Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Spherical crystals in dusty plasmas - Simulation and theory[1] M. BONITZ, C. HENNING, V. GOLUBNYCHIY, H. BAUMGARTNER, P. LUDWIG, Inst. Theoretical Physics and Astrophysics, University Kiel, Germany, O. ARP, D. BLOCK, A. PIEL, IEAP, University Kiel, Germany, A. MELZER, W.D. KRAEFT, Inst. Physik, Universitaet Greifswald, Germany — Coulomb crystals in spherically symmetric traps have been found in trapped cold ions and, recently, in dusty plasmas at room temperature [1] allowing for precision measurements, including individual particle positions and trajectories. Thus, for the first time, strong correlation phenomena can be studied directly on the microscopic level which allows for detailed comparisons with theoretical results and computer simulations. We present molecular dynamics and Monte Carlo simulations of Coulomb crystals in the range from 10 to 10,000 particles which agree very well with the measurements [3]. The results include the ground state shell configurations and symmetry properties [2,3], the crystal stability and melting behavior. Finally, a thermodynamic theory is developed and compared to simpler models, such as shell models [4]. [1] O. Arp, D. Block, A. Piel, and A. Melzer, Phys. Rev. Lett. **93**, 165004 (2004). [2] P. Ludwig, S. Kosse, and M. Bonitz, Phys. Rev. E **71**, 046403 (2005). [3] M. Bonitz, D. Block, O. Arp, V. Golubnychiy, H. Baumgartner, P. Ludwig, A. Piel, and A. Filinov, Phys. Rev. Lett. **96**, 075001 (2006). [4] C. Henning et al., submitted for publication.

[1]Supported by Deutsche Forschungsgemeinschaft via SFB-TR 24.

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Date submitted: 17 Jul 2006 Electronic form version 1.4