Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Fluctuations of Structure and Dynamics in an Aging Colloidal Glass[1] GIANGUIDO C. CIANCI, ERIC R. WEEKS, Department of Physics, Emory University, Atlanta, GA 30322 USA — When a liquid is quenched to form a glass it becomes trapped in a non-equilibrium state. The non-ergodicity of the system is most clearly highlighted by the dependence of the glass' properties on the time elapsed since the quench. This phenomenon is known as aging. Dense colloidal suspensions have been shown to be a good model for the glassy state. We use fast laser scanning confocal microscopy to image sterically stabilized, micron-sized, PMMA spheres in three dimensions and track their positions over time with subpixel accuracy. While aging is most commonly detected by measuring the evolution of variables (such as the mean squared displacement or the intermediate scattering function) averaged over the entire system and over time these quantities cannot yield information about the detailed, structural changes that occur during aging. Confocal microscopy, on the other hand, allows us to intimately study the aging process with minimal or no averaging. We study the statistics of the fluctuations of geometrical and dynamical quantities over time as the sample ages. In particular, we find that the aging process is heterogeneous in time and space and compare the fluctuations of the aging process to intermittent, record induced dynamics models.

[1]Funding: NASA (NAG3-2728)

Gianguido C. Cianci

Date submitted: 05 Dec 2005 Electronic form version 1.4