

Students' Annual Seminar

Force Fluctuations in Disordered Crystals

Pappu Acharya

We show that the melting of soft particle crystals into disordered-crystal states is driven by constrained angular fluctuations of the interparticle forces. The components of forces along the lattice directions display Gaussian fluctuations, whereas the components along the orthogonal directions display confined non-Gaussian fluctuations. This decoupling between the angular degrees of freedom and the magnitudes of the forces allows us to analytically predict several properties within the Gaussian approximation, including the variation of the average coordination $z \approx 3 (1 + \text{erf} (\Delta\Phi/\eta))$ with polydispersity η and the packing fraction $\Delta\Phi = \Phi - \Phi_{\text{crystal}}$. We demonstrate a good agreement between our predictions and numerical simulations of soft disks interacting via linear harmonic potentials.

Friday, Apr 5th 2019

11:30 AM (Tea/Coffee at 10:00 AM)

Seminar Hall, TIFR-H