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Correlated Dynamics in Dense Granular Flow SHUBHA TEWARI, Mount Holyoke College, ALLISON FERGUSON, BULBUL CHAKRABORTY, Brandeis University — We report on studies of dense, gravity-driven granular flow via simulations of two-dimensional, inelastic, bidisperse hard disks in a vertical tube geometry. We analyze the flow in terms of coarse-grained velocity and stress fields. We find that as the flow rate decreases towards jamming, there is an increase in the timescale over which stress autocorrelations decay. While the spatial correlations of the stress do not increase significantly, there is a marked increase in the spatial correlation of the velocity, which is indicative of an increasing length scale that approaches the system size as the flow rate decreases. We further analyze the flow in terms of two different four-point correlation functions of the stress and the velocity analogous to those used to characterize dynamical heterogeneities in supercooled liquids. These allow us to extract a dynamical length scale as well as a relaxation time for this system.

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