Contribution submission to the conference Jena 2013

Multi-scale simulation of strongly correlated dust particles in a partially ionized complex plasma — •Patrick Ludwig[1], André Schella[2], André Melzer[2], and Michael Bonitz[1] — [1]Inst. für Theo. Phys. und Astrophysik, Universität Kiel — [2]Institut für Physik, Universität Greifswald

This talk is devoted to a multi-scale simulation approach for strongly correlated dust clouds in a partially ionized complex plasma. In order to correctly describe the complex interplay of the experimental parameters (a) pressure, (b) rf-power and (c) ion flow velocity on the self-organized particle arrangement, we have to go beyond a simple Yukawa approximation. Our dynamical screening approach [1] provides the sound basis for a systematic exploration of the structural transition from a repulsive Yukawa-like particle-particle interaction at high pressure to a regime where plasma streaming leads to (i) fundamental structural changes, and (ii) to a wake-induced destabilization and melting of the highly correlated many-particle state. Our theoretical results are systematically compared with recent experiments [2]. As an insightful tool for the detailed analysis of the multi-step transition between the liquid and solid phase we use the three-particle correlation function.

[1] Ludwig et al., Plas. Phys. Contr. Fusion **54**, 045011 (2012)
[2] A. Schella et al., Phys. Rev. E **84**, 056402 (2011)

Part:	**P**
Type:	**Vortrag;Talk**
Topic:	**Staubige Plasmen; Dusty Plasmas**
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