Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Vibrofluidized melting of geometrically cohesive granular media
NICK GRAVISH, GEOFFREY RUSSELL, Georgia Tech, SCOTT V. FRANKLIN, Rochester Institute of Technology, DAVID HU, DANIEL I. GOLDMAN, Georgia Tech — Dry granular media composed of particles of special shapes (e.g. long rods or c-shaped particles) can display cohesive effects through particle geometry alone. We study the solid to gas transition in piles of c-shaped particles under vertical vibration as we vary acceleration and frequency. A cylindrical solid of particles is formed with wall angles near 90° and is placed on a solid surface. For fixed frequency as acceleration increases, the pile undergoes two transitions. The first is from the solid-like state to a liquid-like state in which the wall angles relax but the mobile particles remain spatially localized. The second is from the liquid-like state to the gaseous state in which particles become separated (not entangled). Using video and accelerometer measurements, we record the temporal evolution of the spatial density and pile-plate collisional impulse. A critical energy scale, set by the particle geometry and gravitational potential energy, governs the liquid-gas transition.

Nick Gravish
Georgia Tech

Date submitted: 06 Dec 2010 Electronic form version 1.4