratt et al, *Nature* **471**, 612 (2011)

A quantum spin-liquid phase is an intriguing possibility for a system of strongly interacting magnetic units in which the usual magnetically ordered ground state is avoided owing to strong quantum fluctuations. Here we show, using muon spin rotation, that applying a small magnetic field to the spin liquid system κ -(BEDT-TTF) $_2\text{Cu}_2(\text{CN})_3$ produces a quantum phase transition be-

line. The beamline should be ready for user operation beginning 2012.

SINQ: Thermal neutron spectrometer EIGER

The construction of the new triple-axis spectrometer for thermal neutrons is approaching its completion. EIGER will be the first spectrometer at SINQ operating in the energy range up to 70 meV.

SINQ: New automatic sample changer

Devices have been installed and tested on the powder diffractometer HRPT and the small angle scattering instruments for automatic change of samples, including at low temperatures.

SμS: Remarkable increase in LEM count rate

Recently the stainless steel vacuum tube of the Low Energy Muon Spin Rotation (LEM) spectrometer has been replaced by a titanium tube. Due to the weaker absorption of muon decay positrons in the vacuum tube the effective count rate

tween the spin-liquid phase and an antiferromagnetic phase with a strongly suppressed moment. This can be described as Bose–Einstein condensation of spin excitations with an extremely small spin gap. At higher fields, a second transition is found that suggests a threshold for deconfinement of the spin excitations. Our studies reveal the low-temperature magnetic phase diagram and enable us to measure characteristic critical properties. **Read the full story** <<http://www.psi.ch/num/2011#pratt>>

of the LEM setup increased by 15%. The observed gain in count rate is in accordance with the expected value from GEANT4 simulations.

Joint Users' Meeting at PSI: JUM@P'11



The next users' meeting from the **JUM@P** series will be organized at PSI on **September 15-16, 2011**.

The meeting will consist of a plenary session with keynote and invited lectures as well as information about PSI and its user facilities on the first day.

The second day is reserved for topical parallel workshops of a half or one day duration. Poster sessions, a tour of the PSI user facilities and the award of the second **PSI thesis medal**

<<http://indico.psi.ch/internalPage.py?pageId=0&confId=42>> accomplish the program. **Please remember the deadline for the submission of abstracts, which is July 10.**

Further information and online registration (**until August 15**) is available from the **JUM@P11 webpage**

<<http://indico.psi.ch/event/jump11>>

Current Openings

Job opportunities at PSI

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

Announcements

PSI scientific report 2010

The PSI scientific report 2010 is available now. Please **download** the online version!

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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