25. Experimental verification of democratic particle motions by direct imaging of glassy colloidal systems

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We analyze data from confocal microscopy experiments of a colloidal suspension to validate predictions of rapid sporadic events responsible for structural relaxation in a glassy sample. The trajectories of several thousand colloidal particles are analyzed, confirming the existence of such rapid events responsible for the structural relaxation of significant regions of the sample, and complementing prior observations of dynamical heterogeneity. Thus, our results provide the first direct experimental verification of the emergence of relatively compact clusters of mobility which allow the dynamics to transition between the large periods of local confinement within its potential energy surface, in good agreement with the picture envisioned long ago by Adam and Gibbs and Goldstein.