Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Direct imaging of particle dynamics in attractive colloidal glasses[1]

PIOTR HABDAS, ANDRZEJ LATKA, Department of Physics, Saint Joseph's University, YILONG HAN, Physics Department, Hong Kong University of Science and Technology, AHMED ALSAYED, ARJUN G. YODH, Department of Physics and Astronomy, University of Pennsylvania — We use confocal and fluorescent microscopy to study the dynamics of glassy colloidal suspensions. The suspensions are composed of PMMA colloidal particles in density and index-of-refraction matched liquid and stained with a fluorescent rhodamine dye. A controllable depletion attraction is induced between hard-sphere PMMA particles by adding different amounts of polystyrene polymer to the suspension. Our dynamical measurements focus on jumps experienced by PMMA particles that escape the cage formed by its neighbors. We track these particles over time and correlate particle fluctuations with its changes in average position. We find that as the strength of the attractive potential increases, and the system enters an "attractive liquid" phase, the number of jumping particles increases. We calculate the distribution of particle jump sizes, time between jumps, and spatial distribution of particle jumps; these observations are compared to predictions of molecular dynamics simulations.

[1]This research was supported by an award from Research Corporation.

Piotr Habdas
Saint Joseph's University

Date submitted: 27 Nov 2007 Electronic form version 1.4