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Visualization of shear banding in colloidal glasses VIJAYAKUMAR CHIKKADI, University of Amsterdam, ANDREW SCHOFIELD, University of Edinburgh, BERNARD NIENHUIS, PETER SCHALL, University of Amsterdam — Shear banding, i.e. the localization of shear flow, occurs in a manifold of systems ranging from hard materials such as metallic glasses to soft materials such as clays, shaving cream or mayonnaise. We investigate this phenomenon in a dense colloidal system using confocal microscopy that enables to track individual particles in 3D space and time. The particle motions reveal a transition from homogeneous flow to shear localization above a critical shear rate. We elucidate this transition using spatial correlations in the displacement of the particles. The diffusive motion of the particles is correlated over large length, and shows intermittent, scale-free behavior, reminiscent of crystal plasticity. Further, we associate an order parameter with the mobility of particles and demonstrate that shear banding is phase coexistence of regions differing in mobilities.

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