

MONDAY

COLLOQUIUM

Correlations and Fluctuations in Disordered Systems: From Arrested Solids to Driven Particles

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20 Apr 2026 (Monday) | 16:00 Hrs (Tea / Coffee 15:45 Hrs) | Venue: TIFRH Auditorium

Disordered many-body systems, ranging from granular solids and glasses to active matter and driven lattice gases, lack the governing physical principles that underlie conventional equilibrium materials. Yet, these systems display robust and often universal behavior. In this talk, I will discuss how constraints and disorder together organize the physics of such systems. I will first discuss athermal amorphous solids, where local mechanical equilibrium can lead to long-range correlations independent of microscopic structure. I will discuss how disorder gives rise to nontrivial elastic response, anomalous fluctuations of elastic moduli, distinct low-frequency excitations, as well as emergent descriptions in terms of coarse-grained field theories. I will then turn to non-equilibrium systems, where conservation laws and dynamics impose constraints that govern fluctuations. I will present results on new ordered phases and current fluctuations in interacting as well as active systems. I will also discuss the emergence of different scaling regimes in such systems and, in some cases, divergent fluctuations driven by non-equilibrium driving.