the measured values. As shown in the Fig. 4(inset), this difference can be attributed to an experimental increase in $r_0 \sim \omega_x^{-2/3}$ due to the measured decrease of ω_x with α^2. This implies that the average particle charge q is effectively constant, as previously observed for constant neutral pressure [8, 19]. This increase in r_0 with α^2 is not as apparent for y_{rms} since $y_{rms} \lesssim 0.2 x_{rms}$ and $y_{rms} \to 0$ as α^2 increases.

In summary, we have provided direct evidence that the width of a Yukawa cluster exhibits power law behavior for the 1D to 2D zigzag transition caused by decreasing the confining well anisotropy parameter α^2, confirming a previous prediction [16]. Experiments were performed using a dusty plasma with $n = 6$ particles confined in the biharmonic well above a rectangular depression. The width d of the rectangular depression was increased while the plasma remained on to decrease α^2 while the Debye shielding parameter κ remained essentially constant. The dependence of α^2 on d was accurately determined by measuring the c.m. frequencies of the dusty plasma. A transition from the zigzag configuration to an elliptical configuration was also observed. The cluster width was found to be in excellent agreement with the predictions of a model which assumes identical particles confined in a 2D biharmonic well and interacting through a Yukawa potential. From the fit to the model we found the Debye length is comparable to the inter-particle distance, so that Debye shielding significantly effects the physics of these clusters.

Acknowledgments

Portions of this paper are taken from A. L. M.'s undergraduate physics thesis.

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