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Drift Phenomena in an Inductively Coupled Magnetic Neutral Loop Discharge DRAGOS CRINTEA, DIRK LUGGENHOELSCHER, DEBORAH O'CONNELL, Ruhr-University Bochum, Germany, TIMO GANS, Queens University Belfast, Northern Ireland, UWE CZARNETZKI, Ruhr-University Bochum, Germany — The neutral loop discharge is a magnetically enhanced plasma source applicable between 10^{-2} Pa and 10 Pa with electron densities of a few times 10^{10} cm^{-3} to 10^{12} cm^{-3}. A magnetic quadrupole is bent into a torus in which the magnetic field vanishes and is therefore called the neutral loop (NL). The NL is located close to a planar inductive coupling antenna separated from the plasma by a quartz cylinder and operated at 13.56 MHz. The NL confines the electrons and randomizes their trajectories, which leads to an increased heating at low pressures. In addition, the electron pressure gradients in the magnetic field cause a diamagnetic drift. With Thomson scattering the electron velocity distribution is measured and allows the determination of the diamagnetic drift of the electrons along the NL in the range of 10^4 m/s to 10^5 m/s. With an ICCD camera the temporal modulation of the emission is measured and from this the drift velocity is also determined and compared to the laser measurement. Both results agree well over three orders of magnitude in pressure with a simple fluid-dynamic drift-collision model. Drift and confinement are closely related as is also represented by the low transversal electric field measured by a Langmuir probe.

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