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Dynamical Screening and Wake Effects in Spherical Dusty Plasmas PATRICK LUDWIG, MICHAEL BONITZ, University of Kiel, GLENN JOYCE, University of Maryland, College Park, MD, MARTIN LAMPE, Naval Research Lab, Washington, DC — Previous investigations have shown that 3D dusty plasma balls [1] can be well described by a one-component model with a static Yukawa-type pair interaction [2]. However, the multi-component plasma environment requires a systematic investigation of collective many-particle effects on the crystal formation. In particular the effect of streaming ions (i.e. a dynamically-screened Coulomb potential) can strongly influence structure and dynamics of a strongly-coupled dusty plasma. In a plasma with ions streaming at a uniform velocity, the dust-dust potential takes the form of a wake structure, which results in attractive forces between the similarly charged dust grains [3]. Of central interest are therefore the remarkable structural and dynamical consequences for 3D plasma crystals due to the non-reciprocal forces of the wakefield. The considered simulation model comprises an accurate representation of all plasma properties, including screening, wake effects, ion and electron thermal effects, Landau damping, as well as collisional damping.

[1] Arp et al., Phys. Rev. Lett. 93, 165004 (2004)

[2] Bonitz et al., Phys. Rev. Lett. 96, 075001 (2006)

[3] Lampe et al., Phys. Plasmas 7, 3851 (2000)

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