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Avalanches, Plasticity, and Ordering in Colloidal Crystals Under Compression[1] DANIELLE MCDERMOTT, Wabash College, CYNTHIA REICHHARDT, CHARLES REICHHARDT, Los Alamos National Laboratory — Collectively interacting colloidal particles are often used as models to investigate various features of equilibrium and non-equilibrium phenomena. Due to their size scale, colloids provide the advantage that microscopic information on the individual particle level can be directly accessed. Certain studies that may be difficult to undertake in other systems become feasible to perform, such as observations of changes in the particle configurations and dynamics during compression. Using numerical simulations we examine colloids confined in a two-dimensional trough potential undergoing dynamical compression. The depth of this confining well potential is gradually increased and the colloids respond with two behaviors: elastic distortions and intermittent bursts (or avalanches) of plastic motion. We characterize these avalanches, relating behaviors such as shear banding to the particle velocity distributions. We find avalanches which have a non-Gaussian form with power law tails and exponents that are consistent with other condensed matter systems. Thus our model system contributes to understanding the nature of avalanches as events that decrease or increase the structural order in many particle systems.

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