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Experiments reveal different dynamics in two and three dimensions near the colloidal glass transition SKANDA VIVEK, Emory University, COLM KELLEHER, PAUL CHAIKIN, New York University, ERIC WEEKS, Emory University — We use microscopy to study both 3D and quasi-2D colloidal systems as they approach their glass transitions. We use two different bidisperse 2D systems, one of which has hard particles and the other which has particles interacting with long range dipolar interactions. The 3D system also has hard interactions (3D data obtained from Narumi, et al. Soft Matter 2011). In the 3D data, we observe significant plateaus in the mean square displacement curves, in contrast to 2D. This indicates stronger transient localization in 3D. In both 2D systems, as we approach the glass transition, we observe decoupling between translational time scales and time scales for structural reorientation. In 3D, these time scales always remain coupled. Finally, in 2D we observe large clusters of particles moving in parallel directions, but similar clusters are markedly smaller in 3D. In both 2D systems, these clusters become larger on approaching the glass transition. We attribute the observed decoupling of translational and bond-orientational times in 2D to the presence of these large directional clusters. Overall, our results are in good qualitative agreement with recent simulation results [Flenner and Szamel, Nature Communications 2015].

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