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THz SASE FEL towards pump-probe experiments at E-XFEL

A proof-of-principle free-electron laser based THz source is undergoing design studies at the Photo Injector Test facility at DESY in Zeuthen (PITZ). It is considered as a prototype THz source for pump-probe experiments at the European XFEL, benefiting from the fact that the electron beams from the PITZ facility can have the identical time structure as the XFEL pulses. In the proposed experiment, a 4 nC electron beam (~200 A) will be accelerated to 16-22 MeV/c to drive an LCLS-I type undulator, generating SASE radiations in the THz band in the wavelength range between 60 and 100 μm with an expected energy of up to 1 mJ/pulse. In this poster, we report our start-to-end simulation results on the optimization and transport of the electron beam as well as the generation of THz radiations in the LCLS-I undulator. Recent experiments have demonstrated the generation and transport of nearly 170 A electron beam in the 20-m-long, current beamline. Diagnostics on such a beam will also be reported.

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