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Experimental study of low-temperature plasma transport across a magnetic filter[1] ROMAIN BAUDE, FREDDY GABORIAU, GERJAN HAGELAAR, LAPLACE, CNRS and University of Toulouse — Magnetized low-temperature plasmas are widely used in fields like space propulsion, materials processing or neutral beam injection. Charged particle transport in these plasmas is complex and still not fully understood. This paper presents an experimental study of plasma transport across a magnetic barrier as used in various (negative) ion sources. The aim is to obtain experimental data that are sufficiently detailed to provide direct insight into the physical principles of the cross-field transport and to validate numerical simulations. For this purpose we developed a dedicated laboratory set-up featuring an inductive argon discharge connected with a magnetic filter region. A segmented wall probe was used to measure the spatial profiles of the electron and ion current densities across the filter, while the plasma parameters were measured at different positions with a Langmuir probe. Measurements were performed for different gas pressures, magnetic field strengths, and bias voltages. The results clearly demonstrate the transition between a collisional regime where the electron current varies as 1/B2 and a bounded-drift regime with asymmetric electron temperature and 1/B current.

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