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An XUV and soft X-ray split-and-delay unit for FLASH II

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An XUV and soft X-ray split-and-delay unit is built that enables time-resolved experiments covering the whole spectral range of FLASH II from $h\nu = 30$ eV up to 2500 eV. With wave front beam splitting and grazing incidence angles a maximum delay of $-6 \text{ ps} < \Delta t < +18 \text{ ps}$ will be possible with a sub-fs resolution. Two different coatings are required to cover the complete spectral range. Therefore, a design that is based on the three dimensional beam path of the SDU at BL2 at FLASH has been developed which allows choosing the propagation via two sets of mirrors with these coatings. A Ni-coating will allow a total transmission on the order of $T = 55 \%$ for photon energies between 30 eV and 600 eV at a grazing angle $\theta = 1.8^\circ$ in the variable delay line. In the fixed delay line the grazing angle is set so $\theta = 1.3^\circ$. With a Pt-coating a transmission of $T > 13 \%$ will be possible for photon energies up to 1500 eV. For a future upgrade of FLASH II the grazing angle can be changed to $\theta = 1.3^\circ$ in order to cover a range up to $h\nu \approx 2500$ eV.

Primary authors: ROLING, Sebastian (WWU Münster); Mr ROLLNIK, Matthias (WWU Münster)

Co-authors: Dr PLÖNJES-PALM, Elke (DESY); Dr KUHLMANN, Marion (DESY); Mr WAHLERT, Frank (WWU Münster); Prof. ZACHARIAS, Helmut (WWU Münster)

Presenter: ROLING, Sebastian (WWU Münster)

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