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Design Studies for Permanent Magnetic Quadrupole Triplet for Matching into Laser Driven Wake Field Acceleration Experiment with External Injection at SINBAD

Monday, September 16, 2019 7:00 PM (1 hour)

The ARES (Accelerator Research experiment at SINBAD) Linac at SINBAD (Short and INnovative Bunches and Accelerators at DESY) facility at DESY aims to produce high brightness ultrashort electron bunches (sub fs to few fs) at around 100 MeV, suitable for injection into novel accelerators e.g. dielectric Laser acceleration (DLA) and Laser Driven Wakefield acceleration (LWFA). The external injection experiment planned at ARES aims for stable LWFA by combining the reproducible conventional RF-based accelerator technology, with high-power plasma wake field dynamics. The LWFA experiment demands Twiss parameter β to be of the order of few mm, in order to avoid emittance growth because of high accelerating gradient in the plasma. The ARES Linac produces ultra-short bunches at around 100 MeV, so the effect of space charge is significantly high. To match such a space charge dominated beam, strong transverse focusing is required. A Permanent Magnetic Quadrupole (PMQ) triplet is one promising focusing strategy. In this paper, we report the technical design constraints and findings for stable settings for PMQ triplet to match the requirements of the electron beam properties, study of phase spaces for final focus into LWFA experiment.

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