

DESY Photon Science Users' Meeting 2015
European XFEL Users' Meeting 2015

Jointly organized Users' Meeting of
DESY Photon Science and European XFEL

DESY Photon Science Users' Meeting 2015
European XFEL Users' Meeting 2015

January 28-30, 2015 in Hamburg - DESY Auditorium (Bldg. 5)

Wednesday January 28 — European XFEL Users' Meeting (9:00-18:30 DESY Auditorium)

09:00–10:10	**Registration**		
10:10 -10:30	**Opening Session**		
10:10	Welcome	M. Altarelli	*European XFEL, Hamburg*
10:20	Opening address from the Council Chair	M. Meedom Nielsen	*Techn. Univ. of Denmark*
10:30–12:30	**Project update session**	**Chair: M. Meedom Nielsen**	
10:30	General Status of the Project	M. Altarelli	*European XFEL, Hamburg*
11:00	Electron Accelerator Status	H. Weise	*DESY, Hamburg*
11:30	Karabo: the Photon Beamline Control System	B. Heisen	*European XFEL, Hamburg*
11:50	X–Ray Beamline Optics and Photon Diagnostics	H. Sinn	*European XFEL, Hamburg*
12:10	Commissioning Plans and Parameters 1st user run	W. Decking	*DESY, Hamburg*
12:30–14:00	**Lunch break**		
14:00–16:00	**European XFEL instrument progress**	**Chair: R. Abela**	
14:00	The FXE instrument	C. Bressler	*European XFEL, Hamburg*
14:20	The MID instrument	A. Madsen	*European XFEL, Hamburg*
14:40	The SPB instrument	A. Mancuso	*European XFEL, Hamburg*
15:00	The HED instrument	T. Tschentscher	*European XFEL, Hamburg*
15:20	The SQS instrument	M. Meyer	*European XFEL, Hamburg*
15:40	The SCS instrument	A. Scherz	*European XFEL, Hamburg*
16:00–16:30	**Coffee break**		
16:30–18:30	**Science session: Highlights in XFEL Research**	**Chair: C. Schroer**	
16:30	A Single Time-Dependent Order Parameter Concept for Photoinduced Phase Transitions	P. Beaud	*PSI, Villigen, Switzerland*
17:00	Tracking chemical reactions with ultrafast X-ray spectroscopies and scattering	W. Gawelda	*European XFEL, Hamburg*
17:30	Structure and Dynamics of Photosystem II	P. Fromme	*Arizona State University*
18:00	Fixed Target 2D and 3D Protein Crystallography	M. Frank	*LLNL, California, USA*
19:00	**Reception for speakers and participants (DESY canteen, Bldg. 9)**		

Thursday January 29 — Soft X-ray FEL / FLASH experiments - jointly organized with European XFEL (9:00-13:00 DESY Auditorium)

09:00-10:30	**Status of FLASH and FEL experiments**	**Chair: Th. Tschentscher**	
09:00	Welcome	E. Weckert M. Altarelli	*DESY, Hamburg* *European XFEL, Hamburg*
09:10	First Lasing at FLASH2	B. Faatz	*DESY, Hamburg*
09:35	FLASH – a Great Facility for Time–resolved Electron Spectroscopy on Solids and Interfaces	W. Wurth	*DESY, Univ. Hamburg*
10:00	Snapshots of Ultrafast Magnetizaiton Dynamics	J. Lüning	*Université Paris VI*
10:30-11:00	**Coffee break**		
11:00-13:00	**Using intense FEL radiation for experiments**	**Chair: J. Feldhaus**	
11:00	Ultrafast Dynamics in Solids: coupled motion of the Lattice; Spins and Orbitals	S. Johnson	*ETH Zürich*
11:30	Cluster Experiments at the FERMI FEL	F. Stienkemeier	*Freiburg University*
12:00	Overview of the Results from the LDM Collaboration	C. Callegari	*FERMI, Trieste*
12:30	Electron Rearrangement Dynamics in Dissociating Molecules	K. Schnorr	*MPI Heidelberg*
13:00-14:00	**Lunch break**		
13:30-19:00	**Satellite Meetings - Workshops**	*see next page for details*	

SATELLITE MEETINGS - WORKSHOPS

13:30-16:30	GEMS: Status and perspectives of the Helmholtz-Zentrum Geesthacht Outstation at DESY	*CFEL SemRoom II (Bldg. 99)*
14:00-17:30	DESY - EXAFS Beamlines (P64 and P65)	*SemRoom 456 (Bldg. 25f)*
14:00-18:30	SAXS/WAXS/GISAXS - User Workshop@DESY	*SemRoom 4a&4b (Bldg. 01b)*
14:00-19.00	SFX data analysis workshop	*FLASH SemRoom (Bldg. 28c)*
14:30-18:00	High-Energy X-ray Scattering Seminar	*SemRoom 109 (Bldg. 25b)*
14:30-19:00	5. Workshop of X-ray nano-imaging of biological and chemical systems at PETRA III	*DESY Auditorium (Bldg. 5)*
15:50-19:00	HIBEF User Meeting and General Assembly	*CFEL SemRoom I (Bldg. 99)*
14:00-15:30	European XFEL HED Instrument User Workshop – Recent Developments	*CFEL SemRoom I (Bldg. 99)*
13:50-18:30	European XFEL Photon Beam Diagnostics	*University Hamburg Auditorium (Bldg. 61)*
13:30-18:00	European XFEL FXE Instrument User Workshop	*CFEL SemRoom III (Bldg. 99)*

19:00 **Reception for speakers and participants (DESY canteen Bldg. 9)**

Friday January 30 — DESY Photon Science Users' Meeting (9:00-13:00 DESY Auditorium)

08:30	**Registration**		
		Chair: W. Drube	
09:00	Welcome to DESY	E. Weckert	*DESY, Hamburg*
09:10	Photon science at DESY	E. Weckert	*DESY, Hamburg*
09:50	In situ surface crystallography with high-energy X-rays	J. Gustafson	*University Lund*
10:20-10:50	**Coffee break**		
		Chair: G. Grübel	
10:50	Hydrodynamic alignment and assembly of nano-fibrils resulting in strong cellulose filaments	F. Lundell	*KTH Stockholm*
11:20	Enabling flexible polymer tandem solar cells	J. W. Andreasen	*DTU Energy Conversion, TU Denmark*
11:50	Unraveling the activation principles of oncogenic colony stimulating factor 1 receptor: a feast of integrative structural biology	S. Savvides	*Ghent University*
12:20	Report of the DESY Photon Science Users Committee (DPS-UC)	P. Müller-Buschbaum	*DPS–UC Chair, TU München*
12:35	Report of the Komitee Forschung mit SR (KFS)	B. Murphy	*KFS Deputy Chair, Univ. Kiel*
12:50	Report of the Europ. Synchrotron User Organis.(ESUO**)**	U. Pietsch	*ESUO Chair, Univ. Siegen*

13:00-14:00 **Lunch break**

14:00 – 17:00 **POSTER SESSION - Jointly organized by DESY and European XFEL**
13:00 – 18:00 **Vendor exhibition**

VENUE:
CFEL Foyer (Bldg. 99), Poster 1 - 165
FLASH2 hall (Bldg. 28k) Poster 166 - 347
FLASH1 seminar room (Bldg. 28c)

General Information:

Sessions	Oral sessions will be held in the DESY auditorium. The poster session will be held in the CFEL building (Bldg. 99) and in the FLASH2 experimental hall (Bldg. 28k).
Vendor exhibition	The vendor exhibition will take place next to the CFEL building (Bldg. 99), in the FLASH2 experimental hall (Bldg. 28k) and the FLASH seminar room (Bldg. 28c).
Registration	The registration will start on Wednesday 28 January at 08:30h in the foyer of the auditorium
Social event	The XFEL reception will take place on Wednesday 29 January at the DESY canteen (Bldg. 9) The DESY reception will take place on Thursday 30 January at the DESY canteen (Bldg. 9)
Meals	*Breakfast* If you stay at the DESY guest house you may have breakfast at the DESY cafeteria (opens at 07:00h, Bldg. 9) at your own expenses *Lunch* You may have lunch at the DESY canteen (Bldg. 9) at your own expenses
Supermarkets	LIDL From the main gate at Notkestrasse turn right and follow the street (700 – 800m). PENNY Form the main gate at Notkestrasse walk straight down the street "Zum Hünengrab" (700 – 800m).
Cash machine/ATM	You will find a cash machine in the foyer of the DESY canteen (Building 9)
DESY WLAN	Name: UserMeeting2015 WPA/WPA2-PSK: nXg7bdPT
Organizers	I. Gembalies (European XFEL) A. Schwarz (European XFEL) T. Roth (European XFEL) K. Fein (DESY) M. Kreuzeder (DESY) W. Laasch (DESY) F. Lehmkühler (DESY) A. Rothkirch (DESY) D. Unger (DESY)

Main sessions
Abstracts of the talks

An order parameter concept for ultrafast phase transitions

Paul Beaud[1,2], Andrin Caviezel[1], Simon Mariager[1], Laurenz Rettig[1], Gerhard Ingold[2], Christian Dornes[3], Shi-Wen Huang[1], Jeremy Johnson[1], Milan Radovic[1,2], Tim Huber[3], Teresa Kubacka[3], Andres Ferrer[1,3], Henrik Lemke[4], M. Chollet[4], Dilling Zhu[4], James Glownia[4], Marcin Sikorski[4], Aymeric Robert[4], Hiroki Wadati[5,6], Masao Nakamura[7], Masashi Kawasaki[5,7], Yoshinori Tokura[5,7], Steven Johnson[3], Urs Staub[1]

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The exploration of the interaction of structural and electronic degrees of freedom in strongly correlated electron systems on the femtosecond time scale is an emerging area of research. One goal of these studies is to advance our understanding of the underlying correlations, another to find ways to control the interesting properties of these materials on an ultrafast time scale. An extreme example is the so-called `ultrafast' phase transition, where a persistent phase change is induced by a sudden impulsive interaction from a femtosecond laser pulse. Different coordinates of the phase transformation, that in equilibrium are tightly linked to the conventionally defined order parameter, may undergo quite different dynamics. Whether a unified explanation of such dynamics exists remains an open question. Perovskite-type manganites are prototypical examples of strongly correlated electron systems which exhibit properties such as colossal magnetoresistance and insulator-to-metal transitions that are intrinsically related to symmetry changes of the atomic lattice and to fascinating ordering patterns of the spins, orbitals and charges. The application of an intense ultrashort optical pulse melts the electronic order [1] and launches a structural phase transition [2]. Taking advantage of the high flux of the LCLS free electron laser we recently probed with time-resolved resonant x-ray diffraction, both the long-range order of the electronic and the lattice subsystems during the transition [3]. Despite the complex nature of this phase transition that involves symmetry changes of valence charge, orbital order and atomic structure, a fairly simple description relying on a single time-dependent order parameter is sufficient to capture the most essential aspects of the change in symmetry in the time domain. The lattice dynamics occur in a potential surface defined by the magnitude of this single parameter. The resemblance of this concept to Landau theory points to a possible universal description of complex phase transitions in the time domain.

[1] D. Polli *et al.*, Nature Mater. **6**, 643–647 (2007).
[2] P. Beaud *et al.*, Phys. Rev. Lett. **103**, 155702 (2009).
[3] P. Beaud *et al.*, Nature Mater. **13**, 923–927 (2014).

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Tracking chemical reactions with ultrafast X-ray spectroscopies and scattering

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Ultrafast structural dynamics is an emerging field aiming to deliver a detailed understanding of the elementary steps in reacting chemical species, which involve changes in their nuclear, electronic and spin states. Such processes are vital ingredients in Chemistry and Biology, but also in technological applications, including efficient charge transport in solar energy converters and ultrafast switchable molecular magnets.
In order to unravel the complex dynamic behavior in photoexcited molecules we have implemented a suite of ultrafast X-ray spectroscopic and scattering tools to zoom into both the electronic and nuclear structures, with the goal to ultimately deliver a molecular movie of ongoing chemical processes. In view of the many potential applications in chemical and biological dynamics, it is desirable to increase the sensitivity level of such experiments, as well as to decrease the time resolution into the femtosecond time domain.
Here our benchmark results will be presented using a versatile setup that permits simultaneous measurements of ultrafast X-ray absorption and emission spectroscopies combined with X-ray diffuse scattering, which has been recently implemented by us at different synchrotrons and XFELs. It has been applied to study different photochemical reactions, ranging from nascent radicals in solution, molecular spin transitions and ligand exchange reactions to photocatalytic systems, with the goal to deliver a deeper understanding of the elementary steps in chemical reactivity.

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Structure and Dynamics of Photosystem II

Petra Fromme[1,2], Christopher Kupitz[1,2,3], Shibom Basu[1,2] et al. (see ref. 10 for full list of authors)

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Biological processes are highly dynamic, while most of the structures of biomolecules determined by X-ray crystallography represent a static picture of the molecule. Serial Femtosecond crystallography (SFX) provides a novel concept for structure determination, where X-ray diffraction "snapshots" are collected from a fully hydrated stream of nanocrystals, using femtosecond pulses at the high energy X-ray free-electron laser, the Linac Coherent Light Source [1,2]. Diffraction data of nanocrystals of large membrane protein complexes are collected at room temperature in liquid jet. As femtosecond pulses are briefer than the time-scale of most damage processes, femtosecond crystallography overcomes the problem of X-ray damage in crystallography [3]. Data collected at the CXI LCLS beamline at higher energy showed that the concept of fs crystallography extends to atomic resolution [4],[5] and extends to membrane proteins crystallized in lipidic environments [6],[7].
The talk will focus on recent results on serial time-resolved crystallography of Photosystem II using a femtosecond X-ray laser and show the future prospective of time resolved femtosecond crystallography towards molecular movies of biomolecules using Photosystem II as an example. Femtosecond crystallography opens a new avenue for determination of protein dynamics. First experiments on the proof of principle for time resolved serial femtosecond nanocrystallography have been performed on Photosystem I-ferredoxin [8] and Photosystem II nano-crystals [9]. Conformational changes of the Mn_4CaO_5 cluster and its protein environment were observed for the first time in the transition from the dark to the double excited state [10]. These experiments pave the way the determination of molecular movies of the dynamics of membrane proteins "at work" at the European XFEL in the future, where the bunched time structure may allow us to move from molecular snapshots towards the determination of a molecular movies of water splitting.

References:
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[10] Kupitz, C, Basu, S, Grotjohann, I et al Nature 2014, 513, (7517), 261-5

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Fixed target 2D and 3D protein crystallography at XFELs

Matthias Frank,[1,7*] Mark S. Hunter,[1,2,7] Garth J. Williams,[2] Marc Messerschmidt,[2,7] Nadia A. Zatsepin,[3,7] Bill Pedrini,[4] Anton Barty,[5] W. Henry Benner,[1] Geoffrey Feld,[1] P. Fromme,[3,7] Stefan P. Hau-Riege,[1,7] Richard A. Kirian,[3,5,7] Celestino Padeste,[4] Tommaso Pardini,[1] Brent Segelke,[1,7] M. Marvin Seibert,[2] John C. H. Spence,[3] Ching-Ju Tsai,[4] Jay-How Yang,[3,7] Yun Zhao,[3,7] Xiao-Dan Li,[4] Gebhard Schertler,[4] Sebastien Boutet,[2] Matthew Coleman,[1,7] and James E. Evans[6]

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Serial femtosecond nanocrystallography (SFX) has been demonstrated successfully in a number of experiments at LCLS and SACLA over the last years. Most SFX applications to date have used 3-dimensional nano- or microcrystals and utilize a liquid-jet based sample introduction approach that requires large amounts of sample and/or are not conducive to measuring 2-dimensional (2D) protein crystals. 2D crystallography of membrane proteins has been developed originally in cryoelectron microscopy and is an avenue for obtaining structural information on membrane proteins that do not easily form 3D crystals. Here we describe a fixed target approach for 2D and 3D crystallography at XFELs that allows diffraction measurements on samples supported by thin substrates at room temperature. We present first promising results from experiments at LCLS that included 2D crystal samples of the membrane protein bacteriorhodopsin and 3D microcrystal samples of REP24, a soluble protein. We discuss strategies for reducing amounts of required sample and increasing speed of data acquisition further to render this approach a viable alternative to the liquid-jet based sample introduction approaches. The fixed-target approach is expected to open up new opportunities for time-resolved SFX on samples that are not abundant and/or require the sample to be flat.

This work was performed under the auspices of the US Department of Energy by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344 and Pacific Northwest National Laboratory under Contract DE-AC05-76RL01830. Parts of this research were carried out at the Linac Coherent Light Source (LCLS) at SLAC National Accelerator Laboratory. LCLS is an Office of Science User Facility operated for the US DOE Office of Science by Stanford University. Support was provided by the UCOP Lab Fee Program (award No. 118036), NIH grant number 5RC1GM091755, NSF award MCB- 1021557 and NSF STC award 1231306, LLNL Lab-Directed Research and Development Project 012-ERD-031 and the PNNL Chemical Imaging Initiative. Part of this material is based upon work supported by the STC Program of the National Science Foundation through BioXFEL under Agreement No. 1231306.

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First Lasing at FLASH 2

Bart Faatz for the FLASH team[1]

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FLASH2 has been successfully taken into operation. It has achieved lasing in a wavelength range from 8.5 to 40 nm, most of the time while FLASH1 was delivering beam to user. It has been shown that wavelengths scans can be performed in a fraction of the time needed at FLASH1. Most of 2015 will be dedicated to further characterizing the radiation properties of FLASH2 and building up the remaining photon diagnostics and the first two beamlines for users.

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FLASH - a great facility for time-resolved electron spectroscopy on solids and interfaces

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Free electron lasers (FEL) are unique X-ray sources regarding pulse durations on a fs-scale, coherence properties and peak brilliance. Their potential to study ultrafast dynamics has been demonstrated in time-resolved x-ray spectroscopy experiments on solids, surfaces and in the gas phase.
Time-resolved photoelectron spectroscopy (TR-PES) is a very powerful tool to study non-equilibrium electron dynamics of condensed matter systems. In TR-PES experiments on solid targets the number of photoelectrons per pulse is limited by space charge considerations. Hence the signal-to-noise ratio in these experiments is governed by the detection efficiency for electrons and the repetition rate of the photon source. The superconducting free electron lasers FLASH at DESY and European XFEL operate at very high repetition rates, which is perfectly suited for TR-PES. Statistical fluctuations of the FEL's require single shot detection for ultimate time- and energy resolution. To make optimum use of the unique properties of high-repetition rate FEL's new electron analyzer and detection concepts are necessary.
The talk will review such new concepts, discuss the unique opportunities for TR-PES at FEL sources such as FLASH and give some examples for TR-PES experiments at FLASH illustrating the opportunities to follow ultrafast charge rearrangement in solids and at surfaces.

This work is supported by the BMBF priority program FSP-302: "Free-electron lasers"

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Snapshots of Ultrafast Magnetization Dynamics

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Since the discovery of the ultrafast demagnetization phenomenon by E. Beaurepaire and colleagues in 1996 [1], the field of femtomagnetism has developed to an active research area. Initial experiments relied mostly on all-optical pump-probe techniques, which raised concerns about optical artifacts affecting the measurement. Since these limitations can be overcome by X-ray based techniques, the advent of sources providing femtosecond short X-ray pulses was waited for by the interested community. In addition to giving access to the entire electronic structure of the valence band, X-ray techniques offer additional key advantages. First of all, this is their shorter wavelength, which matches naturally the nanometer length scales expected to be of relevance in ultrafast magnetization dynamics. Furthermore, X-ray techniques provide via the accessible core electron absorption resonances element sensitivity and offer a wide variety of magnetic dichroism effects that can be exploited as contrast mechanism, for example, in scattering experiments. This allows individual probing of the magnetization dynamics of components of complex, heterogeneous materials on the nanometer length scale.
Since the mid 2000's, experiments realized at the BESSY femtoslicing source have indeed fulfilled these expectations. With the advent of X-ray free electron lasers emitting in the XUV and soft X-ray photon energy range, however, unprecedented experimental capabilities became available. In this talk I will review how we [2-4] and others (e.g., Ref. [6]) have exploited the high intensity, the femtosecond short duration and the high degree of coherence of the XFEL pulses to obtain novel insight into the mechanisms underlying ultrafast magnetization dynamics. In particular, I will show how the combined nanometer spatial and femtosecond temporal resolution enabled us to obtain clear evidence for the occurrence of spin transport by the hot, polarized valence electrons, a phenomenon predicted theoretically in 2010 by Battiatio and co-workers [6].
In the context of condensed matter experiments, the high peak fluence of the XFEL pulses raises concerns about sample modification and other experimental artifacts hindering the aimed for characterization of a material's property. This is in particular the case in the soft X-ray and XUV photon energy range, where absorption is generally strong. Indeed, we observe already for moderate X-ray fluence values that the intensity of the magnetic probe signal (e.g., the magnetic scattering) may not increase linearly with the intensity of the incident X-ray pulses. In the regime of extreme fluence values (J/cm^2) this can lead to a nearly complete suppression of the magnetic scattering signal [7]. A discussion of these observations and our current understanding of their origin will conclude the presentation.

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Ultrafast Dynamics in Solids:

Coupled Motion of the Lattice, Spins and Orbitals

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The high photon energy and short wavelength of x-rays are uniquely well-suited to quantitatively study the atomic-scale structure of condensed matter. In equilibrium, x-rays have become a well-established means to selectively study different types of time-averaged structures. This has been particularly useful in efforts to better understand modern materials where interactions between the lattice, spins, charge and orbitals have key importance in driving many useful properties.

X-ray FELs have recently added femtosecond time-resolution to these measurements, opening a new frontier where it becomes possible to understand coupling among different degrees of freedom dynamically. Femtosecond time scales are of particular relevance since it overlaps strongly with the typical periods of fundamental excitations such as phonons and magnons.

Here I present a brief overview of some recent experiments that have used the intense short pulses of x-rays from XFELs to measure the dynamics of atomic, spin and orbital structure in solid-state systems. Particular attention will be given to the direct observation of the spin dynamics in a coherent electromagnon in $TbMnO_3$, where spin and lattice degrees of freedom both act together in a way that potentially opens up new avenues for the control of multiferroic domains [1].

References:
[1] T.Kubacka et al. Science 343, 1333 (2014).

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Overview of the results from the LDM collaboration

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The Low Density Matter (LDM) beamline has been built as part of the FERMI Free Electron Laser based in Trieste, Italy, to serve the atomic-, molecular-, and cluster-physics community, fully exploiting the unique characteristics (spectral purity and stability, full tunability, variable polarization, low-jitter) of FERMI [1].
The beamline is equipped with a set of actively-bendable focussing mirrors arranged in a Kirkpatrick-Baez configuration, capable of attaining a focal spot below 10 μm [2].
The LDM endstation [3] has been built as a modular instrument for electron and ion spectroscopy of the broadest possible class of samples. Beams of atoms, molecules, helium droplets, and clusters (rare gas, molecular, metallic) can be produced by interchangeable pulsed valves. An intermediate pickup chamber provides the possibility to dope clusters with other atoms and molecules.
The endstation is equipped with a Velocity Map Imaging (VMI) spectrometer, an ion Time of Flight (TOF) spectrometer, and a photon scattering spectrometer, which are designed to operate simultaneously or as standalone. In addition, the endstation is capable of accommodating user-supplied sources and detectors (notably, a metastable-atom detector [4], a XUV fluorescence spectrometer [5] a magnetic bottle spectrometer [6]).
After the commissioning phase, the LDM beamline has received the first external users at the end of 2012, and has since been heavily exploited for several users' experiments (both external and internal) as well as machine characterization experiments. The first results have just appeared in the literature [4,7, 8, 9] and will be presented along with most recent results and planned upgrades.

References:
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[8] Y. Ovcharenko, et al., Phys. Rev. Lett. 112**,** 073401 (2014)
[9] T. Mazza et al., Nature Commun.

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Electron rearrangement dynamics in dissociating molecules

Kirsten Schnorr[1], Georg Schmid[1], Sven Augustin[1], Arne Senftleben[2], Moritz Kurka[1], Artem Rudenko[3], Kristina Meyer[1], Matthias Kübel[4], Matthias Kling[4], Björn Siemer[5], Michael Wöstmann[5], Helmut Zacharias[5], Rolf Mitzner[6], Stefan Düsterer[7], Rolf Treusch[7], Joachim Ullrich[8], Claus-Dieter Schröter[1], Thomas Pfeifer[1], Robert Moshammer[1]

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Electron transfer and migration are the two driving mechanisms for many fundamental processes in physics, chemistry, and biology, ranging from X-ray astrophysics to DNA repair. Understanding and controlling these mechanisms are long-standing goals. For experiments on charge rearrangement it is crucial to locate the initial excitation and to trace the change in electron density over time. The advent of XUV and X-ray FELs has opened up exactly this possibility: The strong spatial localization of XUV radiation and X-rays combined with femtosecond pulse durations enables ultra-fast pump-probe experiments either with a delayed replica of the FEL pulse itself or a synchronized optical laser. Here, we use an XUV-pump–XUV-probe scheme to access electron-rearrangement dynamics in dissociating molecular iodine ions. A preceding pulse of 87 eV, delivered by FLASH, multiply ionizes and consequently fragments iodine molecules (I_2). Depending on its temporal delay with respect to the pump pulse, an identical probe pulse may induce electron transfer between the dissociating ions. For small delays and correspondingly small internuclear distances symmetrically charged fragments are observed because charge asymmetry is balanced by electron transfer. In contrast, electron transfer is blocked for large delays and large internuclear separations and we observe asymmetrically charged ion pairs. By means of a Reaction Microscope we record the yield of the various coincident ion pairs from dissociating multiply charged molecular ions as a function of the pump-probe delay. This way, we are able to determine the critical internuclear distances and corresponding time scales up to which electron transfer is possible for the multitude of occurring molecular break-up channels. Our results are in very good agreement with predictions of a classical *over-the-barrier* model demonstrating its validity in the so far unexplored low-energetic energy regime relevant for FEL, plasma and chemistry applications.

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In situ surface crystallography with high-energy X-rays

Johan Gustafson[1]

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Surface X-ray diffraction (SXRD) is one of few surface crystallography methods available for in situ studies under ambient conditions. However, a serious drawback of conventional SXRD, with X-rays in the range of 10-30 keV and a point or small two-dimensional (2D) detector, is the limited amount of data that can be acquired in a reasonable time frame. Exploring 2D maps from a substantial part of reciprocal space is extremely time-consuming, and mapping of the 3D reciprocal space with high resolution is currently impossible even with synchrotron radiation. As a result, the probed surface structure has to be known qualitatively from other measurements, and an unexpected structure may easily be left unnoticed, especially under harsh conditions. Furthermore, obtaining a quantitative data set (from an already qualitatively known structure) takes in the order of 10 hours with traditional use of SXRD.In this contribution I will demonstrate how the use of high-energy (HE) X-rays (85 keV) in combination with a large 2D detector accelerates the data collection by several orders of magnitude and enables full surface-structure determination by 3D mapping of reciprocal space on a time scale suitable for in situ studies [1,2]. In addition, the small diffraction angles, resulting from the high photon energy, and the large detector result in data that are easily presented in a more intuitive way, since each detector image contains the projection of a full plane in reciprocal space and straight lines in reciprocal space correspond to straight lines on the detector.
The demonstration of HESXRD, and how to extract the data, will be concentrating on the surface oxide formation on Pd(100) during CO oxidation under semirealistic conditions. Secondly, I will discuss the faceting of a stepped Pd(553) surface, depending on the O_2:CO ratio, also under semirealistic CO oxidation conditions. This latter example clearly shows how HESXRD gives a more intuitive view of an experimental system that, at least for the non-expert, is not straight-forward in surface diffraction.

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Hydrodynamic alignment and assembly of nano-fibrils resulting in strong cellulose filament

Karl M. O. Håkansson[1,2], Andreas B. Fall[1,3], Fredrik Lundell[1,2] , Shun Yu[1,3,4], Christina Krywka[5,6], Stephan V. Roth[4], Gonzalo Santoro[4], Mathias Kvick[1,2], Lisa Prahl-Wittberg[1,2], Lars Wågberg[1,3] and L. Daniel Söderberg[1,2,7]

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[2] *Linné FLOW Centre, KTH Mechanics, KTH Royal Institute of Technology, Stockholm SE-100 44, Sweden*
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[4] *Photon Science, DESY, Notkestraße 85, Hamburg, D-22607, Germany*
[5] *Ruprecht Haensel Laboratory, Univeristy of Kiel, KIEL D-24098, Germany*
[6] *Helmholtz-Zentrum Geesthacht, Institute for Materials Research, Geesthacht D-21502, Germany*
[7] *Innventia AB, PO Box 5604, Stockholm SE-114 86, Sweden*

Wide- and Small Angle X-ray Scattering (WAXS and SAXS) is used to characterise the nanostructure of filaments made from cellulose nano-fibrils, both during preparation and in the final material. Cellulose nanofibrils are obtained from trees and have considerable potential as a building block for biobased materials. Control of the nanostructure is a key to prepare materials with good properties. In this work (Nature Communications **5**:4018, 2014) X-ray scattering is used to demonstrate that this control is obtained in an assembly process that combines hydrodynamic alignment and a dispersion-gel transition. The process is based on flow-focusing: a central stream with water and nanofibrils is focused by two outer streams. The fibrils are first aligned when the central stream is accelerated during the focusing. The aligned structure is then locked by the dispersion-gel transition that is induced by ions diffusing into the central stream from the outer stream. The result is a gel thread. After drying of the thread, smooth filaments with a specific ultimate strength that is higher than previously reported filaments made of cellulose nanofibrils are obtained. The specific ultimate strength and other mechanical properties (stiffness, strain-at-break) are functions of the degree of fibril alignment along the filament direction. The degree of alignment can be controlled if the alignment process is faster than gelation and this is achieved if the device is not to small.

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Enabling Flexible Polymer Tandem Solar Cells

Jens Wenzel Andreasen[1], Henrik F. Dam[1], Thomas R. Andersen[1], Emil B. L. Pedersen[1], Karl T. S. Thydén[1], Martin Helgesen[1], Jon E. Carlé[1], Peter S. Jørgensen[1], Juliane Reinhardt[2], Roar R. Søndergaard[1], Mikkel Jørgensen[1], Eva Bundgaard[1] and Frederik C. Krebs[1]

[1] *Department of Energy Conversion and Storage, Technical University of Denmark*
[2] *Deutsches Elektronen-Synchrotron DESY*

Various strategies are employed to improve the efficiency of polymer solar cells. A large effort is devoted to develop new materials, but also multijunction devices are investigated as a means of improving the power conversion efficiency per area. By using materials that absorbs different parts of the solar spectrum in each subcell, a much larger part of the solar light energy is harvested, while also minimizing the loss by thermalization.
The realization of a complete tandem polymer solar cell under ambient conditions using only printing and coating methods on a flexible substrate results in a fully scalable process but also requires accurate control during layer formation to succeed. The serial process where the layers are added one after the other by wet processing leaves plenty of room for error and the process development calls for analytical techniques that allows *in situ* monitoring of structure formation in the photo-active layers during coating. This is accomplished by a newly developed, versatile *in situ* roll-to-roll coating setup for GISAXS/GIWAXS that may be used both at laboratory and synchrotron facilities.
Furthermore, to verify the successful coating of these complex multilayer devices, we have employed ptychographic tomography, that enables 3D reconstruction of the layer stack with the possibility to probe thickness and density of the individual layers in the stack. The use of ptychography on a complete 12-layer solar cell stack is presented and it is shown that this technique provides the necessary insight to enable efficient development of inks and processes for the most critical layers in the tandem stack such as the recombination layer where solvent penetration in fully solution processed 12-layer stacks is critical in eleven of the steps.
The completed device had an open circuit voltage close to the sum of the subcell open circuit voltages, demonstrating true tandem performance for the first time, for a fully roll-coated device.

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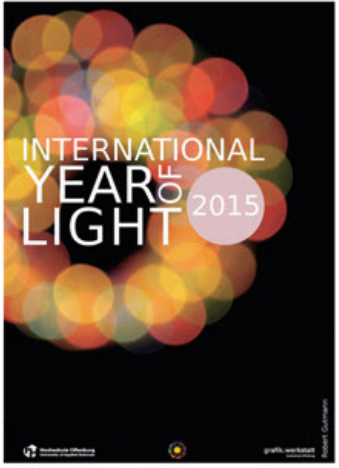
Unraveling the activation principles of oncogenic colony stimulating factor 1 receptor: a feast of integrative structural biology

Jan Felix[1, 2], Steven De Munck[1, 2], Kenneth Verstraete[1,2], Leander Meuris[1,3], Nico Callewaert[1,3], Jonathan Elegheert[1] and Savvas N. Savvides[1*]

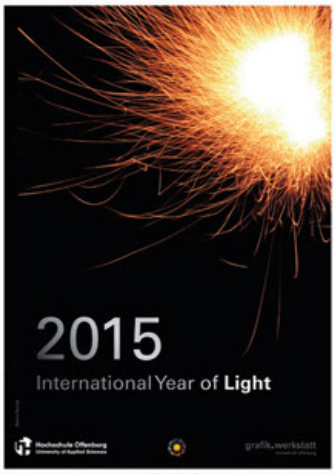
[1] *Laboratory for Protein Biochemistry and Biomolecular Engineering (L-ProBE), Ghent University, Ghent, Belgium*
[2] *Unit for Structural Biology, Inflammation Research Center, VIB, Ghent, Belgium*
[3] *Unit for Medical Biotechnology, Department of Medical Protein Research Research, VIB, Ghent, Belgium*

Colony Stimulating Factor 1 receptor (CSF-1R or FMS) is unique among the hematoietic class-III Receptor Tyrosine Kinases (RTKIII) because it is activated by two distinct cytokine ligands, CSF-1 and interleukin 34 that share no recognizable sequence similarity. CSF-1R plays pivotal roles in innate and adaptive immunity and is involved in inflammatory diseases and cancer. Despite nearly three decades of research in the (patho)physiology and cellular context of signaling mediated by human CSF-1R and as therapeutic antagonism of CSF-1R is gaining relevance in tumor therapy, detailed structural and mechanistic insights of the interaction interface between human CSF-1R and CSF-1 and a synthesis of mechanistic principles underlying their extracellular assembly have remained elusive. Here, we show via a series of structural undertakings and analyses that dimeric human CSF-1 dramatically restructures its cognate receptor to establish a cytokine-receptor interaction interface dominated by electrostatic interactions to drive the assembly of a ternary extracellular signaling complex featuring homotypic receptor interactions mediated by the fourth Ig-like domain proximal to the membrane. In this context, the inherent intersubunit plasticity of human CSF-1 in the unbound state enables switching to a single signaling-competent conformation. In addition, details of the CSF-1:CSF-1R interaction interface and comparisons with the functional counterpart observed in the human IL-34:CSF-1R complex delineate the structural determinants of the functional duality of CSF-1R. Importantly, recapitulation of diverse structural snaphots of CSF-1R and CSF-1 complexes in light of available structure-function data now establishes that concerted structural plasticity both in the cytokine and the receptor play critical roles in the assembly of a highly cooperative CSF-1:CSF-1R signaling complex. Finally, we map somatic somatic mutations to the extracellular human CSF-1R segment associated with cancer and provide insights into their possible mechanistic consequences. Together, such structural insights allow consolidation of a wide array of available data and will be catalytic in future mechanistic interrogation of CSF-1R mediated signaling and its targeting for therapeutic purposes.

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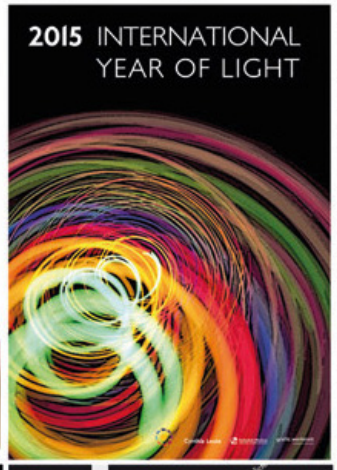

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YEAR OF
LIGHT
2015


ENERGY
BRIGHT
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COLOR
POLARIZATION
SPEED
KELVIN
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ELECTROMAGNETIC WAVES
INFRARED ULTRAVIOLET
SPECTROSCOPY
LUMEN
PHOTON


2015
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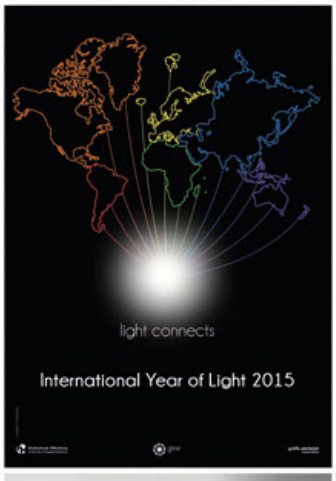

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...they're still
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2015 INTERNATIONAL
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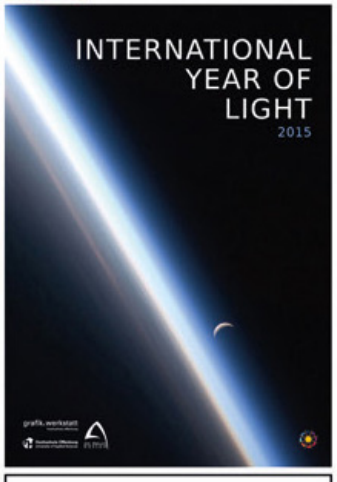


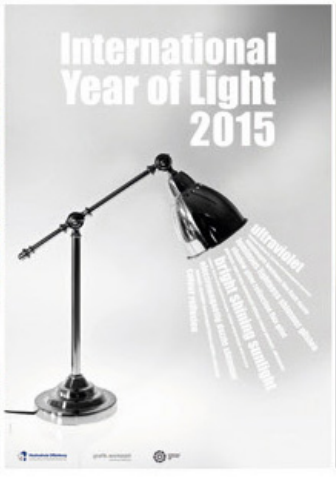

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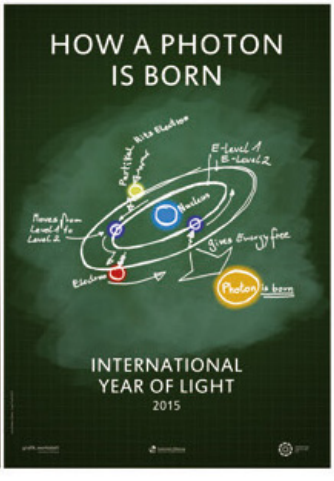

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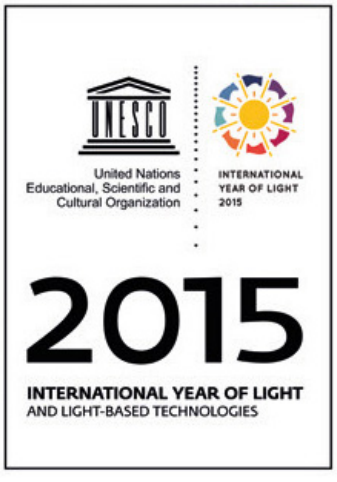

Light is life
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International
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International Year of Light
2015
A Hug
from our oldest Friend


HOW A PHOTON
IS BORN
INTERNATIONAL
YEAR OF LIGHT
2015


UNESCO
United Nations
Educational, Scientific and
Cultural Organization
INTERNATIONAL
YEAR OF LIGHT
2015
2015
INTERNATIONAL YEAR OF LIGHT
AND LIGHT-BASED TECHNOLOGIES

Programs Satellite Meetings

SATELLITE WORKSHOP AT DESY PHOTON SCIENCE USERS' MEETING 2015

DESY – EXAFS beamlines P64 and P65

DATE	Thursday, 29 January 2015, 14:00 h
VENUE	Seminar Room 456, Building 25f

14:00	Welcome	
14:10	Status of beamline P64	**W. Caliebe** *DESY*
14:30	Status of beamline P65	**E. Welter** *DESY*
14:50	QEXAFS for time and spatially resolved studies in catalysis: Status and perspective for the new P64 beamline at PETRAIII	**A. Gänzler** *KIT*
15:10	Development of in situ cells for catalytic reactions at beamline P64	**A. Jentys** *TU München*
15:30	***Coffee Break***	
16:00	Status of the Q-EXAFS monochromator for beamline P64	**O. Müller** *Univ. Wuppertal*
16:20	Alternative solutions to challenging X-ray absorption measurements in the soft X-ray regime	**Hasan Yavas** *DESY*
16:40	Status of the high resolution emission spectrometer	**A. Kalinko** *Univ.Paderborn*
17:00	General discussion about the beamlines and current and future *Verbundforschung projects*	

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CHAIRS	Edmund Welter & Wolfgang Caliebe (DESY)

SATELLITE WORKSHOP AT DESY PHOTON SCIENCE USERS' MEETING 2015

High-Energy X-ray Scattering

DATE	Thursday, 29 January 2015
VENUE	Seminar Room 109, Building 25b

14:30	Welcome	
14:30	Developments and overview for the next user run at P07-EH2	**Uta Ruett** *DESY*
14:50	Developments and overview for the next user run at P02.1	**Jozef Bednarcik** *DESY*
15:10	Investigating nucleation and growth of nanoparticles in chemical reactions	**Ann-Christin Dippel** *DESY*
15:30	Status of P21.2	**Ulrich Lienert** *DESY*
15:45	Status of P21.1	**Martin von Zimmermann** *DESY*
16:00	***Coffee Break***	
16:30	User presentations	
18:00	Closing remarks	

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CHAIR	Uta Ruett & Martin von Zimmermann (DESY)

SATELLITE MEETING AT DESY PHOTON SCIENCE USERS' MEETING 2015

SAXS/WAXS/GISAXS-User Workshop @ DESY

DATE	Thursday, 29 January 2015
VENUE	Seminar Room 4a + 4b, Building 01b

14:00	Welcome	**Rainer Gehrke** *DESY*
14:10	Status of the MiNaXS Beamline	**Stephan Roth** *DESY*
14.30	Status of the Nanofocus Endstation	**Christina Krywka** *HZG*
14:50	Tailoring Zinc Oxide Nanostructures for Solar Cell Applications	**Peter Müller-Buschbaum** *TU München*
15:10	A Non-Equilibrium Transient State of FCC Nanoparticle Crystal Revealed by In Situ GISAXS Tracking of the Solvent Assisted Nanoparticle Self-Assembly	**Karol Vegso** *Institute of Physics, SAS, Bratislava*
15:30	In-Operando GISAXS Study of Metal Nanoparticles Growth on Polymer Films	**Ezzeldin Metwalli** *TU München*
16:00	***Coffee Break***	
16:30	Migration in Multicomponent Materials	**Svenja Reinke** *TU Harburg*
16:50	X-rays and Microfluidics: Current and Future Developments	**Martin Trebbin** *Univ. Hamburg, CUI*
17:10	Polyaddition and Quasiperiodicity in the Morphology of Strained Polyurethanes	**Almut Stribeck** *Univ. Hamburg*
17:30	Online Characterization of Cavitation in Rubber Materials Under Different Load Regimes	**Konrad Schneider, Karsten Brüning** *Leibniz-Institut für Polymerforschung, Dresden*
17:50	Unveiling the Rotary Diffusion of Nano-Scale Fibril Particles Due to Brownian Motion Under Hydrodynamic Shearing Conditions	**Daniel Söderberg, Fredrik Lundell** *KTH Royal Inst. of Technology, Stockholm*
18:10	Final Discussion	

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CHAIR	Rainer Gehrke & Stephan Roth (DESY)

SATELLITE WORKSHOP AT DESY PHOTON SCIENCE USERS' MEETING 2015

SFX data analysis workshop

DATE	Thursday, 29 January 2015
VENUE	FLASH Seminar Room, Building 28c

14:00	Introduction to SFX	**Henry Chapman** *CFEL/DESY/Uni Hamburg*
14:30	Introduction to CrystFEL	**Thomas White** *CFEL/DESY*
15:30	Serial and multi-crystal data collection using synchrotron sources	**Gleb Bourenkov** *EMBL Hamburg*
16:00	**Coffee Break**	
16:30	Cheetah hit-finding software for crystals and single particles	**Anton Barty** *CFEL/DESY*
17:10	CrystFEL integration in Karabo for XFEL	**Chunhong Yoon** *CFEL/DESY/XFEL*
17:30 – 19:00	Tutorials and demonstrations of software	

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CHAIR	Thomas White (CFEL/DESY)

SATELLITE WORKSHOP AT DESY PHOTON SCIENCE USERS' MEETING 2014

The German Engineering Materials Science Centre (GEMS): Status and perspectives of the Helmholtz-Zentrum Geesthacht Outstation at DESY

DATE	Thursday, 29 January 2015
VENUE	CFEL Seminar Room II (building 99)

13:30	Welcome and status of GEMS	**A. Schreyer, M. Müller** *HZG*
13:40	In-situ X-ray scattering during the Birth and Death of Cutting Tool Coatings	**Jens Birch** *Linköping University*
14:00	*In situ* observation of stress fields in TiN thin film performed by scanning X-ray nanodiffraction during indentation	**Juraj Todt** *MU Leoben*
14:20	*In situ* sample environments for nanofocused X-ray beams	**Florian Wieland** *HZG*
14:40	*In situ* high-energy X-ray diffraction experiments for the assessment of the thermal stability of zirconia microparticles	**Elisabeth Leib** *University Hamburg*
15:00	***Coffee Break***	
15:30	*In situ* measurements at high temperature with synchrotron and neutron probes used for the development of Co-Re-based high temperature alloys	**Debashis Mukherji** *TU Braunschweig*
15:50	*In situ* study of phase transformations during laser-beam welding of a TiAl alloy for grain refinement and mechanical property optimization	**Jie Liu** *HZG*
16:10	Final Discussion	

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CHAIR	Martin Müller & Andreas Schreyer (HZG)

SATELLITE WORKSHOP AT DESY PHOTON SCIENCE USERS' MEETING 2015

5TH WORKSHOP ON X-RAY NANO-IMAGING OF BIOLOGICAL AND CHEMICAL SYSTEMS AT PETRA III

ORGANIZED BY VH-VI-403 OF THE HGF IVF

DATE	Thursday, 29 January 2015
VENUE	DESY Auditorium, Building 5

14:30	Welcome & Introduction to X-ray Microscopy at PETRA III	**C. G. Schroer** *DESY/Univ. Hamburg*
15:00	X-ray powder diffraction mapping and tomography for analysis of (degraded) paint layer systems	**F. Vanmeert** *University of Antwerp*
15:20	Tomographic Ptychography of a Budding Yeast Cell Under Cryogenic Conditions	**K. Giewekemeyer** *European XFEL*
15:40	Zernike Phase Contrast in X-ray Microscopy	**I.Vartiainen** *PSI*
16:00	***Coffee Break***	
16:30	Cryo-X-ray Tomography of Biological Tissue and In-Situ Element Mapping	**W. Schröder** *DESY*
16:50	Water Window Ptychographic Imaging with Characterized Coherent X-Rays	**M. Rose** *DESY*
17:10	Nanodiffraction on Single InGaAs Nanowires	**T. Stankevic** *University Copenhagen*
17:30	***Discussion & Coffee Break***	
17:50	Application of X-ray microscopy and ptychography in heterogeneous catalysis	**S. Baier** *KIT*
18:10	DESY NanoLab	**Andreas Stierle** *DESY*
18:40	Closing remarks & end of meeting	

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CHAIRS	Gerald Falkenberg (DESY) & Tim Salditt (Univ. Göttingen)

SATELLITE MEETING AT DESY PHOTON SCIENCE USERS' MEETING 2015

HIBEF USER MEETING AND GENERAL ASSEMBLY

DATE	Thursday, 29 January 2015
VENUE	CFEL Seminar Room I (building 99)

15:50	First experiences with high-intensity short-pulse laser experiments at XFELs	**U. Zastrau** *Univ. of Jena, Germany*
16:10	Ultra-Fast Structural Studies of Shock-Induced Phase Transitions in Bismuth	**M. I. McMahon** *Univ.of Edinburgh, UK*
16:30	*DiPOLE 100: A 100 J, 10 Hz solid-state laser system for science and industry*	**T. Butcher** *CLF STFC, UK*
16:50	*HIBEF-Status*	**T. Cowan** *HZDR, Germany*
17:20-19:00	**HIBEF General Assembly**	

CONTACT	hanns-peter.liermann@desy.de, Carsten Baehtz (baehtz@esrf.fr)
CHAIR	R. Redmer (University of Rostock)

European XFEL HED Instrument User Workshop – Recent Developments

29 January 2015, DESY campus - CFEL, Seminar Room I

Organizers: Thomas Tschentscher, Karen Appel

The high energy density science instrument is one of the six baseline instruments at the European XFEL. With the completion of the technical design report in the first half of 2014, the instrument entered the detailed design phase. This workshop intends to provide to the user community an update on the status of design and proposed implementation. A specific topic is the actual status of the experimental chamber and the detector integration.
It further serves as a platform for communication with users with respect to their detailed requirements. In addition, the current status of the split and delay unit (SDU) will be shown. This optic is provided by the University of Münster in the frame of the BMBF Verbundforschung and will be installed at HED. The presentations will be followed by a time slot allowing for open discussion. This mini-Workshop after a coffee break will be followed by a workshop organized by the HIBEF user consortium.

Programme

Thursday, 29 January 2015

14:00	**Welcome**	**T. Tschentscher**	***European XFEL, Hamburg***
14:05–15:50	**European XFEL HED user workshop**		
14:05	Experimental chamber and detector integration	M. Nakatsutsumi	*European XFEL, Hamburg*
14:30	A multilayer-mirror based SDU: Enabling jitterfree hard x-ray pump / hard x-ray probe experiments at the HED instrument	S. Roling	*University of Münster*
14:50	Discussion with users		
15:30	**Coffee Break**		
15:50-19:00	**DESY-HIBEF General assembly**		
19:00	**Closeout / Adjourn**		

European XFEL

FXE Instrument User Workshop

29 January 2015, DESY campus, CFEL Seminar Room III

Organizers: Federico Boscherini (Bologna University), Christian Bressler (European XFEL)

The FXE instrument is one of the six baseline instruments at the European XFEL. It is specially optimized to permit combined x-ray spectroscopies and scattering experiments on liquid samples with hard x-radiation. This workshop seeks to extend its capabilities towards solid state applications, which includes the design of a special vacuum chamber around the sample position. The Agenda will include an overview of the FXE instrument including a suggestion to investigate key compounds for photocatalytic and photovoltaic applications, followed by presentations towards the solid state option.

Programme

Thursday, 29 January 2015

13:30	**Coffee**		
13:45	**Welcome**	**C. Bressler** **F. Boscherini**	***European XFEL, Hamburg*** ***University of Bologna, Italy***
14:00 - 14:30	**The FXE Scientific Instrument**	**C. Bressler/N.N.**	***European XFEL***
14:30 - 15:00	**Science Case For Solid State Experiments**	**F. Boscherini**	***University of Bologna***
15:00 - 15:30	**Design Details for solid state experiments**	**M. Pedio**	**IOM-CNR, Trieste**
15:30	**Coffee Break**		
16:00 - 18:00	**Solid State FXE Experiments: User Requirements**		
16:00	Femtosecond dynamics of local atomic and electronic structure by spectroscopic study	A. Soldatov / C. Lamberti	*Uni Rostov* *Uni Rostov / Uni Turin*
16:30	Exciton transport in Organic semiconductors	M. M. Nielsen	*DTU Denmark*
17:00	Coupling of structural dynamics in ferroelectrics and strongly correlated electron systems	S. Johnson	*ETH Zürich*
17:30	Femtosecond dynamics of photoexcited charge carriers in semiconductor photocatalysts	L. Pasquini	University of *Bologna*
18:00 - 19:00	**Discussion: User Needs and Next Steps**	**F. Boscherini** **C. Bressler**	**University of *Bologna*** ***European XFEL***
19:15	**Closeout / Adjourn**		

Registration at www.xfel.eu/2015-users-meeting

European XFEL

Satellite Workshop on Photon Beam Diagnostics

29 January 2015, DESY campus, room will be announced on short term

Organizers: Jan Grünert (European XFEL) and Marco Zangrando (FERMI)

The Satellite Workshop on Photon Beam Diagnostics is organized as part of the European XFEL Users' Meeting, like in previous years (except 2014). The target of this Workshop is to bring together the experts in FEL Photon Diagnostics, to strengthen existing collaborations and create new ones, to share the latest progress but also to discuss new experimental methods and instrumentation that seems suited to be used as FEL photon beam diagnostics. Last but not least, progress in this field at the European XFEL facility is presented, and there will be sufficient time for discussions.

Programme

Thursday, 29 January 2015

13:50	**Coffee**		
14:00	**Welcome**	Jan Grünert	*European XFEL, Hamburg*
14:05	Wigner distribution measurement of the spatial coherence properties of FLASH	Tobias Mey	*LLG, Göttingen*
14:25	Current status of single-shot pulse-length metrology using autocorrelation techniques	Dimitrios Rompotis	*University of Hamburg*
14:50	Development of on-line spectral and timing diagnostics at SwissFEL	Pavle Juranić	*PSI*, Villigen
15:15	THz streaking: technical and scientific applications	Adrian Cavalieri	*CFEL, Hamburg*
15:40	X-ray optics & diagnostics at SACLA and applications to CDI	Changyong Song	*RIKEN, Japan*
16:05	**Coffee Break**		
16:20	Polarization monitoring of FEL radiation	Jens Buck	*European XFEL, Hamburg*
16:55	Gas Based Detectors for FEL Photon Diagnostics	Kai Tiedtke	*DESY-FS, Hamburg*
17:20	FERMI laser seeding system: general description and latest developments	Miltcho Danailov	*FERMI@elettra, Triest*
17:45	A Fast Switching Mirror to precisely direct Photon Beams	Martin Sachwitz	*DESY, Zeuthen*
18:10-18:30	**Discussion/Summary**	Jan Grünert Marco Zangrando	*European XFEL, Hamburg* *FERMI@elettra, Triest*
18:30	**Closeout / Adjourn**		

European XFEL

Workshop: Early Science at MID

26-27 Jan 2015, Albert-Einstein-Ring 19, 22761 Hamburg. 3rd floor, Seminar Room 3.11

The aim of the workshop is to discuss experimental capabilities and science opportunities offered by the Materials Imaging and Dynamics (MID) station expected to begin operation in 2017. The emphasis will be on day one capabilities and early experiments. MID will feature setups for (coherent) scattering and imaging in the energy range 5-25 keV. A synchronized optical laser is available for pump-probe experiments and optional x-ray optics (e.g. monochromator, focusing lenses, mirrors, X-ray split-delay line) allow tailoring the beam parameters. The sample environment provides opportunities for SAXS and WAXS in combination with liquid sample injection, fast sample exchange or scanning, pulsed high magnetic fields, as well as a furnace/cryostat for high and low-temperature measurements. An area detector will be available that can acquire images at 4.5 MHz speed taking full advantage of the XFEL machine parameters.

Program

Monday, 26 January 2015

13:30	Welcome and status of MID instrument	A. Madsen	*European XFEL*
14:00	MID beam parameters and optics	T. Roth	*European XFEL*
14:30	MID sample environment and optical laser	J. Hallmann	*European XFEL*
15:00	Discussion		
15:30-16:00	**Coffee Break**		
16:00	XFEL science with nano-beams	C. Schroer	*DESY and Univ. Hamburg*
16:40	Correlations in space and time	C. Gutt	*Univ. Siegen*

Tuesday, 27 January 2015

9:00	Ultrafast XPCS	G. Grübel	*DESY*
9:40	Ultrafast pump-probe CXDI	I. Robinson	*University College London*
10:20-10:40	**Coffee Break**		
10:40	Ultrafast melting of colloidal crystals observed in pump-probe experiment at LCLS	I. Vartaniants	*DESY*
11:20	Ideas for microfluidics experiments at MID	S. Köster	*Univ. Göttingen*
12:00	AGIPD: A 2d pixel detector for the European XFEL	H. Graafsma	*DESY*
12:40-14:00	**Lunch Break**		
14:00	New opportunities for 0.1-meV-resolution IXS at high-repetition-rate	Y. Shvyd'ko	*Argonne National Laboratory*
14:40	IXS for studies of collective dynamics: from glass forming systems to proteins	A. Sokolov	*Univ. Tennessee*
15:20	Dynamics of complex systems studied by XFEL IXS	G. Monaco	*Trento University*
16:00-16:20	**Coffee Break**		
16:20	Ultrafast scattering experiments in materials science	P. Gaal	*HZ Berlin & Univ. Hamburg*
17:00	Femtosecond protein dynamics using split-delay line crystallography	J. J. van Thor	*Imperial College London*
17:40	**Discussion and Close Out**		

List of Posters

Poster 1- 165
CFEL (Bdlg. 99)

Poster 166 – 347
FLASH2 experimental hall (Bldg. 28k)

I Poster Session Topics

I.1 Instrumentation and techniques

1. Wigner distribution measurements of the spatial coherence properties of FLASH
   T. Mey, B. Schäfer, K. Mann, B. Keitel, M. Kuhlmann and E. Plönjes

2. The SFX User Consortia contributions to the SPB/SFX instrument of the European XFEL
   S. Stern, H.N. Chapman and A.P. Mancuso

3. Holographic phase contrast imaging with X-ray waveguides
   M. Krenkel, M. Töpperwien, M. Bartels, A. Ruhlandt, J. Haber, S. Hoffmann, R. Wilke and T. Salditt

4. PAL-XFEL
   B.S. Kim, H.S. Kang, D.E. Kim, K.W. Kim, I.S. Ko and M. H. Cho

5. Current status of soft X-ray beamline at PAL-XFEL
   S. Kwon

6. The PG1 beamline at FLASH. Status and perspectives.
   S. Dziarzhytski, G. Brenner and H. Weigelt

7. ID09b beamline: upgrade program
   A. Leshchev, B. Khakhulin, C. Newby, D. Ribault and E. Wulff

8. Photon Pulse Length Determination by Spectral Correlation Analysis at FLASH
   G. Brenner, S. Düsterer and R. Engel

9. Swift: software for online monitoring of serial femtosecond X-ray diffraction experiments
   B. Daurer, M. Hantke, C. Nettelblad and F. Maia

10. New Data Storage and Analysis facility for PETRA III Experiments
    M. Gasthuber, S. Dietrich, U. Ensslin, M. Strutz, S. Aplin and M. Kuhn

11. COMO – State-, size-, and isomer-selected samples of polar molecules and clusters
    J. Küpper

12. Phase Shifters for the FLASH2 FEL
    M. Tischer, P. Neumann, A. Schöps and P. Vagin

13. Magnetic Tuning of FLASH2 Undulators
    O. Bilani, T.L. Cheung, P. Neumann, A. Schöps, M. Tischer, S. Tripathi, P. Vagin and T. Vielitz

14. Recent developments of PALM setup at PSI for FEL pulse measurements
    I. Gorgisyan, P.N. Juranić, R. Ischebeck, A. Stepanov, V. Schlott, C. Pradervand, L. Patthey, M. Radović, R. Abela, C. P. Hauri, B. Monoszlai, R. Ivanov, P. Peier, J. Liu, T. Togashi, S. Owada, K. Ogawa, T. Katayama, M. Yabashi and L. Rivkin

15. Magnetic Alignment and Pole Tuning Procedures for European XFEL Undulators
    B. Ketenoglu, J. Pflüger, Y. Li, U. Englisch and F. Wolff-Fabris

16. Chamber system for consistent Residual Gas Analyzer to provide high quality measurement for vacuum acceptance test
    T. Korsch, J. Eidam, A. Bartmann and P. Frankenberger

17. Gas-cluster targets dedicated for experiments with high power and high intensity laser systems
    L. Wegrzyński, P. Wachulak, A. Bartnik, T. Fok and H. Hiedorowicz

18. Crystal bender for double crystal Laue monochromator at P21
    A. Gutschmidt

19. In-situ XRD and nanoindentation at PETRA III
    J. Michalikova, S. Michalik, J. Bednarcik, G. Mohanty, J. Wehrs, P. Hvizdos, O. Milkovic, K. Saksl, H. Franz, J. Michler and J.-M. Brequet

20. Russian-German Nanodiffraction Beamline at PETRA Extension
    D. Novikov and J. Raabe

21. dada: a web-based collaborative X-ray images visualisation and analysis tool
    M. Osterhoff and T. Salditt

22. Sample Environment at the European XFEL Facility
    S. Bari, C. Deiter, E. Delmas, M. Kitel, K. Lorenzen, J. Moore and J. Schulz

23. Mapping temperature gradients of cryo-cooler
    J. Bednarcik, J. Pasztorova, A. Ehnes and H.-P. Liermann

24. The Online Photoionization Spectrometer OPIS at FLASH
    M. Braune, G. Brenner, S. Dziarzhytski, S. Grunewald, M. Lomperski, F. Jastrow and K. Tiedtke

25. A Fast Solid Sample Scanner for the XFEL instruments
    C. Deiter, M. Kittel, J. Moore and J. Schulz

26. The CAMP User Endstation at FLASH BL1 - First Results
    D. Rolles, B. Erk, C. Bomme, R. Boll, E. Saveleyv, E. Ploenjes-Palm, B. Keitel, K. Tiedtke, A. Sorokin, G. Brenner, S. Dziarzhytski, R. Treusch, R. Moshammer, J. P. Müller, T. Möller and the CAMP collaboration

27. Stability issues on high heat-load cryo-cooled monochromators at PETRA III
    R. Döhrmann, I. Sergeev, J. Heuer, J. Horbach and H. Schulte-Schrepping

28. Status of P64 - High-Flux EXAFS Beamline at PETRA III
    W. Caliebe, U. Brüggmann and J. Rubeck

29. Obtaining high degree of circular polarization at X-ray FELs via a reverse undulator taper
    E.A. Schneidmiller and M.V. Yurkov

30. Application of the longitudinal space charge amplifier in X-ray FEL facilities
    E.A. Schneidmiller and M.V. Yurkov

31. Statistical properties of the radiation from SASE FEL operating in a post-saturation regime with and without undulator tapering
    E.A. Schneidmiller and M.V. Yurkov

32. Optimization of a high efficiency free electron laser amplifier
    E.A. Schneidmiller and M.V. Yurkov

33. Advances in design of gas focused micro jets
    K. Beyerlein, J. Knoška, M. Heymann D. Oberthur, L. Chavas, M. Wiedorn, L. Adriano, H. Nakatsutsumi, H. Chapman, S. Bajt, B. Šarler, K. Mramor and R. Zahoor

34. In Situ Study of the Growth and Degradation Processes in Tetragonal Lysozyme Crystals on a Silicon Substrate by High-Resolution X-ray Diffractometry
    M. Marchenkova, M. Kovalchuk, P. Prosekov, A. Blagov, Yu. D'yakova, E. Tereshchenko, Yu. Pisarevskii and O. Kondratev

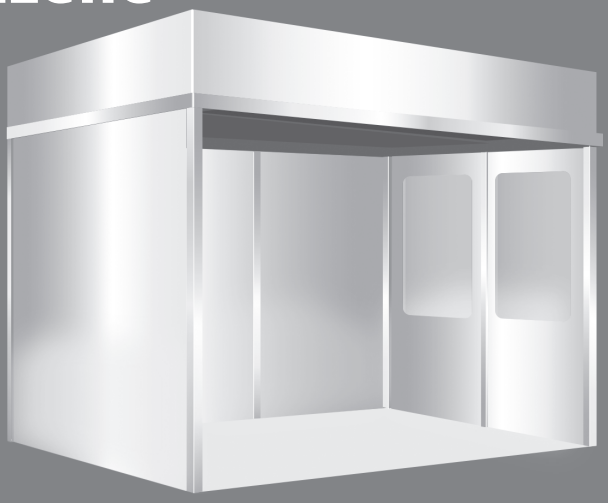
35. Results on seeding development at FLASH
    S. Ackermann, P. Amstutz, R. Assmann, A. Azima, J. Bödewadt, M. Drescher, N. Ekanayake, B. Faatz, K. Hacker, I. Hartl, R. Ivanov, S. Khan, T. Laarmann, L.L. Lazzarino, C. Lechner, Th. Maltezopoulos, R. Molo, J. Müller, T. Plath, J. Rossbach and T. Tanikava

36. Magnetic Field and Cryogenic Sample Environments at XFEL
    J.D. Moore, C. Deiter and J. Schulz

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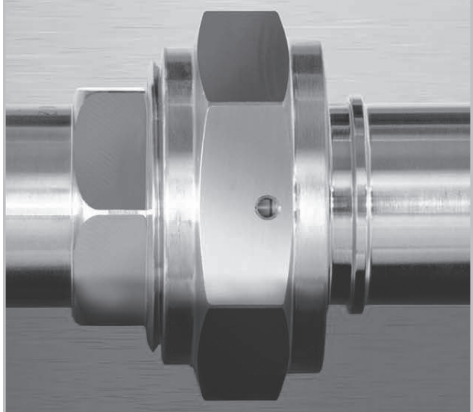
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37. Optical design of hRIXS for the European XFEL
Y.Y. Peng, A. Föhlisch, A. Scherz and G. Ghiringhell

38. The PERCIVAL soft X-rays detector
A. Marras, C.B. Wunderer, S. Lange, M. Viti, M. Bayer, S. Smoljanin, I. Shevyakov, Q. Xia, M. Zimmer, P. Goettlicher, B. Marsh, I. Sedgwick, D. Das, R. Turchetta, L. Stebel, G. Cautero, D. Giuressi, R. Menk, N. Tartoni, J. Marchal, T. Nicholls and H. Graafsma

39. AGIPD: The Adaptive Gain Integrating Pixel Detector at the European XFEL
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42. Status of the High Resolution Powder Diffraction Beamline (HRDB, P02.1)
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44. Calibration and Calibration Data Processing Concepts at the European XFEL
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45. The nanotomography endstation at the P05 beamline at PETRA III
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46. Magnetic properties of XFEL.EU Insertion Devices obtained from moving wire measurements
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47. Preliminary Tests and Status of DSSC-Ladder Camera
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49. Macromolecular Crystallography at Beamline P11 at PETRA III
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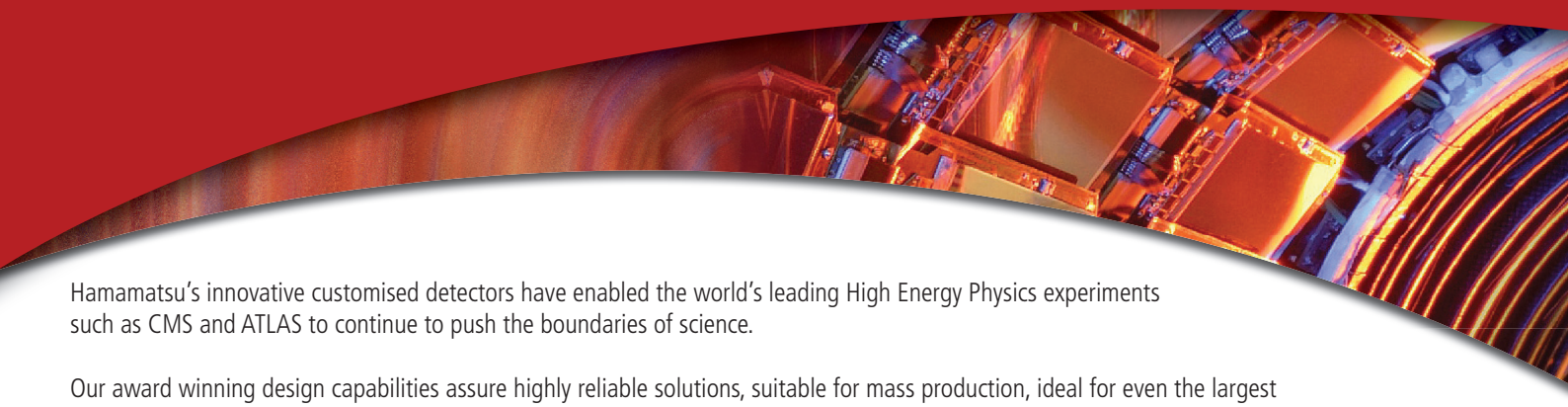
50. Bestimmung von Korrosionseigenschaften von Implantatwerkstoffen
T. Dose, F. Wilde, F. Feyerabend and R. Willumeit-Römer

51. Coherence properties of SACLA and proof-of-principle XPCS in the hard X-ray regime
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52. The Imaging Beamline P05 @ PETRA III - Characterizing Biomaterials with SRμCT
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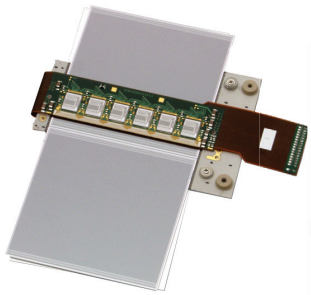
53. Development of a Multi-hit Capable Time- and Spatially Resolving Detector for Time Resolved Electron Spectroscopy
N. Gerken, A. Oelsner, Y. Acremann, M. Scholz and W. Wurth

Innovative detectors for High Energy Physics Experiments

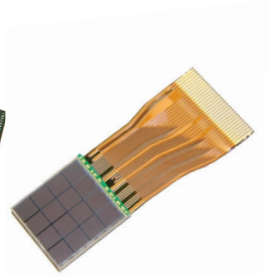


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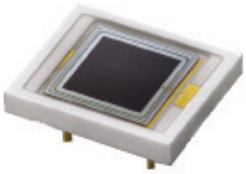
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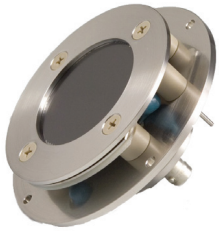
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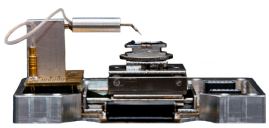
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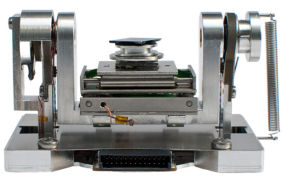
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TEM sample preperation



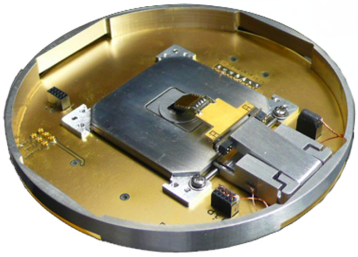
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eucentric tilt



100 mm

in-situ AFM



100 mm

54. Space Charge Corrected Electron Momentum Microscope for Time-Resolved Hard X-ray Photoemission at the European XFEL
M. Scholz, G. Schönhense, Y. Acremann, K. Medjanik, N. Gerken and W. Wurth

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M. Taherkhani, M. Harder, D. Ketenoglu and H. Yavas

56. Characterization of materials and electronic/molecular processes in a broad spectral range
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57. Non-Negative Factor Analysis Methods for XRF Imaging
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58. Double-sided Fresnel zone plates
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60. Fabrication of wedged multilayer Laue lenses
M. Prasciolu, S. Bolmer, A. F. G. Leontowich, H. N. Chapman and S. Bajt

61. Status of the PETRA III extension EXAFS beamline P65
E. Welter, R. Chernikov and M. Herrmann

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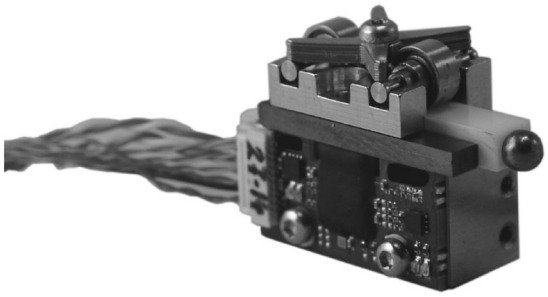
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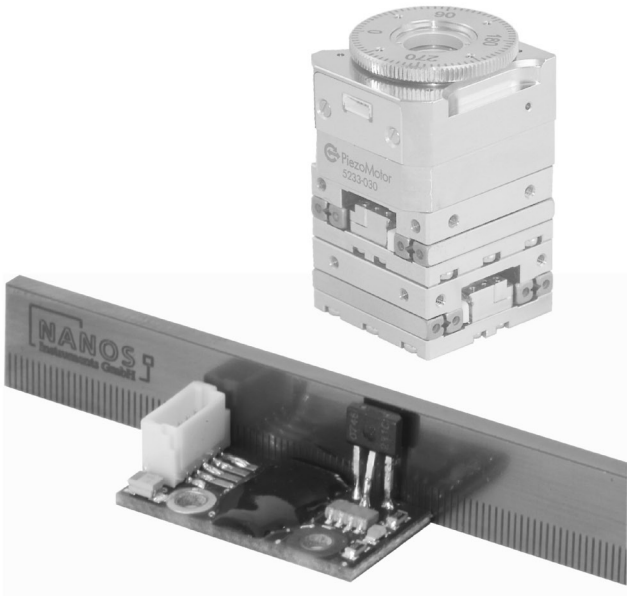


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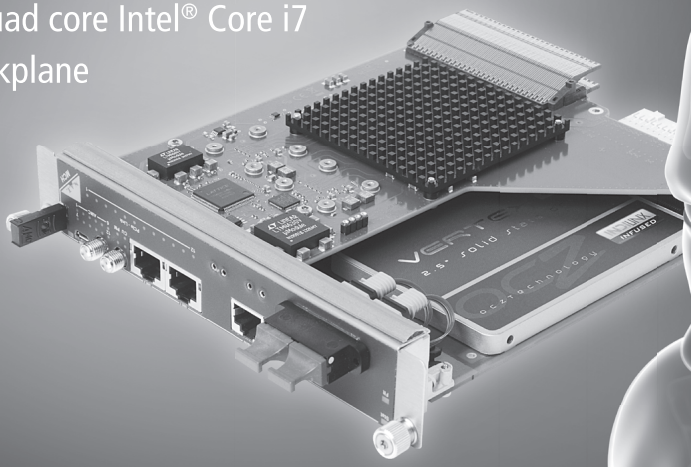
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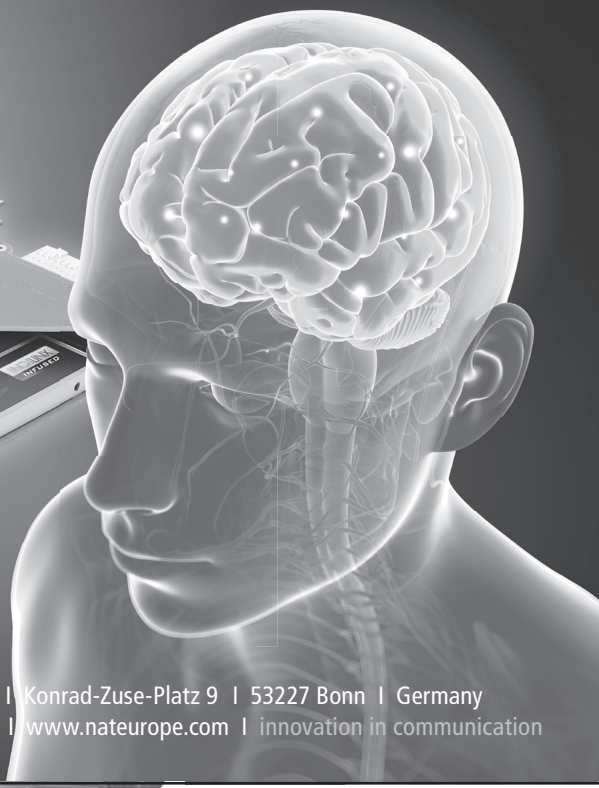
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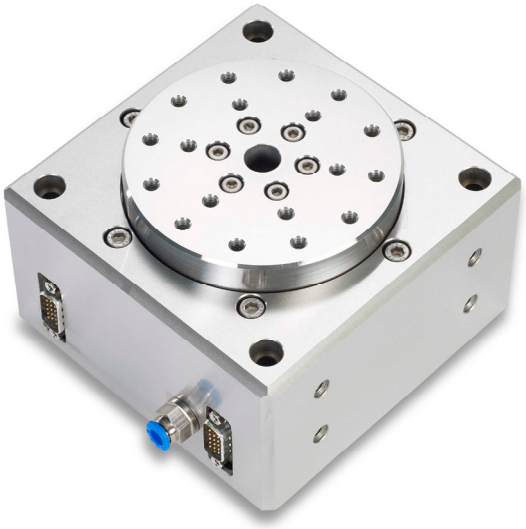
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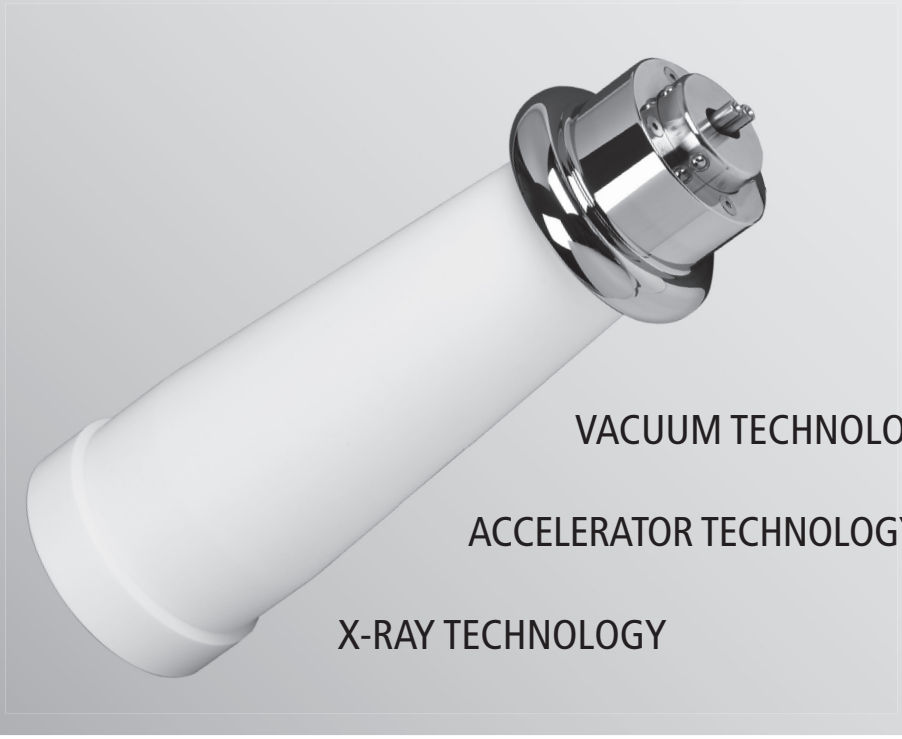
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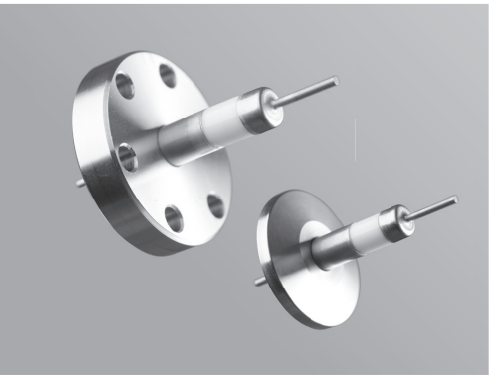
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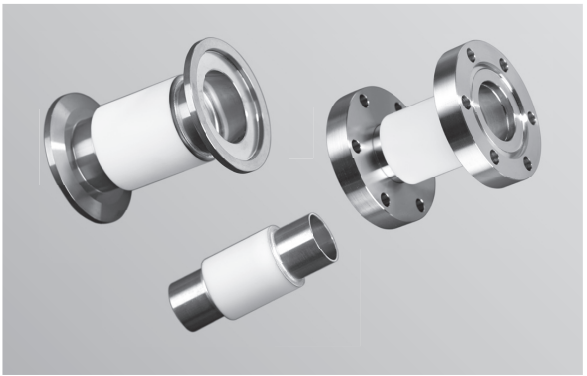
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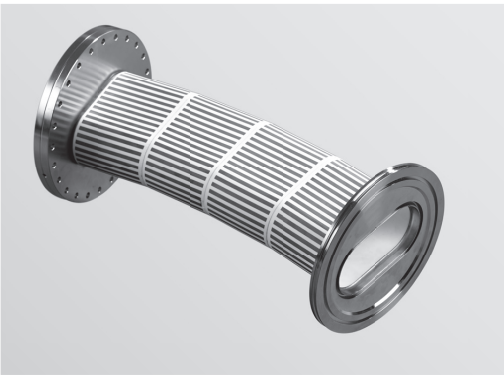
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160. High-intensity phasing with XFELs
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161. Synchrotron X-ray scattering investigation of recombinant and native influenza A matrix protein M1 self assembly
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162. Structural and functional analysis of the MERS-CoV papain-like protease
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163. Towards the observation of the distribution of DNA folds in complex environments using Correlated X-ray Scattering
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164. First structural insights into the N-terminal nickase domain of parvovirus H1 NS1
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165. Interaction of lipid membranes with Ece1-lll - the toxic peptide of the fungus Candida albicans
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167. Imaging instantaneous interatomic electron current with ultrafast resonant X-ray scattering
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168. Dynamics of biomolecule in solid-state asymmetric nanopore and detection of fluorescent signals from single nucleotides for DNA sequencing
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169. Dose-photoreduction quantification and possible prediction at the metal XAS L-edge
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170. Dielectric function in optical limit calculated for a FEL irradiated system
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171. Angularly resolved X-ray scattering measurements of shock and ramp compressed polycrystalline diamond
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172. Ultrafast recombination dynamics of triiodide ions after laser excitation
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173. Synthetic Scattering Images from Laser-Plasma Interaction – Methods
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175. Synthetic Scattering Images from Laser-Plasma Interaction - RCXD
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176. Synthetic Scattering Images from Laser-Plasma Interaction – Heating and Ionization
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177. Modeling of picosecond-time evolution of clusters irradiated by XFEL pulse
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178. XMDYN: a versatile tool for modeling high-intensity X-ray induced dynamics in matter
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179. Auger-pumped Superradiance at 108.9nm in Xenon
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180. Theoretical calculation of above-threshold ionization of xenon involving the giant dipole resonance
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181. X-ray Spectroscopy of Dense Laser Produced Plasmas
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182. The influence of periodic gas puff target parameters on high-order harmonics generation
T. Fok, L. Wegrzyński, V. Nefedova, J. Nejdl, M. Kozlova, A. Bartnik, P. Wachulak, R. Jarocki and H. Fiedorowicz

183. Breakthrough in near-K-edge photoionization of singly and multiply charged ions
A. Müller, D. Bernhardt, A. Borovik, T. Buhr, J. Hellhund, K. Holste, A.L.D. Kilcoyne, S. Klumpp, M. Martins, S. Ricz, J. Viefhaus and S. Schippers

184. Stepwise contraction of the nf Rydberg shells in the 3d photoionization of multiply-charged xenon ions
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185. Ultrafast Energy Transfer from Solvent to Solute induced by sub-ps Highly Intensed THz Pulse
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186. Optical control of the 2nd step Auger cascade in photoexcited Ne 1s-1np
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187. Electron dynamics in He nanodroplets resonantly induced by intense XUV pulses
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188. Diffractive imaging of aligned molecules with X-rays and electrons
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189. Mesh-free plasma simulations: their potential use for describing the interaction of ultra-short laser pulses with matter
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190. Structural dynamics of water solvation, studied with theoretical approaches and ultrafast X-ray methods
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191. X-ray Tracking of Electronic and Structural Dynamics During Chemical Reactions Using Free Electron Lasers
M. Laursen, K. Haldrup, M. Nielsen and K. Møller

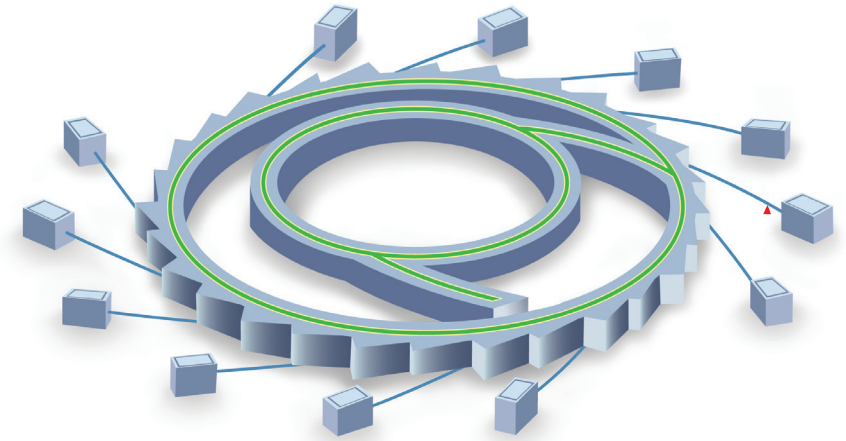
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S.B. Zhang, V. Kimberg and N. Rohringer

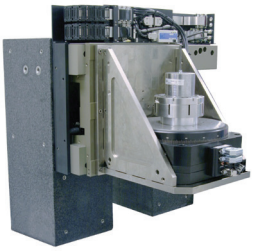
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194. Structural studies of Cu complexes with 1,2,4-triazole-3-thione ligands
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195. Absorption Spectroscopy of complex Systems using PIPE and Traptor
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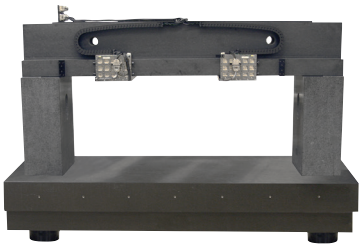




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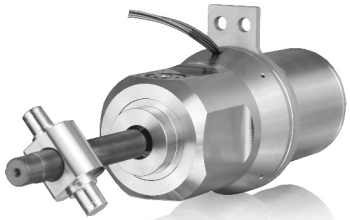
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K. Appel, M. Nakatsutsumi, A. Pelka, G. Priebe, I. Thorpe and Th. Tschentscher

197. Density Functional Theory Studies of Dense Plasmas
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198. Liquid crystal films for high repetition rate laser applications
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199. Photoionized plasmas created using Prague Asterix Laser System (PALS)
A. Bartnik, P. Wachulak, H. Fiedorowicz, T. Fok, Ł. Węgrzyński, R. Jarocki, J. Kostecki, A. Szczurek, M. Szczurek, T. Pisarczyk, T. Chodukowski, Z. Kalinowska, E. Krousky, M. Pfeifer, J. Skala, J. Ullschmied, J. Dostal, R. Dudzak, J. Cikhardt, D. Klir, K. Rezac, J. Hrebicek, T. Medrik and B. Cikhardtova

200. Photoionized plasmas created using laboratory scale, laser-produced plasma EUV sources
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201. Spin dependent vibrational properties of [Fe(pyz)Pt(CN)$_4$] spin crossover polymers
J.A. Wolny, S. Rackwitz, I. Faus, F. Dahms, A. I. Chumakov, K. Schlage, H.C. Wille and V. Schünemann

202. K-Shell Photoionization of Oxygen Isonuclear Sequence
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203. Detailed characterization of a nanosecond-lived excited state: X-ray and theoretical investigation of the quintet state in photoexcited [Fe(terpy)2]$_{2+}$
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204. Theoretical investigation on coherent ionization dynamics in extended systems
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205. Fragmentation cross-sections of DNA constituents for ion impact
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206. Detection of vacuum birefringence in nonlinear QED
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207. Detecting self-generated Mega-Gauss magnetic fields in laser-plasma-interaction via Faraday Rotation
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208. Electronic damage for short high-power X-ray pulses: its effect on single-particle X-ray imaging for 100 as - 10 fs pulse durations.
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209. XUV-Pump THz-Probe Experiments on Neon at FLASH
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210. A Reaction Microscope as Endstation for FLASH II
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211. Separating Para and Ortho water
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213. Ultrafast dynamics in single clusters captured with X-ray imaging
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216. Structural Dynamics of Photoexcited Molecules Probed with Complementary X-ray Techniques
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218. Polaritons in nuclear optical lattices
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220. Time-resolved X-ray diagnostics of heterogeneous clusters excited by femtosecond laser pulses
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222. Present status of the SQS instrument
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228. In-situ XRD of fast compressed iron: analysis of stress and strain in diamond anvil cell
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232. Metal-polymer nanocomposite films: Structure and properties
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233. Study of roughness of periodic multilayer mirrors with GISAXS method
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234. A non-equlibrium transient state of FCC nanoparticle crystal revealed by in situ GISAXS tracking of the solvent-assisted nanoparticle self-assembly
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236. P03: In-Situ and in-Operando Studies of Advanced and Functional Materials
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237. CuPcF4 matrix with embedded metal (Au, Al, Ag) nanoparticles
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238. Resonant X-ray scattering study of domain sizes in wedged multilayer samples
R. Frömter, J. Bach, B. Beyersdorff, C. Weier, R. Adam, L. Müller, S. Schleitzer, M. Berntsen, G. Grübel and H.P. Oepen

239. 3-D hybrid organic-inorganic structures: CuPc matrix with metallic nanoparticles
O. Molodtsova, I. Aristova, O. Vilkov, A. Pietzsch, M. Tchaplyguine, S. Babenkov, V. Kveder and V. Aristov

240. Pristine and potassium doped MnPc: morphology, ordering and electronic properties
O. Molodtsova, S. Babenkov, V. Maslyuk, I. Mertig, T. Bredow and V. Aristov

241. Graphene multilayers on cubic-SiC(001): atomic structure and electronic properties
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243. Magnetic and Electronic Properties of Mn,N-codoped Ge
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244. Versatile AFM setup for diffraction mapping at the Coherence Beamline P10 of PETRA III
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245. Spin precession mapping at ferromagnetic resonance via nuclear resonant scattering
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246. Structural investigations of Fe/GaAs(001) heterojunctions containing MgO tunneling barrier
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247. Effect of X-rays radiations on structural and compositional characteristics of TiO2 thin films deposited on Si
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249. The Spontaneous Formation of Nano Patterns in Velocity-Dependent Dip-Coated Organic Films: From Dragonflies to Stripes
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254. Resonant X-ray Diffraction at Fe_3O_4/NiO Bilayers
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255. In-situ studies of interface coupling in magnetoelectric composites via grazing incidence diffraction
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256. Effect of interfaces and growth parameters on magnetic properties at FeRh thin films
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257. Determination of the Temperature and Potential Dependent Surface Structure of the Mercury-Electrolyte Interface by X-ray Scattering
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258. Anisotropy control in magnetic multilayer devices
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259. In-situ investigation of the organic and bioorganic layers on water surface
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261. Zr-based bulk metallic glass at cryogenic temperatures: in-situ XRD
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262. Thermal and nonthermal melting of silicon under femtosecond X-ray pulse
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263. Investigation of nonferroic domains in TeO_2 single crystals under external electric field using X-ray diffraction methods
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264. Nuclear GISAXS Superstructure Peaks for Characterization of Antiferromagnetically Ordered Nanostripes
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Vendor exhibition

30. Jan. 2015
13:00 – 18:00

CFEL (Bdlg. 99)
FLASH seminar room, upper floor (Bldg. 28c)
FLASH2 experimental hall (Bldg. 28k)


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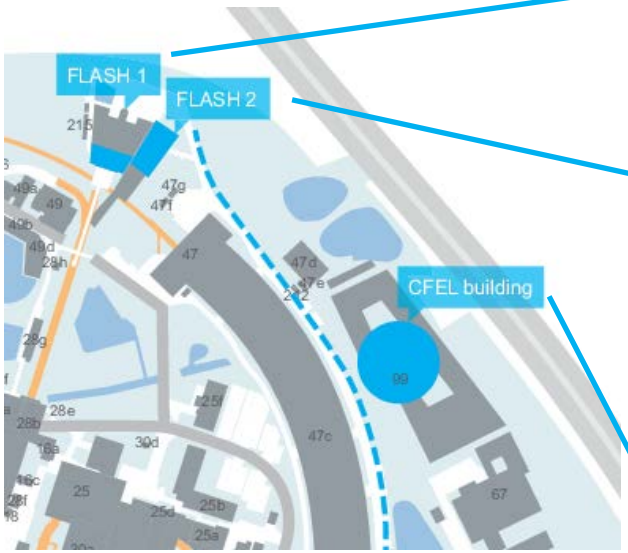
Industrial exhibitors 2015

	Booth no.	Company Name
FLASH 2	1	attocube systems AG
	2	HORIBA Jobin Yvon GmbH
	3	Hositrad Vacuum Technology
	4	Huber Diffraktionstechnik GmbH & Co. KG / AXO Dresden GmbH
	5	incoatec GmbH
	6	Linear- und Handhabungstechnik GmbH & Co. KG
	7	NANOS-Instruments GmbH
	8	Physik Instrumente (PI) GmbH & Co. KG
	9	Phytron GmbH
	10	PINK GmbH Vakuumtechnik
	11	Qioptiq Photonics GmbH & Co. KG
	12	SAES Getters S.p.A.
	13	SmarAct GmbH
	14	SPECS Surface Nano Analysis GmbH
	15	Spetec GmbH
FLASH Seminar Room	16	Alca Technology S.r.l.
	17	bsw TestSystems & Consulting AG / StanTronic Instruments GmbH
	18	Cryophysics GmbH
	19	DECTRIS Ltd.
	20	eltherm GmbH
	21	FMB Feinwerk– und Meßtechnik GmbH
	22	Goodfellow GmbH
	23	greateyes GmbH
	24	Hamamatsu Photonics Deutschland GmbH
	25	Infraserv Vakuumservice GmbH
	26	iseg Spezialelektronik GmbH
	27	LAPP Insulators Alumina GmbH
	28	Newport Spectra-Physics GmbH
	29	Oerlikon Leybold Vacuum GmbH
	30	Oxford Instruments Omicron NanoScience
	31	Pfeiffer Vacuum GmbH
	32	vacom Vakuum Komponenten & Messtechnik GmbH
	33	vaqtec-scientific
	34	VAT Deutschland GmbH
CFEL	35	Aerotech GmbH
	36	Agilent Technologies
	37	Beckhoff Automation GmbH
	38	Carl Zeiss Laser Optics GmbH
	39	Cryoandmore Budzylek GbR
	40	Dockweiler AG
	41	ess Mikromechanik GmbH
	42	Kleindiek Nanotechnik GmbH
	43	MEWASA AG
	44	OELZE Praezisions-Messzeugfabrik GmbH
	45	OWIS GmbH
	46	PREVAC sp. z o.o.
	47	Rohde & Schwarz GmbH & Co. KG
	48	SYMETRIE
		DESY Spin-offs:
		Class 5 Photonics GmbH
		suna-precision GmbH
		X-Spectrum GmbH

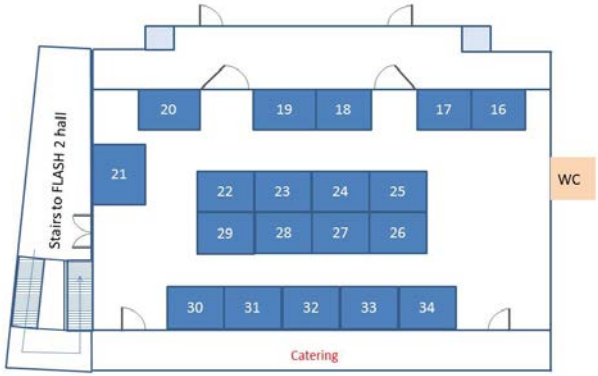
30. Jan. 2015

Poster session 14:00 – 17:00h

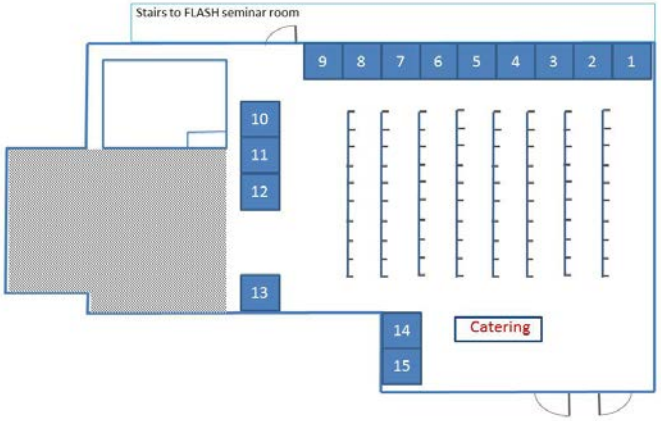
Vendor exhibition 13:00 – 18:00h



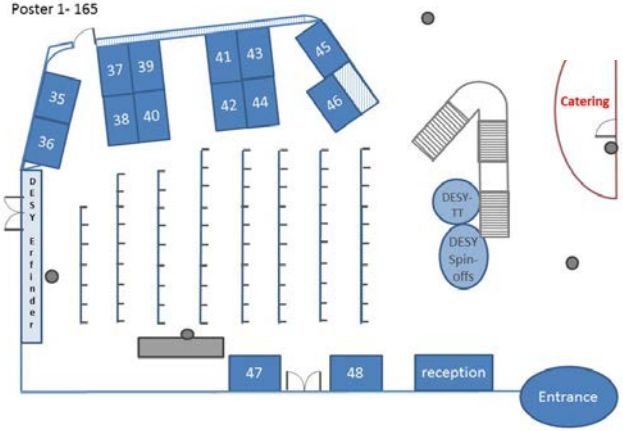
FLASH Seminar room (upper floor)
Industry exhibition



FLASH2 Experimental hall
Industry exhibition and
Poster 166- 347



CFEL Foyer, Bldg. 99
Industry exhibition and
Poster 1- 165



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