Contribution ID: **97** Contribution code: **WEP41** Type: **Contributed Poster**

The SASE3 Soft X-Ray Beamline at European XFEL: Monochromatic Operation

Wednesday, 24 August 2022 17:10 (20 minutes)

The SASE3 soft X-ray beamline at the European XFEL is equipped with the grating monochromator allowing to reduce SASE FEL bandwidth and to improve longitudinal coherence at the experiments in the photon energy range 250 eV - 3000 eV. The design of the monochromator is challenged by a demand to control both photon energy resolution and temporal resolution; the aim to transport close to transform-limited pulses poses very high demands on the optics quality, in particular on the grating. Presently, the monochromator operates with two gratings: the low-resolution grating is optimized for time-resolved experiments and allows for moderate resolving power of about 2000 - 5000 along with pulse stretching of few to few tens of femtoseconds RMS, and the high-resolution grating reaches resolving power of 10000 at a cost of larger pulse stretching. The examples of time-resolved experiments and experiments performed in high photon energy resolution mode are presented. In addition, being operational in spectrometer mode, the monochromator is regularly used for the spectral characterization of the FEL beam including photon pulse length retrieval.

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Session Classification: Wednesday posters

Track Classification: Photon beamline instrumentation & undulators