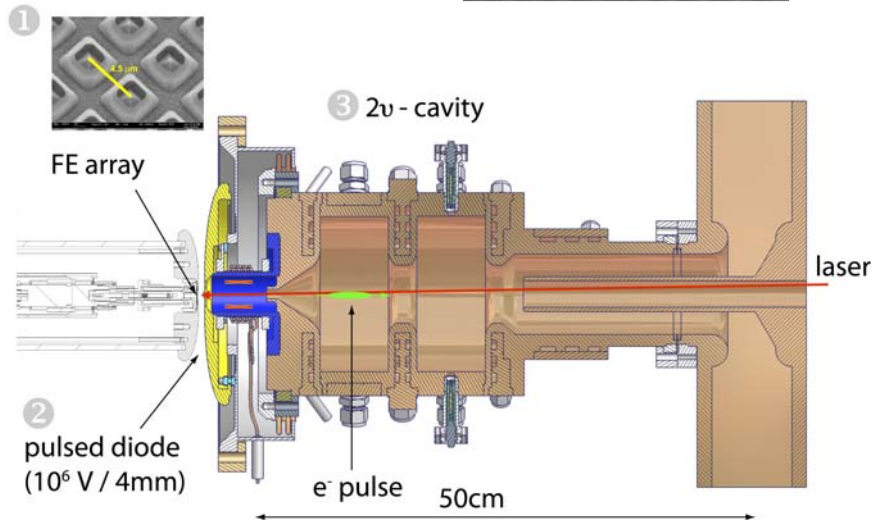
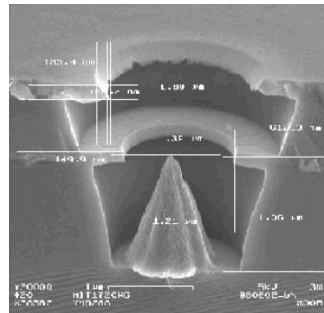


Schweizerische Gesellschaft für Kristallographie
Société Suisse de Cristallographie
Swiss Society for Crystallography

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Section de Croissance et Technologie des Cristaux

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Letter from the President

Perhaps, I should start with IUCr XXI, the last international conference of our community, which took place in Osaka, Japan, from 23-31 August 2008. Many of you were there and had seven wonderful days. The organisation was perfect, and, as we learnt during the closing ceremony, even the risks of an earth quakes, high temperatures and heavy rain was calculated. Fortunately, we did not experience an earth quake and the lecture rooms were air conditioned. Crystallography at its best was presented in two plenary and 36 keynote lectures, in as many as 98 microsypmosia with about 500 selected speakers, and, last not least, on almost 2000 posters. Among the 2'477 participants from 66 countries, there were 46 attendees from Switzerland. This was the ninth largest delegation, once more demonstrating the more than proportional contribution of Swiss crystallography. Financial support from our society for 13 young scientists is certainly jointly responsible for this high number. The General Assembly, gathering on four evenings, elected Sine Larsen, professor of chemsirty at the university of Copenhagen, the new president of the IUCr. It also decided on the locations of the next two IUCr meetings, which will take place 2011 in Madrid and 2014 in Montreal.

Let's switch to science. What do you think about a cubic unit cell with lattice parameters of more than 70 Å? Well, that's nothing special, you may say if you are a biocrystallographer. You will be amazed, however, to learn that this unit cell does not refer to a protein structure but to an intermetallic phase. Take a particular ternary Laves phase with 12 atoms per unit cell and change the composition a little bit. Then you will get a nice cluster-based structure with almost 23'000 atoms per unit cell! The largest unit cell of an intermetallic phase known so far. Why does this happen? Why is nature so kind to crystallographers, offering them so beautiful structures? By the way, charge flipping is the best method to solve structures of such a complexity in a more or less straightforward way. It is really amazing how many surprising discoveries are still being made in rather common intermetallic systems, from quasicrystals to complex intermetallics with giant unit cells.

All that's left now is to wish you a quiet time, free of bureaucratic demands, where you can do what you really want - crystallography. I also wish you and your family peaceful holidays and a Happy New Year



Walter Steurer
President of the SGK/SSCr

Science Opportunities at the Proposed PSI-XFEL

The free electron laser project of Paul Scherrer Institute

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The Paul Scherrer Institut is planning the construction of an X-ray Free Electron Laser. The PSI-XFEL will produce 60 fs pulses of coherent X-rays in the wavelength range 0.1 – 10 nm, with a peak brightness approximately 10^{10} times that of a third-generation synchrotron. The brightness, coherence and short pulses provide opportunities for performing novel science in the fields of chemistry, biochemistry, solid state physics and materials science. The PSI-XFEL could be operational in the year 2016.

What is an XFEL, and how is the PSI-XFEL special?

The active medium in an X-ray free electron laser consists of a 100 femtosecond pulse of 10^9 relativistic electrons moving in the sinusoidal field of an undulator: a periodic linear array of alternately-poled permanent magnets. As in a synchrotron light source, the transverse acceleration from the Lorentz force causes the electrons to emit X-radiation, but in an XFEL, the undulator is sufficiently long that the growing radiation field influences the trajectory of the electrons. At the "resonance condition", where the radiation overtakes an electron by exactly one wavelength per undulator period, certain of the electrons gain energy and others lose energy, thus splitting the pulse into 10^5 "microbunches". As it moves along the undulator, the microbunched electron pulse then radiates as if it were a single charge of 10^9 e, producing an intense, coherent pulse of "superradiant" X-rays.

Besides the PSI-XFEL there are presently three other projected XFELs worldwide: in Stanford, USA (2009), Hyogo, Japan (2011) and Hamburg, Germany (2014). The maximum electron energy and hence the overall XFEL length (800 m) are significantly lower at PSI than for the other projects. This is made possible by PSI innovations in the high-brightness electron source technology, including nanometer-scale field-emitting tips and initial acceleration in a pulsed field of 1 MV across a 4 mm gap, followed by a novel two-frequency RF-cavity. The individual X-ray pulses will be very similar to those of the larger projects (see Table 1). While the Swiss, US and Japanese XFELs will emit 60-120 pulses per second, the Hamburg machine, due to the use of superconducting accelerator technology, will produce 10 trains of 3000 pulses per second, with a minimum pulse spacing of 200 ns.

With sufficient resources, the PSI-XFEL could have enhanced capabilities which are not presently foreseen at the other projects. These include: rapid tuning of the XFEL

wavelength for spectroscopic investigations, the option of circular polarization for magnetic studies, additional beams of pulsed, broadband spontaneous radiation for time-resolved Laue crystallography and wavelength-dispersive spectroscopy, extension of the maximum photon energy to the ultra-narrow Mössbauer resonance of ^{57}Fe at 14.4 keV, and modification of the electron pulses by "seeding" and / or "slicing" to yield substantially narrower spectral widths and / or pulse lengths than those given in the Table. Rapid switching of the electrons will allow the simultaneous operation of three PSI-XFEL branches, covering the photon energies 12.4 – 4.0, 4.4 – 0.4 and 1.2 – 0.13 keV.

Table 1. PSI-XFEL specifications

Maximum electron energy	6 GeV
Photon wavelength	0.1 – 10 nm
Photon pulse length (FWHM)	60 fs
Spectral width (FWHM)	0.1 – 0.9 %
Beam size at undulator exit (FWHM)	25 – 35 mm
Peak brilliance	$10^{33} - 10^{31}$ ph/s/mm ² /mrad ² /0.1 % bw
Flux	$1 \times 10^{11} - 5 \times 10^{12}$ ph/pulse
Pulse repetition rate	100 Hz

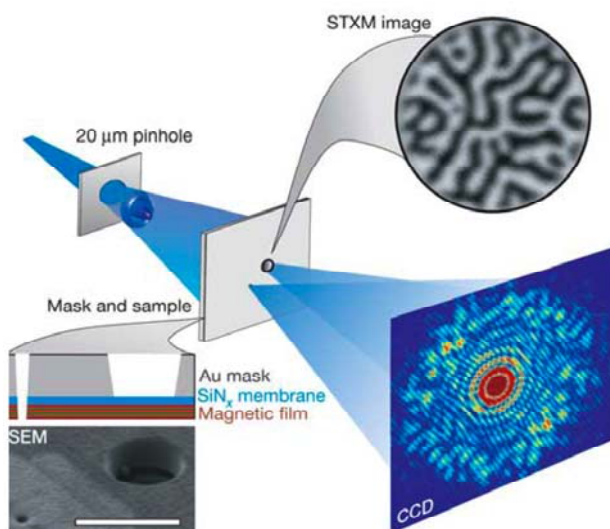


First construction steps for the 250MeV test injector: Status December 2008

Proposed applications

The bright pulses and high degree of coherence of the XFEL radiation will allow time-resolved lensless imaging to be performed on a variety of systems, including ferroelectric and magnetic domains in thin films, biomolecular conformations in solution and molecular diffusion on surfaces. Time-dependent changes can be triggered by a switched electric or magnetic field (see Fig. 1) or by a fs optical laser pulse which is synchronized to the X-ray pulse. On the other hand, *equilibrium* fluctuations on the fs – ns time scale can be studied as a function of wavevector using X-ray Photon Correlation Spectroscopy [3]. All of these techniques require the rapid collection of high-resolution 2D-images and the stepwise variation of a pulse delay. Furthermore, the excited sample must relax to equilibrium before the next pump-probe cycle is initiated. Such processes are compatible with the 100 Hz repetition rate of the PSI-XFEL.

Fig. 1. Static holographic imaging of the sub-mm domain structure in a thin magnetic film, performed at the BESSY synchrotron. Magnetic contrast is provided by using circularly-polarized X-rays at the L_3 absorption edge of the magnetic Co ion. At the XFEL, such a pattern can be measured with a single X-ray pulse, allowing sub-ps pump-probe studies of magnetization dynamics. Reprinted by permission from Macmillan Publishers Ltd: [2].

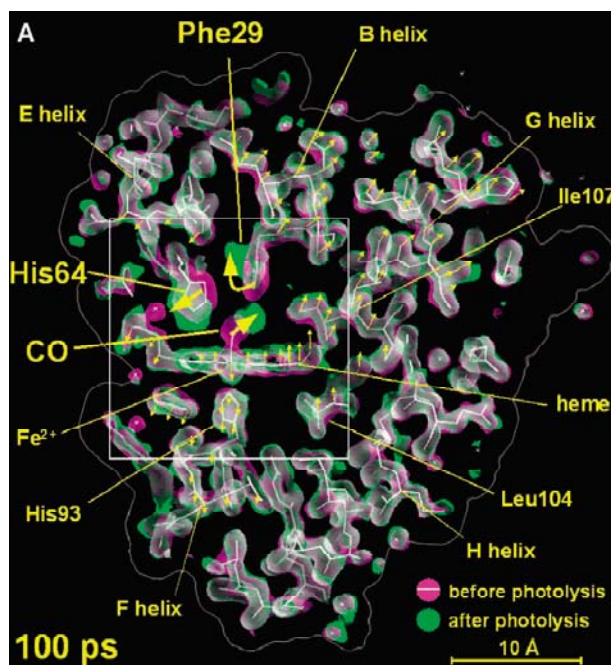


With a tunable XFEL wavelength, X-ray absorption spectroscopy (XAS) can also be used to follow a time-dependent process. For example, it is proposed that a chemical reaction be "gently" initiated on a catalytic surface by using a sub-ps pulse of coherent terahertz radiation [4]. After a variable time delay, the chemical or electronic environment of the reactive species is determined by near-edge (XANES) or far-edge (EXAFS) absorption spectroscopy. It is also foreseen to use time-resolved pump-probe XAS to follow laser-initiated photo-chemical reactions in solution [5].

The time-dependent behavior of solid materials following excitation by a sub-ps laser pulse is a wide field of inquiry, including topics such as non-equilibrium melting, the coherent creation and control of phonons, local structural changes upon the photo-excitation of chromophores, etc. Since the advent of "sliced" synchrotron beams, sub-ps X-ray pulses [6-8] have become available, albeit with very low intensities. At the sliced "FEMTO" beamline of the Swiss Light Source, it has been possible to coherently create and control phonons in a bismuth crystal [8]. Because the PSI-XFEL will deliver vastly more photons per pulse, such pump-probe experiments in solids will become orders of magnitude easier to perform.

The XFEL will also provide several new tools to biochemists. The time-dependent behavior of photosensitive biomolecules in crystalline form can be studied by time-resolved, pump-probe Laue crystallography. Using isolated, 100 ps pulses at a synchrotron, structural changes accompanying the photodetachment of CO from the heme group in myoglobin have been recorded in the ns – ms regime [9] (see Fig. 2). With spontaneous radiation from an incoherent undulator downstream from the XFEL, the same number of broad-bandwidth photons now available in a 100 ps synchrotron pulse will be available in a 100 fs pulse, thus extending time-resolved Laue crystallography into the sub-ps regime.

Fig. 2. A comparison of the local structure of a myoglobin molecule before and after the photodetachment of CO from the heme group, produced using 100 ps time-resolved Laue crystallography. The PSI-XFEL, with an additional spontaneous undulator, will extend such investigations to the sub-ps regime. Reprinted by permission of The American Association for the Advancement of Science: [9].



The "holy grail" of XFEL-based structural biology is the structural determination, with atomic resolution, of large, *individual* biomolecules, without the requirement of crystallization. Indeed, the highly-important membrane proteins can generally not be crystallized, and hence their structures remain largely unknown. It is proposed that the hard X-ray XFEL beam be focused down to 100 nm, and that individual protein molecules be synchronously injected, one-by-one, into the XFEL pulses. Of course, the intense X-ray pulse will quickly destroy the molecule (see Fig. 3), but from sliced pulses shorter than several fs, sufficient scattered photons may possibly be obtained to allow a structural determination. Even with the XFEL in operation, many hurdles must be overcome before this goal can be achieved: pulse shaping and focusing, particle preparation and injection, data collection and, importantly, combining the data from many individual, randomly-oriented molecules.

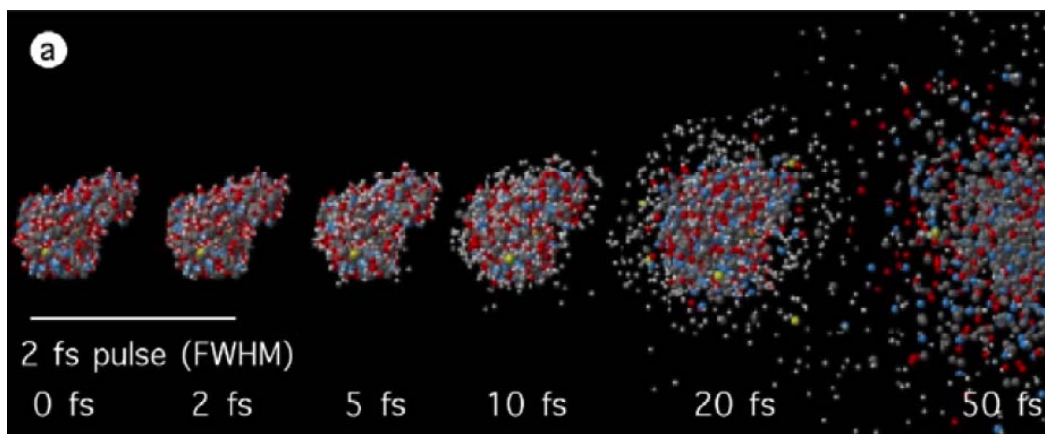


Fig. 3. The simulated "Coulomb explosion" of a protein molecule in a 2-fs XFEL pulse. Scattered photons yield information on the unperturbed molecule. Reprinted by permission from Macmillan Publishers Ltd: [10].

Conclusion

The qualitative advances in performance by an X-ray free electron laser over all existing X-ray sources make accurate predictions of the relevant photon-matter interactions difficult. Nonetheless, novel science will certainly be made possible by the enormous increases in peak brightness, coherence and time resolution. The Paul Scherrer Institut welcomes input from interested parties inside and outside of Switzerland regarding the conceptual design of the PSI-XFEL facility.

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Summary of the International Summer School on Structure Determination from Powder Diffraction Data (2008)

PSI Villigen, June 18th-22nd, 2008

Contributed by Fabia Gozzo (on behalf of the Organizing Committee)



The International Summer School on "Structure Determination from Powder Diffraction Data" took place at the Paul Scherrer Institute (PSI) on June 18th – 22nd, 2008, as planned. To the best of our knowledge this has been the first hands-on workshop combining theory, hands-on experimental sessions at both a synchrotron radiation facility (SLS) and a X-ray powder diffraction laboratory and hands-on tutorials on structural solution using various computer programs. In order to maintain a high teacher-to-student ratio, we limited to 44 the maximum number to participants. The first 20 paying participants were accepted with the first come-first served criterium. The remaining 24 were helped with a partial or a total (in few cases) financial support. The grants were assigned according to merit, pertinence with the on-going research subject, internationality, age and chronology of registration. More than 130 people registered and/or informally applied after the closure of the registrations.

Lectures were given in the morning with all audience in the main lecture room and tutorials (laboratory and data analyses) were given in the afternoon in 4 and 3 groups, respectively. A vast set of compounds of progressive complexity was pre-selected by the school teachers and SR and laboratory X-ray measurements performed prior to the school and during the hands-on session together with samples that the students brought with them. Data collected were, then, analysed during the hands-on afternoon computer tutorials sessions. A minimum of three teachers were present in each room.

We also organized lunches and dinners all together to encourage the participants to further discuss among themselves and with the teachers.

At the end of the school, we have asked all participants to answer to a questionnaire. The average of the overall estimate of the school on a 1-10 scale (1=poor, 10=excellent) has been 8.45. The comments were also positive and encouraging the continuation of this event in the future, possibility that we will soon discuss. There have been a couple of comments stating that the theoretical level of the school was too high and a couple of them stating that the level was too low with respect to the expectations. These comments reveal the disparity of the background of the participants. If we organize the school again in the future, we believe we would change the selection criteria and request that the participants have a minimum background in crystallography and diffraction theory.

We have decided not to produce written material but we have created a location on the school web site where we are uploading all lectures, tutorials and experimental data with appropriate input files, available to all:

<http://user.web.psi.ch/powder08/downloads/>

We have hosted one participant, Dr. Freiermuth from Solvias AG, who was also given the chance to look at one of his non-proprietary samples to evaluate the quality of our fast solid state detector (MYTHEN II) particularly suitable to the analysis of organic compounds that suffer from radiation damage, since it acquires high statistics full diffraction patterns in a few seconds. We are very happy that Dr. Freiermuth acknowledged the high data quality compared with his in-house instrument and the contact established during the school will be certainly find it's continuation.

We again thank all KGF members for the support (for example the grants from SGK/SSCr and ECA) given to our initiative.

Conference report of the MH2008 - International Symposium on Metal-Hydrogen Systems, Reykjavik (Iceland)

Contribution of Delphine Phanon, Jean-Noël Chotard and Nicolas Penin

The « MH2008 – International Symposium on Metal-Hydrogen Systems » was held from the 24th to the 28th of June 2008 in Reykjavik (Iceland). The "MH conference series" takes place every other year and is renowned for being among the most prestigious ones in the field of "hydrogen-based science". As for Iceland, on the forefront of research for renewable energies, it has proven to be a most suitable place to host a conference in the field of hydrogen. Indeed, the country plans to become the world's first hydrogen economy by the year 2050. By that time, all private automobiles, fishing boats and public transportation means are foreseen to be 100% hydrogen powered. As hydrogen can be produced from the country's large renewable energy resources (wind, geothermic and hydro-electricity), achieving this goal would make Iceland the first energy independent country in the world. Today, Reykjavik's public transportation service is proud to claim 3 hydrogen powered buses in its fleet, besides the fact that there is already a sizable number of hydrogen powered cars in use downtown. To provide these engines with energy, the first public hydrogen fuel station, opened early 2003 in Reykjavik, has a self-sufficient hydrogen generating system. Using an electrolyzing unit, the system requires no refilling whatsoever – but to be provided with electricity and water.

The MH2008 conference was organized by Hannes Jónsson and Sveinn Ólafsson with the assistance of Anna-Karin Eriksson, Arni S. Ingason, Gerlinde Xander as vice-chairs – all of whom come from the University of Iceland. The scientific committee was composed of the following international scientists: E. Akiba, Japan; M. H. Mintz, Israel; V. E. Antonov, Russia, D. Noréus, Sweden; B. Hauback, Norway; A. Percheron-Guégan, France; R. C. Bowman, Jr., USA; H. Jonsson, Iceland; R. Cantelli, Italy; D. K. Ross, UK; H. Figiel, Poland; T. Sakai, Japan, D. Fruchart, France; V. A. Somenkov, Russia; Y. Fukai, Japan; T. J. Udovic, USA; E. MacA. Gray, Australia; B. Hjörvarsson, Sweden; M. Gupta, France; C. M. Jensen, USA; R. Kirchheim, Germany; V. A. Yartys, Norway; K. Yvon, Switzerland; Y. Q. Lei, China; I. R. Harris, UK; Q. D. Wang, China; B. Baranowski, Poland.

The meeting was opened with two plenary lectures. These were given by R. Griessen (Vrije University, Amsterdam) on the "*Effects of hydrogen on the optical properties*", and by C. Jensen (University of Hawaii) on the "*Complex hydrides, such as alanates, amides and borohydrides*". Other contributions consisted of 28 invited talks (30 minutes each) and 89 talks (20 minutes each) that were divided into 2 parallel sessions. Over 3 days, approximately 400 posters were distributed. In all, there were some 500 attendants.

Talks and posters were divided into three research fields: **(i)** "Studies of materials for hydrogen storage", **(ii)** "Hydrogen storage" and **(iii)** "Applications". Each of these fields was further divided into several symposia. The first field, "Studies of materials for hydrogen storage", was developed into 7 topics, namely: Surface and interface effects; Catalysis and reaction kinetics; Diffusion, tunnelling, trapping and transport; Crystal structures, hydrogen induced transformations; Thermodynamics, phase diagrams;

Electric, optical and magnetic properties; novel materials-design, prediction and synthesis. The second field, "Hydrogen storage", was developed into 3 topics, namely: Hydrogen storage and properties of bulk-like hydrides; Hydrogen storage and properties of amorphous and composite materials; Hydrogen storage and properties of nanostructures, nanocomposites and porous materials. Finally the third field, "Applications", was divided into 4 topics, namely: Electro-chemical (batteries, fuel cells) applications; Optical, electric and magnetic applications; Separation and membrane materials; hydrogen processing of materials.

The Swiss community, whose research work focuses on "Hydrogen Storage Materials", was well represented. One invited talk was given by former assistant at the Laboratory of Crystallography, Y. Filinchuk (presently at the Swiss-Norwegian Beam Lines ESRF, Grenoble, France). In addition, two posters were presented by R. Cerny and D. Phanon, and three talks were given respectively by J.-N. Chotard, N. Penin (Laboratory of Crystallography) and H. Hagemann (Physical Chemistry Department), all from the University of Geneva, Switzerland. In addition, with the presentation of a few posters, two talks were given by Z. Lodziana and A. Züttel from the "Hydrogen & Energy group" (EMPA), Dübendorf, Switzerland.



Fig. 1: Gullfoss: Beside science, also the landscape was worth a trip to Island.

The next MH conferences will take place in Moscow, in July 2010. For further information, please consult the MH2008 website : <http://erik.raunvis.hi.is/mh2008/>

Dual-space iterative phasing methods in crystallography

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1. Introduction

The phase problem in crystallography is almost as ancient as structural crystallography itself. The approaches to this problem have been for a long time driven by the attempts to reduce the computational complexity of the problem because of limited or inexistent access to powerful computers. A lot of efforts have been invested to the development of Patterson and direct methods in order to make them as computationally efficient as possible.

The advent of cheap computer power available on almost everyone's desk has allowed the development of methods that are conceptually simpler than the classical methods, at the expense of stronger requirements in computing power. Among these techniques are direct-space methods (simulated annealing, genetic algorithms...) and extensions of the classical direct methods, like Shake-and-Bake. Recently, a new class of methods not explicitly based on the direct methods or on direct-space approach [1,2,3] have emerged. These methods are based on an iterative modification of an image in both direct and reciprocal (Fourier) space, and therefore can be denoted as dual-space iterative methods.

Conceptually similar methods have been used since the seventies in the field of image reconstructions, where, in contrast to crystallography, a non-periodic image occupies a support (a confined area), which is typically considered to be known at least approximately. The most widely used algorithm from this field is probably Fienup's hybrid input-output algorithm (HIO) [4]. Nowadays, these methods find their application also in the field of diffractive imaging (see for instance Ref. 5,6,7,8,9).

The dual-space iterative methods can essentially be described in terms of constraint sets and projections onto them. In this review we outline the basic concepts of this approach with emphasis on the crystallographic applications, and we point out some concepts that go beyond the rigorous "projection-onto-the-constraint set" paradigm.

2. Image, constraint sets, projections, relaxed projections

The phasing problem in crystallography can be rephrased as: "find a scattering density that is physically meaningful (i.e. that can be interpreted as an assembly of atoms) and that reproduces the experimental data". The experimental data coming from a diffraction experiment are - after appropriate treatment - a set of squared Fourier amplitudes. Let us sample the scattering density on a three-dimensional grid, and represent it by a vector ρ , with each component of the vector being a density value at one grid point. Let the constraint set C_F be the set of all densities ρ such that a Fourier transform of ρ yields Fourier amplitudes in agreement with the experiment. Let the constraint set C_P be a set of all ρ that are physically meaningful (see below for the discussion on what is meant by "physically meaningful"). Then the searched solution ρ_{sol} lies on the intersection of both constraint sets:

$$\rho = C_F \cap C_P$$

Clearly the constraint sets have to be designed in such a way that their intersection defines a unique solution, or a set of closely related solutions.

The problem of finding an element from the intersection of two (or more) constraint sets has been treated by mathematicians many decades ago [10,11]. In the special case of "convex feasibility" or "convex optimisation" problems, where all sets are convex, well-defined iterative procedures exist, with proven convergence properties.¹ For instance, the intersection between two convex constraint sets is always reached simply by alternating projections onto the first and the second set (Fig. 1a). In crystallography, the set associated with the amplitude constraint is unfortunately non-convex. In such case the algorithms developed for convex sets are not guaranteed to work, because they can get trapped in local minima (Fig. 1b).

It is nevertheless useful to use the terminology and approaches developed for the convex feasibility problem. The three main elements constituting the basis of the algorithms are the image space, the constraint sets and the projections. In the crystallographic context, the image is typically the vector of density values ρ , as it was defined above. The definition of the image is essential, because it defines the space of possible solutions. The constraint sets have also been discussed above: C_F is the set of all densities yielding the experimentally observed Fourier amplitudes, and C_P is the real-space constraint that assures that the solution is physically meaningful. While the definition of C_F is obvious, that of C_P is not. A number of choices have been made in the literature:

- a) Positivity constraint: $\forall i: \rho(i) > 0$
- b) Band positivity constraint: $\forall i: \rho(i) = 0 \vee \rho(i) > \delta > 0$ [2, 4]
- c) Dynamic support constraint: Only a predefined fraction of density values is non-zero [12,13]
- d) Constraint on the number of maxima: The number of peaks in the density must be equal to the expected number [3]. This can be understood as a variation of the previous constraint.

Clearly, these constraints alone are not sufficient to assure that the density will represent a chemically and physically meaningful crystal structure, but if they are properly combined with C_F , they usually lead to a unique solution.

The third element of the algorithms is the projections. A projection is a mapping from an arbitrary point in the image space onto the nearest point of the constraint set:

$$P: P\rho \in C \text{ and } \|P\rho - \rho\| = \min \quad (1)$$

Applying a projection to an arbitrary density ρ results in a new density that belongs to the constraint set. A projection P_F that projects an arbitrary density ρ on C_F can be written as:

$$P_F = \Phi^{-1} A \Phi \quad (2)$$

¹A constraint set is convex if: $x \in C \wedge y \in C \Rightarrow \overline{xy} \in C$ where \overline{xy} denotes the set of all points connecting x and y.

where Φ represents a Fourier transform, and A an operation on the Fourier coefficients, where the phases are left intact, and the amplitudes are replaced with the experimentally observed amplitudes.

It was shown in Figure 1 that only "naively" alternating the projections onto the first and second constraint set can be sometimes successful, but it is prone to stagnation at local minima. This drawback can be overcome by replacing simple projections by relaxed projections (overprojections), or combining these relaxed projections in more elaborate schemes. A relaxed projection R is defined as:

$$R^\gamma = P + \gamma(P - I) = (1 + \gamma)P - \gamma I$$

Thus, a relaxed projection is obtained by "prolongation" of the vector from ρ to $P\rho$ by a factor γ . The special case $\gamma=1$ is called a reflection. Fig. 1c illustrates that using relaxed projections may allow the iteration to escape from a local minimum.

Table 1 shows how the dual-space phasing methods used in crystallography can be expressed as combinations of projections and overprojections.

Table 1: Schemes of the most important variants of the dual-space iterative methods used in crystallography. The general iteration scheme is $\rho^{(n+1)} = M\rho^{(n)}$. I denotes an identity mapping.

Low-density elimination [1]	$M = P_1 P_2$
Difference map ² [2]	$M = I + \beta P_1 R_2^{\gamma_2} - \beta P_2 R_1^{\gamma_1}$
Charge flipping [3]	$M = P_1 R_2$
Charge flipping "F+ Δ F" [11]	$M = R_1 R_2$

Although multiple different combinations of projections have been suggested, it must be emphasized that not all possible combinations are useful. A good algorithm is designed in such a way that it searches the image space efficiently, *i.e.* it does not get trapped in local minima, and explores large parts of the image space. On the other hand, if the iteration approaches the true solution, it must converge close to the solution, and not diverge again. Clearly, the algorithm must be a balance between the perturbing aspect necessary to explore the search space, and the stabilizing aspect needed for stability at the solution. It is therefore not surprising that different types of problems require somewhat different settings and variants of the general scheme.

3. Beyond rigorous projections

A projection has been defined (Eq. 1) as the mapping onto the nearest point on the constraint set. However, in real applications the condition on the minimum distance is not always strictly applied, and sometimes a true projection is replaced by a

² The name "difference map" comes from the fact that the mapping M is in fact a difference between two mappings, each of them combining one projection and one overprojection. It has nothing to do with Fourier difference maps.

"projection-like" mapping, that is a mapping that has properties similar to a projection, especially close to the solution, but is not a projection in the strict sense. Such a mapping can be called pseudoprojection. Using pseudoprojections instead of true projections can have two reasons. Either it is computationally more advantageous to calculate the pseudoprojection than the true projection, or the use of a pseudoprojection brings an advantage over the true projection.

An example of the first case is the "peak projection" used in the original formulation of the difference-map algorithm for crystallography [3]. The constraint set used in [3] is the set of all densities that contain a given number N of peaks. Projecting an arbitrary density onto the constraint set requires erasing all but N peaks so that the total amount of erased density is minimal. In the case where the peaks are spatially extended, finding the true minimum requires trying many combinations of erased peaks, and that is a very costly process. Instead, one can keep only the N largest peaks, and obtain a good approximation of the projection. After this operation the density lies in the constraint set, but the minimum distance from the original density is not guaranteed. The tests on real data have shown that the method is very successful in the structure solution despite of this approximation.

While the above example can be understood as a compromise between the theoretical requirements and the computational costs, in other cases the use of a pseudoprojection can be advantageous. This is the case of the so-called " $\pi/2$ -variant" of the amplitude projection. In this variant the operation A of the standard amplitude projection (the replacement of the amplitudes by the experimental amplitudes, Eq. 2) is replaced by this rule:

$$A(|F_{cur}| \exp(i\varphi)) = \begin{cases} |F_{obs}| \exp(i\varphi) & \text{for large } |F_{obs}| \\ |F_{cur}| \exp(i(\varphi + \frac{\pi}{2})) & \text{for small } |F_{obs}| \end{cases}$$

The current amplitudes (subscript cur) of weak reflections are not replaced by the experimentally observed ones, but kept at their calculated values, but the phases are shifted by $\pi/2$. This modification can be intuitively understood as an orthogonal perturbation to the standard amplitude projection. It has been shown [15] that if the standard amplitude projection is replaced by the " $\pi/2$ -variant", the performance of the classical charge-flipping algorithm is significantly improved.

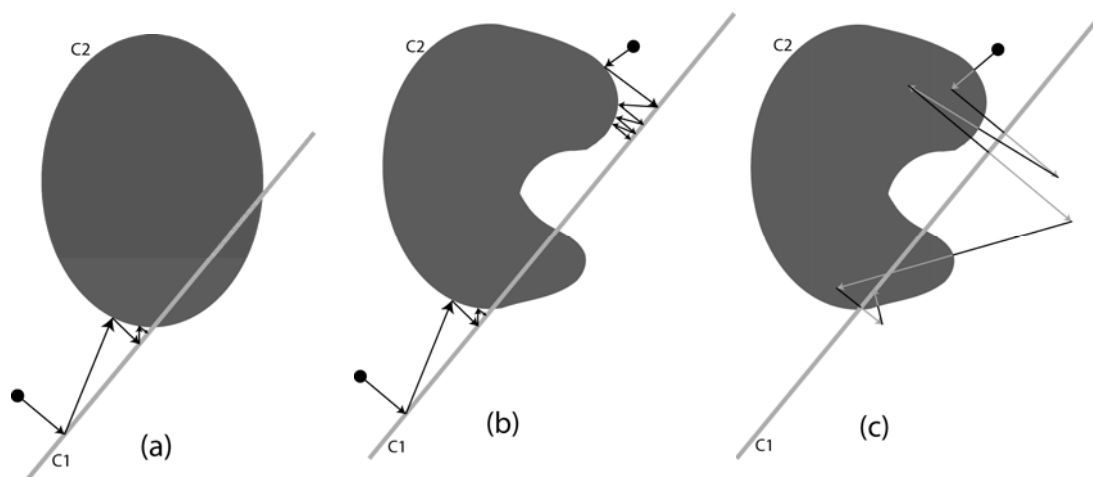


Figure 1: Schematic representation of the search for an intersection of two constraints using iterated projections. C1 (light-grey line) and C2 (dark-grey area) denote two constraints, their intersection represents a set of solutions. Black dots represent a random starting point of the iteration, and arrows indicate the positions after each iteration step. (a) Convex constraints: The solution can be found by repeated application of a simple projection on the two constraint sets. (b) The constraint set C2 is non-convex. For some starting points (upper right) the iteration gets trapped in a local minimum. (c) If relaxed projections are used instead of the true projections, the local minimum is avoided and the true solution can be found. The black part of the arrows indicates a true projection; the grey part indicates the continuation of the displacement along the same direction. The parameter γ of the relaxed projection is in this example equal to 1.

4. Conclusions

The principle of function of the dual-space iterative phase retrieval methods can be elucidated using the concept of projections onto constraint sets, and their combinations. This concept provides an intuitive understanding of how and why the methods work. However, the non-convex nature of the constraints, especially of the amplitude constraint, represents a serious complication to an exact mathematical treatment of these methods in the context of crystallography, and in image reconstruction from diffraction data in general. Prediction of the speed of convergence, optimal parameter setting, or even the success/failure of these methods for a given structure has for now eluded formal proof. Nevertheless, the practice shows that these methods are very powerful, and can not only solve most of the structures in the small-molecule field, but can be applied also in macromolecular crystallography [16].

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News for and from members

We welcome the following new members of the SGK/SSCr:

Personal members

Mr. Ying Zhou, Institute for Inorganic Chemistry, Winterthurerstr. 190, 8057 Zurich
(thesis student)

Dr. Alla Arakcheeva, Laboratoire de Cristallographie, BSP, École Polytechnique Fédérale
de Lausanne, Dorigny BSP-Cubotron, 1015 Lausanne
(senior scientist)

Travel grants for young SGK/SSCr members

The committee will award the grants according to the following rules:

- Preference is given to PhD students
- Proof has to be given that there are no grants available covering the expenses
- A supporting letter by the supervisor of the applicant is necessary

If you wish to apply for a travel grant, please send the above mentioned documents to the president of the SGK/SSCr anytime.

Details for applications are given at:

<http://www.sgk-sscr.ch/TravelGrants.pdf>

Pending Membership Fees

We would like to thank (most of you) for the prompt payment of the 2008 membership fee.

However, several of the fees for 2008 and even a few back to 2006 are still missing. The cover letter indicates the **total amount due** (a negative balance means that you paid in advance and no action is needed).

Formatted: Bullets and Numbering

Please pay the amount due immediately **by bank transfer** to the UBS account:

IBAN CH39 0027 9279 C029 1110 0 , BIC: UBSWCHZH80A

Please avoid to pay in cash at a post office (PC 80-2-2, UBS Zürich, Account No. 230-C0291110.0) as Postfinance is charging significant handling fees to the society.

Thank you for your cooperation.

Your treasurer,
Michael Hennig

Minutes from the General Assembly 2008 of the SGK/SSCr

September 9, 2008, room KOH-B10 at 17:30h
University of Zurich, City Campus

1. Approval of the Agenda published in the SSG/SSCr Newsletter No. 74 (Schiltz)

- a) Annual report
- b) Budget of the last year
- c) Budget of the coming year
- d) Membership fee
- e) Elections (Auditors)
- f) Revision of the statutes of the SSG
- g) Varia

Excused committee members: Walter Steurer, Katharina Fromm
11 members are present. The agenda has been approved by the assembly.
The assembly does not reach the quote for final decisions (Art. 12 of the by-laws).

2. Minutes of the General Assembly on September 13th, 2006, at PSI, Villigen

Published in the SSG Newsletter 73 December 2007, pp.13.
The minutes are approved by the assembly

3. Reports from the SSG:

3.a. Annual Report of the President 2008 (i.V. Schiltz)

General Information

Our longstanding member Christian Bärlocher (ETH Zurich) retired end of June 2008.
He will continue his research and serve the institute on a 20% basis.

Work of the committee

The committee (President W. Steurer, Vice-President K. Fromm, Secretary and ECA representative J. Schefer, Treasurer M. Hennig, Marc Schiltz, Klaus Yvon) met twice in 2008, on 18.1.08 and on 17.7.08 in Berne; in between the committee members communicated per email. The main points dealt with were

- + financial support for four young scientists (see item 8.);
- + Edition of Newsletters 73 (12/07), 74(4/08) and 75 (8/08).

The revised by-laws of the SSCr, agreed on at our last general assembly, have been put on the web.

Contacts to SANW/ASSN

Walter Steurer attended the meetings of the Platform Mathematics, Astronomy and Physics, MAP, and the plenary meeting of the SANW/ASSN.

Budget 2008: This year we received from Sc|Nat in total CHF 7'500, i.e. CHF 1'000 for travel grants for young scientists, CHF 2'500 for the organization of the annual meeting and CHF 1000 for IUCr delegates. The money should be used for participation at IUCr XXI, Osaka. CHF 3'000 was dedicated as support for the organization of ICQ10.

Budget 2009: We applied for a budget of total CHF 4'500, as usual 2'500 for our annual meeting, CHF 1000 for young scientists' support and CHF 1000 for the ECA delegate's participation at ECM-25 in Istanbul, 16-21 August 2009.

3.b. Report of the treasurer (Hennig)

Shown on page 22-24

3.c. Report of the auditors (Bärlocher/Schenk)

The accounting for 2007 has been approved.

4. Budget 2009 and membership fees 2009 (Hennig)

I suggest to spend more money for supporting conference participation of young scientists (CHF 1000 -> 5000) and for educational activities (workshops, schools).

The membership fee does not need to be changed.

5. Reports from the Section Crystal Growth (K. Fromm)

Not available.

6. Budget 2009 of the Section Crystal Growth (Fromm)

Not available anymore (budget of this section has been merged to the SGK/SSCr budget).

7. Report of the delegate to the ECA Council Meeting Marrakesh (Schefer)

The ECA Meeting in Marrakesh was well organized in the traditional scheme with an additional workshop on crystallography in Moroccan art. The general assembly allocated the ECM-27 to Bergen. It was also discussed in which form crystallographic teaching could be done in the future. If you are interested in this discussion and would like to

contribute actively, please contact Massimo Nespolo (massimo.nespolo@lcm3b.uhp-nancy.fr).

8. Award of travel grants in (Steurer)

Financial support for four young scientists in 2008: CHF 1'500.

Just to remember: Rules for travel grants for young SSCr members are still the same

1. Only members of the SGK/SSCr can be financially supported.
2. Student members can get up to CHF 500 for a poster presentation and CHF 750 for an oral presentation.
3. Post-Doc can be supported only for oral presentations with a maximum of CHF 500.
4. Per institute and year, only two persons can be supported.
5. A 1-2 page scientific contribution to the SGK/SSCr newsletter is expected.

10. Election of the Auditors (Schiltz)

We highly appreciate the keenness of the present auditors, Ch. Bärlocher (ETHZ)/K. Schenk (EPFL), and nominate them again. They have accepted the election. With this publication, they will be elected by acclamation if no objections will be made in a written form until February 28, 2009 by a member of the society.

12. Annual Meeting 2009 (Fromm)

September 8th, 2009 in Fribourg, organized by Katharina Fromm.

13. Varia (Schiltz)

1. XXI Congress and general assembly of the IUCr, Osaka, Japan, 23–31 August 2008
 - Keynote lectures : G. Chapuis
 - Lectures at Microsymposia : S. Basso, C. Broennimann, A. Cervellino, G. Chapuis, M. Chergui, F. Fleischer, M.G. Grütter, S.L. Johnson, M. Kenzelmann, A. Linden, A.R. Oganov, I. Orlov, L. Palatinus, F. Pfeiffer, E.V. Pomjakushina, A. Ruf, M. Schiltz, T. Weber, O. Zaharko, A. Zürn
 - Chairperson : H. Grimmer, L. McCusker, A.R. Oganov, L. Palatinus, C. Schulze-Briese, W. Steurer
 - Many poster contributions
 - General assembly
 - CH delegates: Steurer, Schiltz
 - Sine Larsen was elected President of the IUCr
 - Next meetings : 2011: Madrid; 2014: Montreal

Report of the Treasurer

Appendix to the Minutes from the General Assembly 2008 of the SGK/SSCr

Status 1.1.2008

15'136.06

Credits:

	Budgeted	Actual (UBS as of 1.9.08)
Membership dues (158-F, 11-J, 17-S) (158 Full members x 30 CHF = 4740.- 11 Company members x 130 CHF = 1430.- 17 Student members x 10 CHF = 170.-)	6'340.00	*(5'847.27)
Interest (est.)	120.00	(0.00)
SANW for Annual Meeting 2008	2'000.00	(2'000.00)
SANW for ECA delegate 2008 (2000.- + 500.- aus 2007)	2'500.00	(2'000.00)
SANW Young Scientists travel grants	2'000.00	(2'000.00)
SANW for Int.Conf. on Quasicrystals ICQ10	0.00	(3'000.00)

Total Income

12'960.00

(14'847.27)

***120 members paid = 64.5%, 60 members not yet paid = 32.3%, 6 members new=3.2%)**

Debits:

	Budgeted	Actual (UBS as of 1.9.08)
Sekt. Kristallwachstum (2008)	600.00	(0.00)
Membership dues to SANW (175 members)	1'239.00	(1'225.00)
Travel Grants to Young Scientists	2'000.00	(500.00)
Travel Grants for ECA delegate	2'000.00	(0.00)
Contribution Int.Summer School Struc.Sol. at PSI	0.00	(1'500.00)
Contribution ICQ10 at ETH	0.00	(3'000.00)
Annual meeting, payment to NCCR	1'200.00	(1'200.00)
Annual meeting, speakers refunds	800.00	(0.00)
ECA national membership dues 2008 (70€)	116.00	(0.00)
Ordering of payment slips	0.00	(60.00)
Bank Charges	125.00	(23.50)
Postage Charges	55.00	(0.00)
Withholding Tax (35%)	42.00	(0.00)
Total Expenses	8'177.00	(7'508.50)
Income – Expenses	4'783.00	(7'338.77)
Starting Balance + Income – Expenses	19'919.06	(22'474.83)
Estimated UBS Balance per 31.12.2008	19'919.06	(22'474.83)

Cash on Hand – 2008 (as of 1.9.2008)

Credits:

Status 1.1.2008	643.40
Membership fees paid in cash	
1 member paid for 1 year (W. Bensch)	30.00
1 member paid for 3 years (A. Reller)	90.00
1 member paid for 3 years (T. Scholpp)	90.00
1 member paid for 5 years (K. Piontek)	150.00
Total Income	360.00

Debits:

SWITCH (Web address „sgk-sscr.ch“)	17.00
Travel Expenses, Executive Committee	41.00
Total Expenses	58.00

Income – Expenses	302.00
Starting Balance + Income – Expenses	945.40

Cash on Hand 1.9.2008 **945.40**

Total SGK Assets

	1.1.2008	1.9.08	31.12.08 (estimated)
UBS account	15'136.06	22'474.83	19'919.06
CS account	17'218.93	17'218.93*	17'358.83
Cash on hand	643.40	945.40	400.00
Total	32'998.39	40'639.16	37'677.89

*we do not receive any account statements during the year from CS

The accounting has been approved in written form by our auditors, Ch. Bärlocher and K. Schenk.

SGK Budget 2009

(proposal)
(total UBS + CS accounts + cash)

Credits:

Budgeted

Membership dues (158-F, 11-J, 17-S)	6'340.00
SANW reimbursement for Annual Meeting 2009	2'000.00
SANW reimbursement for ECA delegate 2009	2'000.00
SANW young scientists travel grants	2'000.00
Interest (estimated)	120.00

Total Income

12'460.00

Debits

Membership dues to SANW (175 members)	1'225.00
Annual meeting	2'000.00
Travel Grants to Young Scientists	2'000.00
Travel Grant for ECA delegate (2009)	2'000.00
ECA national membership dues 2009	116.00
Travel Expenses Exec. Committee and Auditors	*100.00
SWITCH (Web address „sgk-sscr.ch“)	*17.00
Postage charges	55.00
Bank charges	125.00
Withholding Tax (35%)	42.00

*Paid out of Cash on Hand

Total Expenses

7'680.00

Income – Expenses

4'780.00

Starting Balance Total SGK Assets 1.1.2009

37'677.89

+ Income – Expenses 31.12.2009

42'457.89

Impressions from the Annual Meeting in Zurich Sept. 8-9, 2008

Pictures: Courtesy of Dr. A. Honegger, University Zurich





MaMaSELF 2009/1010, an Erasmus Mundus Program Master in Materials Science Exploiting Large Facilities



Programme

First semester

The first semester consists of lectures and practicals at one out of the three universities yielding 30 ECTS. This part of teaching "Materials Science" will take place at one of the three universities Rennes 1, Torino and TU München.

The academic year will start with a summer school of two weeks, where both lectures and practicals (comprehensively corresponding to 7 ECTS) will offer an excellent introduction into the use of "Large Scale Facilities". The core of the lectures will all be given by the four scientists responsible of the Master in each of the four universities (W. Paulus, C. Lamberti, W. Petry and W. Schmah) exhibiting a huge background in this area. Each year the core lectures will be supported by specific seminars given by other university colleagues and by researchers directly coming from national or European Large Scale Facilities centres.

Second semester

During the second semester each student has to shift to one out of the three other universities to undergo the Master thesis work which will also yield 30 ECTS. The thesis work will take six months and is generally in strong relation with the use of "Large Scale Facilities" for applied or academic research problem.

Scientists coming from all over the world

There will also be a teaching contribution from scientists coming from outside Europe, Japan (University of Kyoto, Institute of Materials Research, University of Yamanashi, and Tohoku University, Sendai) and Russia (Dubna) in order to show the perspectives in non European countries.

Deadline for applications:

Feb. 16, 2009 (non-European-Community citizens, including **Swiss Citizens**)

June 20, 2009 (Citizens of the European Community)

Tuition Fees:

Non-European Citizens: approx. Euro 5'000

European Citizen: free

Grants: (limited number)

Non-European Citizens **incl. Swiss Citizens**: approx. Euro 21'000

European Citizen: approx. Euro 3'100

Students must have:

A four year higher education degree (240 ECTS) or equivalent in Materials Science or related disciplines: chemistry, physics, geo-science, ...
Proof of good English competencies

<http://mamaself.univ-rennes1.fr> (please apply through this web page)

Partners in Switzerland, ETH Zurich, PSI Villigen (SINQ, SLS)

Contact: Dr. J. Schefer, ETH Zurich & PSI Villigen, Jurg.Schefer@psi.ch

Klaus Tschira Preis für verständliche Wissenschaft

Warum Wissenschaft verständlich sein muss ...

Mit KlarText, dem Klaus Tschira Preis für verständliche Wissenschaft, zeichnet die Klaus Tschira Stiftung gGmbH die allgemein verständliche Darstellung von herausragenden Ergebnissen mathematisch-naturwissenschaftlicher Forschung aus und fördert damit den Dialog zwischen Wissenschaft und Öffentlichkeit. Exzellente junge Wissenschaftlerinnen und Wissenschaftler werben mit ihren Texten für eine stärkere gesellschaftliche Unterstützung ihrer Disziplinen. Dieses Engagement ist uns einen Preis wert.

Was wir wann wollen ...

Prämiert werden kann ein Text in deutscher Sprache, der die Ergebnisse Ihrer Dissertation für ein breites Publikum verständlich aufbereitet und in einen grösseren Zusammenhang stellt.

Der Text muss auf Ihrer Dissertation basieren und einschließlich Leerzeichen zwischen 8.000 und 9.000 Zeichen

Details:<http://www.klaus-tschira-preis.info/idee.htm>

Senden Sie Ihre Bewerbung bitte an:

Renate Ries, Klaus Tschira Stiftung gGmbH

Villa Bosch, Schloss-Wolfsbrunnenweg 33

DE-69118 Heidelberg

Tel: 06221-53 31 02, Fax: 06221-53 31 98, renate.ries@kts.villa-bosch.de

Der Einsendeschluss für die vollständige Bewerbung ist der

28. Februar 2009. Es gilt das Datum des Poststempels.

Fourth Max Perutz ECA Prize

The European Crystallographic Association (ECA) invites nominations for the Fourth Max Perutz European Crystallographic Association Prize to recognize a significant achievement or discovery in crystallography in the past 5-10 years. Nominees should be affiliated or identified with the European crystallographic community, as broadly defined in the charter of the ECA (see the ECA-news site: www.ecanews.org).

The prize, including a monetary award and certificate of recognition, will be awarded at the opening ceremony of the 25th European Crystallography Meeting (ECM-25) to be held in Istanbul, Turkey, 16-21 August 2009.

Nominators must be (i) an ECA individual Member or (ii) any person from a member country associated to the ECA or (iii) any member from the CAMs. Nominations for the prize should indicate briefly why the candidate is nominated, include a statement of the contribution for which the prize is to be awarded and an abbreviated curriculum vitae [ca. 2 pages] of the nominee. It may include aspects such as publication record and impact, however, uniqueness (i.e. pioneering contributions) and the importance/usefulness of the nominee's work will always be of prime importance in awarding the prize.

Nominations should be sent by e-mail, no later than **28 February 2009** to:

Prof Andreas Roodt
Dept of Chemistry
University of the Free State
PO Box 339, Bloemfontein 9300
South Africa
Tel.: +27-51-4012547 /9212
Fax: +27-51-4446384
e-mail: roodta.sci@ufs.ac.za

<http://www.ecanews.org/ecaprize.php>

Erwin Felix Lewy Bertaut Prize of the European Crystallographic and Neutron Scattering Associations (ECA-ENSA)

The European Crystallographic Association (ECA) and the European Neutron Scattering Association (ENSA) announce the creation of a prize in honour of the late Erwin Felix Lewy Bertaut, in memory of his scientific achievements which are cornerstones in both crystallography and neutron scattering.

The prize is awarded to a young European scientist (up to 5-8 years after finishing the PhD-thesis) in recognition of notable experimental theoretical or methodological contributions in the field of investigation of matter using crystallographic or neutron scattering methods - see the guidelines available in PDF format.

ECA and ENSA will award that prize in a regular alternating sequence.

Call for nominations

The European Crystallographic Association (ECA) and the European Neutron Scattering Association (ENSA) created 2007 a prize in honour of the late Erwin Felix Lewy-Bertaut in memory of his scientific achievements, cornerstones both in crystallography and in neutron scattering.

This prize is awarded to a young European scientist, with a career extending to 5 to 8 years after thesis defence, in recognition of notable experimental or theoretical or methodological contributions in the field of analysis of matter using crystallographic or neutron scattering methods.

ECA and ENSA will award that prize in regular alternating sequence. The second prize (the first under ECA rule) will be awarded at the European Crystallographic Meeting ECM 25 which will take place in Istanbul, Turkey, 16 - 20 August, 2009. Candidates from all fields of crystallography are welcomed. A selection committee composed by nominees from both Associations will select the successful candidate.

Nominations are expected from Senior Scientists, Supervisors, Officers and Members of the Associations. They should be addressed to Prof. Dr. Hartmut Fuess at the Darmstadt University of Technology, Institute of Materials Science, Structure Research, Petersenstr. 23, DE-64287 Darmstadt. The deadline for submitting nominations is **28 February 2009**.

Calls for proposals

**Beside normal proposals, most facilities allow urgent beam time requests.
Please check directly with the facility.**

Facility	Deadline(s)	Link
SLS: Swiss Light Source All except PX lines Protein beam lines (PX)	March 15, Sept. 15 Feb. 15, June 15, Oct. 15	user.web.psi.ch user.web.psi.ch
SINQ: Swiss Spallation Neutron Source All instruments (regular calls)	May 15, Nov. 15	user.web.psi.ch
SμS: Swiss Muon Source All instruments	Dec. 5	user.web.psi.ch
ESRF: European Synchrotron All instruments, long term proposals All instruments, short term proposals	Jan. 15 March 1, Sept. 1	www.esrf.fr www.esrf.fr
SNBL: Swiss Norwegian Beam Line	March 1, Sept. 1	www.esrf.fr/ exp_facilities/BM1A
ILL: Institut Laue Langevin All instruments	March 10, 2009	www.ill.fr
FRM-II All instruments	Jan. 16, July 17, 2009	user.frm2.tum.de

Calendar of forthcoming meetings

(please mail missing information on meetings of interest to Jurg.Schefer@psi.ch)

			Call for Abstracts
2009			
Jan. 11-16	Saas Fee CH	MaNEP Winter School: Exploring new Phases of Electronic Matter	expired
Jan. 28-29	Hamburg Germany	3 rd European XFEL User Meeting http://www.xfel.eu/3rd-users-meeting	none
Feb. 10-13	Villigen CH	QENS 2009: 9 th International Conference on Quasielastic Neutron Scattering, http://qens2009.web.psi.ch/	expired
Feb. 25-27	Berlin Germany	Neutrons and X-rays Meet Biology http://www.helmholtz-berlin.de/events/biology/	
April 15-24	Martina Franca, Italy	PHARE 2009: A Modular Workshop on Global Phase Retrieving, http://phare.ic.cnr.it/	
March 5-6	Bayreuth Germany	6 th Workshop on Structural Analysis of Incommensurate Crystals, www.crystal.uni-bayreuth.de/inc-workshop2009/	
March 9-12	Hannover Germany	DGK, Annual Meeting of the German Crystallographic Society, http://www.conventus.de/dgk2009/	expired
May 3-7	Oak Ridge USA	International Conference on Neutron Scattering (ICNS2009) http://neutrons.ornl.gov/conf/icns2009/venue.shtml	to be announced
June 14-20	Castellaneta Italy	ICC14: XIV International Clay Conference http://www.14icc.org/	expired
June 21-27	Lekeito Spain	Crystallography online: International School on the of the Bilbao Crystallographic Server, http://www.crystallography.fr/mathcryst/bilbao2009.php	to be announced
June 22-24	Kuala Lumpur Malaysia	ICNX 2009: International Conference on Neutron and X-Ray Scattering, http://icsd.ill.fr/ICNX2009.pdf	Jan. 31, 2008
Aug. 2-Aug. 8	Zuoz CH	8 th PSI Summer School on Condensed Matter Research Functional Materials, http://sls.web.psi.ch	to be announced
August 14-15	Istanbul Turkey	Symmetry and Crystallography in Turkish Art and Culture, Satellite Conference of the ECM-25 www.lcm3b.uhp-nancy.fr/mathcryst/istanbul2009.htm	March 15, 2009
August 16-21	Istanbul Turkey	ECM-25: European Crystallographic Meeting http://www.ecm25.org	March 15, 2009
Aug. 30-Sept.12	Zurich CH	The Zurich School of Crystallography: Bring Your Own Crystal, http://www.oci.uzh.ch/diversa/xtal_school/	May 15, 2009
Sept. 8, 2009	Fribourg CH	Annual Meeting of the SGK/SSCr University Fribourg, http://www.sgk-sscr.ch/	to be announced
Sept. 21-25	Moscow Russia	Clays, Clay Minerals and Layered Materials – 2009 http://www.cmlm2009.ru/	
Oct. 12-13	Villigen CH	JUM@P'09, 1 st PSI User Meeting (SLS,SINQ, SMS)	to be announced

2010**2011**

Aug. 22-29	Madrid Spain	IUCr-2011, 22 nd General Assembly and Congress of IUCr http://www.iucr.org/iucr/cong/iucr-xxii	to be announced
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2012

Aug. 27-30	Darmstadt Germany	EPDIC-12 http://www.epdic12.org/	to be announced
Aug. 29 – Sept. 3	Darmstadt Germany	ECM-26 http://ecm26.ecanews.org/	to be announced

2013

Aug/Sept.	Bergen Norway	ECM-27	to be announced
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2014

August	Montreal Canada	IUCr-2011, 23 rd General Assembly and Congress of IUCr http://www.iucr.org/iucr/cong/iucr-xxiii	to be announced
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Become a member of SGK/SSCr

If you are working in the field of crystallography, you will be interested to become a member of our society. For more information as well as online registration, please have a look on our website (<http://www.sgk-sscr.ch>). Presently, the yearly membership fee is sfr. 30 (sfr. 10 for students). For new members, the membership is free until the end of 2007. Please note: SGK/SSCr members can also apply to be a member of the subsection crystal growth (no additional charge) or for individual membership of the European Crystallographic Association, ECA (additional charge: 10 Euro).

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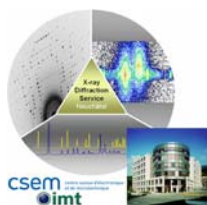
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Membership subsection crystal growth	Yes ()	No ()	
Birth date	Day:	Month:	Year:
Language(s)			
Major research interests			
Highest degree received			
from university			
Present position			

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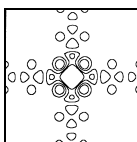
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