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## **Towards Kinetic Models of Electron Transport in Negative Ion Source**

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The extraction of negative ions from a plasma is necessarily accompanied by electrons, which are controlled with a transverse magnetic field. A full numerical analysis of the 3D model is hindered by the computational load and by the rapidly growing electric field towards extraction, so that we pass from quasi-neutral plasma with collisional transport to collision-less sheath to beam region.

It must be noted that ray-tracing approach can only be used in collision-less region.

Theoretical model (mostly 1D in space) can clarify the transition from collisional regime to other regions; preliminary results of simplified collision models, here discussed, show that electrons surf sideways the sheath, with a large angle (depending on collision models), with large divergence of the related transport integrals in the case of Coulomb collision. Model self consistency is also discussed. Some recommendations for numerical ray tracing methods are given.

**Author:** CAVENAGO, Marco (INFN-LNL)

**Presenters:** CAVENAGO, Marco (INFN-LNL); CAVENAGO, Marco (INFN-LNL)

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