Contribution ID: **564** Contribution code: **SUP065**   Type: **Poster Presentation**

Experimental longitudinal emittance manipulation using laser-based photoionization in the Fermilab Linac

Sunday 10 August 2025 15:00 (3 hours)

A series of simulations and beam studies were conducted at Fermilab's linear accelerator to evaluate the effectiveness of longitudinal emittance control via laser-induced photoionization. While similar laser techniques have been employed at Fermilab to enhance injection and extraction efficiency into the Booster, the work presented here focuses on extending these methods to bunch-by-bunch manipulation. This approach utilizes fine-scale correction of the H- bunches'longitudinal spatial distribution. In theory, loosely confined particles in longitudinal phase space contribute to emittance growth during acceleration. By selectively removing these outlying particles through laser scraping (H- + $\gamma \rightarrow$ H + e-), this growth can be reduced. This report presents experimental results from both symmetric and asymmetric longitudinal scraping of H$^-$ bunches in the Fermilab linac, which were subsequently injected into Booster, and evaluates the broader applicability of this method for future high-intensity accelerator operations.

Please consider my poster for contributed oral presentation

No

Would you like to submit this poster in student poster session on Sunday (August 10th)

Yes

Footnotes

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

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Session Classification: SUP: Sunday Student Poster Session

Track Classification: MC6 - Beam Instrumentation, Controls, AI/ML, and Operational Aspects