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XUV and X-ray Free-Electron Lasers and Applications

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Message from the Guest Editors

Nowadays, free-electron laser (FEL) technology is rapidly developing and opens new perspectives for sources of extreme peak brightness in the X-ray spectral region with ultrashort pulse duration and full transverse coherence. Since the operation of FLASH as the first user-dedicated facility for soft-X rays in 2005, the capability of FEL facilities to operate towards higher X-ray energies opens up a new realm for experiments dedicated to coherent X-ray imaging, structure determination of molecules in biology, medical diagnosis, nondestructive testing, and the study ultrafast electron dynamics in matter. Nowadays, seven FEL facilities are in operation worldwide (FLASH, LCLS, SACLA, FERMI, PAL-XFEL, European XFEL, Swiss XFEL) and others are in an advanced stage of development.

- free-electron lasers
- coherent control
- coherent X-ray imaging
- diffractive imaging
- X-ray diffraction techniques
- X-ray ultrafast detectors
- X-ray microfocusing and nanofocusing