Joint DESY and University of Hamburg Accelerator Physics Seminar

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ZOOM video seminar (needs version 5.0+)

Seeding of Electron Bunches at the DELTA Storage Ring

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Abstract

The TU Dortmund University operates the 1.5 GeV electron storage ring DELTA as a lightsource in user operation. At the short–pulse facility of DELTA, a laser seeding setup employing the coherent harmonic generation (CHG) scheme is operated for the coherent emission of THz and VUV radiation based on a laser-induced energy modulation. To control the spectrotemporal shape of the THz pulses, different pulse-shaping techniques were implemented using interferometers and liquid–crystal phase modulators. Frequency–tailored pulses can be used for experiments at a dedicated THz beamline. Using this source, novel THz detectors for beam diagnostics at electron accelerators were extensively tested and characterized. Furthermore, the facility is used for seeding experiments with CHG radiation. Here, a laser–induced energy modulation is transferred into a longitudinal electron density modulation, giving rise to the formation of microbunching and radiation at harmonics of the laser wavelength. In view of a further facility upgrade towards the implementation of echo-enabled harmonic generation (EEHG), proof-of-principle experiments were carried out. A two-fold laser–induced modulation and seeding at different laser wavelengths were successfully realized. The talk gives an overview of the application of laser seeding techniques taking into account the challenges and chances at a storage ring.

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