MAR05-2004-001588

Abstract for an Invited Paper
for the MAR05 Meeting of
the American Physical Society

Rotation of magnetic clusters near the colloidal glass transition

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Colloidal suspensions are a model system that exhibits a glass transition as the particle concentration is increased. Using confocal microscopy we follow the motion of the colloidal particles to study the microscopic behavior of the system as the glass transition is approached. In particular, we embed a small number of paramagnetic beads into dense colloidal suspension of PMMA particles. Sometimes pairs of beads stick together to form dimers. Using an external permanent magnet we exert magnetic force on the dimer causing the dimer to rotate. Such a rotating dimer perturbs the colloidal particles. We study how such perturbations induced by the rotating dimer vary with sample concentration and the dimer rotational speed. Our studies provide further insight in the nature of the glass transition.