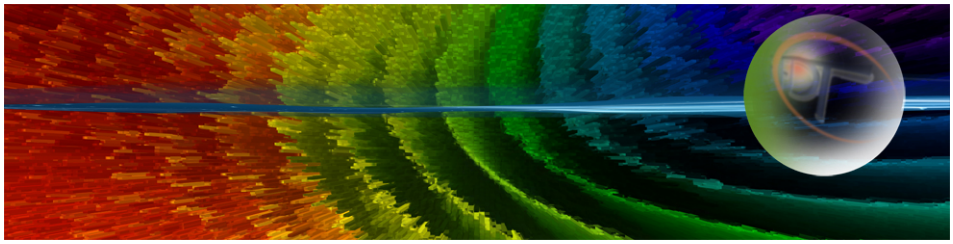

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Measurement of RF-excited non-neutral plasmas in Penning-Malmberg traps

Magnetized non-neutral plasmas confined in electro-magnetostatic traps represent a somewhat simplified system with respect to quasi-neutral plasmas such as those found in high-pressure discharges or fusion machines. At the same time these plasmas retain many physical properties (Kelvin-Helmholtz instabilities, transport, turbulence) of the latter systems while offering enhanced confinement and diagnostic opportunities. In particular, the interpretation and modelling of physical phenomena in these plasmas is made easier by the choice of clean (single-species), quiescent initial conditions. On the contrary, very different dynamics and equilibrium states take place when this condition does not hold, for instance when the plasma is generated by means of a strong external forcing leading to residual-gas ionization. The presence of radio-frequency (RF) excitation and of multiple charged species greatly affects the existence and the path to an equilibrium state, and at the same time the identification of the role of the various phenomena taking place is made much more difficult. As a consequence, the support of extensive experimental measurement is of paramount importance in order to support a correct modelling of the whole system evolution. We discuss the integration of a systematic measurement campaign based on optical and electrostatic diagnostics of plasma properties (charge, density profile and energy) allowing us to track the evolution and most peculiar features of RF-generated and continuously excited trapped plasmas.

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