

Abstract Submitted  
for the DPP09 Meeting of  
The American Physical Society

**Dynamics and Melting of Finite Plasma Crystals** PATRICK LUDWIG, HANNO KÄHLERT, HENNING BAUMGARTNER, HAUKE THOMSEN, MICHAEL BONITZ, University of Kiel — Interacting few-particle systems in external trapping potentials are of strong current interest since they allow to realize and control strong correlation and quantum effects [1]. Here, we present our recent results on the structural and thermodynamic properties of the crystal-like Wigner phase of complex plasma confined in a 3D harmonic potential. We discuss the linear response of the strongly correlated system to external excitations, which can be described in terms of normal modes [2]. By means of first-principle simulations the details of the melting phase transitions of these mesoscopic systems are systematically analysed with the melting temperatures being determined by a modified Lindemann parameter for the pair distance fluctuations [3]. The critical temperatures turn out to be utmost sensitive to finite size effects (i.e., the exact particle number), and form of the (screened) interaction potential.

[1] PhD Thesis, P. Ludwig, U Rostock (2008)

[2] C. Henning et al., J. Phys. A 42, 214023 (2009)

[3] Böning et al., Phys. Rev. Lett. 100, 113401 (2008)

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Date submitted: 20 Jul 2009

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