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Ion Source System: Maximum Extracted Oxygen Beam Current and Emittance Boundary Measurement

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To meet the stringent requirements of the downstream superconducting accelerating section for beam matching conditions and intensity specifications, it is necessary to maximize the beam intensity while maintaining the transverse emittance performance at the exit of the normal-conducting front-end. Systematic measurements were conducted of the emittance at the exit of the Low Energy Beam Transport (LEBT) line, the emittance at the exit of the Radio Frequency Quadrupole (RFQ) accelerator, as well as the overall transmission and acceleration efficiency of the front-end. Through quantitative analysis of these parameters under varying beam intensities, we aim to identify the maximum achievable beam intensity that satisfies the emittance constraints. A visualization-based approach is employed to assist in selecting the beam intensity with optimal overall performance.

Footnotes

Funding Agency

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Yes

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