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Dynamical Screening and Wake Effects in Streaming Classical and Quantum Plasmas — ●PATRICK LUDWIG¹, MICHAEL BONITZ¹, HANNO KÄHLERT¹, and JAMES DUFTY² — ¹Christian-Albrechts Universität zu Kiel — ²University of Florida, USA

In recent years we have shown that collective many-body properties in (i) complex (dusty) plasmas, and (ii) charge asymmetric quantum bilayers can be effectively tuned by changing the plasma parameters (temperature, density, mass-ratio of the different plasma constituents) or the effective range of the pair interaction (see [1] for an overview).

Here we significantly extend the previous analysis by inclusion of ion/electron drift by a high precision computation of the dynamically screened Coulomb potential from the dynamic dielectric function. This allows for an accurate description of all plasma properties including screening, wakefield oscillations, ion and electron thermal effects as well as collisional and Landau damping.[2]

The effective wake-potential results in attractive (non-reciprocal) forces between equally(!) charged plasma constituents, which leads to remarkable structural and dynamical many-particle features, which are well known in dusty plasmas. Similar effects are predicted for quantum plasmas.

[1] P. Ludwig, H. Thomsen, K. Balzer, A. Filinov, and M. Bonitz, Plasma Phys. Control. Fusion 52, 124013 (2010) [2] P. Ludwig, M. Bonitz, H. Kählert, and J.W. Dufty, J. Phys. Conf. Series 220, 012003 (2010)

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