Abstract Submitted
for the GEC10 Meeting of
The American Physical Society

Electron density measurements in technological plasmas using the Multipole Resonance Probe T. STYRNOLL, M. LAPKE, C. SCHULZ, R. STORCH, J. OBERATH, T. MUSCH, I. ROLFES, P. AWAKOWICZ, T. MUSSENBROCK, R.P. BRINKMANN, Department of Electrical Engineering and Information Sciences, Ruhr-University Bochum, Germany, RUB MRP TEAM — This paper deals with the realization of the 'Multipole Resonance Probe (MRP)' [1], and shows its applicability for the measurement of the electron density in technological plasmas. The probe consists of two metallic hemispheres, mounted on a thin holder that serves as balancing unit for the unbalanced signal from the network analyzer. The absorption spectrum is measured by a network analyzer in the range of approximately 100 MHz to 10 GHz. It shows characteristic resonances from which plasma parameters like the electron density can be derived. Due to the spherical symmetry of the probe we are able to obtain algebraic expressions for the resonance frequencies and thus evaluation schemes for the electron density. We study the power and pressure influence of the frequency behavior and show comparisons of Langmuir probe data with the results of the MRP. It shows an excellent agreement and confirms the applicability of the MRP in the challenging environment of technological plasmas. Supported by BMBF (Pluto: Plasma and optical technologies).

[1] M. Lapke et al., Appl. Phys. Lett. **93**, 051502 (2008)

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Date submitted: 12 Jun 2010 Electronic form version 1.4