

Performance of the Fermilab linac injector

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The Fermilab linac injection line consists of a 35 keV magnetron-type H⁻ ion source, two-solenoid Low Energy Beam Transport (LEBT), 201 MHz 4-rod 750 keV Radio Frequency Quadrupole (RFQ), and a Medium Energy Transport (MEBT) containing 4 quadrupoles and a bunching cavity. The injector delivers 25 mA, 48 μ s pulses to drift-tube linac at a repetition rate of 15Hz. The transmission efficiency has been lower than expected since commissioning. Recent beam current measurements suggest that the beam is primarily lost upstream of the RFQ exit. Numerical simulations indicate that ions passing through the non-linear field region of the solenoids could produce a beam with an increased emittance resulting in up to 50 % of the LEBT beam current failing to meet the RFQ acceptance. An aperture restriction was installed upstream of the first solenoid to remove these ions. This report describes the results of measurements and simulations as well as the LEBT tuning.

Footnotes

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