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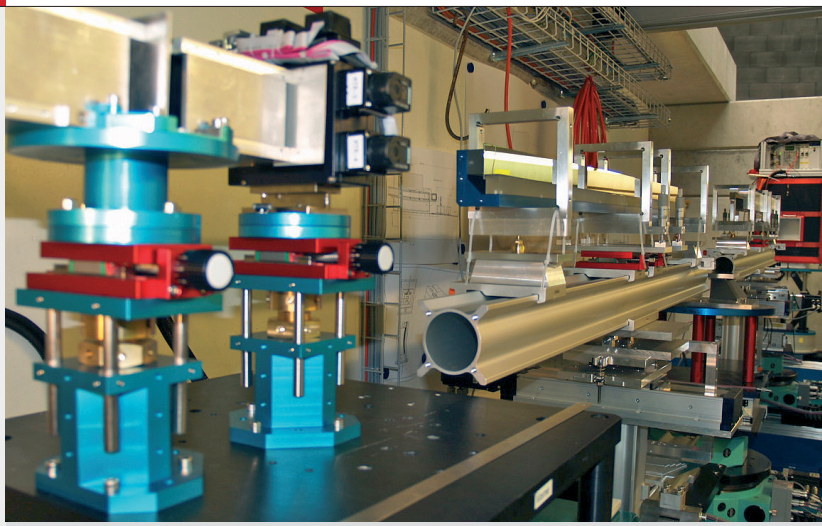
SWISS NEUTRON NEWS



Schweizerische Gesellschaft für Neutronenstreuung
Société Suisse pour la Diffusion des Neutrons
Swiss Neutron Scattering Society

EDITORIAL:

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ON THE COVER:

Snapshot of the BOA beamline for neutron optics, see related article by U. Filges.

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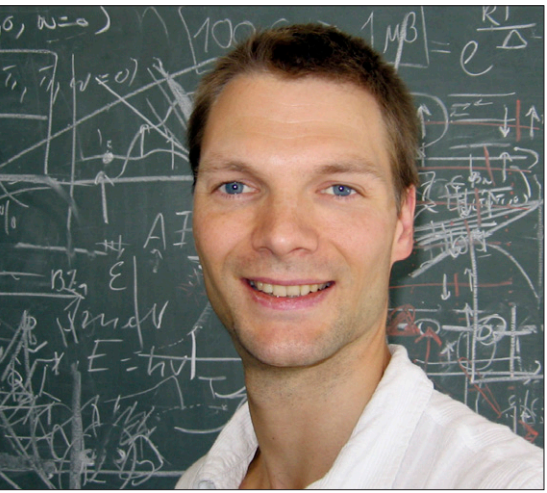


DEAR MEMBERS

Welcome to this latest issue of Neutron News.

This year began with the sad news that Professor Walter Hälg had passed away. He effectively founded neutron scattering in Switzerland and was an honorary member of the Swiss Neutron Scattering Society. His contributions to neutron scattering are internationally recognized and will continue to be remembered amongst other through the ENSA Walter Hälg prize, that he founded, and through the growing strength and depth of the Swiss neutron scattering community.

In the last issue I mentioned the Swiss-Danish collaboration on instrumentation design work for ESS. Combined with several purely Swiss work-packages these projects are now in full swing. The advanced reflectivity concept Selene will soon start prototype tests on the BOA beam-line, which is described in an article in this issue of Neutron News. Another of the instrumentation projects, CAMEA, will be tested on the MARS beam-line, and the prototype manufactured jointly in Denmark and at PSI has arrived and is currently being installed. Common for these and the other ESS instrumentation projects is a desire to not only transfer existing instrument designs, but to combine the source flux of ESS with gains on the instrumentation side. A natural side benefit is that some of these instrumentation advances can be employed also at existing neutron sources, so that already before ESS completion the neutron scattering users may expect improvements.

One great advance for the Swiss neutron scatterers, which is already completed, is the EIGER thermal neutron triple axis spectrometer at SINQ. First neutrons arrived just before winter shutdown in 2011, and following commissioning work, first real test experiments are currently being performed. Complementing SINQ's two cold neutron triple axis spectrometers, EIGER is an important

completion of the capabilities at our national source.

Concerning ESS, many of you will probably have noticed the various topical ESS Science Symposia that have been held or are announced to be held, in addition to the more general "Science & Scientists @ ESS" April conference in Berlin. These meetings form an important part of the process to identify what we the users – existing and future – need and expect of the ESS not just in terms of instrumentation, but also infrastructure, support etc. I highly recommend joining meetings relevant to your interests (http://europeanspallationsource.se/ess-symposia). If there are ideas, concerns or questions concerning the ESS project, you are most welcome to contact us and we will bring it forward either directly to ESS or via the European Neutron Scattering Association. ENSA is currently working towards providing their input and support to the ESS scientific case.

Meanwhile I wish you all an enjoyable late summer and look forward to meet you e.g. at the next general assembly.

Sincerely yours
Henrik M. Ronnow

First experiments on the new BOA instrument at SINQ

Uwe Filges
Laboratory for Developments and Methods LDM, Paul Scherrer Institut, 5232 Villigen

1. INSTRUMENT REDESIGN

Developing of new instrument and device concepts is a crucial point in neutron scattering science. For that reason a large-scaled test & developing beam line at SINQ was requested for many years. The decision to build such a test beam line was made in 2009. The appropriate project "Redesign of the neutron instrument FUNSPIN into BOA" was started in spring of the following year. Already after the SINQ shutdown 2011 first users have completed experiments on the redesigned beam line (with limited equipment). Now in summer 2012 the BOA beam line is fully completed. BOA stands for "**B**eam line for neutron **O**ptics and other **A**pplications". The beam line is a 18 m long instrument located

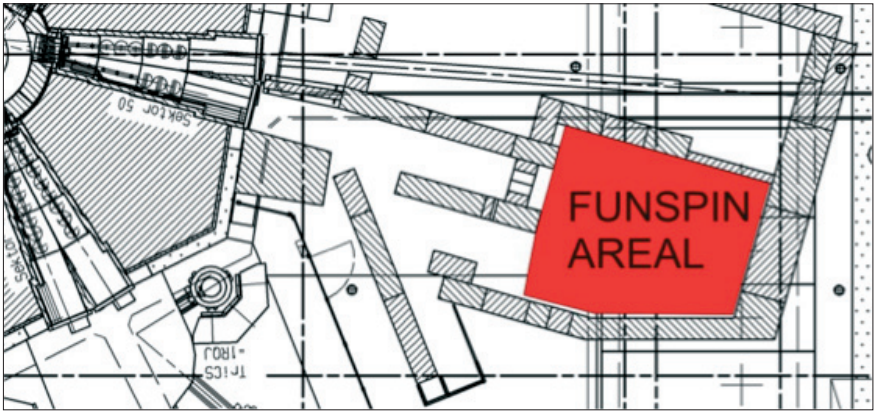


Figure 1: FUNSPIN areal in July 2010.

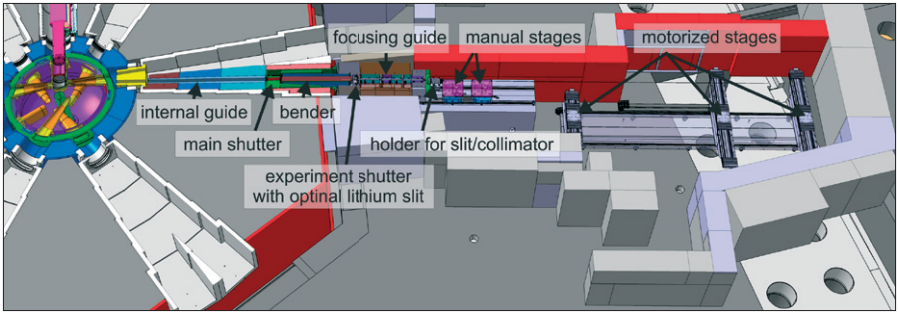


Figure 2: BOA areal in 2012.

at beam-channel 51 looking at the SINQ cold source which delivers a neutron spectrum between 1.5 – 20 Å on the BOA instrument.

Figure 1 shows the former FUNSPIN area in 2009, which was very limited in space and applications. The existing bunker and installed neutron guide were completely redesigned/removed. Also the effort to handle the radioactive bender (see figure 2) was time-consuming and risky (The bender component was taken over from the FUNSPIN set-up for the BOA concept).

In April 2011 the installation efforts of the mechanical components were finished and the so-called "basis" instrument was completed. It was decided that the access to the highly flexible instrument was opened from May 2011.

The instrument is equipped with three turnable axes with flexible translation tables and aperture units. The flexible space is 12.5 m long (n-flight path) and 3.5 m wide. An area sensitive CCD camera system and a He-3 neutron counter system are used for data acquisition. Figure 2 shows the main components of the beam line. A BOA main feature is that the beam line includes a polarization option. The primary polarization is implemented permanently by a supermirror bender unit which is installed inside the SINQ biological shielding of the beam line.

2. RESEARCH ACTIVITIES AT BOA IN 2011

The new BOA beam line has already been used for different research activities of five different PSI groups that were involved in the instrument development. In addition, two international groups carried out their experiments at BOA. The following sections give an overview of the capabilities of BOA.

Monte Carlo Simulations of the BOA Guide System and Bender Characteristics using MsStas
U. Filges, T. Panzner, Paul Scherrer Institut
P. Willendrup, Risoe DTU, Denmark

Very early in the project, the BOA beam line was modelled with the Monte Carlo code McStas. A lot of simulations were done before the first experiments were started. The most important simulation was the prediction of the wavelength distribution given on the

beam line, because any beam line user needs this information for his experimental preparation. Figure 5 shows the simulated spectrum in comparison to the measured data. The agreement is very precise.

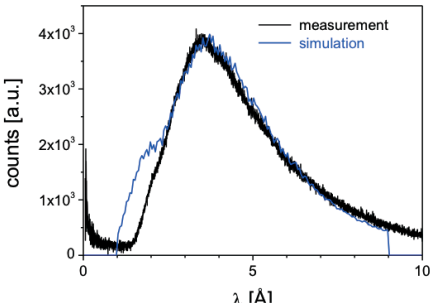


Figure 5: Measured and simulated wavelength distribution at BOA.

Focusing Neutron Optics for Small Samples
T. Panzner, M. Schneider, U. Filges, Paul Scherrer Institut

The practical use of focusing guide elements at regular neutron beam lines revealed the following problems: 1) difficulty of aligning the focal point on tiny samples, 2) adaptation of the beam size to the sample size and 3) optimization of the divergence of the neutron beam with respect to the sample. The idea is to resolve these problems by means of adaptive focusing optics: The curvature of the focusing device can be adjusted thus changing the focusing characteristic. At the BOA beam line three different concepts of adaptive optics were compared (i: a two-point adaptive optics, ii: two different multiple-bending devices). For all concepts prototypes of 500 mm length were built and the profiles of the bent substrates were characterized. The experiments have shown that focal spots smaller than 0.2 mm are possible and adjustable. The expected gain factors (between 5 to 10) in intensity were reached. It is planned to develop the concepts of adaptive optics further. The aim is to build an adaptive neutron optics for the sample enviroment at SINQ.

Proof-of-Principle of the Multiple Small Angle Neutron Scattering (MSANS) Technique
F. M. Piegsa, ETH Zürich
C. Grünzweig, Paul Scherrer Institut
P. Böni, TU Munich, Germany

Small angle neutron scattering (SANS) is a versatile and powerful technique for studying the structure of materials with lateral correlation lengths in the range of about 0.6 nm up to about 600 nm. This corresponds to a q-range of 1 $Å^{-1}$ to 10^{-3} $Å^{-1}$. Measuring correlations lengths in the micrometer range which is of high interest for the research on

Figure 3: Calibrated fuel cladding samples with well-known hydrogen content imaged at BOA.

biological samples, polymers, colloid systems, cements, and micro-porous media leads to unacceptable losses in intensity by a factor of 10^4 using the standard SANS technique due to the necessary higher collimation of the neutron beam. A promising route to overcome this limitation is the so-called multiple SANS (MSANS) technique. In test experiments on the BOA beam line using slit apertures made from 1 mm thick Gadolinium sheets and a CCD neutron camera, commonly used for neutron radiography, a dynamical range of about 10^3 was achieved. The collected experiences are used to prepare an MSANS performance experiment for the existing SANS II instrument at PSI. The test experiments will finally allow an estimation of the performance of a MSANS extension of an existing SANS instrument under realistic conditions.

Zirconium Hydride Measurements and Evaluation of a New Neutron Imaging Detector
E. H. Lehmann, P. Vontobel, Paul Scherrer Institut
A. Tremsin, University of California, Berkeley, USA

It was expected that the very cold spectrum at BOA, where the thermal tail is suppressed by the bender unit, can provide high sensitivity for the detection of hydrogenous materials. This has been proven successfully by quantitative neutron imaging with calibrated hydrated fuel cladding samples of a Zr alloy. The comparison of the image data was made between the conditions at NEUTRA (thermal) and ICON (cold with thermal contributions) in quantitative manner. The raw images are shown in figure 3.

In addition a pixel detector provided by A. Tremsin (University of California, Berkeley) based on a micro-channel-plate neutron converter coupled to a TIMEPIX readout chip was tested at BOA. With the help of a polarizing analyzer device it was proven for the first time that the initially polarized neutrons at BOA are very useful to image directly magnetic fields by means of neutron imaging methods (Figure 4).

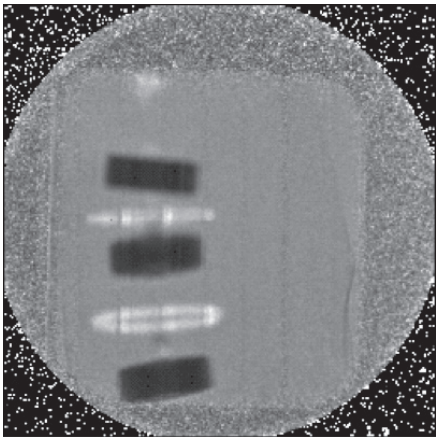


Figure 4: Visualization of magnetic fields near permanent magnets using polarized neutrons; the data were obtained with a pixel detector with 20 mm * 20 mm field of view.

Laue Neutron Diffraction Measurements with a New Compact Camera at BOA
D. Cheptiakov, Paul Scherrer Institut

A test of functioning of the neutron Laue diffraction method was carried out with a newly purchased Laue neutron camera in backscattering mode. The white neutron beam passes through a thin cylindrical pathway in the body of the camera, hits the single

crystal sample located behind the camera, and the back-scattered neutrons are counted by the scintillation detector with a non-binned resolution of 1220 x 1800 pixels, 86 mm in size. A flexible on-chip or post-processing re-binning may be applied and was tested as well, allowing for enhanced absolute intensity when the highest resolution is not mandatory, e.g. for crystals with dimensions on the order of few mm.

A few crystals with typical inorganic ("small-molecule") crystal structures have been tested: NaCl, Cu_3TeO_6, $LiCoPO_4$, $LaFeO_3$, YMn_2O_5, Ho_2CoGa_8, $La_{1.85}Sr_{0.15}CuO_4$ etc., and it has been shown that the principle of Laue diffraction is working fine for them at the BOA beam line. The typical exposition times necessary to obtain Laue backscattering images with good-quality are ranging from 1 to 10 minutes. The majority of images possess good enough quality to deduce and adjust the orientation of crystals as well as to make judgements on their quality. The very low background, the possibility to nicely collimate the neutron beam, and the versatile hardware options on BOA were crucial for the success of these measurements.

Dynamic Nuclear Polarization (DNP) measurements at BOA

Spin filtering neutrons with a proton target dynamically polarized using photo-excited triplet states

P. Hautle, Paul Scherrer Institut

A test of principle was conducted using a novel kind of neutron spin filter based on protons dynamically polarized using photo-excited triplet states. This dynamic nuclear polarization (DNP) method has advantages over classical concepts, as the requirements for cryogenic equipment and magnets are relaxed: the spin filter is operated in a field of 0.3 T at a temperature of about 100 K and has performed reliably over periods of several weeks.

The polarization cross section $s_P(l)$ has been determined for the wavelength range of cold neutrons giving a means to use neutrons to analyze the polarization of the target employed as a spin filter. We obtained an independent measurement of the proton spin polarization of ~0.13 in good agreement with the value determined with NMR. Moreover, the neutron beam was used to measure the proton spin polarization as a function of position in the naphthalene target sample. The polarization was found to be homogeneous, even at low laser power, in contradiction to existing models describing the photo-excitation process.

The versatility of the BOA beam line with its associated equipment and the quality of the highly polarized beam were crucial for the success of this pioneering experiment. Further experiments on BOA are in preparation and beam time is allocated for summer 2012.

3. CONCLUSION

The feedback of the different research groups about the performance and the available equipment at the BOA beam line is very positive and all of them like to use again the beam line in the near future. Already for 2012 the beam line is booked fully.

Walter Hälg (1917–2011)

Walter Hälg, the pioneer of reactor technology and neutron scattering in Switzerland, passed away peacefully on December 28, 2011 at the age of 94. He is well known to the worldwide neutron scattering community through his generous sponsorship of the Walter Hälg Prize which has been awarded biannually to distinguished scientists by the European Neutron Scattering Association (ENSA) since 1999.

Walter Hälg was born in Basel, where he spent his childhood. He was always fascinated by natural sciences, hence he studied physics, chemistry and mathematics at the local university, which was a center of spectroscopy, and he received his Ph. D. degree in molecular physics in 1943. At that time, most experimental equipment was not available commercially, forcing him to build the vacuum spectrograph necessary for his studies by himself. His Ph. D. work addressed interesting UV-spectroscopy investigations on indium and gallium halogenides, the predecessors of materials used in today's semiconductor technology. In 1943, he joined the particle physics group at the University of Basel, given the task to construct a 1 MeV Cockcroft-Walton accelerator.

Walter Hälg's innate pioneering spirit encouraged him to move into new fields. After 1946 he was involved in the design of nuclear reactors on behalf of the company Brown Boveri & Cie.

Walter Hälg

Subsequently in 1952–53, he was delegated to the newly installed Norwegian research reactor JEEP at Kjeller. This was also the place where he first came into contact with neutron scattering. As a scientist trained in the field of spectroscopy, he immediately recognized the power of this new technique. Soon after the commissioning of the light water reactor SAPHIR (critical in 1957) and the heavy water reactor DIORIT (critical in 1960), both installed at Würenlingen (today's eastern site of the Paul Scherrer Institute), he started to build instruments for neutron scattering and made them available to a broad national and international user community. In this respect, Walter Hälg introduced the user system a long time before it was copied later by most of the neutron scattering centers around the world.

Due to his expertise, Walter Hälg was given the task to educate students in the field of reactor technology at the ETH Zurich. From 1955 to 1960 he was a lecturer, and in 1960 he was appointed as a full professor and director of the newly founded Institut für Reaktortechnik. His main fields of research were focusing on reactor theory, numerical mathematics, neutron scattering and computer science. In his institute, numerous students were educated and trained in neutron scattering, establishing a strong community in Switzerland. He steadily pushed the sustainable renewal and permanent upgrade of the instrumentation at the home neutron sources, and he initiated a large number of collaborations to tackle relevant scientific problems in novel fields. Whenever possible, he took active part in both the experiments and data analysis, resulting in a remarkable list of publications and citations. His work jointly performed with chemists of the University of Bern on the magnetic ordering and the location of hydrogen in the molecular complex *prussian blue* has still one of the highest number of citations (297) among all publications resulting from experiments ever performed on a Swiss neutron source up to the present [see Inorg. Chem. **19**, 956 (1980)].

Many commissions and societies used Walter Hälg's expertise and wide interests nominating him as a member or chairman. He was a honorary member of both the distinguished Physical Society of Zurich and the Swiss Society for Neutron Scattering. He served for 10 years as a member and finally as president of the Research Commission of the ETH Zurich until his retirement in 1984. Albert Furrer continued Walter Hälg's work as the new head of the Laboratory for Neutron Scattering. In 1996, the neutron scattering activities were moved from the reactor SAPHIR to the newly built spallation neutron source SINQ, also based on ideas of Walter Hälg, who recognized the potential of the proton accelerator very early. However, the proton current of 0.1 mA was far too low to trigger such a neutron source at that time. Later, when the proton current was increased by an order of magnitude, Walter Fischer and his crew successfully realized this project, now being an established and internationally used large scale neutron facility.

We will always keep Walter Hälg in our memory, not only as a pioneer in reactor technology and neutron scattering, but also as a friend. We express our condolences to his wife Madeleine Hälg-Degen, who stayed by his side for more than 60 years. She will continue to sponsor the highly prestigious ENSA Prize which in the future will be called the *Walter and Madeleine Hälg Prize*.

Peter Fischer, Albert Furrer, Jürg Schefer
PSI, Switzerland

Announcements

SGN/SSDN GENERAL ASSEMBLY

This year's SGN/SSDN general assembly will take place at PSI on: **October 29, 2012, 17:00**

SGN/SSDN MEMBERS

Presently the SGN has 200 members. Online registration for new members of our society is available from the SGN website: http://sgn.web.psi.ch

SGN/SSDN ANNUAL MEMBER FEE

The SGN/SSDN members are kindly asked to pay their annual member fees. The fee is still **CHF 10.–** and can be paid either by bank transfer or in cash during your next visit at PSI. The bank account of the society is accessible for both Swiss national and international bank transfers. The coordinates are as follows: Postfinance: 50-70723-6 (BIC: POFICHBE), IBAN: CH39 0900 0000 5007 0723 6

PSI FACILITY NEWS

TPSI launched a **quarterly electronic newsletter** featuring recent news, events and scientific highlights of the three major PSI user facilities SLS, SINQ and SμS. The online version of the recent edition is available here: http://www.psi.ch/info/facility-news

SINQ CALL FOR PROPOSALS

The next **deadline** for the submission of beam time requests for the Swiss spallation neutron source 'SINQ' (http://sinq.web.psi.ch) will be: **November 15, 2012**

NEUTRON BEAM TIME AT SNS FOR THE SWISS NEUTRON COMMUNITY

An actively shielded 16 Tesla magnet has been realized at the Spallation Neutron Source SNS in Oak Ridge, USA, as a collaboration of the Swiss neutron community and SNS. In return, beam time is available at SNS for Swiss users. Swiss neutron scatteres are therefore encouraged to apply for beamtime at SNS.

REGISTRATION OF PUBLICATIONS

Please remember to **register all publications either based on data taken at SINQ, SLS, SμS or having a PSI co-author** to the Digital User Office: https://duo.psi.ch. Please follow the link 'Publications' from your DUO main menu.

OPEN POSITIONS AT ILL

To check the open positions at ILL please have a look at the following ILL-Webpage: http://www.ill.eu/careers

PHD POSITIONS AT ILL

The PhD program of the Institut Laue-Langevin, ILL, is open to researchers in Switzerland. The contact person at ILL is Anne-Claire Dupuis (PhD@ill.eu). The Swiss agreement with the ILL includes that ILL funds and hosts one PhD student from Switzerland. This position has been filled in 2011.

Minutes of the SGN/SSDN General Assembly on 4.11.2011

Date/Locality: November 4, 2011, Paul Scherrer Institut, main auditorium
Begin: 17:00
End: 18:15
Participants: 16 members of the society

1. WELCOME

The president of the SGN/SSDN, Henrik Ronnow, welcomes the participants to the general assembly 2011.

2. MINUTES OF THE GENERAL ASSEMBLY 2010

The minutes of the general assembly of the SGN/SSDN from 10.11.2010 published in Swiss Neutron News #38 (December 2010) are accepted without objections.

3. ANNUAL REPORT OF THE CHAIRMAN

H. Ronnow reports on the activities of the SGN/SSDN in the year 2011:

a) An aperitif was sponsored by the Society at the PSI Summer School on Zugerberg, August 13–20, 2011 (Probing phase transitions using photons, muons, and neutrons).
b) Two new issues of Swiss Neutron News will appear in 2011 (December issue in preparation).
c) The SGN/SSDN has presently 200 members.
d) A new Swiss ILL PhD student, Eva Hirtenlechner, has started her work in 2011.
e) Meetings in SER focused dominantly on ESS.

4. REPORT OF THE TREASURER

The annual balance sheet 2010 is presented:

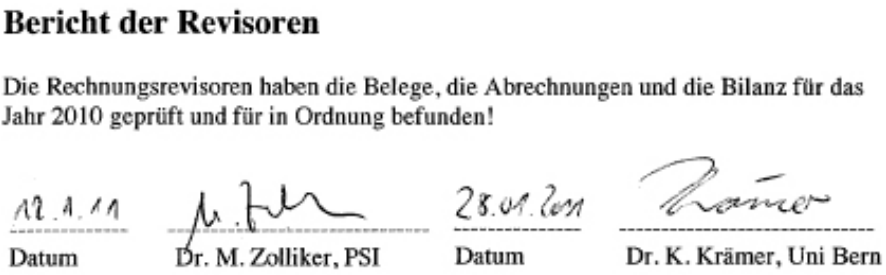
Assets SGN/SSDN on 1.1.2010: **CHF 4142.89**

	Revenues [CHF]	Expenses [CHF]
Membership-fees (cash box)	60.–	
Membership-fees (postal check acc.)	678.85	
Donations (cash box)	0.–	
Interest	2.80	
Total expenses		839.05
– Apéro Zuoz (2010)		795.00
– Expenses PC account		44.05
Total	741.65	839.05
Net earnings 2010:	**– 97.40**	
Assets SGN/SSDN on 31.12.2010:	**4045.49**	

Balance sheet 2010:

	Assets [CHF]	Liabilities [CHF]
Postal check account	3696.99	
Cash box	348.50	
Assets on 31.12.2010	**4045.49**	

5. REPORT OF THE AUDITORS



Bericht der Revisoren

Die Rechnungsrevisoren haben die Belege, die Abrechnungen und die Bilanz für das Jahr 2010 geprüft und für in Ordnung befunden!

12.1.11 — Datum — Dr. M. Zolliker, PSI

28.01.2011 — Datum — Dr. K. Krämer, Uni Bern

Both Auditors (K. Krämer and M. Zolliker) have examined the bookkeeping and the balance 2010. They have accepted it without objection. The participants therefore unanimously vote for a release of the SGN/SSDN board.

6. BUDGET 2012

The treasurer presents the following proposal for the budget 2012:

	Receipts [CHF]	**Expenditures [CHF]**
Member fees	600.–	
Interests	0.–	
Fees PC account		45.–
Summer School Apéritif 2012		600.–
Total	600.–	645.–
Balance 2012	**–45.–**	

The participants accept the budget proposals unanimously.

7. NEW BOARD MEMBER (SUCCESSOR OF PROF. ANNA STRADNER)

Prof. Anna Stradner has moved from the Univ. of Fribourg to the Univ. of Lund, Sweden. However, she is still affiliated with Uni Fribourg and stays in the SGN board for another year.

The term of the SGN board ends in 2012. Therefore, nominations of candidates for the board are welcome! H. Ronnow (president) and M. Kenzelmann (board member) volunteer for the next term. The board proposes to have U. Gasser (secretary) as the successor of A. Stradner in the SGN board and to look for a new secretary.

8. NEWS FROM ENSA (H. RONNOW)

a) The new chairman of ENSA is Michael Steiner (Helmholtz-Zentrum Berlin). He was elected in 2010.

b) As the ESS Preparatory Phase has been completed, ENSA needs to find its role regarding ESS and the current neutron sources in Europe. It is the goal of ENSA to create enthusiasm for ESS across Europe and to represent the users' perspective in relation to ESS, complementary to the interests of neutron facilities and governmental bodies. Furthermore, ENSA will support the operational neutron sources and not only focus on ESS.

c) ENSA is taking influence in EU organs to take part in political discussions. These activities focus on ESFRI, the European Strategy Forum on Research Infrastructures, and ISE, the Initiative for Science in Europe.

d) The next International Conference on Neutron Scattering (ICNS) will be organized in Edinburgh, July 7–11 2013. The next European Conference on Neutron Scattering (ECNS) will take in Zaragossa.

e) The winner of the Walter Hälg Prize (June 2011) is Dr. Gerry Lander.

f) The winner of the 4th Erwin Félix Lewy-Bertaut Prize (July 2011) is Dr. Christian Rüegg.

9. NEWS FROM ILL (K. N. CLAUSEN)

Kurt N. Clausen as the Swiss representative in the ILL Scientific Committee (SC) reports on the 84th and 85th Scientific Council meetings held on April 28–29 2011 and November 17–18, repectively:

a) Andrew Harrison, the former scientific director of ILL, became the new director of ILL as the successor of Richard Wagner. Helmut Schober succeeds Andrew Harrison as scientific director. As before, José Luis Marínez Peña is the technical director.

b) Switzerland is represented in three colleges: College 1 (applied metallurgy, instrumentation and techniques) is chaired by Joachim Kohlbrecher (PSI), college 4 (magnetic excitations) is chaired by Christian Rüegg (PSI), and Marco Lattuada (Adolphe Merkle Institute, Uni Fribourg) has become a member of college 9 (structure and dynamics of soft condensed matter) as successor of Peter Fischer (ETH). Kurt N. Clausen remains as the Swiss representative in the scientific council until end of 2013.

c) In college 4 Swiss proposals with good marks were rejected in 2011 due to the member country balance.

d) The ILL2020 Vision workshop was held September 15–17, 2010 with presentations of proposals for instruments and infrastructure on the first day and parallel sessions on scientific key topics on the second day.

e) As a consequence of the Fukushima incident, the ILL high flux reactor will be subject to a "comprehensive and transparent re-assessment of margins."

f) The stress tests due to the Fukushima incident are expected to have consequences for the budget planned for 2012–16, such that further budget cuts are to be expected.

g) The Scientific Committee has considered various strategies for the imposed budget cuts and has focused on science and instrument performance. The Committee does not recommend the decommissioning of any instrument, but various issues have been identified on the instruments D3, D7, VIVALDI, D9, SALSA, IN1, IN3, PF2, and PN3. These need to be addressed by ILL on an agreed timescale and are related to user base, productivity, instrument attractiveness, or technical competitiveness.

h) India has joined the ILL as a scientific member country in 2011.

i) Any comments and suggestions regarding the ILL should be addressed directly to Kurt N. Clausen, PSI.

10. NEWS FROM ESS

Ch. Rüegg and Kurt N. Clausen report on developments at ESS.

a) Switzerland signed the Memorandum of Understanding (MoU) for the ESS on Sept. 21, 2011. The ESS is now part of the Swiss roadmap for 2013–16. 17 European countries have signed the MoU, which does not imply a legal commitment of the member countries for the construction of ESS, but the member counries signal their best intentions.

b) ESS is in a Design Review Update phase until end of 2012, and the construction phase is planned to start in 2013. ESS is planned to become operational in 2019 and to reach its full size in 2025 with 22 instruments. It is estimated to cost 1.5 billion €.

c) With the MoU, 2 million CHF become available in 2012 for in kind contributions to ESS; this amount is channeled through PSI. For the construction phase (2013–16) a Swiss contribution of 20 million CHF is forseen.

d) After the completion of ESS, the Swiss contribution to operation costs is expected to be comparable to the Swiss involvment in ILL (3 to 4 %).

e) Swiss contributions to ESS are planned for the areas of instrumentation (scattering jointly with Denmark; imaging jointly with Germany), neutronics calculations, and target technology.

f) The Siss – Danish collaboration for ESS instrumentation has been started, and work packages for different instruments have been defined for the time frame 2011–14. Positions for these work packages have been advertised by PSI. The Swiss-Danish work packages include an extreme environment spectrometer, a reflectometer, a compact chopped SANS (BioSANS), a hybrid instrument, and neutron optics.

11. MISCELLANEOUS

H. Ronnow points out that the regular ILL PhD program is open to researchers in Switzerland. The contact person at ILL is Anne-Claire Dupuis (PhD@ill.eu).

The Swiss agreement with the ILL includes that ILL funds and hosts one PhD student from Switzerland. This position has been filled in 2011.

U. Gasser
December 2011

Swiss PhD position at ILL

Switzerland is a member country of the Institute Laue Langevin (ILL) in Grenoble, France, and it's contribution entitles it to have a PhD student at ILL. In June 2011, Eva Hirtenlechner started her PhD on this Swiss position at ILL under the supervision of Mechthild Enderle (ILL), Christian Rüegg (PSI) and Joël Mesot (PSI and ETHZ). In this article, Eva Hirtenlechner presents a brief overview of her academic background and her first year of research at the ILL.

I grew up in the eastern part of Switzerland where I attended school before I moved to Zürich to begin my degree in Physics at Eidgenössische Technische Hochschule Zürich (ETHZ). Over the course of my studies I gained experimental skills through laboratory sessions and in particular my master thesis. I was fortunate enough to write a semester thesis with Prof. Ono's group at Kyoto University in Japan. At ETHZ I attended interesting lectures about magnetism. These lectures inspired me to focus my PhD in this area of physics and more specifically in the field of neutron scattering, although this technique was new for me at the time.

I started my PhD in June 2011 at the Institute Laue Langevin (ILL), Grenoble. Working with my supervisor within the triple axis (TAS) group we are investigating several model materials for spin ½ antiferromagnets. The goal is to observe and to investigate new multiparticle phenomena in materials with unconventional ground states and to understand large entangled systems.

One of the materials under investigation is a spin ½ low-dimensional type-II multiferroic, namely lithium copper vanadate ($LiCuVO_4$). A draft of its crystal structure is shown in figure 1. A type-II or magnetic multiferroic is a material in which ferroelectricity and magnetic order appear together. Magnetoelectric effects allow the possibility to control the electric polarization by applying an exter-

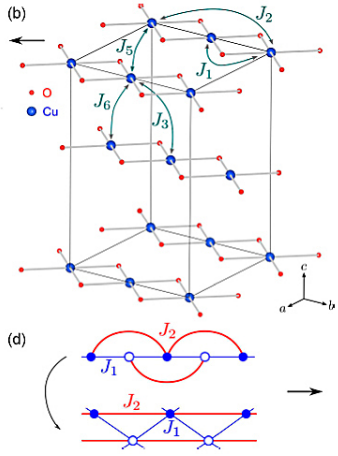


Figure 1:
b) shows a draft of the crystal structure and scheme of exchange path between copper atoms at $LiCuVO_4$ and
d) shows a simplified J_1 (ferromagnetic exchange) – J_2 (antiferromagnetic exchange) chain model.
Image by M. Mourigal, PhD Thesis, THÈSE NO 5081 (2011), http://biblion.epfl.ch/EPFL/theses/2011/5081/5081_abs.pdf

nal magnetic field, H. One is able to favor a magnetic domain by setting H = 0 and applying an electric field. These effects have generated considerable attention over recent years. Since the start of my thesis in June, I have been able to complete an experiment with $LiCuVO_4$ on IN20 at the ILL. Figure 2 shows the IN 20 triple axis spectrometer.

I have also investigated other materials such as a one-dimensional spin ½ Heisenberg antiferromagnet ($CuSO_4 \cdot 5D_2O$) and a one-dimensional Ising magnet ($RbCoCl_3$). In the Autumn of 2011 I had the opportunity to travel to ISIS in the UK to perform one of the experiments on $RbCoCl_3$. I was also able to attend the Oxford Neutron school in September. Through the lectures there and meeting research students and scientists from many different areas and institutions I was able to gain a deeper insight into neutron scattering and broaden my knowledge of the subject. The next part of my research will consist of an evaluation of the collected data and a course at the Hercules School in Grenoble, which I plan to attend later this year.

Over the last seven months of my PhD, I have thoroughly enjoyed working at ILL. I find the research immensely interesting, and on top of this, I get the chance to gain insight into how a large research institute such as the ILL, which offers experimental time to scientists from all over the world, is ran on a daily basis. The diversity of scientists working at the ILL is vast; therefore I have the opportunity to enjoy working with people from many different countries. As well as enabling me to focus on my research, during my thesis I am also able to improve my French and establish close international friendships.

More about $LiCuVO_4$:

- M. Enderle, C. Mukherjee, B. Fåk, R. K. Kremer, J.-M. Broto, H. Rosner, S.-L.Drechsler, J. Richter, J. Malek, A. Prokofiev, W. Assmus, S. Pujol, J.-L. Raggazzoni, H. Rakoto, M. Rheinstadter and H. M. Rønnow, Europhys. Lett. **70**, 237 (2005).
- M. Enderle, B. Fåk, H.-J. Mikeska, R. K. Kremer, A. Prokofiev and W. Aßmus, Phys. Rev. Lett. **104**, 237207 (2010).
- M. Mourigal, M. Enderle, R. K. Kremer, J. M. Law and B. Fåk, Phys. Rev. B **83**, 100409(R) (2011).

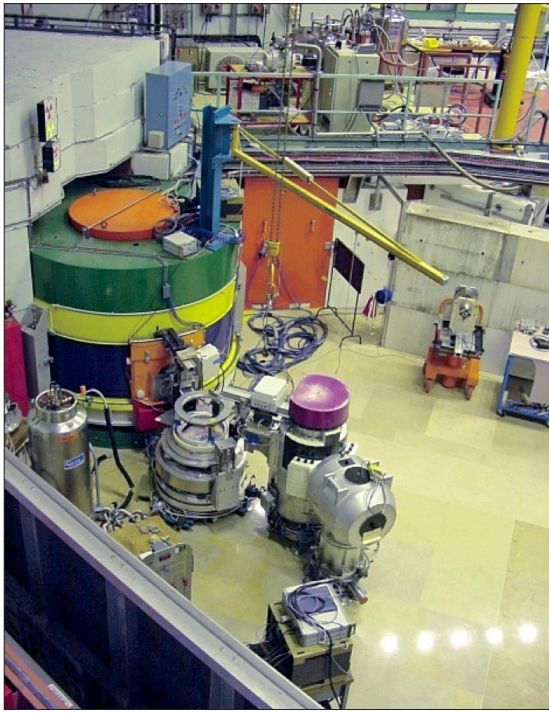


Figure 2: The IN20 Triple Axis Spectrometer at the Institute Laue Langevin where the experiment on $LiCuVO_4$ was performed. Image by E. Farhi, Aug. 01

Conferences and Workshops 2012–2013

(an updated list with online links can be found here: http://www.psi.ch/useroffice/conference-calendar)

SEPTEMBER 2012

- First European Mineralogical Conference
  September 2–6, 2012, Frankfurt, Germany
- XXII CAC: XXII Conference on Applied Crystallography
  September 2–6, 2012, Targanice/ Andrychow, Poland
- ECSCRM 2012: 9th European Conference on Silicon Carbide and Related Materials
  September 2–6, 2012, St Petersburg, Russia
- International Conference on Diamond and Carbon Materials
  September 2–6, 2012, Granada, Spain
- Indaba 7: Insights from Structure
  September 2–7, 2012, Skukuza, Kruger National Park, South Africa
- 7th International Conference on Aperiodic Crystals
  September 2–7, 2012, Cairns, Australia
- 7th International Conference on Aperiodic Crystals
  September 2–9 2012, Cairns, Australia
- Carisma 2012
  September 3–5, 2012, Copenhagen, Denmark
- Photon 12
  September 3–6, 2012, Durham, UK
- CMD-24, ECOSS-29, ECSCD-11 and CMMP-12: European Condensed Matter Conferences
  September 3–7, 2012, Edinburgh, UK
- OMEE-2012: Oxide Materials for Electronic Engineering
  September 3–7, 2012, Lviv, Ukraine
- NPAE-Kyiv2012: Current Problems in Nuclear Physics and Atomic Energy
  September 3–7, 2012, Kyiv, Ukraine
- PIXEL2012: 6th International Workshop on Semiconductor Pixel Detectors for Particles and Imaging
  September 3–7, 2012, Inawashiro, Japan
- 33rd Risø International Symposium on Materials Science: Nanometals – Status and Perspective
  September 3–7, 2012, Roskilde, Denmark
- PEPC8: EMBO Practical Course on Protein expression, purification and characterization
  September 3–11, 2012, Hamburg, Germany
- 6th CIMST Summer School on multiscale Bio-medical Imaging
  September 3–14, 2012, Zurich, Switzerland
- 16th Laboratory Course Neutron Scattering
  September 3–14, 2012, Juelich and Garching / Munich, Germany
- 22nd IUBMB and 37th FEBS Conference
  September 4–9, 2012, Sevilla, Spain

- Diamond Light Source Synchrotron Radiation User Meeting 2012
  September 5–6, 2012, Didcot, UK
- TCM3: 3rd Tunisian Crystallographic Meeting
  September 5–7, 2012, Sousse, Tunisia
- SAXS Software Packages Irena and Nika, Course 2
  September 6–7, 2012, Argonne, IL, USA
- Fifth K. H. Kuo Summer School of Electron Microscopy and Crystallography and Intl Workshop of Cryo-Electron Microscopy
  September 7–12, 2012, Hefei, Anhui, China
- LINAC12: XXVI Linear Accelerator Conference
  September 9–14, 2012, Tel Aviv, Israel
- Magnetic Tight Binding
  September 10–11, 2012, London, UK
- 4th DISCUS Workshop on Diffuse Scattering and Structure Simulation
  September 10–13, 2012, Erlangen, Germany
- Innovations in Biomedical Materials 2012
  September 10–13, 2012, Raleigh, NC, USA
- SMARTER Conference: Structure elucidation by combining magnetic resonance, computation modeling and diffractions
  September 10–13, 2012, Saint Quentin en Yvelines, France
- SSPC16: Solid State Proton Conductors
  September 10–14, 2012, Grenoble, France
- Faraday Discussion 161: Lipids and Membrane Biophysics
  September 11–13, 2012, London, UK
- 6th International Conference on Materials Science and Condensed Matter Physics
  September 11–14, 2012, Chisinau, Moldova
- Mc Phase School 2012
  September 11–14, 2012, Grenoble, France
- XLI National Congress of the Italian Crystallographic Association
  September 11–14, 2012, Verona, Italy
- G-protein-coupled-receptors: from structural insights to functional mechanisms
  September 12–14, 2012, Prato, Italy
- LANSCE Neutron Scattering School on Soft Matter
  September 12–21, 2012, Los Alamos, NM, USA
- 14th Annual National School on Neutron and X-Ray Scattering
  September 12–25, 2012, Argonne and Oak Ridge, USA
- Macromolecular Structure: 25th Anniversary Meeting of the NCMH
  September 13, 2012, Nottingham, UK
- XTOP 2012 Satellite Workshop: Synchrotron-Based High Resolution X-ray Diffraction
  September 13–14, 2012, Moscow, Russia
- Applications of Precession Electron Diffraction
  September 14–15, 2012, Manchester, UK
- 6th European Charge Density Meeting
  September 15–20, 2012, High Tatras, Slovakia
- Italian Crystallographic Association School on 'Structure, Microstructure, Nanostructure: exploiting the potential of powder diffraction techniques'
  September 15–20, 2012, Trento, Italy
- XTOP 2012: The 11th Biennial Conference on High Resolution X-Ray Diffraction and Imaging
  September 15–20, 2012, Saint Petersburg, Russia

- MOF 2012: 3rd International Conference on Metal-Organic Frameworks and Open Framework Compounds
  September 16–19, 2012, Edinburgh, UK
- 50th European High Pressure Research Group Meeting
  September 16–21, 2012, Thessaloniki, Greece
- 12th International Conference on Electronic Spectroscopy and Structure
  September 16–21, 2012, Saint-Malo, France
- ESS workshop on: Building an Advanced Center for Data and Computing for ESS
  September 17–18, 2012, Copenhagen, Denmark
- ESS Science Symposium: Neutrons for Energy – Advanced Materials for Energy Storage
  September 17–19, 2012, Delft, The Netherlands
- Sample Environment at Neutron Scattering Facilities
  September 17–20, 2012, Sydney, Australia
- Magnetic Structure Determination Workshop
  September 17–20, 2012, Oak Ridge, TN, USA
- E-MRS 2012: European Materials Research Society Fall Meeting
  September 17–21, 2012, Warsaw, Poland
- HSC14: Neutrons and Synchrotron Radiation in Materials for Energy
  September 17–21, 2012, Grenoble, France
- Nanomaterials: Application and Properties 2012
  September 17–22, 2012, Alushta, Ukraine
- Croissance cristalline – Defauts ponctuels
  September 19, 2012, Lyon, France
- IKON 3 Meeting
  September 19–21, 2012, Lund, Sweden
- A Celebration of the 50th Anniversary of the Diode Laser
  September 20–21, 2012, Coventry, UK
- IUCrHP2012/QuBS2012: Advances in Crystallography at High Pressures
  September 23–27, 2012, Mito, Ibaraki, Japan
- ICCBM 14: 14th International Conference on the Crystallization of Biological Macromolecules
  September 23–28, 2012, Huntsville, AL, USA
- SISN Summer School 2012: Neutron Diffraction and Reflectometry
  September 23–29, 2012, Bolzano, Italy
- 25th Annual MAX-lab user meeting
  September 24–26, 2012, Lund, Sweden
- Deutsche Neutronenstreutagung 2012
  September 24–26, 2012, Bonn, Germany
- 9th NOBUGS conference
  September 24–26, 2012, Rutherford Appleton Laboratory, Oxfordshire, UK
- PhD School on Radiography Techniques and Analysis
  September 24–28, 2012, Copenhagen, DK
- Diamond Synchrotron Rad. Summer School 2012
  September 24–28, 2012, Oxford and Didcot, UK
- MSE2012: Materials Science and Engineering Meeting
  September 25–27, 2012, Darmstadt, Germany

- Symposium on: Thin film characterization with synchrotron radiation / X-rays and neutrons: small probes for big problems at the Materials Science and Engineering Meeting MSE 2012
  September 25–27, 2012, Darmstadt, Germany
- Workshop on Transient and Ultrafast Processes in X-ray Excited Matter
  September 26–27, 2012, Hamburg, Germany
- International School on Modern Diffraction Methods of Structure Analysis
  September 26–29, 2012, Lviv, Ukraine
- SRC Users' Meeting
  September 28–29, 2012, Stoughton, WI, USA
- 15th Heart of Europe Biocrystallography Meeting
  September 28–30, 2012, Beilngries, Germany
- 70th Annual Pittsburgh Diffraction Conference
  September 30 – October 2, 2012, Menlo Park, CA, USA
- 10th International Conference on Quasielastic Neutron Scattering and 5th Workshop on Inelastic Neutron Spectrometers
  September 30 – October 4, 2012, Nikko Sogo Kaikan, Japan

OCTOBER 2012

- Structural Dynamics and Dynamical Structures
  October 3–5, 2012, Grenoble, France
- JCNS Workshop 2012: Trends and Perspectives in Neutron Scattering for Soft Matter and Biophysics
  October 8–11, 2012, Tutzing, Germany
- 40 Years D11 – Status and Perspectives of SANS at ILL
  October 10–12, 2012, Grenoble, France
- Advanced Simulation Techniques for Total Scattering Data
  October 16–19, 2012, Santa Fe, New Mexico, USA
- Workshop on applications of neutron and synchrotron scattering techniques to characterize nuclear materials
  October 17–19, 2012, Berkeley, CA, USA
- EMBO practical course on Solution Scattering from Biological Macromolecules
  October 17–24, 2012, Hamburg, Germany

NOVEMBER 2012

- Annual Meeting of the German Society for Biominerals
  November 1–3, 2012, Hamburg, Germany
- Advances and Frontiers in Chemical Spectroscopy with Neutrons
  November 14–16, 2012, Abingdon, UK
- SAS2012: International Small-Angle Scattering Conference
  November 18–23, 2012, Sydney, Australia
- Polymorphism and Crystallization
  November 19–22, 2012, Prague, Czech Republic

- MRS Fall Meeting 2012
  November 25–30, 2012, Boston, MA, USA
- Structure and Dynamics of Condensed Matter by Scattering Methods; Past Present and Future: A Prof. John White Celebratory Symposium
  November 25–30, 2012, Lucas Heights, Australia
- MRS Symposium VV: Advanced Materials Exploration with Neutrons and Synchrotron X-Rays
  November 25–30, 2012, Boston, MA, USA
- PSI Powder Diffraction School
  November 26–27, 2012, PSI Villigen, Switzerland
- EMBO Global Exchange Lecture Course: Structural and biophysical methods for biological macromolecules in solution
  November 29 – December 6, 2012, Hyderabad, India

DECEMBER 2012

- NMI3-I: final meeting
  December 5–6, 2012, Garching, Germany

JANUARY 2013

- 5th MaNEP Winter School – Understanding electronic and magnetic correlations
  January 13–18, 2013, Saas-Fee, Switzerland
- SYREES 2013: Synchrotron Radiation for Electrochemical Energy Storage
  January 21–22, 2013, Soleil Synchrotron, Gif-sur-Yvette, France
- 8th SOLEIL Users' Meeting
  January 23–24, 2013, Soleil Synchrotron, Gif-sur-Yvette, France
- Flipper 2013: International Workshop on Single-Crystal Diffraction with Polarised Neutrons
  January 23–25, 2013, Grenoble, France

FEBRUARY 2013

- 44th IFF Spring School: Quantum Information Processing
  February 25 – March 8, 2013, Jülich, Germany

MARCH 2013

- German Physical Society – Spring Meeting: Condensed Matter Research
  March 10–15, 2013, Regensburg, Germany
- 21st Annual Meeting of the German Society for Crystallography
  March 19–22, 2013, Freiberg, Germany

MAY 2013

- ReX&GG2013: 5th International Conference on Recrystallization and Grain Growth
  May 5–13, 2013, Sydney, Australia

JUNE 2013

- Gordon Research Conference on Electron Distribution and Chemical Bonding
  June 2–7, 2013, Les Diablerets, Switzerland
- ICCS 2013: International Conference on Computational Science
  June 5–7, 2013, Barcelona, Spain
- The Zurich School of Crystallography 2013
  June 9–22, 2013, Zurich, Switzerland

JULY 2013

- NOP&D-2013: International Workshop on Neutron Optics and Detectors (ICNS satellite meeting)
  July 2–5, 2013, Munich, DE
- ICNS 2013: International Conference on Neutron Scattering
  July 7–11, 2013, Edinburgh, UK
- 17th International Zeolithe Conference
  July 7–12, 2013, Moscow, Russia

AUGUST 2013

- 12th PSI Summer School on Condensed Matter Physics
  August 17–25, 2013, Zuoz, Switzerland
- ECM 28: The 28th Meeting of the European Crystallographic Association
  August 25–29, 2013, Warwick, UK

SEPTEMBER 2013

- Joint Annual Meeting of the Swiss and Italian Crystallographic Societies
  August 9–13, 2013, Como, Italy

Swiss Neutron Scattering Society
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