Joint DESY and University of Hamburg Accelerator Physics Seminar

Monday, 19.03.2018

(13:00 in Room 459/30b)

Prospects of an XFELO Oscillator Driven
by an SCRF Linac or on a By–Pass of a USR

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Abstract

The results of the x-ray optics experiments on diamond resilience and Be-CRL performance are encouraging for the feasibility of an XFELO. An XFELO will broaden the scientific vista for X-ray FELs in areas requiring fully coherent and ultra-fine spectral bandwidth. A 7-8 GeV super-conducting linear accelerator producing a constant stream of electron bunches is an ideal driver for an XFELO. With an optimized injector, it can produce fully coherent X-ray pulses with 3 meV BW and time averaged brightness 10^{28} photons/s/(mm·mr)^2/0.1% BW at 14.4 keV, which is higher by three orders of magnitude expected from LCLS-II-HE. By using a transverse gradient undulator (TGU), an XFELO looks also feasible in a bypass of a large storage ring with multi-bend achromats, an "ultimate storage ring" (USR). Due to the beam cooling requirement, the ring-based XFELO will need to be operated in a pulsed mode. On the other hand, the X-ray BW could be an order of magnitude smaller than that based on a linac. For a PEP-X-based XFELO, the average brightness is estimated to be about 10^{26}.

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