

Abstract Submitted
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Structural transitions in spherical 3D screened Coulomb crystals¹

MICHAEL BONITZ, DANIEL ASMUS, VOLODYMYR GOLUBNICHYI, HENNING BAUMGARTNER, PATRICK LUDWIG, ITAP, University of Kiel — After the first observation of 3D Coulomb crystals [2], the particularly interesting structures of spherical concentric shells were found in experiment and simulations [3], and it was then demonstrated that the Coulomb interaction between the dust particles is screened [4]. Here, we extend this work by performing extensive molecular dynamics simulations to calculate the ground states of mesoscopic Coulomb balls ($N \leq 60$) in a wide range of screening parameters. The ground states interesting structural transitions, such as the changes of the shell population with the screening parameter as well as the particle number. We present a phase diagram where a general trend to increased inner shell populations with increased screening can be seen.

[1] R. W. Hasse et al., Phys. Rev. A 44, 4506 (1991)

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

[3] P. Ludwig et al., Phys. Rev. E 71, 046403 (2005)

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

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