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From spontaneous to induced dynamic fluctuations: Granular packings as an experimental probe FREDERIC LECHENAULT, North Carolina State University, OLIVIER DAUCHOT, SPEC, CEA France, GIULIO BIROLI, SPhT, CEA France, JEAN-PHILIPPE BOUCHAUD, Science & Finance, Capital Fund Management — We track the motion of a horizontally vibrated amorphous assembly of bidisperse hard disks, for densities ranging across the jamming transition. The spatial extension of dynamical heterogeneities and the associated relaxation time are found to exhibit critical behavior. Moreover, a dynamical fluctuation inequality relating the dynamical susceptibility χ_4 and the response of the dynamics to a change in density is tested. As the diffusion length is found to rescale these quantities, the dependencies of the inequality on length and time scales as well as density can be evaluated independently. Surprisingly, the lower bound is found to reproduce the non-monotonic behavior of χ_4 in time, which reveals an intimate link between dynamical heterogeneity and marginal super diffusion. Finally, the bound is shown to be tight and to mimic the anomalous features of the dynamical susceptibility across the transition.

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