



No. I/12 - 30 March 2012

PSI photon, neutron and muon user facilities newsletter

Editorial



Rafael Abela

Dear Colleagues,

The SwissFEL project is progressing rapidly on three routes: preparation of building permit, design and construction of prototypes for the accelerator and the challenging phase of preparing future experiments. The final decision for the project will be taken by the Swiss parliament in fall of this year. Academic groups from Swiss universities and PSI are performing experiments at the XFEL facility LCLS (USA), testing new devices and measuring strategies at the SLS and planning tests at SACLA (Japan). All this exchange of experiences will strongly influence the specific future user-stations of SwissFEL. Furthermore, the interaction with future users has been strengthened: two scientific workshops on hard X-Ray instrumentation have been held in the fall of 2011. The first workshop focused on spectroscopic experiments, while the second one was dedicated to scattering and diffraction experiments. The results of the workshops are still **available on the web** <<http://www.psi.ch/swissfel/swissfel-workshops>>. The next steps in the design process will be discussed in the course of five topical meetings, to be held at PSI until summer of 2012.

Two collaboration agreements with European institutions were signed in November 2011. A "Swiss-Swedish Partnership" on Accelerator, Photon and Neutron Science, between PSI, EPFL, the Royal Institut of Technology in

New calls for proposals

SLS: PX-beamlines

deadline: June 15, 2012

non-PX beamlines

deadline: September 15, 2012

more information

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

SINQ/all instruments

deadline: May 15, 2012

more information

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

SμS/instruments GPS, LTF, and GPD

deadline: June 2012

more information

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

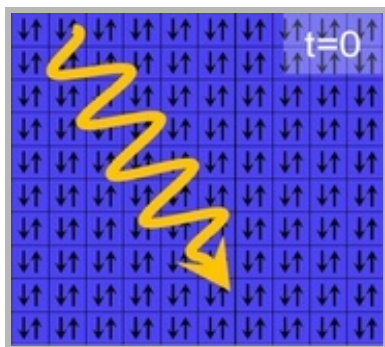
An **overview** about all proposal submission deadlines of the PSI facilities can be obtained **here** <<http://www.psi.ch/useroffice/proposal-deadlines>> .

Stockholm, the University of Uppsala and the University of Stockholm covers technology developments for the next generation of free-electron lasers as well as collaborations in photon and neutron science. The second partnership, a MoU between PSI and STFC (UK), will enable the exploitation and expansion of technological and scientific capabilities of the future SwissFEL.

Rafael Abela on behalf of the PSI SwissFEL team

Research highlights

SLS - Materials Sciences



Creating magnetism takes much longer than destroying it

S.O. Mariager, Physical Review Letters 108, 087201 (2012)

Researchers at the Paul Scherrer Institute are find-

ing out how long it takes to establish magnetism and how this happens. Establishing a magnetically ordered phase in the metallic alloy iron-rhodium takes much longer than the reverse process of demagnetization. This fact was established by researchers of the Paul Scherrer Institute (PSI), Switzerland, together with colleagues of an international collaboration. Magnetism is established in a two-step process. Initially, small magnetic regions form, but have random orientation. Subsequently, these regions rotate until they all have a common orientation. This is reported in an article which has recently been published in the renowned journal "Physical Review Letters". The result comes from basic research, but has relevance for the computer industry, as it shows which processes limit the speed of magnetic data storage and where improvements might be made.

Upcoming events

April 15-18: NIUS 2012: ESS Neutron Imaging User Symposium, Bad Zurzach, CH, **more information**

<<http://www.psi.ch/nius2012>>

April 19-20: Science and Scientists at ESS, Berlin, DE, **more information**

<http://ess.se/ess_conferences/?page_id=54>

April 24: Workshop SwissFEL Experimental Station C: Coherent Diffraction Imaging, PSI, CH, **more information**

<<http://www.psi.ch/swissfel/swissfel-workshops>>

May 7-10: 4th MaMaSELF status meeting, Rigi Kulm, CH, **more information**

<<http://diffraction.web.psi.ch/mamself-rigi-ch.htm>>

May 22: Workshop SwissFEL 2nd Phase Experimental Stations, PSI, CH, **more information**

<<http://www.psi.ch/swissfel/swissfel-workshops>>

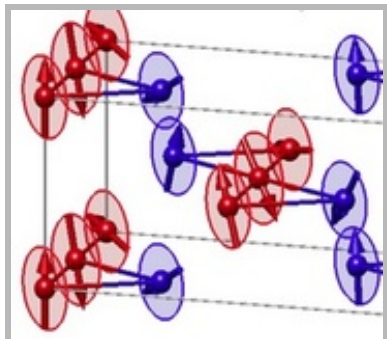
June 4-8: X-FEL school 2012, Annecy, FR, **more information**

<<http://xfel2012.grenoble.cnrs.fr>>

June 19: Workshop SwissFEL Scientific Computing & Data Acquisition, PSI, CH, **more information**

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

SINQ - Functional materials



Coupling of Magnetic and Ferroelectric Hysteresis by a Multicomponent Magnetic Structure in Mn_2GeO_4

J.S. White et al, Physical Review Letters 108, 077204 (2012)

The olivine compound

Mn_2GeO_4 is shown to feature both a ferroelectric polarization and a ferromagnetic magnetization that are directly coupled and point along the same direction. We show that a spin spiral generates ferroelectricity, and a canted commensurate order leads to weak ferromagnetism. Symmetry suggests that the direct coupling between the ferromagnetism and ferroelectricity is mediated by Dzyaloshinskii-Moriya interactions that exist only in the ferroelectric phase, controlling both the sense of the spiral rotation and the canting of the commensurate structure. Our study demonstrates how multicomponent magnetic structures found in magnetically frustrated materials like Mn_2GeO_4 provide a new route towards functional materials that exhibit coupled ferromagnetism and ferroelectricity.

Read the full story <<http://www.psi.ch/num/2012#white>>

SμS - Materials Sciences: Coexistence or Separation?

Superconducting properties of single-crystalline $A_xFe_{2-y}Se_2$ ($A=Rb, K$) studied using muon spin spectroscopy

Z. Shermadini et al, Physical Review B 85, 100501(R) (2012)

information <<http://www.psi.ch/swissfel/swissfel-workshops>>

June 20-22: SGK/SSCr Annual Meeting 2012, Zurich, CH, more information

<<http://www.sps.ch/en/events/>>

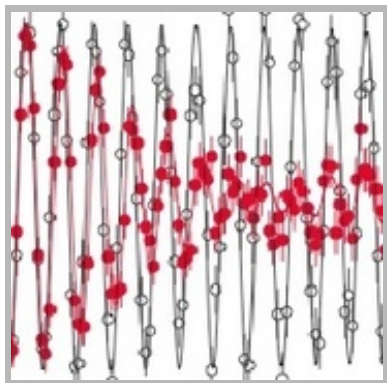
Facility news

SLS: first light at PEARL

PEARL <<http://www.psi.ch/sls/pearl/pearl>> (Photo-Emission and Atomic Resolution Laboratory) is a new soft X-ray beamline dedicated to surface science. The main synchrotron-based technique is photoelectron diffraction, while scanning tunnelling microscopy provides complementary real-space information. The X-ray optics section of the beamline has been set up, and detected synchrotron light for the first time in December 2011. Commissioning of the optics, and installation of the end station are planned for 2012.

SINQ: conceptual design work for the ESS

Several laboratories at PSI are now involved in the conceptual design of new instruments and in the devel-



We report on the superconducting properties of $A_x\text{Fe}_{2-y}\text{Se}_2$ ($A=\text{Rb}, \text{K}$) single crystals studied with the muon spin relaxation or rotation (μSR) technique. At low temperatures, close to 90% of the sample volumes exhibit large-moment magnetic order

which impedes the investigation of their superconducting properties by μSR . On the other hand, about 10% of the sample volumes remain paramagnetic and clearly show a superconducting response. The temperature dependence of the superconducting carrier density was analyzed within the framework of a single s-wave gap scenario. The zero-temperature values of the in-plane magnetic penetration depths $\lambda_{ab}(0)=258(2)$ and $225(2)$ nm and the superconducting gaps $\Delta(\theta)=7.7(2)$ and $6.3(2)$ meV have been determined for $A = \text{Rb}$ and K , respectively. The microscopic coexistence and/or phase separation of superconductivity and magnetism is discussed.

Read the full story <<http://www.psi.ch/num/2012#shermadini>>



HERCULES School at Swiss Light Source

The annual **HERCULES** <<http://hercules-school.eu/17-about-the-school.htm>> school aims at training young European

researchers (PhD students, postdoctoral scientists) in the field of neutron and synchrotron radiation in a broad range of scientific disciplines. The four-week school is organized each year for 70-75 participants and includes practical sessions at large scale user facilities. The 2012 synchrotron radiation practicals took place at Swiss Light Source (SLS, PSI) and at synchrotron SOLEIL in March. During three days the SLS exclusively opened its beam lines for the school and performed practical training on cutting-edge experimental setups, i.e. the same

development of key neutron technologies for the European Spallation Source ESS. The results of these work packages, ranging from the optimization of shielding and moderators to high-intensity reflectometry, will be delivered to the ESS at the end of 2012.

SINQ: sample environment

A new bottom loading closed cycle refrigerator to be used within an Euler Cradle has been commissioned successfully. The CCR reaches 4K and is equipped with a Joule-Thomson stage to extend the accessible temperature range down to 1.6K. Work is in progress to have the devices accessible to users at TRICS in the near future.

S μ S: reconstruction of beam line

The major reconstruction of the low energy muon beam line has successfully been completed and tested using low energy protons. It became necessary, because a spin rotator for longitudinal field μSR was implemented. Excellent beam properties like transmission rates and a

environment setup that is used for research.

narrow beam spot have been obtained. Especially advantageous to the former setup is the shortened time of flight between trigger detector and sample, which should result in a better time resolution by a factor of two.

Current Openings

Job opportunities at PSI

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

Announcements

NMI3-II access programme is back

The next period of the European Union 'Neutron and Muon Integrated Infrastructure Initiative - NMI3-II' has started on February 1, 2012. Again, both SINQ and $\text{S}\mu\text{S}$ are NMI3-II partner facilities, which means that eligible users will be able to claim travel and subsistence funds for their experiments at PSI. As before, an explicit application is not necessary since all eligible proposals will enter the selection process. More information about eligibility criteria, selection and funding rules as well as further procedures can be found **here**. <<http://www.psi.ch/useroffice/sinqss-nmi3>>

PSI summer school on condensed matter research 2012

Registration is now open for the 11th PSI summer school on condensed matter physics, which will be organized from August 11-17, 2012 in Zugerberg, Switzerland. The 2012 edition of the traditional school is dedicated to the fascinating and growing field of imaging experiments at large scale facilities. International experts and PSI staff members will introduce and deepen your knowledge of real space imaging from life to materials sciences. Again, the school will be complemented by a hands-on practical training at the PSI large scale facilities for selected participants. **More information** <<http://www.psi.ch/summerschool>>

FEL Memorandum of Understanding

After a long preparation phase and extensive discussions, a Memorandum of Understanding between all European free-electron laser facilities and accelerator-based short pulsed facilities is ready to be signed. The MoU is based on the core activities defined during the preparatory phase of the Euro-FEL project, (financed by the EU under the acronym IRUVX-PP); the signing ceremony should take place at the spring meeting of the European Association of National Research Facilities (ERF), to be held by the end of May 2012 at DESY.

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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