

Abstract Submitted
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On the influence of wakefields on 3D particle arrangement¹ MATTIAS KROLL, JAN SCHABLINSKI, DIETMA BLOCK, ALEXANDER PIEL, IEAP CAU Kiel — So far basically two different particle arrangements have been observed in 3D dust clouds. On the one hand, plasma crystals, trapped in the lower plasma sheath, feature among the hexagonal structure within the horizontal plane a distinctive chain structure in vertical direction. On the other hand, Yukawa balls show an isotropic structure of concentric shells [1]. The difference in structure is caused by the directed ion flow in the sheath. Because of this ion flow, the shielded interaction between particles is not the isotropic Yukawa potential, but rather takes the form of a wakefield [2]. However, the picture of either particle chains or hcp-ordered dust clouds is too simple. The structure of plasma crystals is strongly affected by the confinement. In this contribution experiments with two particles trapped in the lower plasma sheath are presented. The particles were manipulated by a laser and their response is analyzed. Stereoscopic digital in-line holography as a novel diagnostic for dusty plasmas allows to observe the particle trajectories with high spatial and temporal resolution. The excitation of metastable particle positions will be demonstrated and their role for the 3D particle arrangement in dust clouds is discussed.

[1] O. Arp et al., Phys. Rev. Lett. 93, 195002 (2004)

[2] A. Melzer et al., Phys. Rev. E, Vol. 54 (1996)

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