PHYSICAL MATHEMATICS SEMINAR

PACKING OF SPHERICAL AND PLATONIC SOLIDS

ARSHAD KUDROLLI

Clark University

ABSTRACT:

Although ordered packings and maximum packing density of many fundamental solids such as spheres, cylinders and cubes are well known, particles with these shapes rarely exhibit order when brought together far from equilibrium and rarely reach their highest packing density. We discuss a series of experiments investigating the packing structure of spheres and the Platonic solids with various packing protocols including random deposition on a substrate, vibration, shear and fluidization. Particle friction, boundaries and gravitational field can be important to the obtained packings. The motivation for our study is not only to understand the structure of disordered packing and the effect of particle symmetry, but also to develop strategies for assemble materials from single elements with novel strength and conduction properties. A rich array of structures can be demonstrated to be formed. Besides hexagonal close packed , face centered cubic, body centered cubic and disordered phases exhibited by spheres, we show that cubes can grow in a simple cubic lattice or in a disordered packing by changing the deposition angle with respect to the substrate, and cylinders/rods form crystalline packing with axis aligned with gravitational field.

TUESDAY, OCTOBER 18, 2011
2:30 PM
Building 2, Room 105

Reception at 3:30 PM in Building 2, Room 290
(Math Dept. Common Room)

http://math.mit.edu/pms

Massachusetts Institute of Technology