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Testing the paradigms of the glass transition in colloids via dynamic simulation JIALUN WANG, Cornell University, XIAOGUANG PENG, QI LI, GREGORY MCKENNA, Texas Tech University, ROSEANNA ZIA, Cornell University — Upon cooling, molecular glass-formers undergo a glass transition during which viscosity appears to diverge, and the material transitions from a liquid to an amorphous solid. However, the new state is not an equilibrium phase: material properties such as enthalpy continue to evolve in time. Rather, the material evolves toward an intransient state, as measured by the Kovacs signature experiments, e.g. the intrinsic isotherm, which reveals a paradoxical dependence of transition time on quench depth, and suggests that whether the glass transition occurs at the beginning or end of this transition is an open question. Colloidal glass formers provide a natural way to model such behavior, owing to the disparity in time scales that allow tracking of particle dynamics. We interrogate these ideas via dynamic simulation of a hard-sphere colloidal glassy state induced by jumps in volume fraction. We explore three methods to model the jump: evaporation, aspiration, and particle-size jumps. During and following each jump, the positions, velocities, and particle-phase stress are tracked and utilized to characterize relaxation time scales and structural changes. Analogs for the intrinsic isotherms are developed. The results provide insight into the existence of an ideal glass transition.

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