Tata Institute of Fundamental Research
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Webinar

A theoretical approach for the static and dynamic properties of confluent cellular monolayers

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The ability of cells in tissues to change shape and move in a coordinated manner is essential in morphogenesis, wound healing, cancer progression, asthma advancement etc. During these biological processes, the cell layer exhibits a solid-to fluid-like glass transition, a nearly universal distribution of cell shape variability, and a remarkable correlation between the static and dynamic properties. However, no proper theoretical framework existed to understand, analyse, and quantify the static and dynamic properties, and their correlations in a confluent cell monolayer. In my doctoral research work, we have developed such a framework via analytical theories, simulation studies, and experiments. In this talk, I will summarise our extended random first-order transition theory for confluent cellular systems, a mean-field theory of cell shape, and my experimental findings that establish the connection between statics and dynamics. Moreover, I will show that our theoretical results agree remarkably well with simulations and experiments on diverse systems.

Wednesday, Nov 13th 2024

11:30 Hrs