Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Vestige of $T = 0$ jamming transition at finite temperature in 3D THOMAS CASWELL, MARGARET GARDEL, SIDNEY NAGEL, University of Chicago, ZEXIN ZHANG, ARJUN YODH, University of Pennsylvania — When a random packing of spheres at T = 0 is compressed to the jamming transition, the system becomes rigid and the first peak of the pair-correlation function, $g(r)$, diverges [1]. We study the manifestation of this signature and the associated particle dynamics when the temperature, T, is no longer negligible. To this end, we employ a three-dimensional packing of monodisperse, micron-size, colloids made from n-isopropyl acrylimide (NIPAM). NIPAM particles change size and hence the packing fraction of the system in response to environmental temperature. Thus by changing sample temperature we can probe all packing fractions of interest using a single sample. These particles are compressible so the system can reach packing fractions and configurations inaccessible to hard colloids. We observe a vestige of the T = 0 divergence as a maximum in the first peak of $g(r)$ versus packing fraction coincident with dynamical arrest of the particles. The general features in 3D are in agreement with a previous study in a two-dimensional bi-disperse NIPAM system [2]. We report the dependence of $g(r)$ and particle motion on packing fraction.
[1] C. S. O'Hern, et al., Phys. Rev. E 68, 011306 (2003). [2] Z. Zhang, N. Xu, et al., Nature 459, 230 (2009).

Thomas Caswell
University of Chicago

Date submitted: 11 Nov 2011 Electronic form version 1.4