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FFA@CEBAF beam transport error and tolerance simulation studies

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The Continuous Electron Beam Accelerator Facility (CEBAF) is a 12 GeV recirculating electron accelerator at the Thomas Jefferson National Accelerator Facility (JLAB). Major upgrades to the accelerator are being investigated which include a new 650 MeV injection beamline and state-of-the-art fixed-field alternating (FFA) gradient recirculation arcs. The upgrade will extend the energy of the electron beam to over 20 GeV. In this paper, we provide an error and tolerance simulation study of the amended beam optics transport of the existing accelerator tuned for 22 GeV operation. The study is conducted with the particle tracking codes elegant and Bmad in two parts. In the first part, we treat each section of the accelerator (electromagnetic arcs and linacs) modularly with ideal conditions at the beginning. The second part is a pseudo start-to-end (S2E) simulation with accumulated errors propagating from one beamline to the next.

Footnotes

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North America

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