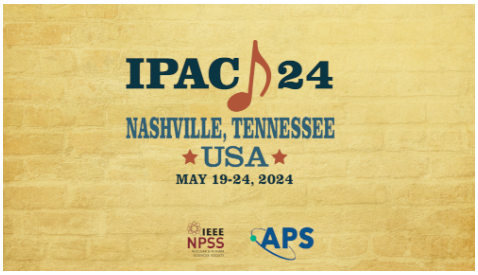

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Final physics design of proton improvement Plan-II at Fermilab

Monday, 20 May 2024 16:00 (2 hours)

This paper presents the final physics design of the Proton Improvement Plan-II (PIP-II) at Fermilab, focusing on the linear accelerator (Linac) and its beam transfer line. We address the challenges in longitudinal and transverse lattice design, specifically targeting collective effects, parametric resonances, and space charge nonlinearities that impact beam stability and emittance control. The strategies implemented effectively mitigate space charge complexities, resulting in significant improvements in beam quality—evidenced by reduced emittance growth, lower beam halo, decreased loss, and better energy spread management. This comprehensive study is pivotal for the PIP-II project's success, providing valuable insights and approaches for future accelerator designs, especially in managing nonlinearities and enhancing beam dynamics.

Footnotes

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