Yale Institute for Nanoscience and Quantum Engineering

Friday- October 30, 2015

12:00 to 1:00 p.m.

BECTON SEMINAR ROOM

Light lunch will be served at 11:45 a.m.

Bhaskar Sen Gupta

Department of Mechanical Engineering & Materials Science, Yale University

"Interparticle Contact Networks of Granular Packings Below Jamming"

We employ computer simulations to investigate the structural properties of interparticle contact networks in granular packings of bidisperse disks below jamming onset at which the system becomes solid-like. We show that the properties of the contact networks are highly sensitive to changes in the packing-generation protocol and its numerical implementation. Thus, we formulate an analytical method to implement steepest descent of hard, athermal particles undergoing isotropic compression, which allows us to calculate the number of contacts as a function of packing fraction. These results represent an important first step in developing a theoretical description of shear- and compression-induced jamming in frictional granular media.

Charles McEnally

Department of Chemical and Environmental, Yale University

"Nanoparticles Gone Bad: Soot Emissions from Combustion Devices"

One of the most objectionable aspects of current power plants and engines is that they often form carbonaceous soot particles and emit them into the atmosphere. Soot particles are black, so they absorb sunlight and cause global warming. Furthermore, given their sub-micron size, they penetrate deeply into lungs and contribute to fine-particle toxicity that kills millions of people worldwide each year. Fortunately, combustion fuels – which have had a fixed composition for the past half century – are beginning to change due to concerns over energy security and renewability. Since soot formation rates depend strongly on fuel chemistry, this shift provides an opportunity to greatly reduce soot emissions. Recent research in our group has defined a fundamental material property – Yield Sooting Index – which characterizes the propensity of a fuel to form soot, measured its value for hundreds of specific hydrocarbons, and identified desirable characteristics for future fuels to minimize soot emissions.

Host: Professor Eric Altman