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Polarized Electron Injector for Positron Capability at CEBAF 12 GeV

Content

As a part of the effort to expand the capabilities of CEBAF 12 GeV (Continuous Electron Beam Accelerator Facility) at Jefferson Lab, the addition of a polarized positron source is considered. This capability would provide acceleration of high duty-cycle polarized positrons, with spin >60% polarization, through the same main CEBAF accelerator machine with appropriate magnet field reversals and linac phasing to the four CEBAF experimental halls. To produce this positron beam, a high average current (1-10 mA) highly polarized electron beam with energy of 100 – 150 MeV is required at the positron source target. The focus of this paper is the design of that polarized electron beam injector. We will describe the production and delivery of a >1 mA highly polarized electron beam. We will discuss different aspects of the design, the photocathode gun, beam dynamics simulation results, spin manipulation, bunching and accelerating process and final electron beam parameters.

Footnotes

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