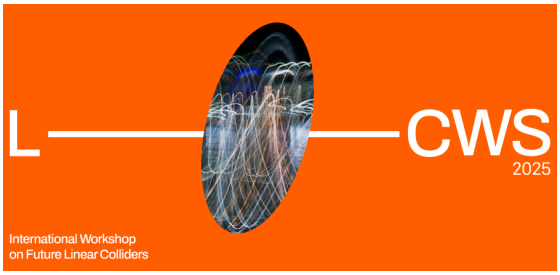

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Selection of Target Thickness and Size of Drive Electron Beam for Ce+BAF Injector

Wednesday 22 October 2025 11:20 (20 minutes)

A baseline concept for a continuous wave (CW) polarized positron injector was developed for the Continuous Electron Beam Accelerator Facility (CEBAF) at Jefferson Lab. This concept is based on the generation of CW longitudinally polarized positrons by a high-current, polarized electron beam (1 mA, 130-370 MeV, and 90% longitudinal polarization) that passes through a rotating, water-cooled, tungsten target. The positron yield and longitudinal polarization are calculated for the 123 MeV Ce^{+}BAF injector at the Low Energy Recirculator Facility (LERF). The longitudinal and transverse CEBAF acceptances, defined as an energy spread of less than 1% and a normalized emittance of less than 100 mm·mrad, have been used in these calculations. The impact of target thickness, transverse electron beam size, and electron beam energy on the yield and polarization of a positron injector is evaluated. The total energy deposited by the beams in the tungsten target and the peak energy density are calculated for different target thicknesses, electron beam sizes, and energies.

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