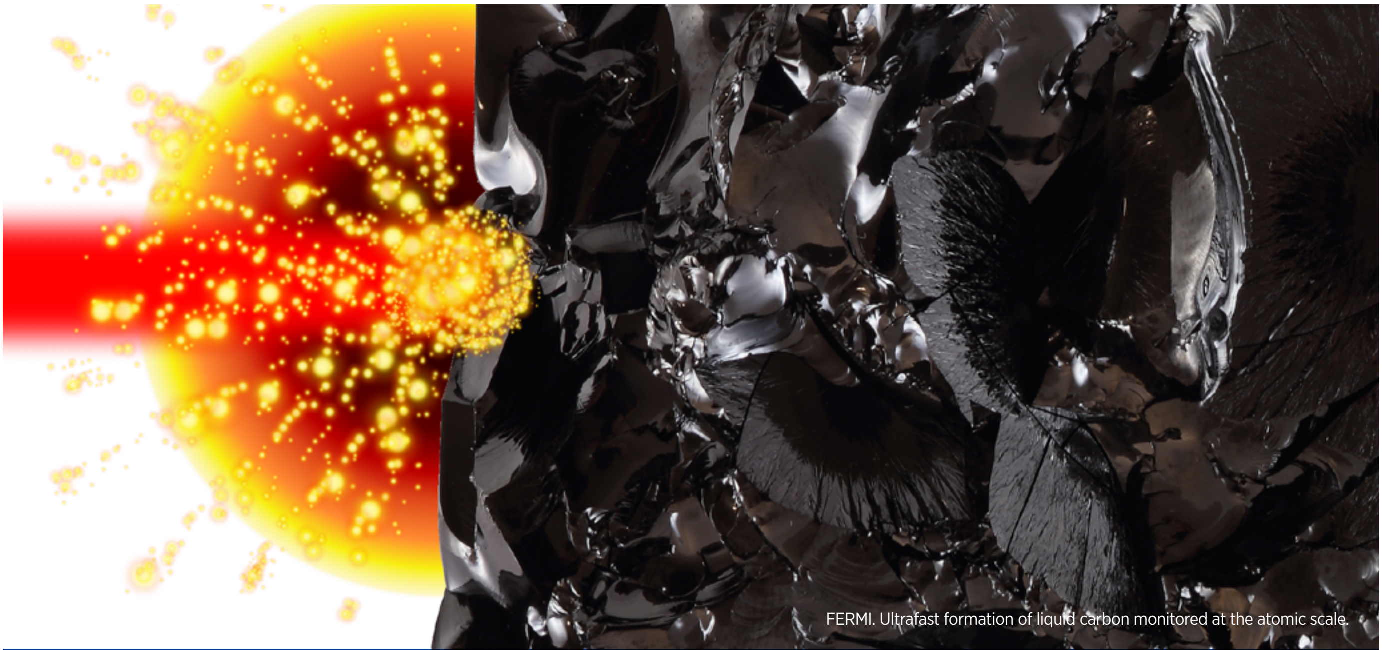
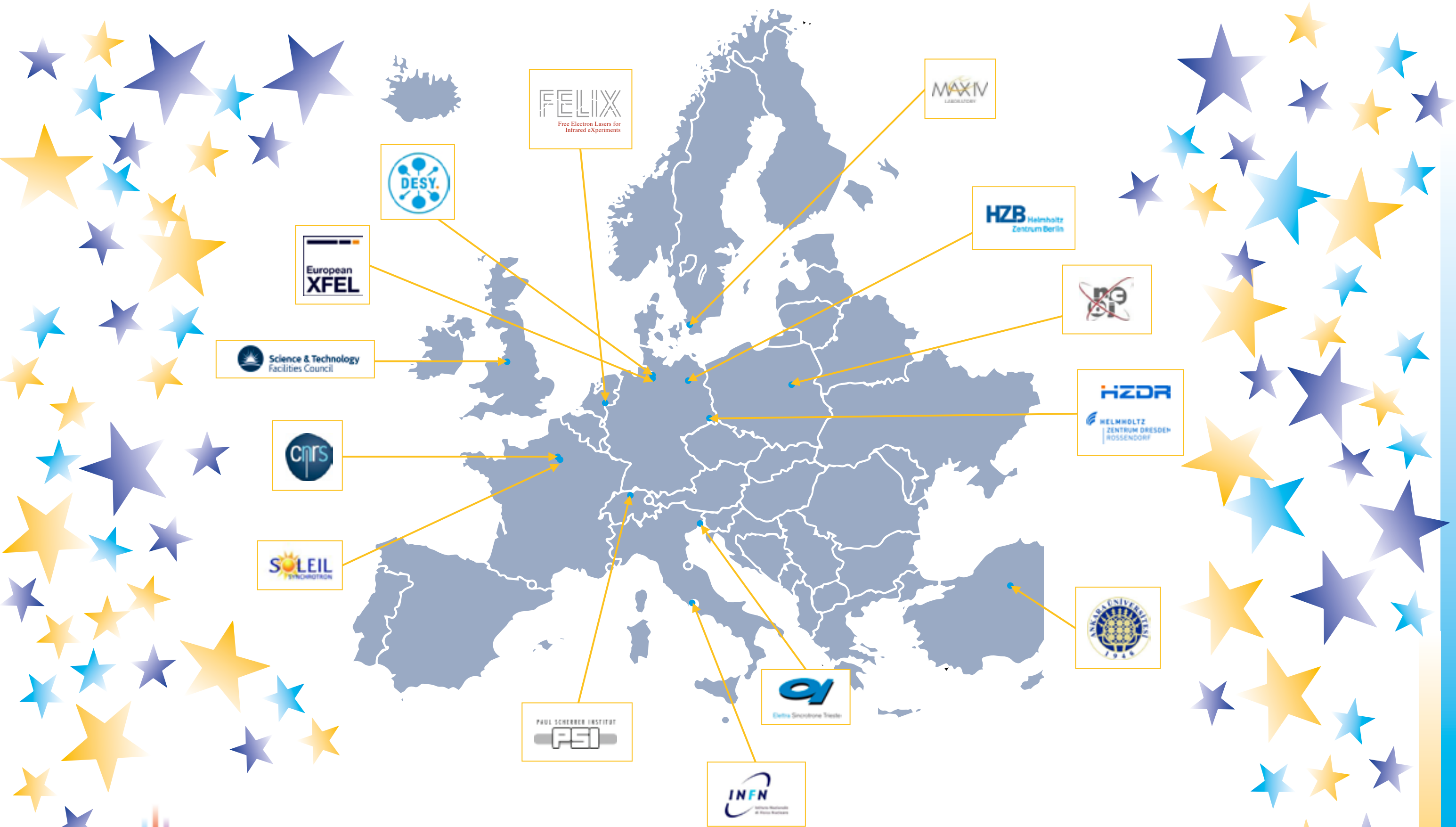
FELs OF EUROPE NEWS 1|21

10. ISSUE | www.fels-of-europe.eu



FERMI. Ultrafast formation of liquid carbon monitored at the atomic scale.

IN THIS ISSUE



FELs OF EUROPE wishes you a Happy New Year

FELs of Europe in challenging times – Activities 2020 and outlook for 2021/2022

We are looking back on an exceptional year. Just like for everyone and everything else, the pandemic changed the year also for FELs of Europe. The FoE Steering Committee (SC) has quickly decided to adapt its activities. The face-to-face meeting scheduled in spring at the Radboud University in Nijmegen was canceled but during the year there have been a number of efficient and productive online meetings. FoE supported the local organizing committees of the two 2020 FoE events the Science@FELs Conference and the PhotonDiag workshop in taking the decision to hold both events virtual and in reorganizing them accordingly. As reported elsewhere in this newsletter the two events were a success. The hosts for the Science@FEL 2022 will be again DESY and European XFEL for a hopefully in person meeting, while for the PhotonDiag 2022 the FoE SC is pleased to announce that we received the candidature of Helmholtz-Zentrum Berlin. Formal approval is on the agenda of the first SC meeting in 2021.

Webinar series

The FoE SC discussed during several meetings the possibility of organizing scientific webinars focused on FELs, sources, experiments and scientific highlights, in collaboration with the LEAPS Strategy Group 2 on FELs. The webinar series is now expected to start early 2021. You will find more information soon on the FoE website (www.fels-of-europe.eu).

Soft X-ray and IR facilities meetings

Besides the two main FoE events, we also plan to start in 2022 a series of *soft X-ray and IR facilities meetings*, inspired in structure and content to the successful series of *Hard-X ray 5-ways meeting* which has been held now by the X-ray facilities for several years. The first meeting dedicated to soft X-ray and IR facilities (and beamlines) is planned in 2022 in or near Dresden organized by HZDR.

10 years FELS of Europe

Finally, 2022 will also see the 10-year anniversary of the FoE Collaboration that was signed in Hamburg on the 31st of May, 2012. We would like to celebrate ten years of fruitful collaboration among the laboratories and facilities of the FoE collaboration in a dedicated event, maybe as a satellite to the other events in 2022, with seminars on the FoE facilities and with scientific highlights presented by our users. It is also worth to mention that the FoE collaboration members have relationships with FEL facilities and projects in Novosibirsk, Russia and Yerevan, Armenia; the possibility to welcome new partners in the FoE family is under consideration and will be further explored in 2021.

We are looking forward to meeting you first in video and then in person at our webinars, meetings and conferences in 2021 and 2022. We hope you will find the offered program interesting and attractive and that you will join them so that they become successful as our 2020 events!

Michele Svandrlik

FERMI

Ultrafast formation of liquid carbon monitored at the atomic scale

A novel approach combining FEL and fs-laser pulses has been developed at the FERMI FEL (beamline EIS-TIMEX) with the aim of generating liquid carbon (l-C) under controlled conditions and monitoring its electronic structure properties across the Fermi level. The experimental method has been tested depositing a huge amount of optical energy (5 eV/atom, 40 MJ/kg) through ultrashort laser pulses (duration shorter than 100 fs, 10^{-13} s) onto a self-standing amorphous carbon foil (a-C, thickness about 80 nm) and subsequently probing the excited sample volume with the FEL pulse finely varying both the FEL photon energy across the C K-edge (~ 283 eV) and delay between FEL and laser pump. This approach is achievable through the unique characteristics of FERMI that operates using a laser seeding process. The obtained time-resolved x-ray absorption spectroscopy (tr-XAS, Fig. 2) on l-C has been carried out with a record time resolution of less than 100 fs. The formation of the l-C phase has been found to occur in about 300 fs after absorption of the laser pump pulse as an effect of the induced constant volume (isochoric) heating of the carbon sample. Theoretical calculations performed at the University of Kassel (prof. M. Garcia), in agreement with the experimental tr-XAS data, reveal that the obtained l-C sample reached the temperature of about 14200 K at a pressure of about 50 GPa (0.5 Mbar). Tr-XAS data, corroborated by calculated p-projected electronic density of states (p-DOS), confirm that l-C under the obtained thermo-dynamic conditions is a metallic liquid. Its atomic structure is dominated by carbon atom chains as an effect of the pronounced sp1 hybridization. The process leading to the l-C phase has non-thermal nature as the melting mechanism is not driven by the phonon system, but by the sudden change of the electronic structure of C and massive increase of delocalized electrons. The excited carbon sample volume is expected to rapidly start expanding just after 0.5-1 ps, therefore the generated l-C phase can be assumed to be stable only for a few hundreds of fs. That is the lifetime of laser driven l-C.

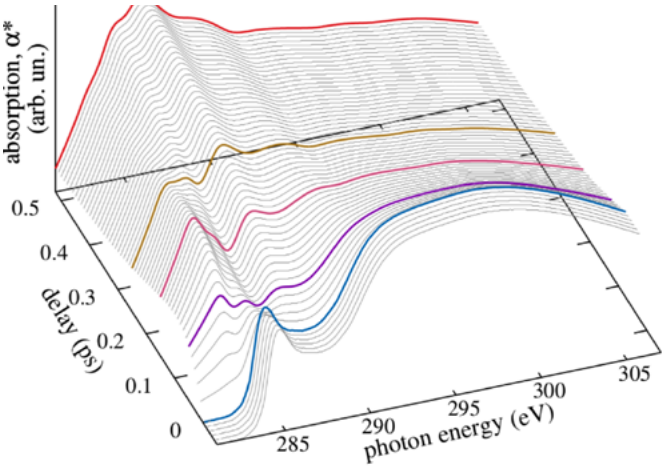


Fig 1: Ultrafast nonthermal melting dynamics in carbon revealed by tr-XAS at the C K-edge; blue curve: a-C, red curve: l-C.

Emiliano Principi

Original publication:
E. Principi, S. Krylow, M. E. Garcia, A. Simoncig, L. Foglia, R. Mincigrucci,G. Kurdi, A. Gessini, F. Bencivenga, A. Giglia, S. Nannarone and C. Masciovecchio, *Atomic and Electronic Structure of Solid-Density Liquid Carbon,* Phys. Rev. Lett. 125, 155703 (2020). https://link.aps.org/doi/10.1103/PhysRevLett.125.155703

HZDR

Nanoscale-Confined Terahertz Polaritons in a van der Waals Crystal

The broad tunability and high repetition rate of the FELBE IR/THz FEL is a powerful tool for studying low energy excitations that are important in complex and low-dimensional materials. The resonant coupling of light into specific lattice vibrations is of particular interest for nanophotonic technologies, since it can provide a means for manipulating light at sub-wavelength scales. Researchers led by a team from the Technische Universität Dresden have applied the method of scattering-Scanning Near-field Optical Microscopy (s-SNOM) to image the nanoscale confinement of phonon polaritons in a low-dimensional van der Waals crystal. In particular, flakes of the biaxial α-MoO_3 were imaged using a range of THz frequencies from the FELBE FEL to excite uniaxial phonon polaritons (Fig 2). The s-SNOM tip acts as a near-field antenna to provide the momentum component aligned to the proper crystal direction to launch the phonon polaritons. As the s-SNOM tip is scanned near an edge of the flake that is orthogonal to the crystal axis associated to the polariton mode, the reflected

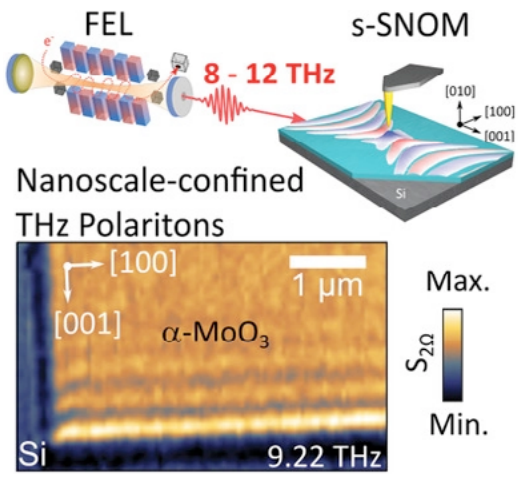


Fig 2: Extreme confinement of long-wavelength terahertz radiation to nanoscale dimensions is achieved in the natural hyperbolic van der Waals crystal α-MoO_3. A range of highly anisotropic, in-plane THz polaritonic excitations are directly visualized in the 8–12 THz spectral range, exhibiting ultralow-loss propagation, tunable THz response, and orthogonal propagation directions. Advanced Materials, DOI: (10.1002/adma.202005777)

polaritons scatter from the tip and can be detected in the far-field, allowing for direct measurement of the polariton wavelength and decay length.
Measurements taken as a function of the FEL wavelength for flakes of different thickness showed excellent agreement between the analysis of s-SNOM images and the analytical dispersion model based on ab initio calculations of the corresponding low-dimensional α-MoO_3 crystal structure. The s-SNOM measurements also demonstrated the extraordinary spatial confinement of the optical THz field by the phonon polariton. This confinement provides a strong enhancement of the electric field in the vicinity of a polaritonic element and opens new possibilities for enhanced control of nanophotonic devices at THz frequencies.

J. Michael Klopf

Original publication:
de Oliveira, T. V. A. G., Nörenberg, T., Álvarez-Pérez, G.,Wehmeier, L., Taboada-Gutiérrez, J., Obst, M., Hempel, F., Lee, E. J.M., Klopf, J. M., Errea, I., Nikitin, A. Y., Kehr, S. C., Alonso-González, P., Eng, L. M. , *Nanoscale-Confined Terahertz Polaritons in a van der Waals Crystal,* Adv. Mater., 2005777 (2020).
https://doi.org/10.1002/adma.202005777

FELIX Laboratory

Shaken, not stirred: a recipe for spin switching

For the first time, an international team of scientists demonstrates switching of magnetization by triggering the vibrations of crystal lattice. Their work is published in Nature Physics.

History tells us that small perturbations can have a profound effect on macroscopic systems; an unfortunate example being the collapse of the Broughton and Angers bridges in the mid-nineteenth century brought about by the (resonant) marching of soldiers in unison. Similarly, in condensed matter systems, small excitations can have large repercussions on both their ground and excited states.

The major question left open, however, is whether such excitations can be used for a constructive rather than destructive effect. Researchers from FELIX Laboratory and the University of Bialystok, in collaboration with scientists from the Institute for Molecules and Materials, Delft University of Technology and the Max Planck Institute for Solid State Research, have found a way to convincingly prove this.

The team has demonstrated that shaking atoms in a crystal for a short time can lead to a permanent switching of magnetization. Previous attempts focused on resonant pumping of phonon modes failed. For this excitation, researchers used the short and intense pulses from the free electron laser FELIX. It suited ideally to fit the resonance frequencies of the lattice. Following the excitation, nonlinear interactions in the phonon system change the potential landscape of the magnetic system forcing the latter to evolve into a peculiar four-domain pattern. "It has been discussed for years that such switching in principle could be possible, but has only now been realized, thanks to the high intensity and narrow bandwidth of the FELIX pulses", explains professor Kirilyuk.

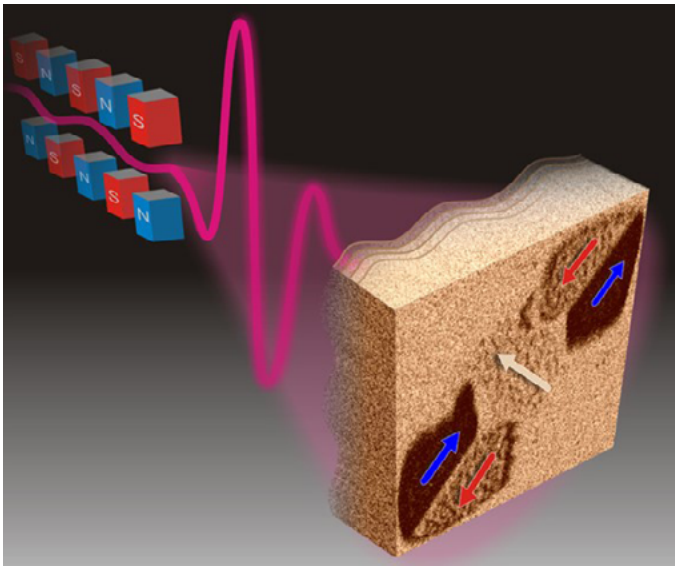


Fig 3: Four-magnetic-domain pattern switched by a FELIX pulse

This discovery paves the way to novel approaches in fundamental science. Ultrafast modification of the crystal field environment has the potential to become the most universal way to manipulate magnetization. It could be the starting point for innovative IT-concepts concepts such as ultrafast opto-spintronic devices.

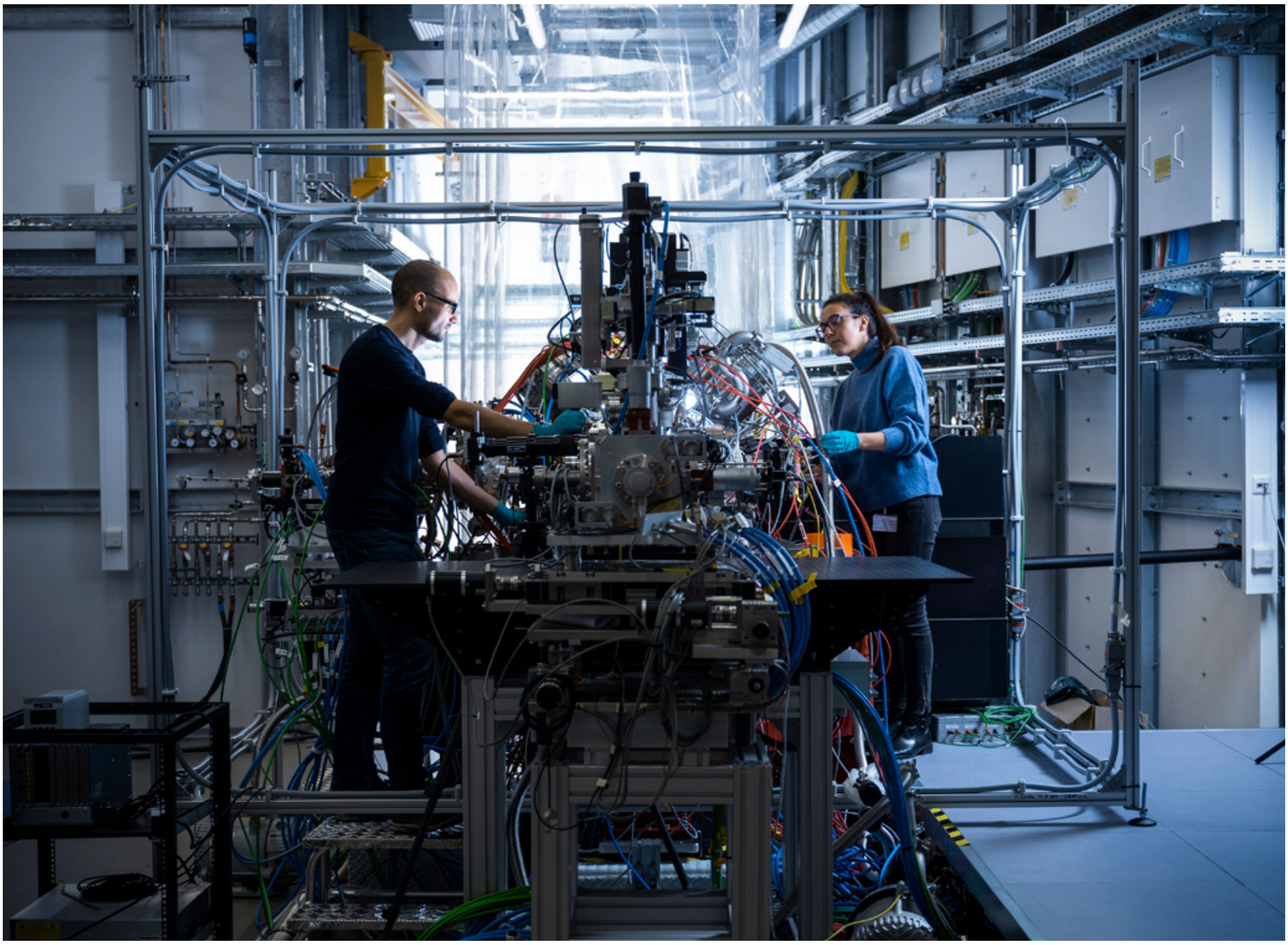
Andrei Kirilyuk

Original publication:
A. Stupakiewicz, C.S. Davies, K. Szerenos, D. Afanasiev, K.S. Rabinovich, A.V. Boris,A. Caviglia, A.V. Kimel and A. Kirilyuk, *Ultrafast phononic switching of magnetization,* Nature Physics (2021) DOI: 10.1038/s41567-020-01124-9

European XFEL

A new window into the world of atoms

European XFEL used to observe a fundamental process in the interaction of X-rays with atoms



The SQS experiment station is dedicated to the study of free atoms and molecules, as well as clusters and nano-particles that consist of up to several thousands of atoms. Experiments will focus on "non-linear" multi-photon processes beyond the conventional "linear" process of absorption of just one photon, and on time-resolved investigations of the ultra-fast molecular fragmentation caused by these processes. Copyright European XFEL / Jan Hosan.

What happens when X-ray beams cross paths with supersonic atoms? A German- Swedish research team investigated this using a new method and found that they could identify single atoms that underwent a rare process, the so-called stimulated Raman scattering. This work was carried out at European XFEL's Small Quantum Systems (SQS) instrument and the results have been published in Science. The results have potential to be used for the efficient manipulation of atoms and molecules to gain deeper understanding in fundamental physics and for practical applications, which extends to chemistry, nanoscience and quantum engineering.

Stimulated Raman scattering occurs when two photons, or X-rays, of different wavelengths hit a single atom and results in two photons of longer wavelengths leaving the atom; this is what is known as a non-linear process. Using X-ray experiments, instead of visible light experiments, to study such non-linear processes allows for detailed insight into the motion of electrons and atomic nuclei in molecules. However, this has not been trivial.

"Typically, the much stronger linear processes occlude the interesting nonlinear processes," says Uli Eichmann, lead author, from Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy. In the much more frequent linear processes one photon hits the atom, is absorbed by it and another photon of the same wavelength is emitted. The new method introduced by the team, called Photon-Recoil Imaging, is instead able to clearly identify the distinctive signature left by the non-linear stimulated Raman scattering process. "This new method opens unique possibilities when combined in the future with two time-delayed X-ray pulses of different wavelengths. Such pulse patterns have recently become available at X-ray lasers, like the European XFEL," says Michael Meyer, Group Leader of the SQS team at European

XFEL and co-author of the paper. Because X-ray pulses with different wavelengths allow researchers to specifically address particular atoms in a molecule, it is possible to observe in detail how electrons will move in molecules over time. In the long run, the researchers hope not only to observe this movement but also to influence it via tailored laser pulses. "Our approach allows for a better understanding of chemical reactions on the atomic scale and may help to steer the reactions in a desired direction. As the movement of electrons is the essential step in chemical and photochemical reactions occurring, e.g., in batteries and solar cells, our approach may give new insight in such processes as well," says Jan-Erik Rubensson, professor at Uppsala University, who is also a co-author.

Original publication:
U. Eichmann, H. Rottke, S. Meise, J.-E. Rubensson, J. Söderström, M. Agåker, C. Såthe, M. Meyer, T. M. Baumann, R. Boll, A. De Fanis, P. Grychtol, M. Ilchen, T. Mazza, J. Montano, V. Music, Y. Ovcharenko, D. E. Rivas, S. Serkez, R. Wagner, S. Eisebitt, *Photon-Recoil Imaging: expanding the view of nonlinear x-ray physics,* Science 369, 1630-1633 (2020).
https://doi.org/10.1126/science.abc2622
https://science.sciencemag.org/content/369/6511/1630

DESY

New science opportunities at FLASH with high-repetition rate coherent FEL pulses: The FLASH 2020+ project

Driven by the scientific demand of the user community to provide highly coherent pulses in the soft x-ray spectral range at high repetition rates and to improve the possibilities for few femtosecond time-resolved experiments, the upgrade project FLASH 2020+ has started at FLASH at DESY in Hamburg, Germany.

FLASH2020+ will provide ambitious developments for the two FEL lines (FLASH1 and FLASH2). Starting from 2022, the FLASH accelerator will receive an energy upgrade combined with a new flexible electron beam compression scheme and a laser heater will be installed to mitigate micro-bunching instabilities. The slight increase from 1.25 GeV to 1.35 GeV in electron beam energy combined with an afterburner undulator will extend the usable wavelength range to the oxygen K-edge at FLASH2. It will enable the facility to analyze important elements for energy research and the whole water window for biological investigations. In the second upgrade phase planned for 2024, the FLASH1 beamline will be completely rebuild and severely modified. A wavelength tunable high repetition rate laser together with variable gap undulators (APPLE-III type) will allow generation of coherent pulses of variable polarization by external seeding. This facilitates fully independent parallel operation of the two FEL lines. A further upgrade for shorter pulses and variable polarization at FLASH2 is also intended in a later project phase. Parallel to the accelerator and FEL work, the experimental stations will be upgraded. A time compensating monochromator beamline is specially designed to preserve the short FEL pulses and provide a narrow spectral bandwidth at the same time. An important goal is to provide users with a new flexible pump-probe laser system that will provide high-energy, high repetition rate synchronized pulses across the whole optical spectrum and beyond. The FLASH2020+ plans are fulfilling the wishes of the x-ray FEL user community and are optimized for accommodating those experimental techniques that currently suffer from low signal or low hit rate. Studies on very low-density samples and experiments with low signal levels, but also photoemission experiments requiring an attenuated intensity to avoid space charge effects at the sample, will strongly benefit. The upgrade is of importance to develop new technologies for future accelerators and will keep FLASH at the forefront of science with FELs.

. Enrico Allaria & Karolin Baev

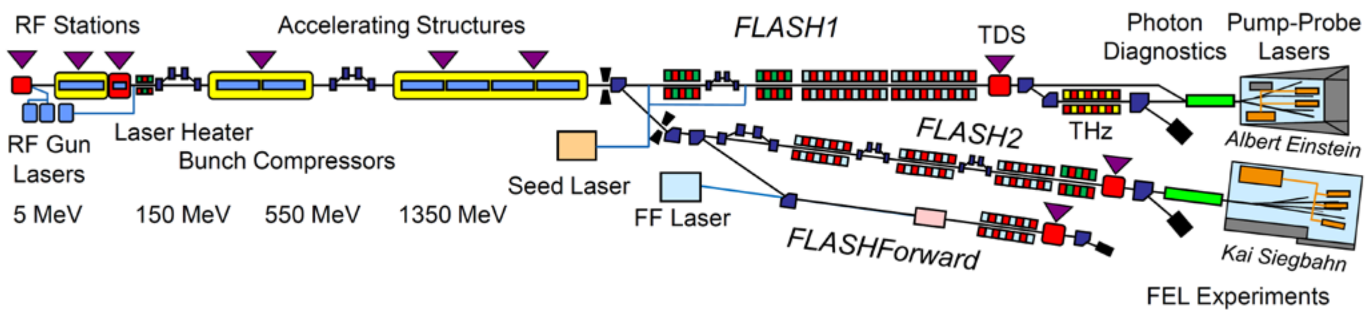


Fig 4: FLASH 2020+ layout

UK XFEL Science Case

UK researchers have been developing a science case for a new national X-ray FEL facility over the past year or so under the leadership of Professor Jon Marangos, Imperial College. The project to create the Science Case was funded by STFC and launched at the Royal Society in July 2019. Several face to face dedicated workshops were held, each one being dedicated to a particular science user area. A team of around twenty five experts from universities, national laboratories and industry drafted the Science Case. Once the draft was publically available a further round of user consultation workshops were held virtually during the summer of 2020. The UK XFEL Science Case has now been finalised and submitted to STFC for review by an expert panel.

The Science Case discusses in detail a large number of science and technology research challenges and national priorities which could be addressed by a new national XFEL facility. The intention is to look forward to what new capabilities a machine operating from around 2030 might be able to deliver. In the process the team drew on the expertise of the UK accelerator science and laser communities to identify a feasible set of advanced specifications that go beyond those currently available. Technical options for the facility have been looked at in broad terms and some possible facility layouts that satisfy the user requirements to differing degrees have been proposed in outline. Provided that STFC is convinced of the “mission need” for the UK XFEL it is anticipated that the next step would be a two year Conceptual Design study, starting in 2021.

The UK XFEL Science Case is available for download from https://www.clf.stfc.ac.uk/Pages/UK-XFEL-science-case.aspx

Jim Clarke

Photondiag 2020

The 5th FELs OF EUROPE conference on photon diagnostics, instrumentation and beamline design, was planned at the Paul Scherrer Institute (PSI) in October 2020. Due to Covid-19 constrains the Photondiag 2020 was carried out virtual. The conference format provided a mix of life and pre-recorded talks, poster presentations and online workshop sessions. More than 200 participants from countries all over the world registered and a lot of daily attendance made it a great success.

Program: varied and relevant

More than 30 contributions distributed into twelve sessions covered topics in the field of photon diagnostics, ranging from new devices for online measurements, to data processing, new experimental challenges and future developments for next generation X-ray light sources. After the inspiring ‘welcome words’ of PSI Photon Science Division Head Gabriel Aeppli, the conference started with presentations of the facility overviews. The rapidly evolving status of the FEL-facilities worldwide gave a rich impression on how lively and active the field is. Related to the session topics eight invited talks were selected by the program committee. Contributions on spatial, temporal and spectral pulse properties with emphasis on single shot diagnostics and coherence properties may summarize the first two days of the conference. In addition, new achievements in the detector development for photon diagnostics were presented. Related to photon diagnostic at synchrotrons the topics of beam position monitoring and the effect of optical vibrations were discussed. Attosecond pulse characterisation was pointed out to be highly relevant for photon diagnostic in the context of new experimental methods. The final session topic of the conference dealt with scientific computing and management of high volume data.

Screenshot take during the Photondiag (Dr. Pavle Juranic (PSI))

The next day this was followed by four satellite meetings on single-shot pulse energy and pulse length measurements, as well as wavefront characterisation and soft X-ray photon diagnostics.

And the winner is...

As a ceremonial element, the FoE Award on Photon Transport and Diagnostics 2020 was awarded to Dr. Ichiro Inoue and Dr. Taito Osaka. More on the prizewinners in the article below.

Thanks to all

Besides the corona constrains, PSI was contented being the host of the PhotonDiag2020 and would like to thank all participants for their contributions, the program committee, that included people from all across the world facilities, the session chairs and the local organization team, for making the conference a great success. The PhotonDiag conference 2022 will be hosted by the Helmholtz Zentrum Berlin HZB.

Gregor Knopp

Dr. Taito Osaka and Dr. Ichiro Inoue win FoE Award on Photon Transport and Diagnostics 2020

On behalf the FELs of Europe (FoE) Collaboration, in recognition of their outstanding contributions related to the fields of free electron laser photon diagnostics, photon transport, beamline developments and instrumentation the FoE Award on Photon Transport and Diagnostics 2020 was given to Dr. Ichiro Inoue and Dr. Taito Osaka, from RIKEN SPring-8 Center, Hyogo, Japan.

In their recent joint work on reflective self-seeding they have built a channel-cut crystal fitting the requirements for self-seeding with respect to geometry but as well surface quality. In addition, they have led a team of scientists verifying that their method of self-seeding works is fully applicable. Their achievement has contributed to the performance of self-seeding significantly and the method is now routinely available e.g. for user experiments at SACLA.

Dr. Taito Osaka has a strong focus on developing crystal optics and applying crystals for a variety of x-ray methods, e.g. wavefront and intensity splitting the x-ray beam, split and delay optics, crystal surface polishing and properties, or the micro channel-cut crystals. His work on crystal-based X-ray split-and-delay optics for hard X-rays has been the basis for developments at various FEL facilities. Developing instrumentation and methods to use the outstanding optical properties of single crystals is a ‘common thread’ through his recent works.

Dr. Ichiro Inoue is more involved in the topic of coherence applications and interferometry. He has investigated and developed interferometry methods for coherence and time domain characterisation of FEL radiation. In particular, the application of the ‘Hanbury-Brown-Twiss’ scheme for determination of the pulse duration has been appraised highly original. Such concepts may pave the way for the development of advanced methods for measuring pulse durations down to the attosecond regime where direct measurements become rather difficult if not impossible.

The prize winners were announced at the PhotonDiag 2020 conference. Literally, the price was given for their work on the development

Dr. Taito Osaka (left), Dr. Ichiro Inoue (right) holding a print copy of the FoE Award on Photon Transport and Diagnostics 2020 certificate. (Photo: Dr. Taito Osaka and Dr. Ichiro Inoue RIKEN Spring-8 Center)

of a reflection self-seeding scheme using a micro channel-cut crystal monochromator and the development of a Hanbury-Brown-Twiss interferometric technique for determining ultrashort X-ray pulse durations.

The award is accompanied with a price money of € 1.000. The picture shows two happy price winners, holding a copy of the certificate that was handed over - ‘virtually’ - during the conference in a ceremonial session including a scientific presentation of the winning team. The FoE steering committee congratulates the two price winners and whishes all the best for their future careers.

Gregor Knopp

Literature:
Determination of X-ray pulse duration via intensity correlation measurement of X-ray fluorescence. Inoue et al., J. Synchrotron Rad. 26, 2050 (2020).
Generation of narrow-band X-ray free-electron laser via reflection selfseeding, Inoue et al., Nature Photonics 13, 319 (2019).
A micro channel-cut crystal X-ray monochromator for a self-seeded X-ray free-electron laser, T. Osaka et al., J. Synchrotron Rad. 26, 1496–1502 (2019).

Rebecca Boll from the European XFEL won this year's FELs of Europe prize, which was awarded by EuXFEL scientific director Serguei Molodtsov (left) (Credit: European XFEL).

Science@FELs 2020 virtual conference attracted record attendance

The Science@FELs conference is organised biannually by the FELs of Europe collaboration and highlights scientific progress in free-electron laser science. It has evolved into one of the most important international conferences in this field. From 14-16 September 2020 scientists exchanged most recent results from FELs around the world with a record registration number of over 700 participants for this first virtual conference. Taking place largely in the afternoon for European participants, also scientists from America got up early in the morning, while Asian colleagues stayed up until late at night to participate in the sessions.

This year's FELs of Europe prize in recognition of recent achievements the area of FEL science and applications by a young scientist was awarded to Dr. Rebecca Boll (European XFEL) "for" her outstanding research on multiple ionisation of rare gases and photoinduced dynamics of ring-type molecules. The results obtained demonstrate the rich and unique potential of X-ray science at FELs. As every time, the award ceremony and laureate's talk were a highlight of the conference.

The virtual Science@FELs2020 conference featured a lively exchange within nine invited sessions across the many fields of science that are conducted at FELs. Participants joined in to listen to talks on new developments, imaging, materials science, magnetic and correlated materials, femto-chemistry, catalysis, atomic and molecular physics, bioscience and laser physics. The conference was accompanied by three focus tutorials for younger scientists led by eminent FEL experts. Furthermore, everybody got a chance to present most recent results in two poster sessions. While this virtual poster session was a novel experience for everybody, fruitful discussions took place and participants enjoyed the event. During a virtual tour through the FLASH and European XFEL facilities, the participants were also able to witness a behind-the-scenes experience with a live stream from the FLASH accelerator tunnel, experimental halls and laser hutches as well as special insights into all instruments at European XFEL in dedicated videos and Q&A sessions.

Elke Plönjes-Palm

LEAPS Plenary Meeting 2020

The LEAPS Plenary Meeting, originally foreseen to be hosted at ALBA in Barcelona by the acting chair member of LEAPS, was held online on 24 and 25 November 2020. The first morning was dedicated to meetings of the LEAPS working and strategy groups to discuss their activities, with particular focus on DIGITAL LEAPS. This activities aims to pursue a New Pathway of LEAPS Facilities into the Post-Corona Era and in a dedicated session the content of this initiative was shared with the whole LEAPS family. The Strategic Elements addressed by DIGITAL LEAPS include: Resilient and Energy-saving Operation of LEAPS Research Infrastructures; Digital User Operation; Advanced Materials for the Digital Transformation and for the Circular Economy; Molecular Infection Fight; Advanced Digital Communication; Digital Training Concepts.

With the goal to address the above listed Strategic Elements, the LEAPS Research and Development Board has presented at the Plenary Meeting a DIGITAL LEAPS proposal, including four main areas of intervention:

STAndardisation for Remote Sample Handling (STARS): to make sample tracking F.A.I.R. compatible; to help users and user offices to manage samples; to improve procedures already in place at facilities and exploit them to full capacity

• *LEAPS Integrated Platform (LIP)*: to develop an integrated platform, a facility independent interface system to access and operate the LEAPS facilities;

• *Reference Design for a Fully Automated User Beamline*: to study how an ideal, self-aligning and self-calibrating beamline could look like;

• *Collaboration Platform for LEAPS Members: From Technology News to "Innovation Mall"*: to implement a user-friendly digital platform aiming to encourage transversal collaborations, to enhance knowledge exchange and synergy, to foster knowledge and technology transfer amongst LEAPS members.

The proposal includes also more potential developments of facilities, to make them more resilient, efficient and green and of platforms and networks to further promote information sharing, for instance on advanced materials, molecular infection fight and the creation of smart user Networks.

The proposal, that was very well received as innovative and creative, and is now being evaluated by the LEAPS facilities. They will send their feedback to the General Assembly to define priorities.

Screenshot during the LEAPS plenary meeting

On the second day of the meeting, the recently approved H2020 project LEAPS-INNOV was presented as well as the ARIE (Analytical Research Infrastructures in Europe) Green Deal Proposal, to be submitted to the EC early 2021. The Plenary meeting was then concluded by a panel discussion on "LEAPS: Engines for Science &Innovation"; beside LEAPS representatives, panelists from the EC, ESFRI, industry, LENS and ESUO attended the meeting and actively contributed to an interesting and alive discussion.

The LEAPS General Assembly in the afternoon of November 25 has approved the creation of a new Working Group (1.4) dedicated to photon diagnostics for FELs and next generation synchrotron radiation sources (SR). The main goal of WG 1.4 is the definition and start-up of joint activities between the European FELs and SR sources in the areas of photon diagnostics and machine learning applications, focusing on the special requirements of non-invasive diagnostics tools.

The first activities of the group, coordinated by the ad-interim spokesperson M. Zangrando (Elettra) and co-spokesperson K. Tiedtke (DESY), will be devoted to gather experts from the different LEAPS partners, to propose common-interest topics, and to organise a first kick-off meeting in the beginning of 2021.

More information: https://leaps-initiative.eu/

Michele Svandrlik

About FELs of Europe

FELs of Europe is an initiative of the ESFRI projects EuroFEL and European XFEL. It is a collaboration of all free electron laser (FEL) facilities in Europe, with the goal to meet technological and scientific challenges of these novel and rapidly developing technologies, and to provide a worldwide unique, pan-European research infrastructure that enables exploiting the full scientific potential of these unique accelerator based short-pulse light sources. The collaboration includes 14 facilities in 10 countries.

All members are either operating or developing free electron laser (FEL) facilities and/or advanced short-pulse light sources (SPS), based on accelerator technologies. Due to their unique properties, these light sources provide a step change in the ability to address research needs across the disciplines of physics, chemistry, materials, and life sciences. FELs will improve our understanding of processes on a molecular level, leading to development of new materials and methods for tomorrow's technological advancement, clean environment, sustainable energy, and health care.

FELs of Europe will facilitate the enhancement and exploitation of the full scientific potential of FELs in an efficient way by promoting joint technical development and collaborating closely with users and related communities. It will promote efficient open access to the research infrastructure and optimal conditions for users.

More info at: www.fels-of-europe.eu

CURRENT AND UPCOMING CALLS FOR PROPOSALS

www.fels-of-europe.eu/user_area/call_for_proposals

For experiments at Swiss FEL:
Launch 8 February 2021

For experiments at FELIX
Deadline: 15 May 2021

For experiments at FLASH
Deadline: planned for 1 October 2021

UPCOMING EVENTS

Webinar Series in 2021:
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