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MID, Materials Imaging and Dynamics

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The MID instrument, located in the beamline SASE2 of the European XFEL Facility, has been in operation since 2019. The focus of the MID instrument is ultrafast studies of materials using the High repetition rate and high spatial coherence of the European XFEL accelerator.
The instrument work in a large range of hard x-ray energy ranges from 5 keV to 24 keV. The beam size at the sample position can be tailor from 2 mm to 300 nm (using CRLs) optics. For the longitudinal coherence, the instrument has 2 monochromators Si 111 and Si 220, what allows bandwidths of 10-4 and 6x10-5, respectively. As a plus, the self-seeding available at SASE2 allows to reduce the bandwidth of the photons from the machine to 1.5 eV. The instrument has also a splitting and delay line (SDL) that is capable of dividing the incoming xrays in two pulses and scan them from -10 to 800 ps. A magnetic pulse environment capable of generating 14 T pulse magnetic fields is available. An optical laser 800 nm with 15 (50) fs
pulse width and a maximum pulse power of 1 mJ is also available for performing pump-probe experiments.
The main detector at the instrument is the single pulse resolve AGIPD, that has a 200 µm square pixel. This detector can work with the 4.5 MHz repetition of the x-ray source and collect 352 pulses by train. The AGIPD detector can be located in WAXS and SAXS configuration and at arrange between 3 and 8 m from the sample. Other detectors available are the Epix, Jungfrau and the scintillator couple Andor Zyla.
The main experimental technique at MID is XPCS (X-ray photon correlation spectroscopy), but experiments of holography, Bragg CDI, ptychography, SAXS, WAXS and pump-probe diffraction have been performed successfully. In the oral contribution some of these experiments will be present to the audience.

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Primary author: RODRIGUEZ FERNANDEZ, Angel (European XFEL Facility GmbH)

Presenter: RODRIGUEZ FERNANDEZ, Angel (European XFEL Facility GmbH)

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