Contribution ID: **65** Contribution code: **TUP14**   Type: **Poster Presentation**

3D simulations of the CAPRICE ECRIS extraction system

Tuesday, September 17, 2024 5:00 PM (1h 30m)

The simulation of the ion extraction from the Electron Cyclotron Resonance Ion Sources (ECRISs) is necessary for the optimization and development of the performance of ion sources.
Due to the magnetic field configuration of the ECRISs the calculations need to be performed in 3D.
Therefore simulation programs based i.e. on C^{++} libraries like IBSimu were developed. In this work a physical model was implemented in IBSimu generating detailed 3D simulations of ion extraction from a CAPRICE-type ECRIS.
Simulations of multi-species Argon ion beam including Helium contribution as support gas extracted from CAPRICE are carried out. The study includes the effect of different space charge compensation degrees.
Furthermore, ion beams extracted with different plasma electrode apertures were analyzed in terms of ion beam current, beam profile, beam size, divergence angle, and beam quality.
In addition the simulation results were compared to experimental findings, i.e. ion beam intensities and beam profiles measured with viewing screens.

Footnotes

Funding Agency

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Primary author: HÄNDLER, Michael (Goethe Universität Frankfurt)

Co-authors: ANDREEV, Alexander (GSI Helmholtzzentrum für Schwerionenforschung GmbH); MAIMONE, Fabio (GSI Helmholtzzentrum für Schwerionenforschung GmbH); FRANCHETTI, Giuliano (GSI Helmholtzzentrum für Schwerionenforschung GmbH); MAEDER, Jan (GSI Helmholtzzentrum für Schwerionenforschung GmbH); GALONSKA, Michael (GSI Helmholtzzentrum für Schwerionenforschung GmbH); LANG, Ralf (GSI Helmholtzzentrum für Schwerionenforschung GmbH); Dr HOLLINGER, Ralph (GSI Helmholtzzentrum für Schwerionenforschung GmbH)

Presenter: HÄNDLER, Michael (Goethe Universität Frankfurt)

Session Classification: TUP: Poster Session