Two-Dimensional Phase Behavior of Colloidal Peanuts

SHARON GERBODE, ANGIE WOLFGANG, STEPHANIE LEE, BETTINA JOHN, CHEKESHA LIDDELL, FERNANDO ESCOBEDO, ITAI COHEN, Cornell University — While the phase behavior of spherical colloidal suspensions has been well studied, the ordering of non-spherical colloidal particles remains a largely unexplored yet important problem. In this talk we will describe ongoing studies of one very simple extension of the spherical particle: the colloidal peanut. These peanuts have an aspect ratio that makes them comparable to dimer particles. Confining the colloidal peanuts to two dimensions, we find that the suspension can undergo a phase transition from a liquid to an ordered phase in which each individual peanut lobe resides on a triangular lattice site. The lobe packing is very similar to the hexagonally close packed crystalline arrangement formed by spheres in 2D. Unlike their spherical counterparts, however, the colloidal peanuts are not isotropic, and in particular, each peanut has a specific orientation, or director. In this talk we will describe the correlations between defects in the underlying triangular lattice and the local director field. We will also report on our measurements of long-range director correlations, and if time permits, we will describe ongoing work relating to phases formed by peanut particles with different aspect ratios.

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Date submitted: 17 Nov 2006

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