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The Optics of the Athos Soft X-ray Beamlines at SwissFEL

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SwissFEL is a free electron laser, comprising of two undulator lines with three endstations each: covering 2 – 12.7 keV (up to 1.5 mJ) and 0.25 –2 keV (up to 5.0 mJ), respectively.
We present the design and commissioning of the ATHOS soft x-ray optics, starting with the overall beamline-layout and the optical components inside the front-end: a gas attenuator, a thin foil based solid-state attenuator, slits and a photon-beam diffusor, dispersing the x-ray beam and protecting the beam-stopper.
Inside the optics hutch a horizontal deflection mirror separates the bremsstrahlung and the x-rays. To ensure a common beam-path behind the monochromator, for mono- and pink-beam operation, two vertical offset mirrors can move into the beam instead of the monochromator. We discuss the design and performance of these in-house build mirror-systems. The monochromator has an upward deflecting grating, accommodating different beam-heights at the endstations. We present commissioning results for the monochromator using an ionisation chamber, a scintillation screen based 2D-detector and a 1D-detector with improved resolution for also characterising the spectrum of attosecond pulses.
There are horizontal deflection mirrors between the monochromator (common to all three endstations) and the exit slits (specific to the endstations) to steer the beam towards the corresponding experiment.
Each endstation has a KB-mirror system to focus the beam onto the sample. We use slit scanning to optimise its focal spot size. A laser-based pointing system (upstream of the KB) coincides with the x-ray beam, enabling sample alignment ahead of the beamtime.

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yes

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