TIFR Centre for Interdisciplinary Sciences
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Students' Annual Seminar

The role of structure in shear jamming

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We study jamming in frictionless packings. In the absence of friction, a collection of spheres jam at the random close packings density (RCP) $\Phi_j \approx 0.64$ (3D). We produce packings below $\Phi_j \approx 0.64$, that can support load or carry stress. Our model system consists of soft spheres interacting via a repulsive harmonic potential. A wide range of low density packings are obtained by subjecting an assembly of soft spheres to athermal quasistatic shear and compression. We show that these configurations have structural features similar to jammed packings at Φ_j. The average coordination number dependence on the packing fraction Φ is similar to packings obtained by jamming with friction. Our study shows that shear induces geometric features characteristic of jammed states, while friction is instrumental in stabilizing packings over a range of densities below the isotropic jamming point. The lower limit of shear jamming is the random loose packing density (RLP) $\Phi_{RLP} \approx 0.55$, which is defined as the lowest density for which mechanically stable packings can be generated in the presence of friction.

Wednesday, Jan 27th 2016

4:00 PM (Tea/Coffee at 3:45 PM)

Seminar Hall, TCIS