

Abstract Submitted
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Density profile of strongly correlated spherical Yukawa plasmas¹

M. BONITZ, C. HENNING, P. LUDWIG, V. GOLUBNYCHIY, H. BAUMGARTNER, Inst Theoretische Physik und Astrophysik, Universitaet Kiel, Germany, A. PIEL, D. BLOCK — Recently the discovery of 3D-dust crystals [1] excited intensive experimental and theoretical activities [2-4]. Details of the shell structure of these crystals has been very well explained theoretically by a simple model involving an isotropic Yukawa-type pair repulsion and an external harmonic confinement potential [4]. On the other hand, it has remained an open question how the average radial density profile, looks like. We show that screening has a dramatic effect on the density profile, which we derive analytically for the ground state. Interestingly, the result applies not only to a continuous plasma distribution but also to simulation data for the Coulomb crystals exhibiting the above mentioned shell structure. Furthermore, excellent agreement between the continuum model and shell models is found [5]. [1] O. Arp, D. Block, A. Piel, and A. Melzer, Phys. Rev. Lett. 93, 165004 (2004). [2] H. Totsuji, C. Totsuji, T. Ogawa, and K. Tsuruta, Phys. Rev. E 71, 045401 (2005) [3] P. Ludwig, S. Kosse, and M. Bonitz, Phys. Rev. E 71, 046403 (2005) [4] M. Bonitz, D. Block, O. Arp, V. Golubnychiy, H. Baumgartner, P. Ludwig, A. Piel, and A. Filinov, Phys. Rev. Lett. 96, 075001 (2006) [5] C. Henning, M. Bonitz, A. Piel, P. Ludwig, H. Baumgartner, V. Golubnichiy, and D. Block, submitted to Phys. Rev. E

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