On the influence of wakefields on 3D particle arrangement\textsuperscript{1} MAT-
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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-
odered 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.

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