Contribution ID: **85** Type: **Poster**

Plasma Conditions for High-Intensity He^{2+} Beams: A Semi-Empirical Modeling Approach

Tuesday, 9 September 2025 16:30 (1h 30m)

The demand for high-intensity He^{2+} ion beams is rapidly increasing, driven by applications in ad-vanced medical therapies and groundbreaking scientific research. The stringent requirements for these beams require a deep understanding of the interplay between plasma parameters and beam properties. Establishing this connection would enable strategic R&D advancements for next-generation ion sources.
This work presents a semi-empirical strategy to estimate the plasma conditions required to produce high-intensity He^{2+}. The approach is based on solving a non-linear system of balance equations for helium plasmas, incorporating the critical cross-sections of key reactions. The method accounts for the generation of helium ions, providing a comprehensive framework for optimizing ion sources'per-formances.
We will also discuss the theoretical methodology and explore the plasma parameter regimes neces-sary to enhance the production of high-intensity ion beams. These findings provide critical insights into the development of advanced ion sources tailored to the needs of the medical and scientific communities.

Primary authors: CASTRO, Giuseppe (Istituto Nazionale di Fisica Nucleare - LNS); D'AGOSTINO, Grazia (INFN-LNS div. Acceleratori); Dr CELONA, Luigi (INFN - LNS); LEONARDI, Ornella (INFN-LNS); Dr GAMMINO, Santo (INFN - LNS)

Presenter: CASTRO, Giuseppe (Istituto Nazionale di Fisica Nucleare - LNS)

Session Classification: Poster Session

Track Classification: Production of high intensity ion beams