

MID

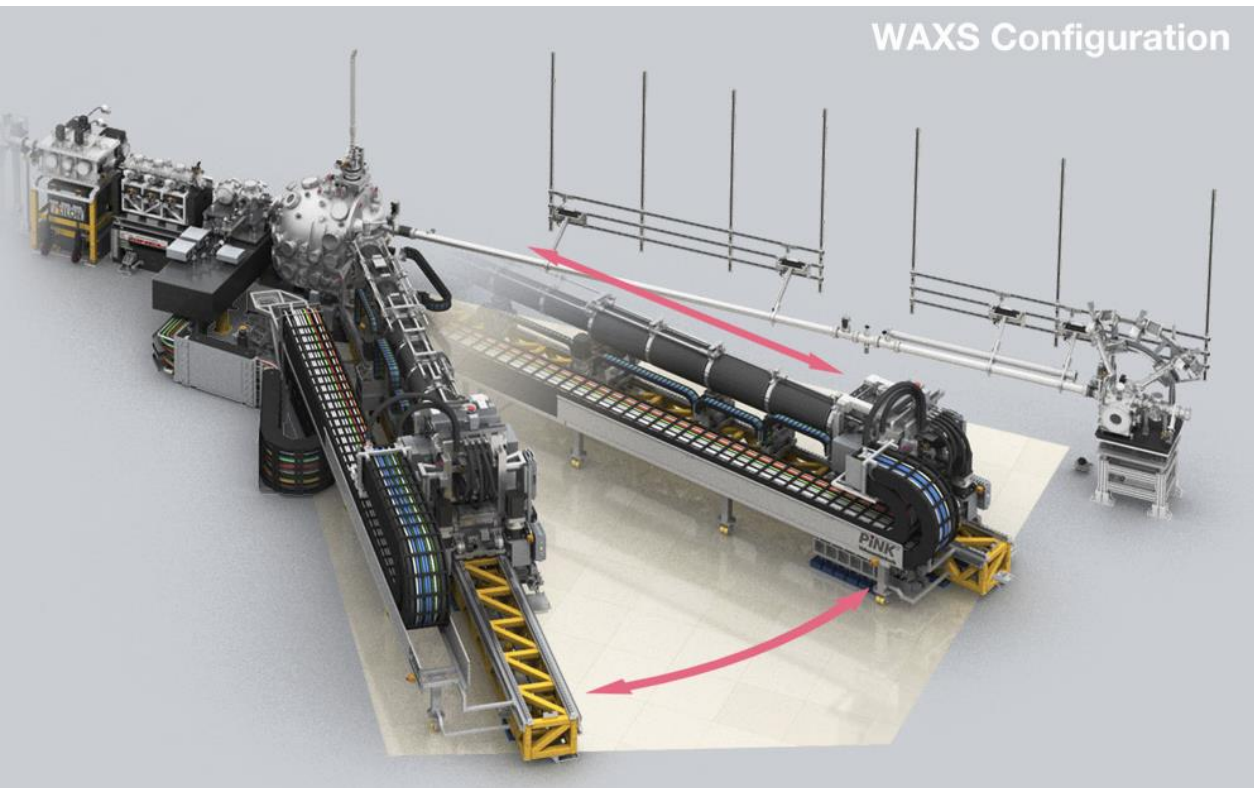
Materials Imaging and Dynamics



local contacts
and
technical coordinators



Materials Imaging and Dynamics (MID) instrument



Versatile scattering/imaging setup

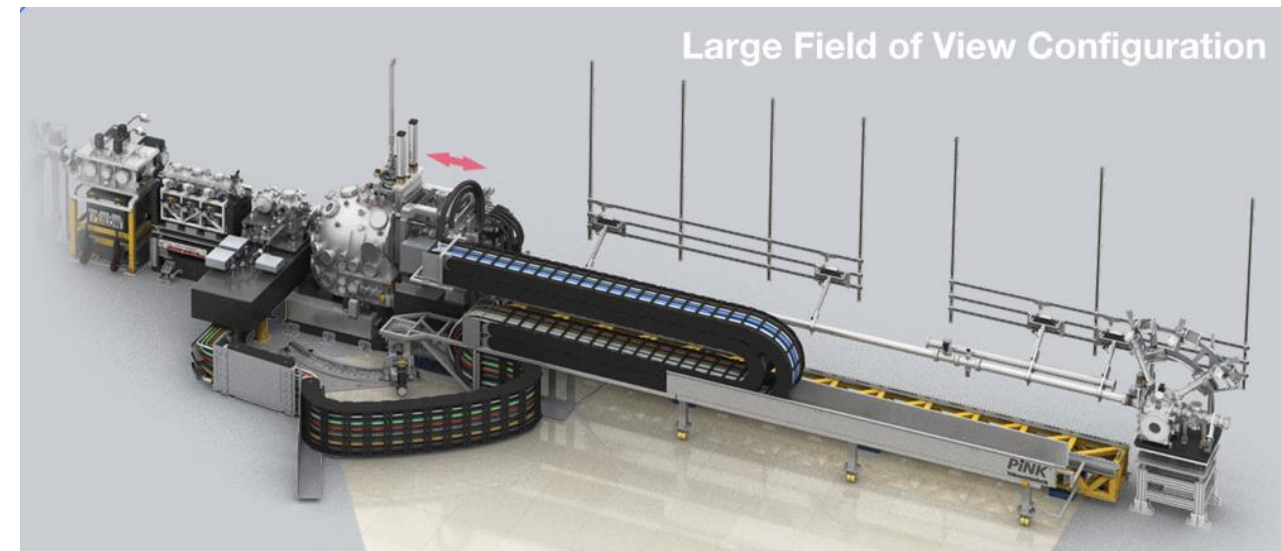
Flexible geometry: SAXS, WAXS, Large Field of View
Sample - detector distance $\sim 0.2 - 8$ m, 2θ up to $\sim 50^\circ$
5 - 24 keV, $\sim 10^{12}$ ph/pulse @ 9 keV

MHz and Mpixel area detector (AGIPD), Hi-res CCDs
Windowless (all in-vacuum setup) or sample env. in air

Self-seeding or mono, optical fs laser, nano focusing
2-color operation, attosecond pulses

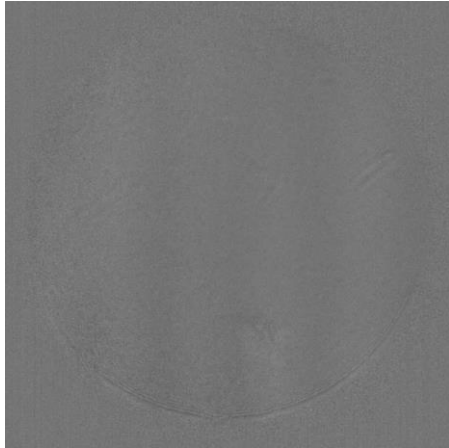
Start of operation: March 2019

A. Madsen *et al.*, *J. Synch. Rad.* **28**, 637 (2021)

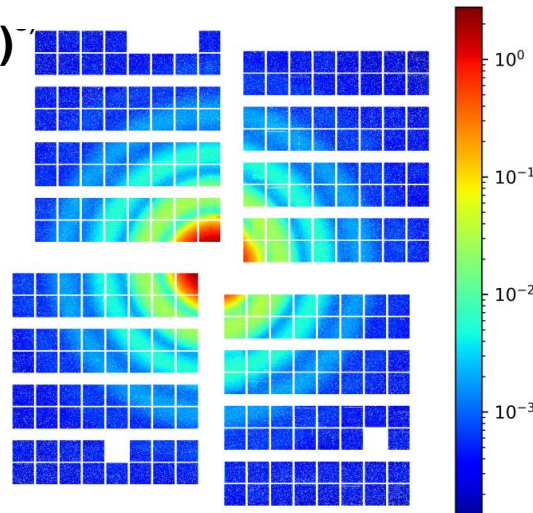


MID science

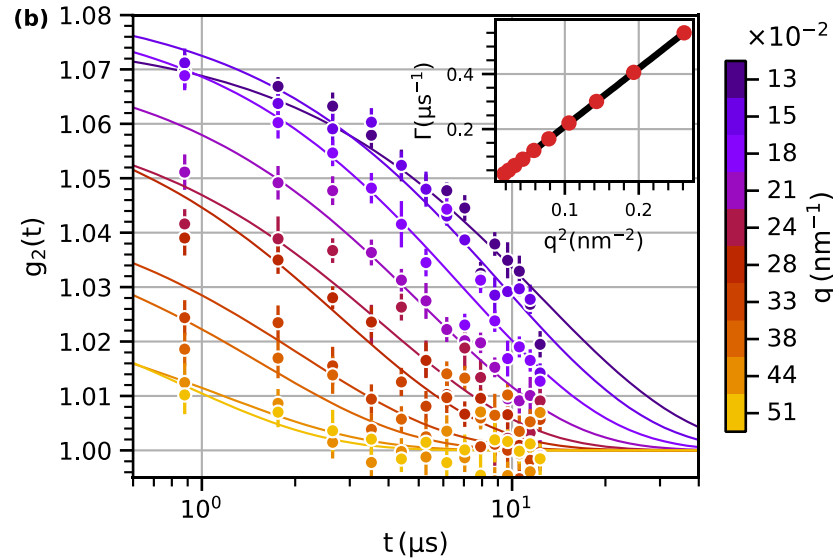
Cavitation bubble dynamics
(TR imaging, NF holography)



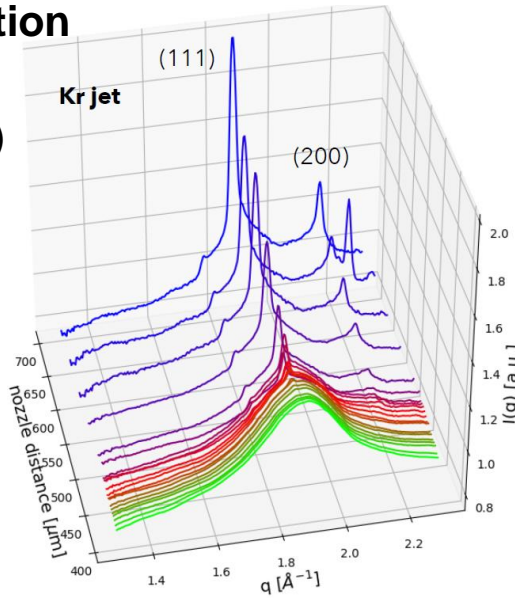
Colloidal science
(TR-SAXS)



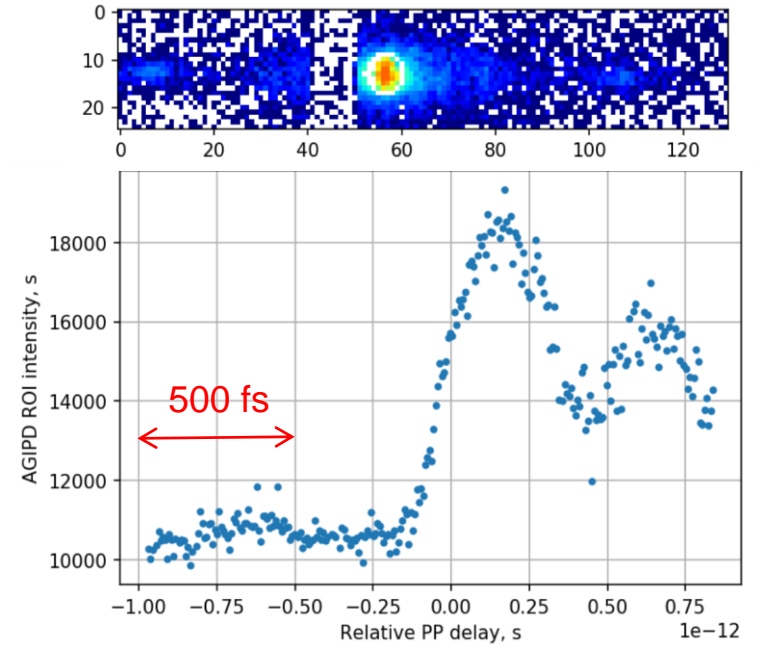
Protein dynamics (MHz XPCS)



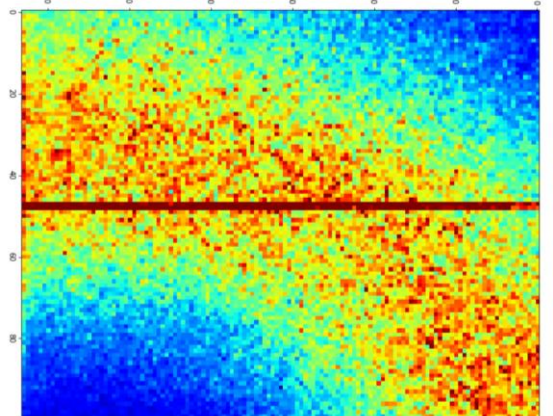
Crystallization
kinetics
(TR-WAXS)



LA phonons in STO
(fs laser pump – X-ray probe)



Coherent scattering
and speckle



MID open for Call 12

- **Deadline for submission: Nov 8 at 16h (CEST). Scheduling period: Aug-Dec 2024**

- **Specifications very similar to Call 11**

- **Standard configuration available for small-angle MHz XPCS**

 - AGIPD MHz area detector, 1M pixels, 200 μm pixel size

 - 7–12 keV, ~ 1 mJ/pulse (SASE)

 - Min. correlation function lag time 440 ns, max. lag time ~ 155 μs (352 pulses)

 - q-range (8 m sample–detector distance): $\sim 7 \times 10^{-3} - 0.1$ \AA^{-1} (small angle scattering)

 - Beam size on sample: $\sim 0.3 - 10$ μm with large NA optics, > 10 μm with tunnel optics

- **Hard X-ray split-and-delay line open for proposals (two color, XPXP, XSVS,...)**

 - Photon energy: $\sim 7 - 10$ keV

 - Delay range: $-10 - 800$ ps

 - Bandwidth: $\sim 6 \times 10^{-5}$, 2×4 Si(220) reflections

- **Self-seeding available (discuss with us well ahead of submitting the proposal)**

 - Up to ~ 0.8 mJ achieved in ~ 1 eV bandwidth at 9 keV

 - Tested up to ~ 18 keV, special preparations required...

MID open for Call 12

■ Detectors

AGIPD MHz & Mpixel detector; Jungfrau 500k (100 kHz), ePix100 (10 Hz)
Andor Zyla CCD (10 Hz), Gotthard line detector (for DES spectrometer)
X-ray eye, scintillators, APD,...

■ Sample environment

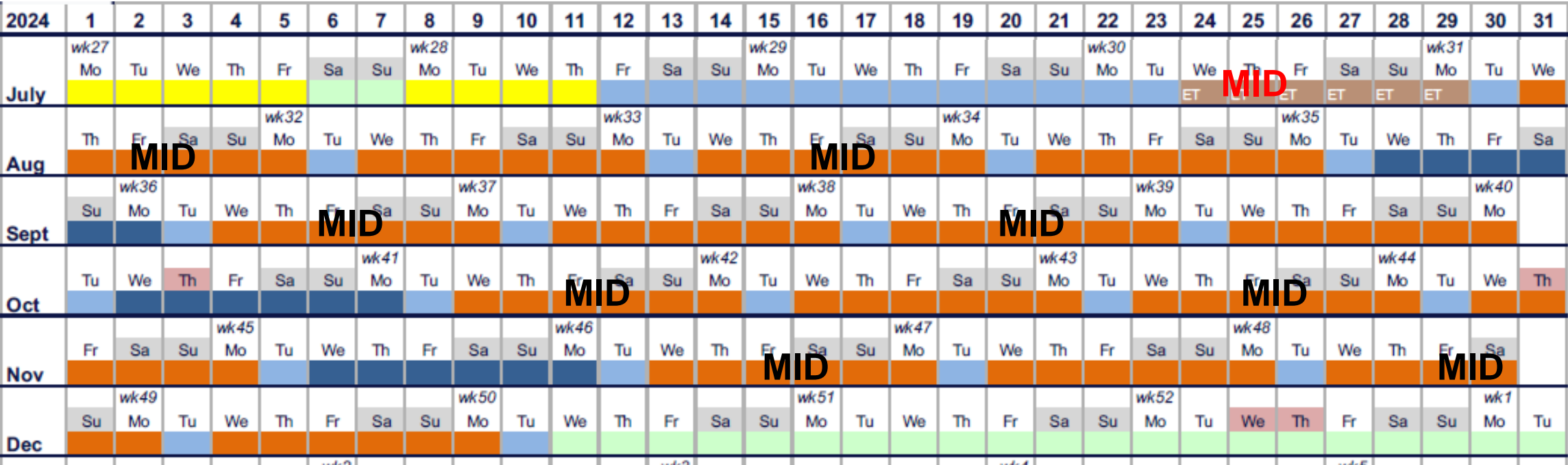
He cryostat, liquid jets, hexapod for flexible mount of user supplied equipment
Fast solid sample scanner, pulsed B field,...

■ Optical lasers

800 nm, 400 nm, 266 nm (MHz PP, mJ, fs)
1030 nm (MHz PP, mJ, ps)
1064 nm, 532 nm (10 Hz, mJ, ns)

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8 weeks (8×6 days) of beam in 2024-II available at MID

Hints to write a successful proposal for MID

Proposal success rate of MID (2019-2023): 24%

To be in the top tier:

■ Avoid obvious mistakes

Talk to MID staff beforehand and proofread the text and figures

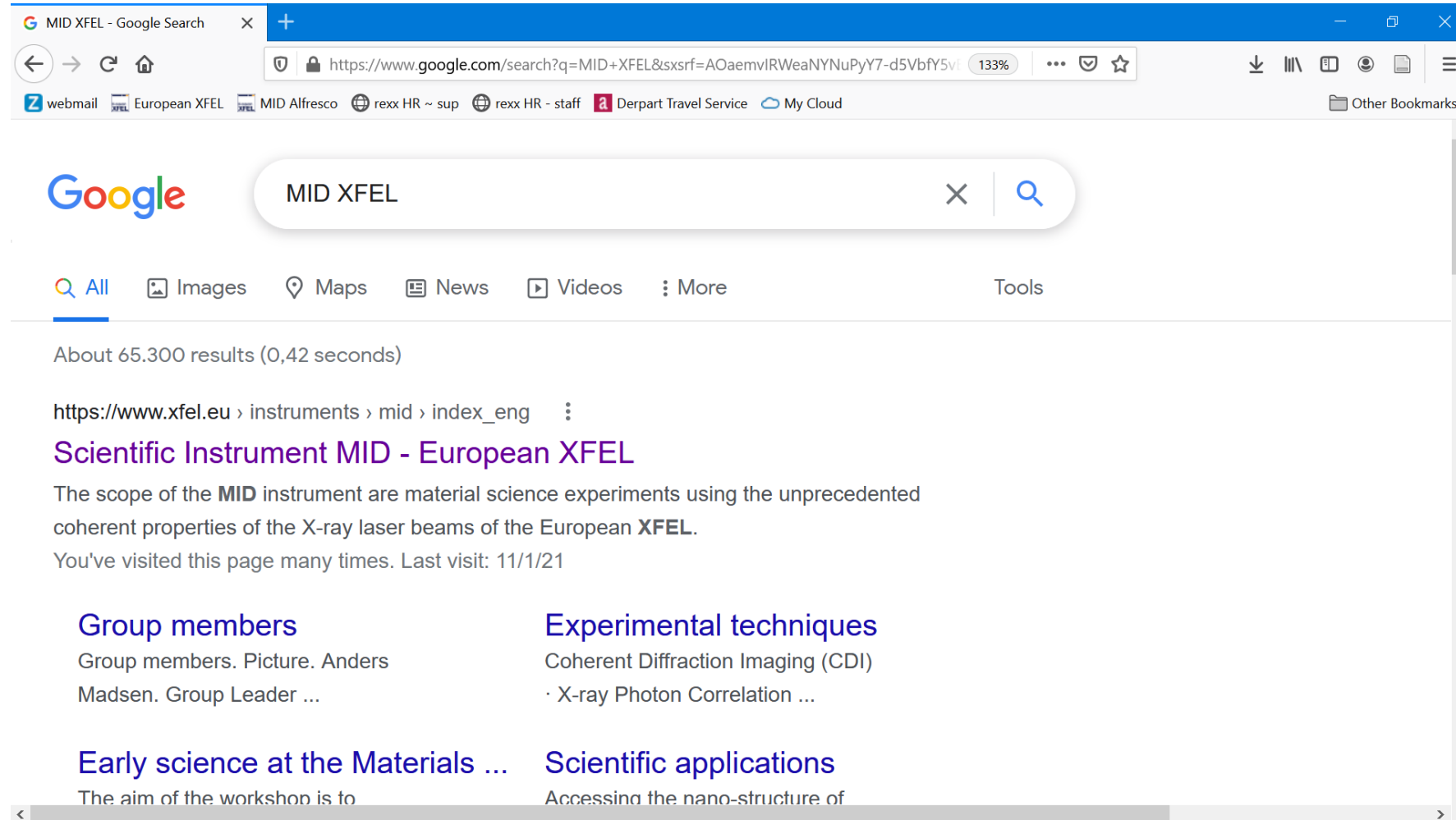
■ Focus on science

Write a compelling science case based on novelty and excellence

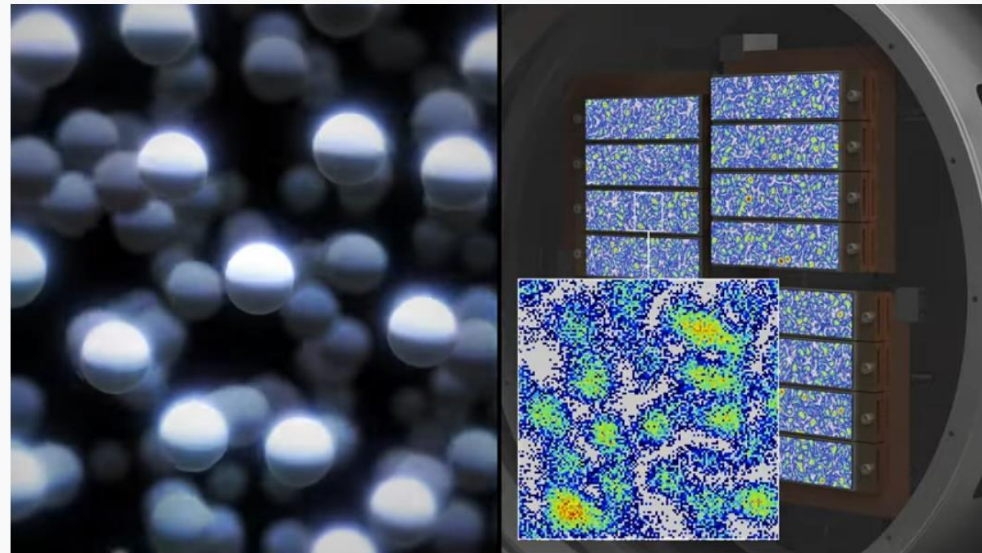
■ Why EuXFEL?

If possible show data collected with other methods illustrating the unique role of EuXFEL

Need more information?



MID on YouTube



The MID instrument at the European XFEL

<https://www.youtube.com/watch?v=S-ACzHyFIIk>

<https://www.youtube.com/watch?v=vCrriuHSWsc>



MID change of configuration time-lapse