Abstract Submitted
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The Multiple Resonance Probe: A Novel Device for Industry Compatible Plasma Diagnostics[1] RALF PETER BRINKMANN, ROBERT STORCH, MARTIN LAPKE, JENS OBERRATH, CHRISTIAN SCHULZ, TIM STYRNOLL, Ruhr University Bochum, CHRISTIAN ZIETZ, Leibniz University Hannover, PETER AWAKOWICZ, THOMAS MUSCH, THOMAS MUSSENBROCK, ILONA ROLFES, Ruhr University Bochum, PLUTO TEAM — To be useful for the supervision or control of technical plasmas, a diagnostic method must be i) robust and stable, ii) insensitive to perturbation by the process, iii) itself not perturbing the process, iv) clearly and easily interpretable without the need for calibration, v) compliant with the requirements of process integration, and, last but not least, vi) economical in terms of investment, footprint, and maintenance. Plasma resonance spectroscopy, exploiting the natural ability of plasmas to resonate on or near the electron plasma frequency, provides a good basis for such an "industry compatible" plasma diagnostics. The contribution will describe the general idea of active plasma resonance spectroscopy and introduce a mathematical formalism for its analysis. It will then focus on the novel multipole resonance probe (MRP), where the excited resonances can be classified explicitly and the connection between the probe response and the desired electron density can be cast as a simple formula. The current state of the MRP project will be described, including the experimental characterization of a prototype in comparison with Langmuir probes, and the development of a specialized measurement circuit.

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Ralf Peter Brinkmann
Ruhr University Bochum

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