Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Yielding and Mechanical Memory in Active and Passive Complex Systems

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Glasses are dense, nonequilibrium solids with liquid-like structure and solid-like rigidity. This sustained departure from equilibrium makes these systems suitable for studying memory effects. For example, the preparation route of the glass itself marks a history, producing well-annealed or poorly annealed states. Among annealed glasses, ultrastable ones are exceptionally well annealed and mechanically stable; however, they are brittle and prone to catastrophic failure.

Using molecular dynamics simulations, I will show that active doping suppresses the known brittleness of ultrastable glasses and that a non-temperature-like behaviour emerges from a compensatory interplay between shear rate and active forcing. I will then discuss the nature of memory under unidirectional shear and report the inverse Bauschinger effect (IBE) in these systems, an effect not previously observed in amorphous materials. I will then comment on the generality of this effect and show that IBE is not limited to active ultrastable glasses but, under appropriate conditions, can also be observed in passive amorphous solids. Finally, I will conclude by exploring some aspects of yielding in rod-like particles that exhibit liquid-crystal phases.

Monday, Sep 22nd 2025

11:00 Hrs (Tea / Coffee 10:45 Hrs)

Auditorium, TIFRH