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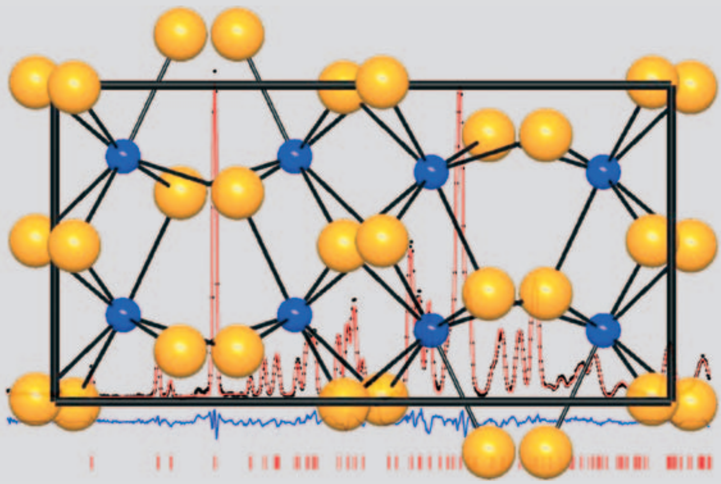
September 2011

SWISS NEUTRON NEWS



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

EDITORIAL:

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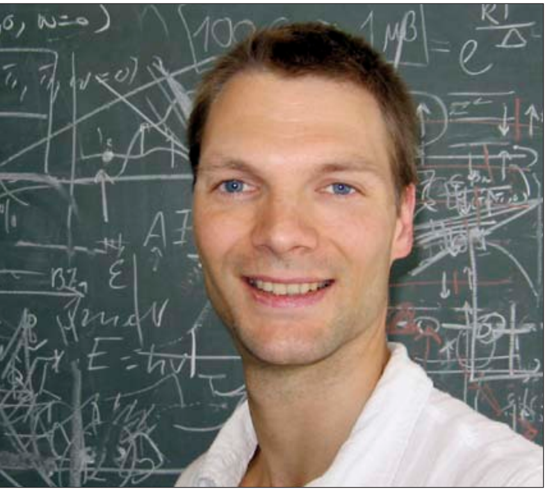
ON THE COVER:

Structure and neutron powder diffraction pattern of $YbBr_2$ in the SrI_2 phase, see related article by K. Krämer, D. Biner, and L. Keller.

Contents

The President's Page



DEAR MEMBERS

Welcome to this latest issue of Neutron News.

Picking up from where I finished the last president's page – namely welcoming Dr. Christian Rüegg back to Switzerland in the role as head of the Laboratory for Neutron Scattering at PSI, I can now continue by congratulating him as recipient of the Fourth Erwin Félix Lewy-Bertaut Prize, which is awarded jointly by the European Crystallographic Association (ECA) and The European Neutron Scattering Association (ENSA). He receives this honour for outstanding contributions to the science of low-dimensional spin systems and quantum phase transitions. The announcement can be found on the webpage of the European Neutron Scattering Association (http://neutron.neutron-eu.net/n_ensa), which also reveals that the latest winner of the Walter Hälg Prize is Dr. Gerry Lander. In addition to his many scientific achievements – most notably in the field of actinide magnetism, Gerry was instrumental for the pioneering role of the Intense Neutron Pulsed Source (IPNS) at Argonne National Laboratory. IPNS was the world's first pulsed neutron user facility, and as such played an important part towards the new and future spallation sources that are currently making neutron scattering an attractive and productive field of research.

The European Spallation Source (ESS) project continues its progress, and it is important all neutron scatterers in Europe continue their support for this project. The design update phase has already brought several choices about machine specifications and technological solutions. Meanwhile the instrumentation specifications have been kick-started with the negotiation of instrument development packages to be contributed from institutes around Europe. Notably, German neutron institutes have received funding to contribute a number of work packages. The

Swiss-Danish initiative mentioned in the previous Neutron News has progressed far, resulting in the description of 5 work-packages for instrument or instrumentation-technology design work. These include: A crystal chopper spectrometer; a reflectometer; a compact 'BioSANS'; a novel hybrid imaging+diffraction concept; and dedicated neutron optics. This suite has been chosen to span the usage patterns and hence needs of Swiss neutron scatterers, and simultaneously corresponds to where Switzerland possesses particular instrumentation expertise. We welcome any SGN members wishing to contribute to or discuss these topics to contact us.

Of other news from the ENSA meeting in Budapest this spring, I can mention that it was decided that the 2015 European Conference on Neutron Scattering will take place in Zaragoza, Spain. And finally, concerning the issue of lacking world supply of ^{3}He, which is used in detectors (of which a lot are needed with new instruments and sources in the works), for instance we have heard encouraging progress from a collaboration between a number of institutes about alternatives in the form of ^{10}B based detectors. Prototypes up to 10x10cm in size (layers of thin films) are achieving efficiencies up to 60–65% at wavelengths of 2.5Å. This effort is largely driven by the significant needs at new facilities, but new successful detector technologies will of course benefit all neutron facilities including our home source at PSI.

Henrik M. Ronnow

Phase Transitions of $YbBr_2$

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The crystalline phases of $YbBr_2$ were investigated by powder neutron diffraction over its whole solid state temperature range. The low temperature SrI_2 phase is observed up to 550 K, the α-PbO_2 phase between 260 K and 750 K, the $CaCl_2$ phase between 690 K and 790 K, and the rutile phase from 790K to the melting point at 955 K (682°C). All phase transitions are 1st order, except for the 2nd order $CaCl_2$ to rutile transition. Differential scanning calorimetry yields the transition energies and confirmed the transition temperatures from neutron experiments.

INTRODUCTION

Experiments under non-ambient conditions such as temperature, pressure, or magnetic field are among the strengths of neutron scattering. Here, we report about temperature dependent neutron diffraction to characterize the solid phases of $YbBr_2$.
The divalent state of ytterbium with its $4f^{14}$ closed shell electron configuration is, after europium, the second most stable among the lanthanides. A comprehensive review on the chemistry of reduced rare-earth halides was published by Meyer [1]. Yb^{2+} chlorides were known since the pioneering work by Klemm et al. [2]. Bärnighausen and coworkers investigated divalent lanthanide bromides. They determined the structure of $YbBr_2$ and found its high temperature phases [3,4]. At room temperature $YbBr_2$ adopts the SrI_2 structure which is followed by the α-PbO_2, $CaCl_2$, and rutile phases up to the melting point. However, the earlier x-ray diffraction work on quenched crystals was affected by the crystal quality and contemporary technical limitations prohibited high resolution structure refinements.
In our search for new scintillator materials we investigated several AX_2 compounds where A is a divalent cation and X a halide ion. Efforts in scintillator research have increased during the last decade. Out of the very diverse applications for scintillators just two fields should be mentioned. A growing demand for security controls in international travel and

trading is obvious. Continuous progress in medical diagnostics requires new scintillators with higher resolution, faster imaging for in situ investigations, and all that combined with a lower radiation dose for the patient. In collaboration with the group of Prof. P. Dorenbos from TU Delft we systematically investigated rare earth halides for their scintillation properties [5]. Among those, $LaCl_3$:Ce and $LaBr_3$:Ce are meanwhile commercially available as BriLanCe 350® and 390, respectively. The key-features of scintillators are high light output, fast response, good energy resolution, and high stopping power. After the investigation of AX_3 host lattices we looked for further alternatives. Going from AX_3 to AX_2 compounds results in higher density and therefore bigger stopping power. Also, an AX_2 has a smaller band gap than the respective AX_3 compound, where A is one of the rare earth elements stable in both the divalent and tervalent states. A smaller band gap generally increases the light output of a scintillator, i.e. the number of emitted photons per MeV incident energy. However, many AX_2 compounds undergo phase transitions. For a scintillator this may be a major drawback since most high-end applications require the material in form of big single crystals.

Phase transitions of AX_2 compounds have been thoroughly studied, e.g. for SiO_2, $CaCl_2$, and MgF_2 [6-8]. In the general sequence, the most important phases are quartz with coordination number (CN) 4, cristobalite, stishovite with CN 6, rutile, $CaCl_2$, α-PbO_2, SrI_2 with CN 7, CaF_2 with CN 8, and $PbCl_2$ with CN 9. Temperature and pressure determine the stability of a specific phase. An increase in temperature results in thermal expansion, i.e. decreasing density. Accordingly, a high temperature phase often shows a lower CN than its lower temperature neighbor. Pressure causes the opposite effect than temperature. Pressure compresses a compound, results in higher density, and often a higher CN is observed in a high pressure phase.

Among AX_2 systems $YbBr_2$ offers the quite unique opportunity to study 4 different phases just as function of temperature. For most other systems high pressure equipment is required to induce such a sequence of phase transitions. In this paper we report the structures, thermal expansion, phase stability ranges, and phase transition energies of $YbBr_2$ as obtained from a combination of neutron diffraction and differential scanning calorimentry (DSC).

EXPERIMENTAL

$YbBr_2$ was synthesized from $YbBr_3$ and Yb (99.99%, Metall Rare Earth Ltd.). $YbBr_3$ was prepared according to the ammonium halide method [9] from Yb_2O_3 (99.9999%, Metall Rare Earth Ltd.), HBr acid (Merck, suprapur), and NH_4Br (Merck, reinst, sublimed in air before use). For purification the $YbBr_3$ was sublimed in a vacuum-sealed silica ampoule at 950°C. The starting materials with a 5% excess of Yb were sealed in a tantalum ampoule by helium arc welding and jacketed in a silica ampoule under vacuum. The ampoule was heated to 980°C for 1 day and then the furnace switched off. Since rare earth halides are highly hygroscopic, all handling of materials was done in dry boxes (MBraun, Munich) with H_2O and $O_2 < 0.2$ ppm.

$YbBr_2$ was obtained as faint pink powder. The room temperature x-ray powder diffraction diagram showed the pattern of the SrI_2 phase without additional lines. Phase transitions were examined by DSC on a Mettler DSC823e. Samples of about 40 mg were measured in gas-tight gold crucibles. For neutron diffraction, a sample of 7 g was sealed under 0.25 bar helium in a tantalum tube of 8 mm diameter. Neutron diffraction patterns were measured on the DMC powder diffractometer at SINQ. The neutron wavelength was 2.4526 Å. The temperature was varied between 1.5 K and 980 K using a cryofurnace and an ILL-type furnace.

RESULTS AND DISCUSSION

Neutron powder diffraction patterns of the four solid phases of $YbBr_2$ are shown in Fig. 1 and their crystallographic data are summarized in Table 1. On heating, $YbBr_2$ transforms from the SrI_2 to the α-PbO_2, then to the $CaCl_2$, and finally to the rutile phase, see Fig. 2. In the low temperature SrI_2 structure Yb is surrounded by 7 Br atoms in the shape of a distorted mono-capped trigonal prism. All high temperature phases have a six-fold Yb coordination of more or less distorted octahedral shape. Accordingly, the SrI_2 to α-PbO_2 phase transition requires a major reorganiza-

(a) Space groups and lattice parameters

T / K	phase	space group	Z	a / Å	b / Å	c / Å
870	rutile	P42/mnm	2	6.8257(4)	6.8257(4)	4.4379(3)
750	$CaCl_2$	Pnnm	2	6.7630(5)	6.8707(5)	4.4223(3)
550	α-PbO_2	Pbcn	4	6.6934(5)	8.1392(6)	7.3274(5)
1.5	SrI_2	Pbca	8	13.669(1)	7.3085(8)	7.0352(8)

(b) Atomic positions

T / K	phase	atom	x / a	y / b	z / c
870	rutile	Yb	0	0	0
		Br	0.3033(6)	0.3033(6)	0
750	$CaCl_2$	Yb	0	0	0
		Br	0.2875(9)	0.3194(9)	0
550	α-PbO_2	Yb	0	0.3466(6)	0.25
		Br	0.2613(8)	0.1075(9)	0.0786(7)
1.5	SrI_2	Yb	0.1108(2)	0.4511(4)	0.2746(5)
		Br	0.2037(5)	0.1136(9)	0.1591(9)
		Br	–0.0310(4)	0.262(1)	0.008(2)

Table 1: Crystallographic data of $YbBr_2$ in the SrI_2, α-PbO_2, $CaCl_2$, and rutile phases.

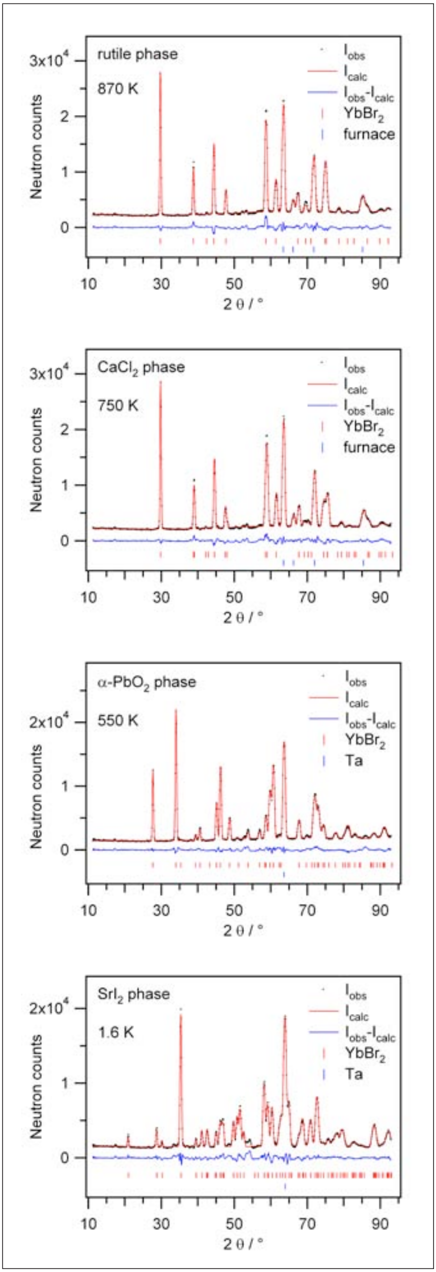

Figure 1: Neutron powder diffraction patterns of $YbBr_2$ in the SrI_2, α-PbO_2, $CaCl_2$, and rutile phases.

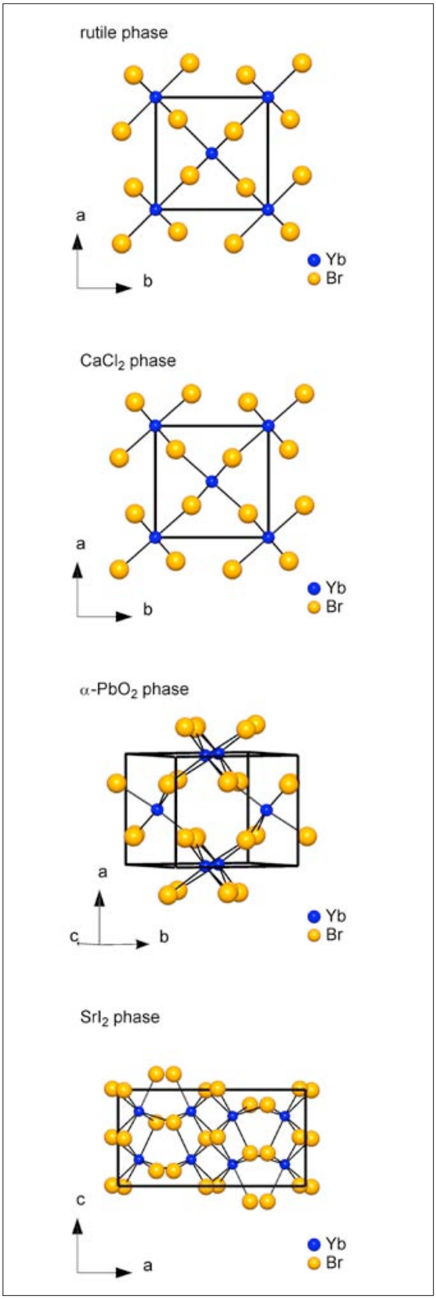

Figure 2: Crystal structures of the $YbBr_2$ phases.

tion of the ions. For the high temperature phases the connectivity remains the same along the series but distances and angles between the ions change. The $YbBr_6$ octahedra share *trans*-edges to form chains. Furthermore, the equatorial Br atoms act as apices to neighboring chains and form a three-dimensional network according to the *Niggli*-formula $YbBr_{6/3}$. In the α-PbO_2 to $CaCl_2$ phase transition the tilts of the octahedra along the chain disappear and the unit cell reduces to half its size due to the higher symmetry. Finally, the $CaCl_2$ to rutile transition involves a slight rotation of the octahedral chains parallel to the c-axis. It puts the equatorial planes of neighboring chains perpendicular to each other and establishes a tetragonal symmetry, cf. Table 1.

In the diffraction measurements, the SrI_2 phase was detected between 1.6 K and 550 K, the α-PbO_2 phase from 260 K to 750 K, the $CaCl_2$ phase between 690 K and 790 K, and the rutile phase from 790 K to the melting point at 955 K (682°C), see Fig. 3. Obviously, the SrI_2 to α-PbO_2 and the α-PbO_2 to $CaCl_2$ phase transitions are of 1st order and exhibit

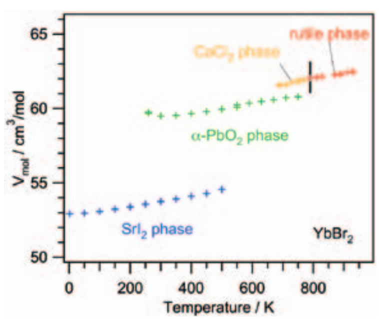

Figure 3: Molar volume of $YbBr_2$.

wide hystereses in temperature. On heating the phases are stable to the upper and on cooling down to the lower temperature limits mentioned above. Due to the structural rearrangements from seven- to six-fold coordination the molar volume changes by more than 9% for the 1st transition. This is detrimental for crystal growth since the material breaks up into powder passing through that transition. In contrast to the previously discussed ones, the $CaCl_2$ to rutile phase transition is 2nd order, i.e. fully reversible and without discontinuity in molar volume. The continuous merging of the orthorhombic a- and b-axes towards a common tetragonal a-axis can nicely be followed in Fig. 4, where the temperature dependent changes of lattice parameters are displayed. The rutile to melt phase transition is again 1st order, i.e. the crystallization occurs at lower temperature than the melting. In DSC measurements, see Fig.5, a super-cooling of the melt by typically 50 K was observed whereas it was only about 20 K in case of the neutron experiments. These values strongly depend on experimental conditions as cooling rate and sample mass.

DSC measurements confirmed the temperatures of the phase transitions, see Fig. 5, and furthermore yield the transition enthalpies. On heating, endothermic effects of 1409 J/mol and 803 J/mol were observed for the SrI_2 to α-PbO_2 and the α-PbO_2 to $CaCl_2$ phase transitions, respectively. The $CaCl_2$ to rutile phase transition causes no effect in DSC since it is 2nd order. The melting enthalpy amounts to 19.075 kJ/mol. As discussed above, the 1st order phase transitions show a hysteresis. These amount to 50 K, 60 K, and 290 K for the crystallization, the $CaCl_2$ to α-PbO_2, and

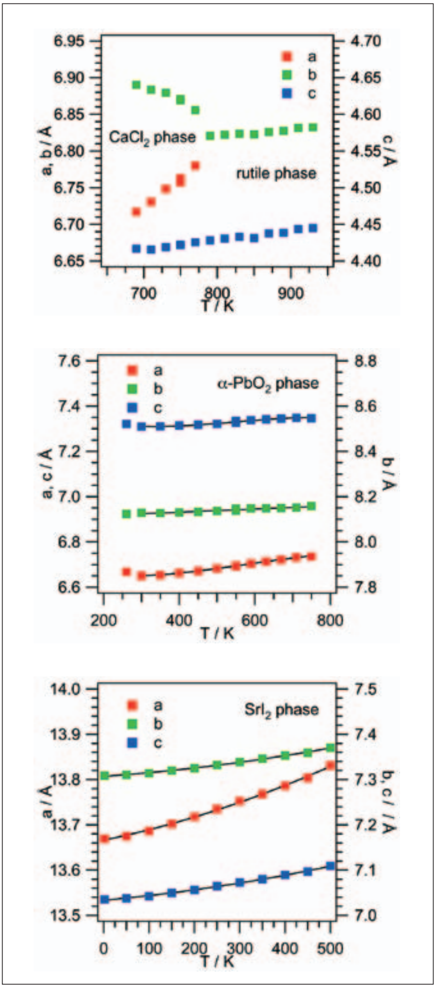

Figure 4: Thermal expansion of $YbBr_2$.

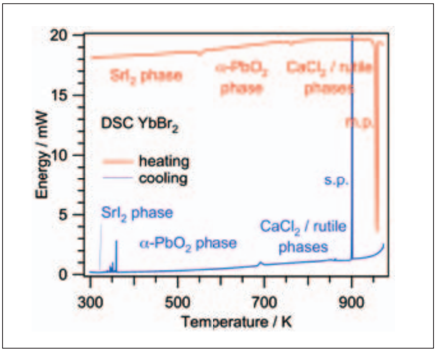

Figure 5: DSC measurements of $YbBr_2$.

the α-PbO_2 to SrI_2 phase transitions, respectively. On cooling, the α-PbO_2 to SrI_2 phase transition is kinetically hindered. It is spread over a temperature interval of more than 50 K and occurs as many individual peaks, see Fig. 5. Again, this reflects the big structural changes accompanied with that transition.

The availability of $YbBr_2$ and $YbBr_3$ from the present work initiated further studies on ytterbium bromides. Recently, Butman et al. investigated the composition of the saturated vapor over ytterbium bromides by high temperature mass spectroscopy [10] as well as the formation enthalpies of these molecules and ions [11].

SUMMARY

The combination of powder neutron diffraction and DSC measurements allowed a thorough characterization of the various solid phases of $YbBr_2$ and the phase transitions between them. Several of those 1st and 2nd order, 'normal', kinetically hindered, or fully reversible transitions can be regarded as text book examples. The phase transitions prohibit a growth of $YbBr_2$ crystals and thereby most probably any further technical application. However, the knowledge about $YbBr_2$ contributes to the overall basic understanding of the series of AX_2 phase transitions.

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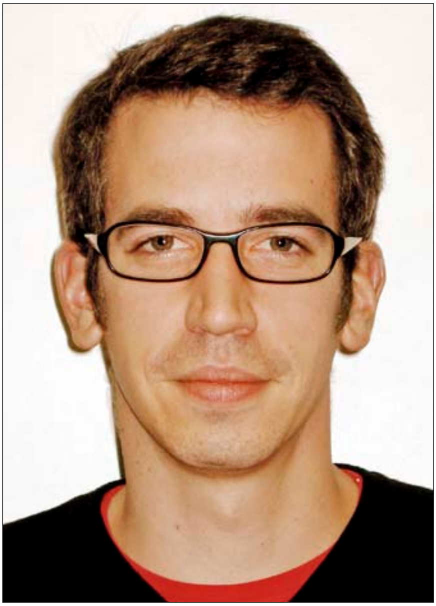
Winner of the Fourth Erwin Félix Lewy-Bertaut Prize (July 2011)

European Neutron Scattering Association **European Crystallographic Association**

The European Crystallographic Association (ECA) and The European Neutron Scattering Association (ENSA) jointly award the Fourth Erwin Félix Lewy-Bertaut Prize to Dr. Christian Rüegg for his outstanding contributions to the science of low-dimensional quantum spin systems and quantum phase transitions, notably for his neutron scattering studies of the spin-½ system ACuCl3 (A = K, Ti, NH4) and the discovery of Bose Condensation in such systems. The prize was given to Dr. Rüegg during ECNS 2011 in Prague.

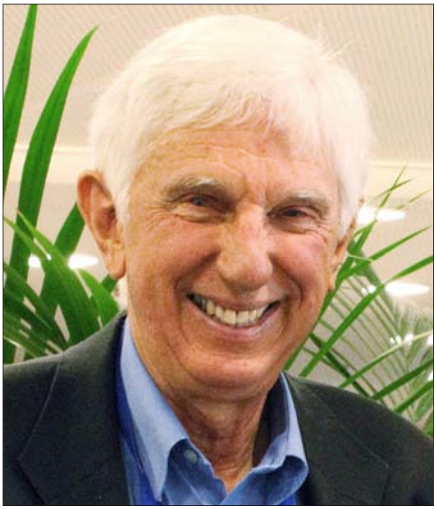


Dr. Christian Rüegg

Winner of the Walter Hälg Prize (June 2011)

European Neutron Scattering Association

It is a great pleasure to inform you about the outcome of the Selection Committee Meeting for the Walter Hälg Prize on June 23rd 2011: The next recipient of the Walter-Hälg-Prize is Dr. Gerry Lander. The committee awarded Dr. Gerry Lander the prize because of his many ground breaking scientific achievements mostly in the field of the magnetism of the actinides and his outstanding contributions to the development of neutron sources, in particular his scientific leadership making IPNS the basis for the spallation neutron sources to become the neutron sources of the future. The prize was given to Dr. Lander during ECNS 2011 in Prague.



Dr. Gerry Lander (courtesy of Juliette Savin / NMI3)

Announcements

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

PSI 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, 2011

JUM@P '11 USERS' MEETING

The second joint users' meeting of SINQ, the Swiss Muon Source SμS, and the Swiss Light Source SLS will take place September 15–16 at PSI. Information about the meeting is available under:
http://indico.psi.ch/event/jump11

SGN/SSDN GENERAL ASSEMBLY

This year's SGN/SSDN general assembly will take place at PSI on:
November 4, 2011, 17:00 in the Auditorium WHGA/001

NEUTRON BEAMTIME 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

SWISS PHD POSITION AT ILL

ILL funds and hosts one PhD student from Switzerland. This position had become vacant, was advertised in fall 2010, and has been awarded to Dr. Ch. Rüegg and Prof. J. Mesot in cooperation with Dr. M. Enderle at ILL for a project on Quantum and Frustrated Magnetism.

PAUL SCHERRER INSTITUT

PSI

JUM@P ’11
Joint Users’ Meeting at PSI 2011

2nd Joint Users’ Meeting at PSI: JUM@P’11
September 15–16, 2011

Paul Scherrer Institut, Villigen, Switzerland

Scope

The Paul Scherrer Institute runs three major user facilities for condensed matter research on one campus: The Swiss Light Source **SLS**, the Swiss Spallation Neutron Source **SINQ** and the Swiss Muon Spource **SμS**.

The aim of the Joint Users’ Meetings @ PSI is to bring together the three user communities and to generate new synergies among the scientists.

Program

Plenary session
Poster session
Award of PSI Thesis Medal 2011

Topical workshops:
- Heterogeneous Catalysis
- XFEL Experiments in Condensed Matter
- Advancing Quantitative Chemical Imaging
- Resonant Inelastic and Elastic X-ray Scattering
- Multiple Order Parameter Systems
- Soft Condensed Matter
- Imaging

Registration: http://indico.psi.ch/event/jump11
Contact: useroffice@psi.ch

Deadlines
Abstract submission: July 10, 2011
Registration: August 15, 2011

Conferences and Workshops 2011

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

SEPTEMBER

- 9th International NCCR Symposium on New Trends in Structural Biology
  September 1-2, 2011, Zürich, Switzerland

- ISACS6: Challenges in Organic Materials & Supramolecular Chemistry
  September 2-5, 2011, Beijing, China

- ECMS 2011: 7th European Conference on Mineralogy and Spectroscopy
  September 4-7, 2011, Potsdam, Germany

- Diamond 2011: 22nd European Conference on Diamond, Diamond-Like Materials, Carbon Nanotubes and Nitrides
  September 4-8, 2011, Garmisch-Partenkirchen, Germany

- ISPMA 12: 12th International Symposium on Physics of Materials
  September 4-8, 2011, Prague, Czech Republic

- WIRMS: 6th International Workshop on Infrared Spectroscopy and Microscopy with Accelerator-Based Sources
  September 4-8, 2011, Trieste, Italy

- 24th European Conference on Biomaterials
  September 4-9, 2011, Dublin, Ireland

- ICOMAT-2011: International Conference on Martensitic Transformations
  September 4-9, 2011, Osaka, Japan

- IPAC 2011: Second International Particle Accelerator Conference
  September 4-9, 2011, San Sebastian, Spain

- ICXOM21: 21st International Congress on X-ray Optics and Microanalysis
  September 5-8, 2011, Campinas, SP, Brazil

- SHELX Workshop
  September 5-8, 2011, Göttingen, Germany

- YUCOMAT 2011: Thirteenth Annual Conference
  September 5-9, 2011, Herceg Novi, Montenegro

- 15th JCNS Laboratory Course Neutron Scattering
  September 5-16, 2011, Juelich and Garching, Germany

- 12th Oxford School on Neutron Scattering
  September 5-16, 2011, Oxford, UK

- EQSANS 2011: Introduction to the EQ-SANS
  September 6-7, 2011, Oak Ridge, TN, USA

- ACCMS-6: 6th Conference of the Asian Consortium on Computational Materials Science
  September 6-9, 2011, Biopolis, Singapore

- Powder Diffraction at Australia's Synchrotron and OPAL Facilities: Experiment Planning to Data Analysis
  September 6-9, 2011, Melbourne, Australia

- MECA SENS VI: 6th International Conference on Stress Evaluation using Neutrons and Synchrotron Radiation September 7-9, 2011, Hamburg, Germany

- ACIN 2011: International Symposium on Advanced Complex Inorganic Materials
  September 11-14, 2011, Namur, Belgium

- Recent Advances in Macromolecular Crystallization 2011
  September 11-14, 2011, Le Bischenberg, Strasbourg, France

- NOMAD 2011 – Nanoscale Ordered Materials Diffractometer Workshop
  September 12-13, 2011, Oak Ridge, TN, USA

- Euromat 2011 – Advanced Materials and Processes
  September 12-15, 2011, Montpellier, France

- Summer School on Application of Neutrons and Synchrotron Radiation in Engineering Materials Science
  September 12-16, 2011, Lauenburg, Germany

- ISIC18: 18th International Symposium on Industrial Crystallization
  September 13-16, 2011, Zürich, Switzerland

- HAXPES 2011: 4th International Workshop on_ Hard X-ray Photoelectron Spectroscopy
  September 14-16, 2011, Hamburg, Germany

- International Meeting on Materials for Electronic Applications 2011
  September 14-16, 2011, Agadir, Morocco

- JUM@P 11: Second Joint Users Meeting at PSI
  September 15-16, 2011, Villigen, Switzerland

- SGK/SSCr Annual Meeting
  September 16, 2011, Bern, Switzerland

- DyProSo XXXIII: 33rd International Symposium on Dynamical Properties of Solids
  September 18-22, 2011, Aussois, France

- 40th Congress of the Italian Crystallography Association
  September 19-22, 2011, Siena, Italy

- Joint Meeting of the German Crystallographic Society (DGK), German Mineralogical Society (DMG) and Austrian Mineralogical Society (ÖMG)
  September 20-24, 2011, Salzburg, Austria

- ICFPE2011: 2011 International Conference on Flexible and Printed Electronics
  September 22-23, 2011, Tokyo, Japan

- From Elementary Chemical Processes to Complex Biological Structures for the Benefit of Life and Human Health
  September 23, 2011, Florence, Italy

- 19th Bruker-Nonius CCD Users Group Meeting
  September 25-27, 2011, Madison, WI, USA

- DRIP XIV: International Conference of Defects – Recognition, Imaging and Physics in Semiconductors
  September 25-29, 2011, Miyazaki, Japan

- IX Krajowe Sympozjum Uzytkownikow Promieniowania Synchrotronowego
  September 26-27, 2011, Warsaw, Poland

- 25th Rhine-Knee Regional Meeting on X-ray Crystallography of Biomacromolecules
  September 28-30, 2011, Sursee, Switzerland

- HEC-14: 14th Heart of Europe bio-Crystallography Meeting
  September 29 - October 1, 2011, Zagan, Poland

- Neutron Diffraction at TOPAZ
  September 29 - October 1, 2011, Oak Ridge, TN, USA

OCTOBER

- Geometry of Interfaces
  October 3-7, 2011, Primosten, Croatia

- 8th Autumn School on X-ray Scattering from Surfaces and Thin Layers
  October 4-7, 2011, Smolenice, Slovakia

- JCNS workshop 2011: Neutron instrumentation – from continuous to spallation sources
  October 4-7, 2011, Tutzing, Germany

- GISAXS2011
  October 10-12, 2011, Hamburg, Germany

- Science Vision for the ESS – German Perspectives
  October 10-12, 2011, Bad Reichenhall, Germany

- Handheld XRF Workshop
  October 11-13, 2011, Newtown Square, PA, USA

- ADD 2011: Workshop on Analysis of Diffraction Data in Real Space
  October 12-14, 2011, Grenoble, France

- Reflektometrie an der ESS – Anforderungen und Perspektiven
  October 13, 2011, Bad Reichenhall, Germany

- Workshop on Energy Management in Large Scale Facilities
  October 13-14, 2011, Lund, Sweden

- Basic Rietveld Refinement and Indexing
  October 17-19, 2011, Newtown Square, PA, USA

- Advanced Rietveld Refinement and Indexing
  October 20-21, 2011, Newtown Square, PA, USA

- IUBMB: 13th International Union of Biochemistry and Molecular Biology Conference
  October 22-27, 2011, Merida, Yucatan, Mexico

- ESF-COST High-level Research Conference on Systems Chemistry III
  October 23-28, 2011, Crete, Greece

- Workshop on Topological Materials
  October 26-28, 2011, Grenoble, France

- Celebrating the 40th Anniversary of the Protein Data Bank
  October 28-30, 2011, Cold Spring Harbor, NY, USA

NOVEMBER

- AACr 2011: VII Reunion de la Asociacion Argentina de Cristalografía
  November 2-4, 2011, Bariloche, Rio Negro, Argentina

- MaThCryst Workshop on Mathematical Crystallography
  November 2-6, 2011, Manila, Philippines

- ISCAN 2011: International Symposium on Clusters and Nano- Structures
  November 7-10, 2011, Richmond, VA, USA

- III ESAACris: 3rd International School of the Argentinian Crystallography Association
  November 7-18, 2011, Bariloche, Rio Negro, Argentina

- 9th TOPAS Users' Meeting with hands-on sessions
  November 8-11, 2011, Bad Herrenalb, Germany

- School of Crystallization and Crystallography for Latin America
  November 12-25, 2011, Florianopolis, Brazil

- EMBO Practical Course: Computational Structural Biology
  November 14-18, 2011, Cambridge, UK

- 1st AOCNS: 1st Asia-Oceania Conference on Neutron Scattering
  November 20-24, 2011, Tsukuba, Japan

- VIII International School on Crystallography and X-ray Diffraction
  November 21-26, 2011, Havana, Cuba

- ICAM workshop: New frontiers in the physics of two dimensional electron systems
  November 23-25, 2011, Buenos Aires, Argentina

- 2011 MRS Fall Meeting and Exhibit
  November 28 - December 2, 2011, Boston, MA, USA

- Workshop on Perspectives in Terahertz Spectroscopy with Neutrons
  November 29-30, 2011, Berlin, Germany

- Solomonoff 85th Memorial Conference
  November 30 - December 2, 2011, Melbourne, Australia

JANUARY 2012

- 7th SOLEIL Users' Meeting
  January 18-19, 2012, Soleil Synchrotron, Gif sur Yvette, France

- 6th International Symposium Hydrogen and Energy
  January 22-27, 2011, Stoos, Switzerland

APRIL 2012

- ARRS 2012: Meeting of the American Roentgen Ray Society
  April 29 - May 4, 2012, Vancouver, Canada

JUNE 2012

- ICCS 2012: International Conference on Computational Science
  June 4-6, 2012, Omaha, Nebraska, USA

JULY 2012

- Science at FEL's: SRI 2012 Satellite Metting
  July 15-18, 2012, Hamburg, Germany

NOVEMBER 2012

- SAS2012: International Small-Angle Scattering Conference
  November 18-23, 2012, Sydney, Australia

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