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X-ray Optical Delay Line at European XFEL

Free-electron lasers (FELs) are the most advanced class of light sources, enabling a wide range of innovative experiments such as two-color pump-probe spectroscopy. For this experiment, it is required to control the temporal delay between two X-ray pulses. For this purpose, the soft X-ray Self-Amplified Spontaneous Emission (SASE3) beamline at the European XFEL was equipped with a magnetic chicane (MC) that delays the electron beam and therefore the corresponding photon sources. Using an optical delay line (ODL) would allow the implementation of two pulses crossed with zero-time as well as negative delay. The ODL consists of a double optics chicane using 4 flat silicon mirrors coated with 50 nm B4C that delays the x-ray beam.

We present a brief description of ODL and review its specification. The mirror surface was measured and wavefront propagation software was used to examine the effects of the mirror surface on the beam spot. The study of the damage threshold was also an important challenge that we examined.

Journal of Synchrotron Radiation Special Issue: will you submit your contribution?

yes

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