

DNR: STYR 2021/1143

**Status of beamlines  
at MAX IV**

**May 2021**



### ***Status of MAX IV***

The MAX IV accelerators are fully operational, 14 beamlines are able to take X-ray light, and 12 are able to serve users. However, the pandemic continues to prevent normal operations. MAX IV entered a "warm shutdown" state on 18 January due to the strained situation in Skåne in early 2021, during which only staff needed to keep the facility secure were allowed on site and everyone else was required to work from home. General user operation and most on-site project activities were suspended during this period. Design work, documentation, planning, and programming were least affected by the shutdown and progressed, but projects requiring on-site work or physical interventions were significantly impacted. Combined with the suspension of beamline operations, these project delays resulted in some delays to delivering experimental capabilities and beamlines to users.

MAX IV began a gradual restart of activities in March, where access by MAX IV staff to the Laboratory was slowly increased ("restricted operations" mode). This made it possible to restart some operations and a number of projects requiring on-site activity. Beamlines previously in operation were prioritised, beginning with the BioMAX beamline operating in remote access mode only. Preparatory work for projects depending on the summer shutdown, where suspension could mean a delays of up to a full year, were also prioritised. The MAX IV Central Project Office was instrumental for moving the project portfolio forward during this period with the very limited number of staff allowed on site.

Starting in April, implementation of new procedures, supported by risk assessments, enabled more staff to work on site safely, remote access or mail-in (RA/MI) operations on additional beamlines, and more project activities. As part of a planned gradual reopening of beamlines to users, MAX IV is restarting RA/MI operations on one beamline on each of the 1.5 and 3 GeV rings each week, with the goal of resuming RA/MI operations on all beamlines able to serve users by autumn. Pandemic conditions are not expected to abate for the next few months, so users and visitors will continue to be denied access to the MAX IV site until September at soonest. All experiments during this period must be performed by remote access, mail-in service, or a combination of these two modes.

Appendix 1 lists the status of individual beamlines with techniques currently available to users on beamlines in operation and estimated dates to deliver planned capabilities for beamlines in commissioning or under construction.

### ***Science impact and outlook***

The scientific output of MAX IV continues to accelerate, with 40 papers registered through the first 4 months of the year. Of note are high impact papers published in Nature Communications, ACS catalysis and Carbon on results from HIPPIE, Nature Comms and Cell Chem Bio papers from BioMAX, Nature Comms and PNAS papers from Bloch, and Nanomaterials papers from NanoMAX. The beamlines on the 1.5 GeV ring are also publishing high-level papers, such as a paper on Dirac band-splitting in TaSe<sub>4</sub> from Bloch appearing in Physical Review Research. A demonstration experiment at FemtoMAX on protein serial crystallography (Jensen et al., J. Synch. Rad. 2021) shows the possibilities of this beamline. Together with 10 Hz operations, the potential of FemtoMAX for time-resolved studies is becoming visible.

Appendix 2 lists 2021 publications to date. Registered MAX IV and MAX-lab publications are available at <https://www.maxiv.lu.se/science/publications/>.

**Appendix 1**  
**Current status of individual beamlines**

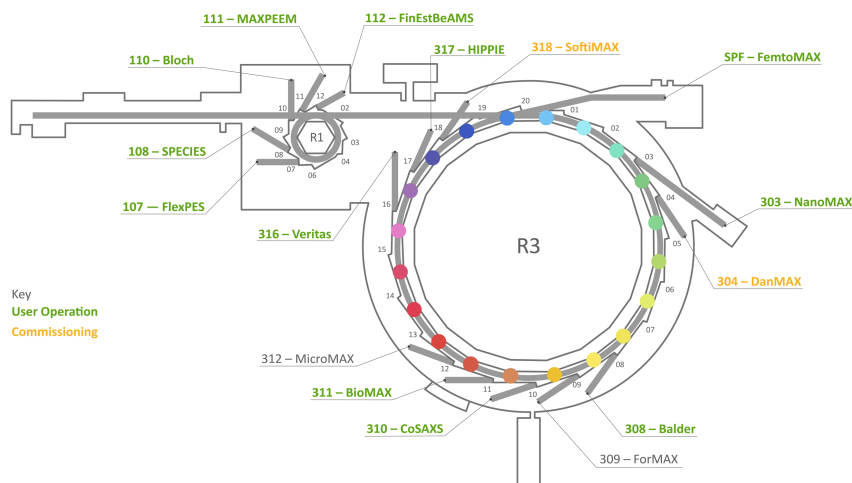
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## Current status of individual beamlines



### Balder

Balder is in general user operation.

First general users for XES and XRD experiments are delayed due to the warm shutdown and Covid-19 travel restrictions, which impacted installation and support work.

- XRD First General user Q3 2022
- XES Spectrometer First General users Q3 2022

#### Techniques available to general users

X-ray absorption spectroscopy (XANES and EXAFS) in transmission, continuous scanning down to 30 sec/EXAFS

X-ray absorption spectroscopy (XANES and EXAFS) in fluorescence with 7 element SDD, continuous scanning down to 300 sec/EXAFS

#### Techniques available to commissioning experts

X-ray Emission Spectroscopy (XES), expert mode with limited angular range

### **BioMAX**

BioMAX is in general user operation.

#### **Techniques available to general users**

Data collection at fixed energy between 6 and 19.5 keV, detector distance between 126 and 900 mm, beam focus of 20x5 microns or 50x50 $\mu\text{m}$ and defining aperture of 5, 10, 20 or 50 $\mu\text{m}$
Automated sample mounting and dismounting from UniPucks, 29 puck positions in dewar
Sample temperature 100 K; room temperature with or without humidity control available for manual mounting only
SAD and MAD experiments
Automated data integration, scaling and merging. Offline remote access for manual data processing.
SX experiments using HVE-injector (High viscosity extrusion injector), fixed target scan using the MD3
Element identification by X-ray fluorescence
Remote data collection
Fragment-based drug screening

### **Bloch**

Bloch is in general user operation.

First general users for spin-ARPES experiments are delayed due to the warm shutdown and Covid-19 travel restrictions, which impacted installation and support work

- Spin-ARPES First General users Q3 2022

#### **Techniques available to general users**

High-resolution angle resolved photoelectron spectroscopy (ARPES), using deflection based analyzer or 6-axis manipulator
Linear vertical or horizontal polarised light from EPU, with energy range 10-1000eV (peak flux and resolution 15-200eV)
Online Scanning tunneling microscopy (STM), 50K - 300K

### CoSAXS

CoSAXS is in general user operation.

First general users for WAXS time resolved experiments are delayed due to the warm shutdown and Covid-19 travel restrictions, which impacted installation and support work.

#### Techniques available to general users

Solution/soft matter conventional SAXS & bio SAXS

Sample environment: Baseline configuration, heating stages, user implementation

#### Techniques available to commissioning experts

Time resolved experiments

WAXS

XPCS

Advanced sample environments: rheometer, heating stages, microfluidics, stopped flow, magnets

### DanMAX

The powder X-ray diffraction (PXRD) station is being commissioned.

First expert users and first general users are delayed due to the warm shutdown. The procurement of the Imaging end-station is underway and installation is planned in mid-2022.

- First expert users: Q3 2021
- First general users: Q4 2021

#### Techniques available to commissioning experts

##### X-ray powder diffraction

Time resolved studies

Low temperature studies

In situ battery set up

2D PXRD mapping

Total scattering

### **FemtoMAX**

FemtoMAX is in general user operation with 10 Hz.

#### **Techniques available to general users**

Scattering set-up (SAXS, WAXS) in-vacuo sample environment  
 Crystallography and grazing incidence X-ray diffraction.  
 Excitation 400 nm – THz radiation.  
 Time-resolved X-ray induced fluorescence measurements.  
 Time resolution is 500 fs for scanning measurements (work ongoing to improve), <200 fs for single-shot.

### **FinEstBeAMS**

FinEstBeAMS is in general user operation.

First general users for the solid state end station are delayed 3 months due to the warm shutdown and Covid-19 travel restrictions, which impacted installation and support work

- Solid End-station First general users: Q3 2021

#### **Techniques available to general users**

High-resolution photoelectron and Auger electron spectroscopy of gaseous samples. (GPES)  
 Ion time-of-flight mass spectrometry of gaseous samples (GPES)  
 X-ray absorption of gaseous samples, measured in the total ionYield mode (GPES)  
 Photoluminescence spectroscopy of solid samples in the wavelength range 1.4um-200 nm (PLES)  
 Measurement of photoluminescence excitation functions at fixed emission wavelengths as well as reflection spectra from polished surfaces of solid samples. (PLES)  
 Temperature dependencies of luminescence properties of solid materials in the temperature range from 10 K up to 350 K. (PLES)  
 Photoelectron-photon coincidence (PEPICO) spectroscopy of gaseous samples (GPES)  
 X-ray photoelectron spectroscopy of surfaces and interfaces in UHV (SSES)  
 Angle-resolved photoelectron spectroscopy of 2D materials and condensed matter physics (SSES)

### **FlexPES**

FlexPES is in general user operation.

#### **Techniques available to general users**

Beamline: Linear horizontally polarized light from LPU, with energy range 40-1500 eV. Spot on sample both defocused (0.5-1.5 mm) and focused (from 50x15  $\mu\text{m}$  to 150x40  $\mu\text{m}$  in different end stations)

Surface- and material science (SMS) branch: High-resolution photoelectron spectroscopy (PES) on solid samples using SES-2002 analyzer and 4-axis manipulator; X-ray absorption spectroscopy (XAS or NEXAFS) using total and partial electron yield

Low density matter (LDM) branch: High-resolution PES on LDM samples using R4000 analyzer with these sample delivery systems (samples must be approved by chemical safety group):

- Liquid jet setup for e.g. aqueous solutions
- Molecular jet source (continuous beam) for cold beams of atomic and molecular gases
- Gas cell for PES on atomic and molecular gases

### **ForMAX**

Commissioning of ForMAX is delayed from Q3 2021 to Q1 2022 due to Covid-19 travel restrictions, which delayed the insertion device site acceptance test.

- Start of commissioning: Q1 2022 (previously Q3 2021)
- First expert users: Q1 2022 (previously Q4 2021)
- First general users: Q4 2022

### **HIPPIE**

HIPPIE is in general user operation.

#### **Techniques available to general users**

Catalysis Cell: APXPS of solid-gas interfaces up to 10 mbar, for catalysis and surface science

PM-IRRAS: APXPS and FTIR on the same spot up to 1 mbar for catalysis and surface science

Liquid/electrochemistry cell: APXPS of solid-liquid (dip-and-pull setup) and gas-liquid (liquid jet setup) interfaces up to 30 mbar for electrochemistry, energy, environmental, and atmospheric science

### **MAXPEEM**

MAXPEEM is in general user operation.

#### **Techniques available to general users**

Soft X-ray SPELEEM (micro-LEED, PED, micro ARPES, XMCD microscopy)



### **MicroMAX**

The MicroMAX project timeline is delayed due to Covid-19 travel restrictions, which delayed the insertion device site acceptance test and increased the risk for delayed functionality.

- Start of commissioning: Q2 2022
- First expert users: Q4 2022
- First general users: Q2 2023

### **NanoMAX**

The NanoMAX KB station is in general user operation.

#### **Techniques available to general users**

Scanning X-ray diffraction and coherent imaging in Bragg geometry
Forward ptychography and CDI
X-Ray fluorescence mapping in 2D
Forward ptycho-tomography (under development, not all samples are suitable, contact beamline team to discuss feasibility before proposal submission)

Development of the NanoMAX FZP end station is on track.

- Start of commissioning: Q3 2021
- First expert users: Q3 2021
- First general users: Q4 2022

### **SoftiMAX**

First general users on the STXM branch for are delayed due to an optics cooling leak, the warm shutdown and Covid-19 travel restrictions, which impacted installation and support work. A conceptual design report is being developed for the second branch.

- First general users: Q4 2021

#### **Techniques available to commissioning experts**

STXM
Forward ptychography (basic)
XMCD Microscopy (basic)
XRF mapping

### **SPECIES**

SPECIES is in general user operation.

Project delays due to warm shutdown and Covid-19 travel restrictions has slowed progress towards scope of the SPECIES RIXS branch and has had an impact on general user operation.

#### **Techniques available to general users**

Standard cell: APXPS up to 20 mbar for catalysis, oxidation studies, and surface science

ALD cell: APXPS for in-situ ALD experiments up to 20 mbar

RIXS using the GRACE spectrometer (emission energy range 50-650 eV, only linear polarization horizontally and vertically). Solid samples only. LN2-sample cooling available, 4-axis manipulator

### **VERITAS**

Veritas B branch line (the open port branch) is in general user operation.

First general users on the Veritas A branch line are delayed due to optics cooling leaks, the warm shutdown and Covid-19 travel restrictions, which impacted installation and support work.

- First general users (A branch): Q4 2021

#### **Techniques available to general users**

User roll-up at the open port branch. Only approved equipment (contact beamline)

## **Appendix 2**

### **2021 publications**

Status of beamlines at MAX IV

May 2021

BEAMLINE(S)	AUTHORLIST	TITLE	JOURNAL	DOI
BioMAX	Fitzgerald EA, Butko MT, Boronat P, Cederfelt D, Abramsson M, Ludviksdottir H, van Muijlwijk-Koezen J, de Esch JJP, Dobritzsch D, Young T, Danielson UH	Discovery of fragments inducing conformational effects in dynamic proteins using a second-harmonic generation biosensor	RSC ADVANCES	
*BioMAX	Ramos J, Lau V, Haertlein M, Erba EB, Mcauley KE, Forsyth VT, Mossou E, Larsen S, Langkilde AE	Structural insights into protein folding, stability and activity using in vivo perdeuteration of hen egg-white lysozyme	IUCRI	<a href="https://doi.org/10.1107/S2052252521001299">10.1107/S2052252521001299</a>
*BioMAX	Haddad Momeni M, Fredslund F, Bissaro B, Raji O, Vuong TV, Meier S, Nielsen TS, Lombard V, Guigliarelli B, Biaso F, Haon M, Grisel S, Henrissat B, Welner DH, Master ER, Berrin JG, Abou Hachem M	Discovery of fungal oligosaccharide-oxidising flavo-enzymes with previously unknown substrates, redox-activity profiles and interplay with LPMOs.	NATURE COMMUNICATIONS	<a href="https://doi.org/10.1038/s41467-021-22372-0">10.1038/s41467-021-22372-0</a>
BioMAX	Sprenger J, Carey J, Schulz A, Drouard F, L Lawson C, von Wachenfeldt C, Linse S, Lo Leggio L	Guest-protein incorporation into solvent channels of a protein host crystal (hostal)	ACTA CRYSTALLOGRAPHICA SECTION D	<a href="https://doi.org/10.1107/S2059798321001078">10.1107/S2059798321001078</a>
*BioMAX	Schriever K, Saenz-Mendez P, Rudraraja RS, Hendrikse NM, Hudson EP, Biundo A, Schnell R, Syren PO	Engineering of Ancestors as a Tool to Elucidate Structure, Mechanism, and Specificity of Extant Terpene Cyclase.	JOURNAL OF THE AMERICAN CHEMICAL SOCIETY	<a href="https://doi.org/10.1021/jacs.0c10214">10.1021/jacs.0c10214</a>
*BioMAX	Martelli G, Pessatti TB, Steiner EM, Cirillo M, Caso C, Bisognin F, Landreh M, Monte PD, Giacomini D, Schnell R	N-Thio-beta-lactams targeting L,D-transpeptidase-2, with activity against drug-resistant strains of Mycobacterium tuberculosis.	CELL CHEMICAL BIOLOGY	<a href="https://doi.org/10.1016/j.chembio.2021.03.008">10.1016/j.chembio.2021.03.008</a>
*BioMAX	Pallesen JS, Narayanan D, Tran KT, Solbak SM, Marsaglia G, Sørensen LME, Høj LJ, Munafò F, Carmona RMC, Garcia AD, Desu HL, Brambilla R, Johansen TN, Popowicz GM, Sattler M, Gajhede M, Bach A	Deconstructing Noncovalent Kelch-like ECH-Associated Protein 1 (Keap1) Inhibitors into Fragments to Reconstruct New Potent Compounds.	JOURNAL OF MEDICINAL CHEMISTRY	<a href="https://doi.org/10.1021/acs.jmedchem.0c02094">10.1021/acs.jmedchem.0c02094</a>
BioMAX	Rehling D, Zhang SM, Jemth AS, Koolmeister T, Throup A, Wallner O, Scaletti E, Moriyama T, Nishi R, Davies J, Desroses M, Rudd SG, Scobie M, Homan E, Berglund UW, Yang JJ, Helleday T, Stenmark P	Crystal structures of NUDT15 variants enabled by a potent inhibitor reveal the structural basis for thiopurine sensitivity.	JOURNAL OF BIOLOGICAL CHEMISTRY	<a href="https://doi.org/10.1016/j.jbc.2021.100568">10.1016/j.jbc.2021.100568</a>
BioMAX	Fragment-Based Discovery of Novel Allosteric MEK1 Binders	Fragment-Based Discovery of Novel Allosteric MEK1 Binders	ACS MEDICINAL CHEMISTRY LETTERS	<a href="https://doi.org/10.1021/acsmmedchemlett.0c00563">10.1021/acsmmedchemlett.0c00563</a>
BioMAX	Kmezik C, Mazurkewich S, Meents T, McKee L, Idstrom A, Armeni M, Savolainen O, Branden G, Larström J	polysaccharide utilization locus from the gut bacterium <i>Dysgonomonas mossii</i> encodes functionally distinct carbohydrate esterases.	JOURNAL OF BIOLOGICAL CHEMISTRY	<a href="https://doi.org/10.1016/j.jbc.2021.100500">10.1016/j.jbc.2021.100500</a>

BEAMLINE(S)	AUTHORLIST	TITLE	JOURNAL	DOI
BioMAX	Heidler Thomas V., Ernits Karin, Ziolkowska Agnieszka, Claesson Rolf, Persson Karina	Porphyromonas gingivalis fimbrial protein Mfa5 contains a von Willebrand factor domain and an intramolecular isopeptide	COMMUNICATIONS BIOLOGY	<a href="https://doi.org/10.1038/s42003-020-01621-w">10.1038/s42003-020-01621-w</a>
BioMAX	Kalyani DC, Reichenbach T, Aspeborg H, Divne C	A homodimeric bacterial exo-beta-1,3-glucanase derived from moose rumen microbiome shows a structural framework similar to yeast exo-beta-1,3-glucanases.	ENZYME AND MICROBIAL TECHNOLOGY	<a href="https://doi.org/10.1016/j.enzmictec.2020.109723">10.1016/j.enzmictec.2020.109723</a>
BioMAX	Talibov VO, Fabini E, Fitzgerald E, Tedesco D, Eriksson D, Talu MJ, Rachman MM, Mihalic F, Manoni E, Naldi M, Sanese P, Forte G, Signorile ML, Barril X, Simone C, Bartolini M, Dobritzsch D, Rio AD, Danielson UH	Discovery of an allosteric ligand binding site in SMYD3 lysine methyltransferase	CHEMBIOCHEM	<a href="https://doi.org/10.1002/cbic.202000736">10.1002/cbic.202000736</a>
*BioMAX	Hasan M, Khakzad H, Happonen L, Sundin A, Unge J, Mueller U, Malmström J, Westergren-Thorsson G, Malmström L, Ellervik U, Malmström A, Tykesson E	The structure of human dermatan sulfate epimerase 1 emphasizes the importance of C5-epimerization of glucuronic acid in higher organisms	CHEMICAL SCIENCE	<a href="https://doi.org/10.1039/D0SC05971D">10.1039/D0SC05971D</a>
BioMAX	Vella Peter, Rudraraju Reshma Sriakshmi, Lundback Thomas, Axelsson Hanna, Almqvist Helena, Vallin Michaela, Schneider Gunter, Schnell Robert	A FabG inhibitor targeting an allosteric binding site inhibits several orthologs from Gram-negative ESKAPE pathogens	BIOORGANIC & MEDICINAL CHEMISTRY	<a href="https://doi.org/10.1016/j.bmc.2020.115898">10.1016/j.bmc.2020.115898</a>
Bloch	Yi HEMIAN, Huang ZENGLE, Shi WUJUN, Min LUJIN, Wu RUJ, POLLEY C, Zhang RUOXI, Zhao YI-FAN, Zhou LING-JIE, Adell J, Gui XIN, Xie WEIWEI, Chan MOSES H W, Mao ZHIQIANG, Wang ZHIJUN, Wu WEIDA, Chang CUI-ZU	Surface charge induced Dirac band splitting in a charge density wave material (TaSe4)2I	PHYSICAL REVIEW RESEARCH	
Bloch	Schulz S, Vyazovskaya A Yu, Poelchen G, Generalov A, Güttler M, Mende M, Danzenbächer S, Otrokov MM, Balasubramanian T, Polley C, Chulkov EV, Laubschat C, Peters M, Klement K, Krellner C, Usachov D Yu, Vyalkikh DV	Classical and cubic Rashba effect in the presence of in-plane 4f magnetism at the iridium silicide surface of the antiferromagnet GdIr2Si2	PHYSICAL REVIEW B	<a href="https://doi.org/10.1103/PhysRevB.103.035123">10.1103/PhysRevB.103.035123</a>
FemtoMAX BioMAX	Jensen M, Ahlberg Gagner V, Cabello Sanchez J, Bengtsson A U J, Ekstrom J C, Bjorg Ulfarsdottir T, Garcia-Bonete M J, Jurgilaitis A, Kroon D, Pham V T, Checchia S, Coudert-Alteirac H, Schewa S, Rossie M, Rodilla H, Stake J, Zhaunerchyk V, Larsson J, Katona G	High-resolution macromolecular crystallography at the FemtoMAX beamline with time-over-threshold photon detection	J. SYNCHROTRON RADIATION	<a href="https://doi.org/10.1107/S1600577520014599">10.1107/S1600577520014599</a>
*FlexPES	Athle R, Persson AEO, Irish A, Menon H, Timm R, Borg M	Effects of TiN Top Electrode Texturing on Ferroelectricity in Hf1-xZrxO2	ACS APPLIED MATERIALS & INTERFACES	<a href="https://doi.org/10.1021/acsami.1c01734">10.1021/acsami.1c01734</a>
FlexPES	Abid AR, Reinhardt M, Boudjemia N, Pelimanni E, Milosavljevic AR, Saak CM, Huttula M, Björneholm O, Patanen M	The effect of relative humidity on CaCl2 nanoparticles studied by soft X-ray absorption spectroscopy	RSC ADVANCES	<a href="https://doi.org/10.1039/d0ra08943e">10.1039/d0ra08943e</a>

BEAMLINE(S)	AUTHORLIST	TITLE	JOURNAL	DOI
*HIPPIE	Persson N, Ram MS, D'acunto G, Liu Y, Benter S, Pan J, Li Z, Borg M, Mikkelsen A, Wernersson LE, Timm R	Tuning oxygen vacancies and resistive switching properties in ultra-thin HfO <sub>2</sub> RRAM via TiN bottom electrode and interface engineering	APPLIED SURFACE SCIENCE	<a href="https://doi.org/10.1016/j.apsusc.2021.149386">10.1016/j.apsusc.2021.149386</a>
*HIPPIE	Divins NJ, Kordus D, Timoshenko J, Sinev I, Zegkinoglou I, Bergmann A, Chee SW, Widrinna S, Karslioglu O, Mistry H, Luna ML, Zhong JQ, Hoffman AS, Boubnov A, Boscoboinik JA, Heggen M, Dunin-Borkowski RE, Bare SR, Cuenya BR	Operando high-pressure investigation of size-controlled Cu <sub>2</sub> Zn catalysts for the methanol synthesis reaction	NATURE COMMUNICATIONS	<a href="https://doi.org/10.1038/s41467-021-21604-7">10.1038/s41467-021-21604-7</a>
*HIPPIE	Pramhaas Verena, Roiaz Matteo, Bosio Noemi, Corva Manuel, Rameshan Christoph, Vesselli Erik, Gronbeck Henrik, Rupprechter Guenther	Interplay between CO Disproportionation and Oxidation: On the Origin of the CO Reaction Onset on Atomic Layer Deposition-Grown Pt/ZrO <sub>2</sub> Model Catalysts	ACS CATALYSIS	<a href="https://doi.org/10.1021/acscatal.0c03974">10.1021/acscatal.0c03974</a>
*HIPPIE	Scardamaglia M, Boix V, D'acunto G, Struzzi C, Reckinger N, Chen X, Sivayogimath A, Booth T, Knudsen J	Comparative study of copper oxidation protection with graphene and hexagonal boron nitride	CARBON	<a href="https://doi.org/10.1016/j.carbon.2020.09.021">10.1016/j.carbon.2020.09.021</a>
MAXPEEM	Singh Harishchandra, Alatarvas Tuomas, Kistanov Andrey A., Aravindh S. Assa, Wang Shubo, Zhu Lin, Sarpi Brice, Niu Yuran, Zakharov Alexei, de Groot F. M. F., Huittula Marko, Cao Wei, Fabritius Timo	Unveiling interactions of non-metallic inclusions within advanced ultra-high-strength steel: A spectro-microscopic determination and first-principles elucidation	SCRIPTA MATERIALIA	<a href="https://doi.org/10.1016/j.scriptamat.2021.113791">10.1016/j.scriptamat.2021.113791</a>
I311-XPS MAXPEEM	Stanishev Vallery, Armakavicius Nerijus, Bouhafs Chamseddine, Coletti Camilla, Kuhne Philipp, Ivanov Ivan G., Zakharov Alexei A., Yakimova Rositsa, Darakchieva Vanya	Critical View on Buffer Layer Formation and Monolayer Graphene Properties in High-Temperature Sublimation	APPLIED SCIENCES-BASEL	<a href="https://doi.org/10.3390/app11041891">10.3390/app11041891</a>
I311-PEEM MAXPEEM	Selegard Linnea, Skallberg Andreas, Zakharov Alexei, Abrikosova Natalia, Uvdal Kajsa	Step by step rare-earth catalyzed SiO <sub>x</sub> annealing and simultaneous formation of Europium-silicide by low coverage of Eu doped Gd <sub>2</sub> O <sub>3</sub> nanoparticles	SURFACE SCIENCE	<a href="https://doi.org/10.1016/j.susc.2020.121743">10.1016/j.susc.2020.121743</a>
*MAXPEEM	Armakavicius Nerijus, Kuhne Philipp, Eriksson Jens, Bouhafs Chamseddine, Stanishev Vallery, Ivanov Ivan G., Yakimova Rositsa, Zakharov Alexei A., Al-Temimy Ameer, Coletti Camilla, Schubert Mathias, Darakchiev Vanya	Resolving mobility anisotropy in quasi-free-standing epitaxial graphene by terahertz optical Hall effect	CARBON	<a href="https://doi.org/10.1016/j.carbon.2020.09.035">10.1016/j.carbon.2020.09.035</a>
NanoMAX	Nissila Tuukka, Wei Jiayuan, Geng Shiyu, Teleman Anita, Oksman Kristina	Ice-Templated Cellulose Nanofiber Filaments as a Reinforcement Material in Epoxy Composites	NANOMATERIALS	<a href="https://doi.org/10.3390/nano11020490">10.3390/nano11020490</a>
*Species	Lin Jack J., Raj Kamal R., Wang Stella, Kokkonen Esko, Mikkela Mikko-Heikki, Urpelainen Samuli, Prisle Nonne L.	Pre-deliquescent water uptake in deposited nanoparticles observed with in situ ambient pressure X-ray photoelectron spectroscopy	ATMOSPHERIC CHEMISTRY AND PHYSICS	<a href="https://doi.org/10.5194/acp-21-4709-2021">10.5194/acp-21-4709-2021</a>

BEAMLINE(S)	AUTHORLIST	TITLE	JOURNAL	DOI
Species	Kokkonen Esko, da Silva Felipe Lopes, Mikkela Mikko-Heikki, Johansson Niclas, Huang Shih-Wen, Lee Jenn-Min, Andersson Margit, Bartalesi Antonio, Reinecke Benjamin N., Handrup Karsten, Tarawneh Hamed, Sankari Rami, Knudsen Jan, Schnadt Joachim, Sathe Conny, Urpelainen Samuli	Upgrade of the SPECIES beamline at the MAX IV Laboratory	JOURNAL OF SYNCHROTRON RADIATION	<a href="https://doi.org/10.1107/S1600577521000564">10.1107/S1600577521000564</a>
Accelerator	Grabski M, Al-Dmour E	Commissioning and operation status of the MAX IV 3 GeV storage ring vacuum system	JOURNAL OF SYNCHROTRON RADIATION	<a href="https://doi.org/10.1107/S1600577521002599">doi: 10.1107/S1600577521002599</a>
D1011	Kamal C., Stenberg Nader, Walle Lars Erik, Ragazzon Davide, Borg Anne, Uvdal Per, Skorodumova Natalia V, Odellius Michael, Sandell Anders	Core-Level Binding Energy Reveals Hydrogen Bonding Configurations of Water Adsorbed on TiO <sub>2</sub> (110) Surface	PHYSICAL REVIEW LETTERS	<a href="https://doi.org/10.1103/PhysRevLett.126.016102">10.1103/PhysRevLett.126.016102</a>
*I811	Tiberg Charlotta, Sjostedt Carin, Fedje Karin Karlfeldt	Speciation of Cu and Zn in bottom ash from solid waste incineration studied by XAS, XRD, and geochemical modelling	WASTE MANAGEMENT	<a href="https://doi.org/10.1016/j.wasman.2020.10.023">10.1016/j.wasman.2020.10.023</a>
I911-4	Barciszewski J, Szpotkowski K, Wiśniewski J, Kolodziejczyk R, Rakus D, Dzugaj MJA	Structural studies of human muscle FBPaase	ACTA BIOCHIMICA POLONICA	<a href="https://doi.org/10.18388/abp.2020.5554">10.18388/abp.2020.5554</a>
I911-4 MX	Kuktaite Ramune, Repo-Carrasco-Valencia Ritva, de Mendoza Cesar C. H., Plivelic Tomas S., Hall Stephen, Johansson Eva	Innovatively processed quinoa (Chenopodium quinoa Willd.) food: chemistry, structure and end-use characteristics	JOURNAL OF THE SCIENCE OF FOOD AND AGRICULTURE	<a href="https://doi.org/10.1002/jsfa.11214">10.1002/jsfa.11214</a>
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BEAMLINE(S)	AUTHORLIST	TITLE	JOURNAL	DOI
*MX	Beckmann R, Jensen K, Fenn S, Speck J, Krause K, Meier A, Röth M, Fauser S, Kimbung R, Logan DT, Steegmaier M, Kettenberger H	DutaFabs are engineered therapeutic Fab fragments that can bind two targets simultaneously	NATURE COMMUNICATIONS	<a href="https://doi.org/10.1038/s41467-021-20949-3">10.1038/s41467-021-20949-3</a>