Contribution ID: **10** Type: **Oral**

Repercussions of the magnetic filter field and the extraction aperture configurations on the negative ion beam properties: insights from a Particle-In-Cell model.

Friday, 7 October 2022 08:30 (30 minutes)

In this talk, we will describe in detail the consequences on the negative ion kinetics of the asymmetry in the plasma parameters perpendicular to the magnetic field direction (due to the plasma polarization induced by the Hall current intercepted by the ion source wall). This work is relevant to negative ion sources with a magnetic filter field producing an electron drift directed toward one of the walls. We will show using a 2.5D Particle-In-Cell model [1] (2.5D meaning the numerical mesh is 2D but particle losses parallel to the magnetic field lines are also considered) that the transverse plasma asymmetry results in an extracted negative ion beam current density profile which is asymmetric as well. In addition, we will discuss how the geometry of the extraction aperture affect the total ion current and phase-space properties of beam which is extracted from the ion source.

[1] G. Fubiani et al., New J. Phys. 19, 015002 (2017)

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Session Classification: Oral session 11

Track Classification: 12. Numerical simulations of sources or beams