

Abstract Submitted  
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**Time-dependent correlation buildup in spherical Yukawa balls<sup>1</sup>**

HANNO KAEHLERT, MICHAEL BONITZ, ITAP, University of Kiel — In recent years it has become possible to create 3D dust crystals in experiments [1], where the particles arrange on concentric spherical shells. Compared to confined ions the interaction between the dust particles is screened, which has been shown to affect the shell occupation of the ground state [2], and the probability of metastable states [3,4]. Here we study dynamical processes in a trapped Yukawa plasma by means of Langevin dynamics simulations, which fully include the Coulomb correlations, the confinement and friction with the neutral gas. By cooling a weakly correlated initial state towards the strong coupling regime, the formation of concentric shells is observed. While in systems with Coulomb interaction the shells clearly emerge at the cluster boundary, they appear almost simultaneously for sufficiently large screening. Monte Carlo simulations are used to show that the sequence, in which radial order is established, is determined by the confinement potential.

- [1] O. Arp, D. Block, A. Piel, and A. Melzer, PRL **93**, 165004 (2004)
- [2] H. Baumgartner et al., New J. Phys. **10**, 093019 (2008)
- [3] D. Block et al., Phys. Plasmas **15**, 040701 (2008)
- [4] H. Kählert et al., Phys. Rev. E **78**, 036408 (2008)

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Hanno Kaehlert  
ITAP, University of Kiel

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