Statistical physics of disordered matter

"Physical properties of dense liquids and disordered solids : from atoms to pedestrians"

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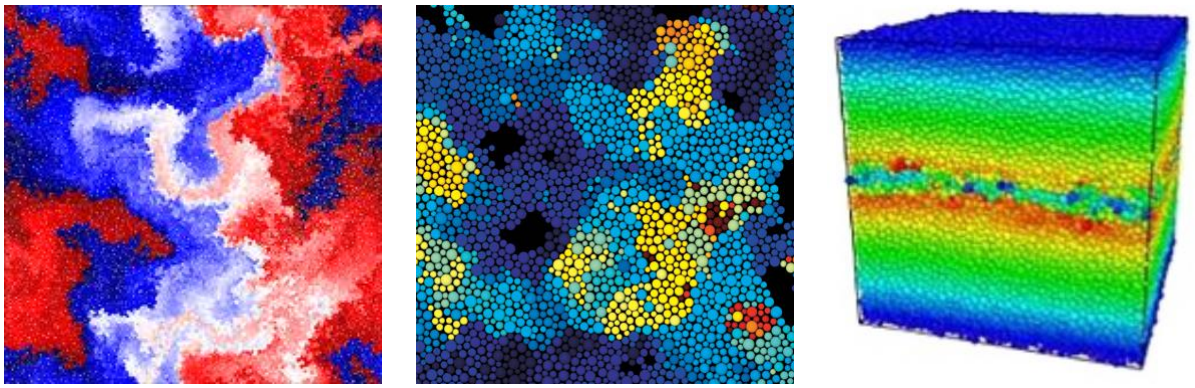
Format: This mini-colloquium complements the plenary talks from A. Tanguy and L. Berthier. For this reason, there will be no invited speaker, and all talks will be contributed, of a duration dictated by the number of submissions.

The ubiquity of disordered matter contrasts with the conceptual and fundamental challenges to rationalise how their physical properties emerge from disorder at the microscopic scale. Understanding the mechanisms responsible for the slow dynamics of dense liquids, as well as those dictating the physical properties of disordered solids remains an important goal. This endeavour has a long history for thermal solids composed of atoms, molecules, polymers and colloids, with much progress on their static properties and more work required to fully rationalise their dynamics, in the bulk and under confinement. Interestingly, very recent studies have broadened the scope of the field by focusing on disordered liquids and solids made of active entities, from motile colloidal particles up to human scales, in which rich collective dynamical behaviour emerge.

The goal of this mini-colloquium is to discuss recent advances in the statistical physics of disordered matter, understood in a very broad sense from their dynamics and physical properties (thermal, mechanical, rheological, etc.). The mini-colloquium will gather researchers working on a variety of systems, from thermal to active or driven, bulk or confined, via experiments, computer simulations and analytical approaches. The goal is to offer a platform to present exciting recent advances in this field.



From left to right: chaotic dynamics in a dense active liquid (Y.E. Keta *et al.*, PRL 132 **21** 2024); dynamic heterogeneities in a deeply supercooled liquid (B. Guiselin *et al.,* Nature Physics **18** 2022), yielding of stable disordered solid (M. Ozawa *et al*., PNAS **115** 6656 2018).