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Dynamical heterogeneities in dense granular flow: timescales and large-scale particle rearrangements ALLISON FERGUSON, BULBUL CHAKRABORTY, Brandeis University — Recent interest in understanding the dynamical arrest leading to a fluid $\rightarrow$ solid transition in both thermal and athermal systems has led to questions about the nature of these jamming transitions (PRL **86**, 111 (2001), Nature **411**, 772 (2001)). It is believed that these jamming transitions are dependent on the influence of extended structures on the dynamics of the system (Science **287**, 627 (2000)). Simulations of steady-state gravity-driven flows of inelastically colliding hard disks show the formation of large-scale linear chains of particles with a high collision frequency even at flow velocities well above the jamming transition (EPL **66**, 277 (2004)). These chains can be shown to carry much of the collisional stress in the system due to a dynamical correlation that develops between the momentum transfer and time between collisions in these "frequently-colliding" particles. While measurements of slowly decaying stress correlations yield an average lifetime for these structures which scales inversely with the flow velocity (cond-mat/0505496), distributions of time scales associated with the stress chains may provide more information about their effect on the dynamics of the flowing granular medium. These distributions may be obtained by considering time scales related to large-scale rearrangements of neighbouring particles in analogy with measurements done on supercooled fluids.

Allison Ferguson
Brandeis University

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