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Electron Beam Matching Strategies for External Injection in LWFA for SINBAD-ARES

Wednesday, September 18, 2019 7:00 PM (1 hour)

Laser-driven plasma wakefield acceleration (LWFA) provides an innovative and compact alternative to conventional RF accelerators. The electron beam can be injected to a plasma accelerator using different techniques. The advantage of external injection from an RF accelerator is given by the possibility to inject fully characterized bunches with a well-controlled beam quality. In addition, the consideration of a staged approach in the plasma accelerator always requires the use of an externally injected beam. The matching of the electron bunches to the accelerating wakefield in the plasma makes high demands on the electron beam properties at the plasma entrance and the timing. Further requirements and constraints for the design of the matching beamline are given by the incoupling of the high-power laser and the implementation of diagnostic tools. This conference contribution presents different strategies and a first layout proposal to externally match a low-energy, high-charge electron beam to an accelerating plasma cell. The shown studies are done for SINBAD-ARES (Accelerator Research Experiment at SINBAD) at the Deutsches Elektronen-Synchrotron (DESY), a linac under construction that will be a test facility for the generation of high brightness probes for LWFA and their external injection to a plasma cell.

Primary author: PANOFSKI, Eva (Deutsches Elektronen-Synchrotron)

Co-authors: Dr ASSMANN, Ralph (Deutsches Elektronen-Synchrotron DESY, Germany); DORDA, Ulrich (DESY); FERRAN POUSA, Àngel (DESY); LEMERY, Francois (DESY); MARCHETTI, Barbara (DESY); MARTINEZ DE LA OSSA, Alberto (Deutsches Elektronen-Synchrotron DESY); SVYSTUN, Elena (DESY); WALKER, Paul Andreas (DESY); YAMIN, Sumera (DESY)

Presenter: PANOFSKI, Eva (Deutsches Elektronen-Synchrotron)

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