



No. I/10 - 31 March 2010

# PSI photon, neutron and muon user facilities newsletter

## Editorial



Rafae Abela

Dear colleagues,

An important decision has been taken towards the realization of SwissFEL at PSI. The ETH Board has discussed at its board meeting, on the 1st and 2nd of March 2010, the proposal presented by our Institute and has given unanimously its support by including the project in the strategic planning of the ETH Domain. The SwissFEL project will thus be included in the BFI proposition of the State Secretariat for Education and Research to the Federal Government for the years 2011 – 2015.

The PSI directorate has placed special consideration to the local public opinion on the project. Therefore in January two 'town hall' meetings have been organized in the community of Würenlingen, the preferred site for the facility. In these meetings the long term strategy of PSI, the scientific opportunities of SwissFEL, as well as the impact of the facility on the local and regional level were discussed. A working group including local authorities and associations will give advice on environmental and local issues during the definition and approval phase.

The technical development of the project has also reached its first milestone: In the SwissFEL injector test facility the first electron beam from the gun has been extracted and accelerated to an energy of 5 MeV. The characterization of the beam, improvements on their quality and the implementation of the diagnostic are the short

## New calls for proposals

**SLS:** PX-beamlines: call on May 8 with deadline on June 15, 2010.

**See our call schedule**

**SINQ:** all instruments: deadline on May 15, 2010.

**More information** <[http://sin-q.web.psi.ch/sinq/sinq\\_call.html](http://sin-q.web.psi.ch/sinq/sinq_call.html)>

**SμS:** instruments GPS, LTF, GPD and DOLLY: deadline in June 2010.

**More information**

<[http://lmu.web.psi.ch/facilities/next\\_call.html](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://user.web.psi.ch/user/deadlines.html>> .

## Upcoming events

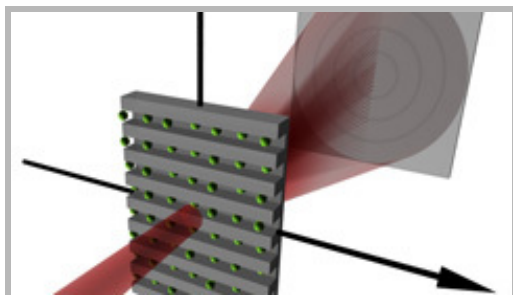
**May 3-6: MaMaSELF 2010**  
Master in Materials Science  
Exploiting Large Scale Facili-

term goals. We express our thanks to all the groups that worked hard for these achievements, as well as for the installation of the whole facility.

*R. Abela*

On behalf of the SwissFEL team

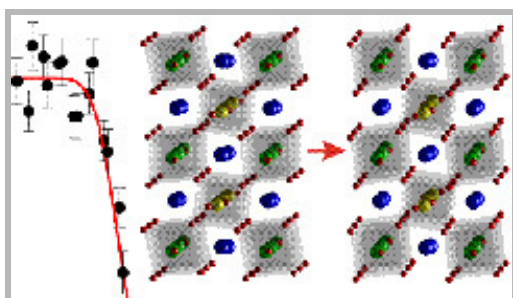
## Research highlights



**SLS: Confinement-Induced Orientational Alignment of Quasi-2D**  
**K. Nygård et al:**  
**EPL 86, 66001**  
**(2009)**

Extreme confinement is known to induce ordering of the fluid, thereby affecting its properties.

However, experimental studies are hampered by the confining surfaces. In this work we show that x-ray scattering experiments on artificial fluids under extreme confinement, making use of colloidal fluids confined in diffraction gratings, can be used to determine both the average density profile and the fluid's local structure. In particular, the experiment shows how extreme confinement induces orientational alignment of the fluid, while still preserving a fluid-like structure. **Read the full story here!**



<http://num.web.psi.ch/highlights.html#haug>

ties Status Meeting, Rigi Kulm, Switzerland.

**Information and registration** <<http://diffraction.web.psi.ch/mamaself-rigi-ch.htm>>

### **May 24-30: Diffraction at the Nanoscale - Nanocrystals, Defective&Amorphous Materials**

A hands-on workshop on X-rays, synchrotron radiation and neutron diffraction techniques including experimental and computational aspects.

Registration is closed.

### **August 7-13: 9th PSI Summer School**

on condensed matter research, Zuz, Switzerland.

**Information and registration** <<https://school.web.psi.ch/html/index.shtml>>

## Facility news

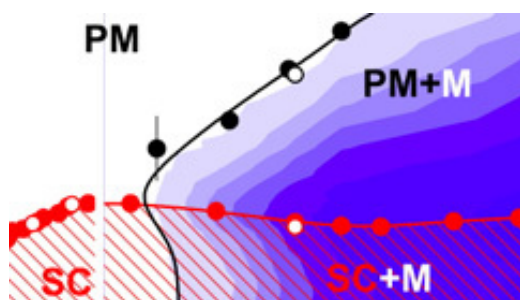
### **SLS: Reliability of Operation at SLS**

In 2009 SLS had an excellent year with a record uptime of 98.75%. Unfortunately 2010 started with a major problem on the cryogenic system of the 3rd harmonic cavity resulting in a down-time of 100.2 hours. An additional cryogenic problem occurred in March adding another

## **SINQ: Magnetic-Field-Enhanced Incommensurate Magnetic Order in the Underdoped High-Temperature Superconductor $\text{YBa}_2\text{Cu}_3\text{O}_{6.45}$**

**D. Haug et al: PRL 103, 017001 (2009)**

A neutron-scattering study of the static and dynamic spin correlations in the underdoped high-temperature superconductor  $\text{YBa}_2\text{Cu}_3\text{O}_{6.45}$  in magnetic fields up to 15 T is presented. The field strongly enhances static incommensurate magnetic order at low temperatures and induces a spectral-weight shift in the magnetic-excitation spectrum. A reconstruction of the Fermi surface driven by the field-enhanced magnetic superstructure may thus be responsible for the unusual Fermi surface topology revealed by recent quantum-oscillation experiments. **Read the full story here!** <<http://num.web.psi.ch/highlights.html#haug>>



**$\mu\text{S}$ : Pressure Induced Static Magnetic Order in Superconducting  $\text{FeSe}_{1-x}$**

**M. Bendele et al, Physical Review Letters 104, 087003 (2010)**

**Letters 104, 087003 (2010)**

We report on a detailed investigation of the electronic phase diagram of  $\text{FeSe}_{1-x}$  under pressures up to 1.4 GPa by means of ac magnetization and muon-spin rotation. At a pressure 0.8 GPa the nonmagnetic and superconducting  $\text{FeSe}_{1-x}$  enters a region where static magnetic order is realized above  $T_c$  and bulk superconductivity coexists and competes on short length scales with the magnetic order below  $T_c$ . For even higher pressures an enhancement of both the magnetic and the superconducting transition temperatures as well as of the corresponding order parameters is observed. These exceptional properties make  $\text{FeSe}_{1-x}$  to be one of the most interesting superconduct-

38.3 hours of down-time. Some of the shifts lost will be compensated by eight additionally scheduled user operation shifts in April and by the ten user reserve shifts in August. The beamline managers will contact selected users at the end of March. Actions to improve the reliability of the cryogenic system are being evaluated and we will keep the users informed.

**Thesis Award:** C. Robert Maass was awarded with the "Nachwuchspreis der Deutschen Gesellschaft für Materialkunde" for his doctoral thesis on "In-Situ Laue Diffraction on Deforming Micropillars". The main aim of these studies was to develop and build a testing methodology that allowed a combination of micro focused polychromatic diffraction and micro-compression testing; i.e. an in-situ test. Successful experiments could be performed in collaboration with the MicroX-AS beamline team. **More information.** <<http://mss.web.psi.ch/research/experiment/p3.html>>

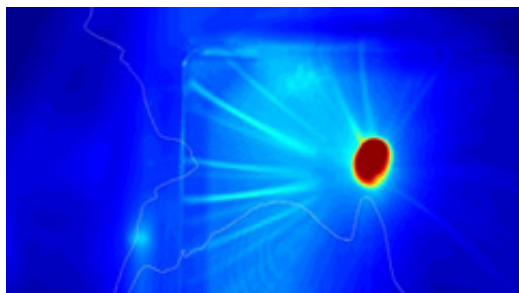
**SINQ:** The restart of SINQ after the annual shutdown is scheduled for April 26, 2010

ing systems investigated extensively at present. **Read the full story here!** <<http://num.web.psi.ch/highlights.html#bendele>>

## News from the SLS Users Association JUSAP

In a cooperation between PSI and its user association JUSAP a new electronic feedback form has been established. A couple of weeks after their stay at PSI all participants of an experiment performed at one of the PSI large user facilities are electronically asked to complete a short feedback form and to rate the experiment, the facilities and the services provided at PSI. Those feedbacks will be used to further improve the user service at the PSI facilities.

## News from SwissFEL



In the SwissFEL injector test facility the first electron beam from the gun has been extracted and accelerated to 5 MeV.

The Paul Scherrer Institut was the main organizer of ICANS XIX, the 19th Meeting of the International Collaboration of Advanced Neutron Sources in Grindelwald from March 8-12, 2010 with almost 200 participants from 19 different countries. **More information.** <<http://icans.web.psi.ch/>>

**SμS:** New detectors for  $\mu$ SR spectrometers. A compact fast timing detector consisting of a Geiger-mode Avalanche Photodiodes (G-APD) coupled to a plastic scintillator and read-out electronics has recently been developed and tested at PSI. The integrated time resolution of the new detector system is better than 100 ps. In addition, the system is capable to work in high magnetic fields and it therefore constitutes the foundation for future  $\mu$ SR spectrometers with superior time resolution e.g. the High field spectrometer being built at PSI. **More information.**

<<http://lmu.web.psi.ch/facilities/PSI-Detectors.html>>

The high field project at PSI recently obtained an additional grant from the R'E-quip program of the Swiss National Science

Foundation.


## Announcements

### 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](http://num.web.psi.ch/publ_all.htm)>

### SwissFEL Science case

The SwissFEL Science Case has been finished. The documents official designation is „PSI Bericht Nr. 09-10“. The document is available as a **PDF file**  from the **SwissFEL web page**.

### Proprietary research

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

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>>

**Contact:** PSI User Office, Phone: +41-56-310-4666, Email: [useroffice@psi.ch](mailto:useroffice@psi.ch)