**Upgrading of the THz beamline for pump-probe experiments in FLASH2020+**

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FLASH at DESY has a unique FEL scheme providing soft X-ray beam and intense THz beam simultaneously with only a few femtosecond timing jitter. The two beams can be used to study matter by pump-probe techniques. FLASH2020+, a project to upgrade FLASH, is ongoing at DESY[1]. After the upgrade, a THz beam with over 250 µJ/pulse and a broad THz bandwith is expected to be transported through the beamline and provided to the endstation with high repetition rate. The THz undulator source, tunable in wavelength and currently inline with the XUV undulator, will be separated from the XUV undulator, which will allow a completely parastic operation for THz only experiments, such as non-linear THz spectroscopy. At the same time, photon energy loss in the currently complex separation of THz and XUV photon beams will be avoided in the future.

A new beamline FL11 shall be equiped with bendable KB optics[2] and provide photon energies beyond the carbon K-edge. In addition, a dedicated experimental end-station for THz-XUV pump-probe experiments for studying solid state physics, and femtomagnetism at FL11 is under development. The THz doubler, a special FLASH operation mode producing double pulses for pump–probe experiments [3, 4], will be further developed. This will significantly enhance the capability and flexibility for THz-XUV pump-probe experiments at FL11.

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