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**Investigation of the Wakefield Interaction within 3D Dust Particle Clusters in a Complex Plasma** KE QIAO, TRUELL HYDE, LORIN MATTHEWS, JIE KONG, JORGE CARMONA REYES, CASPER - Baylor University, ZHUANHAO ZHANG, JIMMY SCHMOKE, MIKE COOK, CASPER-Baylor University — Two-dimensional (2D) dust particle systems confined to a horizontal plane within a capacitively coupled rf discharge have been studied extensively over the past decade. However three-dimensional (3D) clusters, where the wake field interaction between particles often plays a major role, have not yet received the same amount of attention. In this research, stable 3D dust particle clusters, consisting of 1-5 particles, were formed in a complex plasma confined within a glass box. These clusters were examined over a range of powers in order to determine the various structural phases allowed by the system. As rf power was increased, the system was observed to exhibit a series of structural phase transitions. (For example, a 3-particle cluster can exist as a linear chain, a triangle in the vertical plane or a triangle in the horizontal plane.) Analysis employing a force-balance method was used to quantitatively determine the wakefield interaction between the particles.

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