The FLASH facility – current status and future upgrade plans

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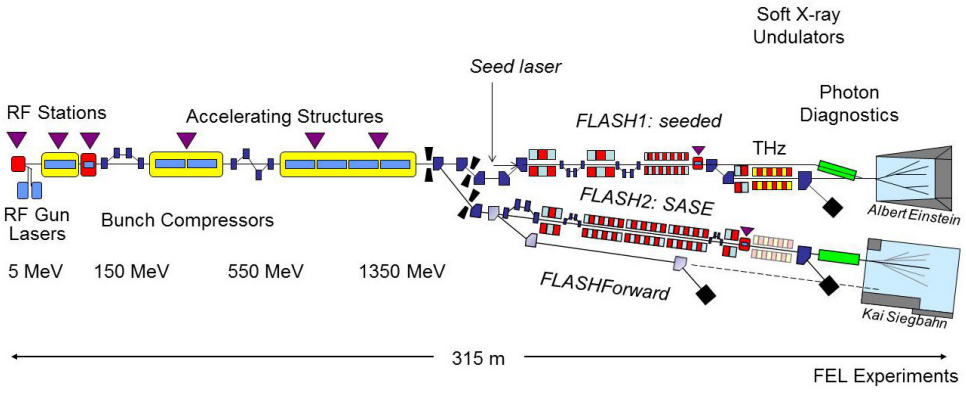
FLASH is the only high-repetition-rate FEL in the XUV/soft X-ray regime worldwide. Based on superconducting accelerator technology developed at DESY, it can provide up to 8000 pulses/s for experiments in such diverse fields as atomic, molecular, and optical physics, chemistry, condensed matter and nanoscience, life science, warm dense matter research, and FEL physics and technology, including development of new methods and instrumentation.

The outstanding opportunities for time-resolved studies at FLASH, which are based on unique pump–probe instrumentation including fully synchronized optical lasers, a large suite of X-ray split-and-delay units, a THz source that is phase stable with respect to the FEL pulses, and sophisticated diagnostics for pulse arrival and duration, attract a large number of eminent researchers in ultrafast science to FLASH.

The recent addition of a second FEL line, FLASH2, with variable-gap undulators that enable easy wavelength tuning and novel lasing schemes for users in parallel to the operation of FLASH1, the progress in creating and measuring ultrashort single-spike SASE pulses, and the new suite of dedicated state-of-the-art end stations have made FLASH even more attractive to users, as manifested in the record number of proposals in the last call.

To keep FLASH at the forefront of FEL science and technology, an ambitious upgrade program is currently planned. FLASH2020+ foresees operation of two FEL lines, with one line providing externally seeded pulses up to the full repetition rate of FLASH and the second line allowing for flexible novel lasing schemes based on a set of variable undulators. This line will be designed to deliver coherent radiation from THz to soft X-rays. The new ideas are fully in sync with the requirements of the community for breakthrough science with a high-repetition rate XUV/soft X-ray FEL.



Planned FLASH2020+ layout within the present footprint