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Dust Dynamics Simulations with the Consideration of Wake Effects PATRICK LUDWIG, HANNO KÄHLERT, MICHAEL BONITZ, Kiel University, Germany, WOJCIECH MILOCH, University of Tromsø, Norway — The theoretical description of complex plasmas requires multiscale concepts that adequately incorporate the correlated interplay of streaming electrons and ions, neutrals, and dust grains. By means of an effective dust potential, the multiscale problem can be effectively reduced to a one-component plasma model of the dust subsystem. The statically screened Coulomb (Yukawa) potential has been proven to yield good agreement with the experiments for various specific setups [1,2]. Streaming of the plasma leads, however, to strong deviations from the Yukawa potential by giving rise to a distinct oscillating wake structure behind each grain. Here we present a systematic evaluation of the electrostatic dust potential in the presence of a streaming plasma environment by (i) a high precision computation of the dynamically screened Coulomb potential from the dynamic dielectric function, and (ii) a detailed assessment of these linear response results, particularly, in view of non-linear effects and dynamical grain charging processes by means of self-consistent full 3D PIC simulations [3].

[1] Introduction on Complex Plasmas, M. Bonitz, N. Horing, and P. Ludwig (eds.), Springer (2010) [2] P. Ludwig et al., *Plas. Phys. Control. Fusion* **52**, 124013 (2010) [3] P. Ludwig, W.J. Miloch, H. Kählert, and M. Bonitz, submitted for publication in *New J. Phys.* (2011)

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