FLASH (free electron laser)

FLASH
Free-Electron Laser
in Hamburg

- FLASH is a user facility, providing laser-like radiation in the VUV and soft X-ray range to different user experiments.

- It is also a pilot facility for the future XFEL, using superconducting accelerator modules.

FLASH info

Goal of FLASH: To deliver laser-like coherent radiation pulses with a tuneable wavelenght between 6 nm to 120 nm in the femtosecond range with peak powers in the GW.

Example of use: Time-resolved observation of chemical reactions with atomic resolution.

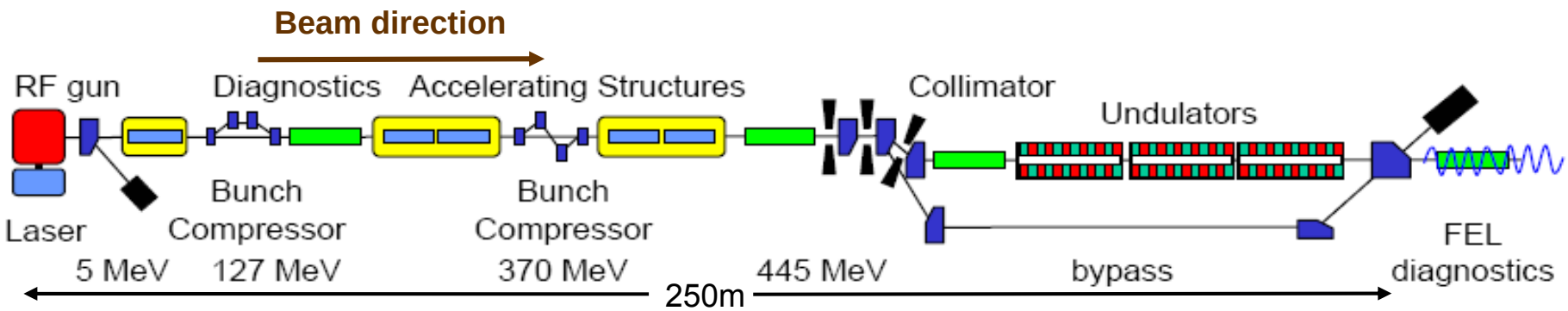
Functional principle: The lasing process is initiated by the spontaneous undulator radiation from accelerated electrons, and the FEL works then in the so-called Self-Amplified Spontaneous Emission (SASE). The SASE wave lenght depends on the e – beamenergy.

FLASH Parameters:

Electron bunch lenght:	≤ 800 µs (1 - 800 micro bunches)
Repetition rate:	1 - 10 Hz
RF frequency:	1.3 GHz (L–band)
Max. beamenergy after shutdown 2007:	1 GeV » (SASE with 6nm)

Schematic overview of FLASH

FLASH
Free-Electron Laser in Hamburg



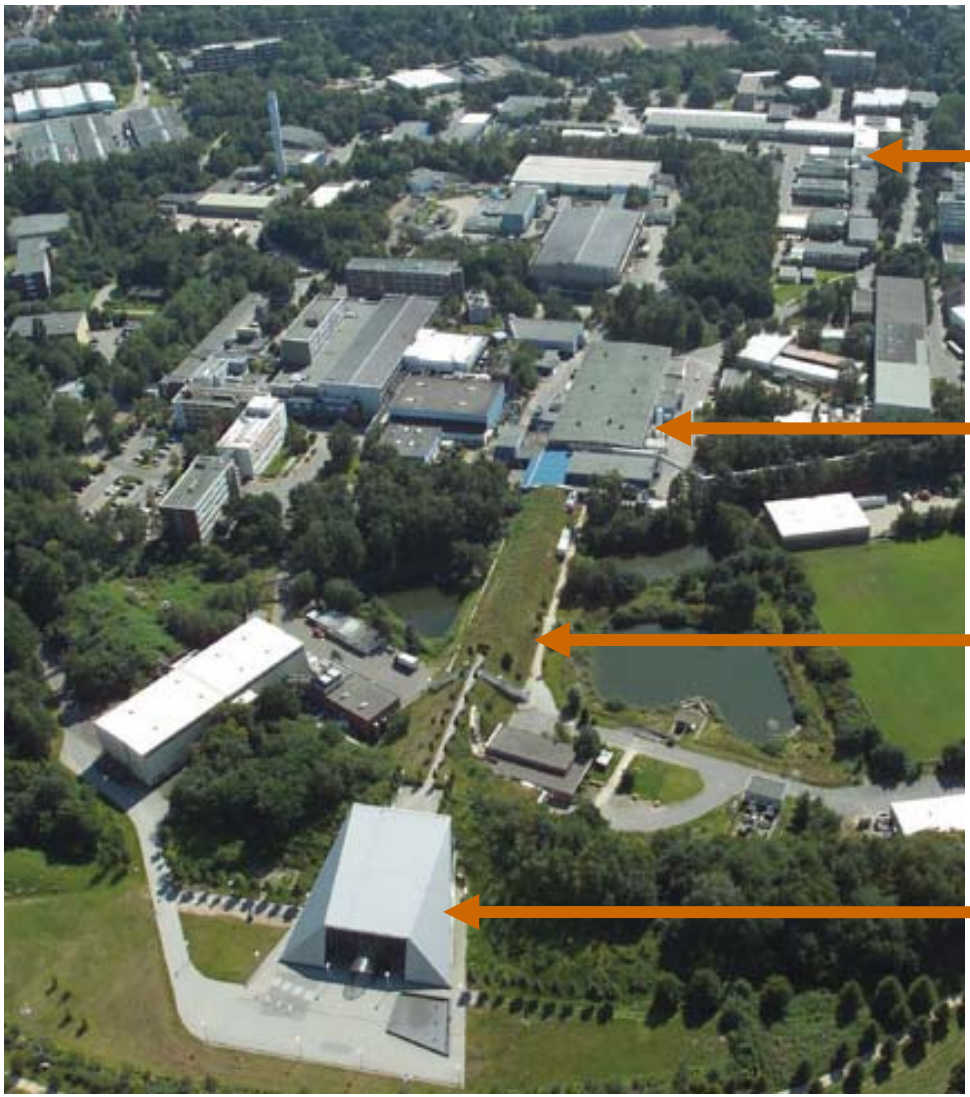
-The electron bunches are produced in a laser-driven photoinjector and accelerated by a superconducting linear accelerator.

-In two bunch compressors the 1nC electron bunches are longitudinally compressed, this increases the peak current from initially 50 -80 A to 1-2 kA as required for the FEL operation.

-After acceleration and collimation, the beam passes the 30 m long undulator, that consists of permanent magnets with a fixed gap of 12 mm and produces SASE.

-Finally, a dipole magnet deflects the electron beam into a dump, while the FEL radiation propagates to the experimental hall.

From the Top



EPICS collaboration Meeting

FLASH (Hall 3)

laser-driven photoinjector + acceleration + bunch compression

FLASH tunnel

Acceleration + undulators

Experimental hall

User experiements