ICTS Colloquium

Title : The jamming transition in sphere packings

Speaker : Srikanth Sastry, Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru

Date : Monday, August 1, 2016

Time : 3:00 pm

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : The transition from a fluid to a rigid state, upon changing temperature, density or applied external stresses, arises in diverse disordered condensed matter systems, such as the glass transition in supercooled liquids, gelation, and the jamming transition in granular matter. The emergence of rigidity in these systems is a subject of active investigation and not well understood. Jamming in granular matter, composed of macroscopic constituent particles, is controlled by density and external stress, arises in diverse soft matter systems, and has been studied extensively using hard and soft sphere packings as model systems. Among the poorly understood aspects of transitions to rigidity, including jamming, are the nature and role of structural change. This applies in particular to the phenomenon of shear jamming, wherein jamming is induced by the application of shear deformation to frictional sphere assemblies, over a wide range of densities below the random close packing density, or jamming point, of frictionless sphere packings. After introducing the relevant issues, I will describe recent work analyzing the geometric aspects of shear jamming, and argue that structural features that arise when frictionless spheres are subjected to shear deformation shed light on the process of shear jamming. This idea is validated by frictional simulations, as well as the analysis of force balance conditions, and percolation aspects including rigidity percolation.