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Measuring heterogenous stress fields in a 3D colloidal glass NEIL LIN, MATTHEW BIERBAUM, Cornell University, MAX BI, Rockefeller University, JAMES SETHNA, ITAI COHEN, Cornell University — Glass in our common experience is hard and fragile. But it still bends, yields, and flows slowly under loads. The yielding of glass, a well documented yet not fully understood flow behavior, is governed by the heterogenous local stresses in the material. While resolving stresses at the atomic scale is not feasible, measurements of stresses at the single particle level in colloidal glasses, a widely used model system for atomic glasses, has recently been made possible using Stress Assessment from Local Structural Anisotropy (SALSA). In this work, we use SALSA to visualize the three dimensional stress network in a hard-sphere glass during start-up shear. By measuring the evolution of this stress network we identify local-yielding. We find that these local-yielding events often require only minimal structural rearrangement and as such have most likely been ignored in previous analyses. We then relate these micro-scale yielding events to the macro-scale flow behavior observed using bulk measurements.

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