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Exploring the Potential of H_3^+ for High-Intensity Applications

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The use of H_3^+ (triatomic hydrogen ions) presents a promising alternative to the more conventional H^- ions in high power proton accelerators. In this work, we examine the advantages of H_3^+ beams with respect to extraction efficiency, Lorentz dissociation, and space charge limits. The physical properties of H_3^+ enable it to overcome the injection/extraction energy and intensity limits, while still supporting charge exchange based injection and extraction with minimal beam loss. To further illustrate its potential, a conceptual design of a superconducting H_3^+ cyclotron is briefly presented, demonstrating both its technical feasibility and performance advantages.

Footnotes

Funding Agency

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Yes

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