PHYSICS COLLOQUIUM: Jamming, Clogging, and Confinement in Dense Granular and Suspension Flows

Brian Utter

Teaching Professor, Physics

University of California, Merced

Date:
12/4/2020

Time:
10:30 AM-11:50 AM

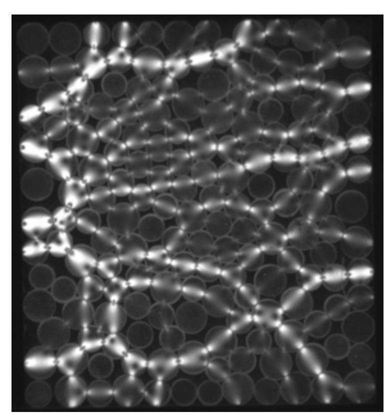
Link:
Please email
snsgradstaff@ucmerced.edu
for Zoom link and passcode

About The Speaker:

Brian joined the UCM Department of Physics as a Teaching Professor in fall 2020. His research interests include experimental soft condensed matter and work in physics education and teacher training. Prior to joining UCM, he served on the faculties at Bucknell University (2015-20) and James Madison University (2004-15) as a Professor of Physics and Astronomy. Brian earned his Ph.D. in 2001 from Cornell University before completing a postdoc at Duke University.

Abstract:

Particle and suspension flows arise in a variety of systems in both nature and industry with grain-level interactions determined primarily by relatively simple interactions, such as friction, normal forces, and lubrication. Despite this, describing macroscopic flow is surprisingly challenging because unexpected properties emerge from the nonlinearity and history dependence of interactions in these complex systems. Features such as clogging, segregation, shear-banding, and avalanching provide striking examples of such emergent properties. I will present results from laboratory experiments on granular and multiphase (grain-fluid) systems in which we aim to better understand flow statistics, in particular near the abrupt jamming/clogging transition between flow and arrest. Specific measurements presented include characterizing particle-scale kinematics and forces in shear flow, jamming of vibrated grains under shear, and clogging of particles in bidirectional flow. In these systems, we find that flow is strongly influenced by the geometry and confinement imposed in the experiment as well as imposed fluctuations and that one can alter flow substantially by tuning these boundary effects.



For more information, contact : Daniel Beller
dbeller@ucmerced.edu