Discontinuous fluidization transition in dense suspensions of actively deforming particles

ELSEN TJHUNG, Univ of Cambridge, LUDOVIC BERTHIER, CNRS, Universite Montpellier — Collective dynamics of self-propelled particles at high density have been shown to display a glass-like transition with a critical slowing down of 2 to 4 orders of magnitude. In this talk, we propose a new mechanism of injecting energy or activity via volume fluctuations. We show that the behaviour of actively deforming particles is strikingly different from that of self-propelled particles. In particular, we find a discontinuous non-equilibrium phase transition from a flowing state to an arrested state. Our minimal model might also explain the collective dynamics in epithelial tissues. In particular, without needing self-propulsion or cell-cell adhesion, volume fluctuations of individual cells alone might be sufficient to give rise to an active fluidization and collective dynamics in densely packed tissues.

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