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Investigating the Structure of the Wake of a Dust Particle in the Plasma Sheath¹ HENDRIK JUNG, FRANKO GREINER, ALEXANDER PIEL, Christian-Albrechts-Universität zu Kiel — Due to the deflection of the ambient streaming ions, a negatively charged dust particle in the plasma sheath forms a wake with a net positive space charge in downstream direction. The wake is characterized by attractive, non-reciprocal forces between negatively charged particles and a charge reduction of a particle in the wake of another particle. In this contribution a two-particle system is used to investigate the ion wake structure behind a dust particle in the plasma sheath of an rf discharge [Jung, PoP 22, 053702 (2015)]. For this purpose, we have used the phase-resolved resonance method [Carstensen, PoP 18, 033701 (2011)] that evaluates the dynamic response of the particle system to small external, sinusoidal perturbations, which allows to measure the wake induces characteristics. Plasma inherent etching processes are used to achieve an increasing levitation height of the lower particle, so that the structure of the wake of the upper particle, which is nearly unaffected by etching, can be probed. In good agreement with theoretical predictions, a significant modification in the plasma sheath to one long potential tail is observed. The presented method is used to investigate the influence of a strong magnetic field on the formation and spatial structure of the wake.

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Hendrik Jung
Christian-Albrechts-Universität zu Kiel

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