

Low energy multi-beam dynamics in novel LANSCE front end

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The proposed novel 100 MeV injector for the LANSCE Accelerator Facility* is designed to replace the existing 750-keV Cockcroft-Walton-columns-based injector. The new Front End includes two independent low-energy transports for H⁺ and H⁻ beams merging at the entrance of a single RFQ, with the subsequent acceleration of particles in the new Drift Tube Linac. The challenge of the design is associated with the necessity of simultaneous acceleration of protons and H⁻ ions with different beam currents, beam charges per bunch, beam emittances, and space charge depression, in a single RFQ and DTL, while injection beam energy is reduced from 750 keV to 100 keV. Acceleration of various beams in a single RFQ provides less flexibility for optimal adjustment of acceleration and focusing parameters concerning the existing LANSCE setup. The paper discusses details of self-consistent multi-beam dynamics in the proposed injector.

Footnotes

*Y. K. Batygin et al., "Advancement of LANSCE Front End Accelerator Facility", in Proc. IPAC'21, Campinas, Brazil, May 2021, p.1894 (2021).

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