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Probing Dynamical Heterogeneity in Dense Colloidal Suspensions with Depletion Attraction[1] ZACHERY BROWN, GREGORY HOGAN, Department of Physics, Saint Joseph's University, MATTHEW GRATALE, ARJUN G. YODH, Department of Physics and Astronomy, University of Pennsylvania, PIOTR HABDAS, Department of Physics, Saint Joseph's University — We directly observe the particle dynamics in dense colloidal suspensions. Using depletion attraction, we vary inter particle potential to study the reentrant glass transition. Confocal microscopy and particle tracking allow us to follow particle trajectories over time. By varying inter particle attraction strength for a fixed volume fraction of colloidal suspensions, we observe three qualitatively different states. Mean square displacement and long time diffusion constant vary with the depletant concentration and indicate a glass state for low attraction strengths, ergodic liquid state for moderate attraction strengths, and attractive arrested state for the highest attraction strengths. Variance in the self overlap function gives the four point susceptibility, a measure of dynamical heterogeneity over a range of length scales and lag times. Results show that the lag times corresponding to the most heterogeneous dynamics are longer for arrested states than for fluid states. The length scale that maximizes four point susceptibility across a range of attraction strengths exhibits a reentrant glass behavior similar to that of the long time diffusion constant.

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