DY 40: Granular Matter

Time: Wednesday 16:30–17:30 Location: ZEU 118

DY 40.1 Wed 16:30 ZEU 118

Heaping and secondary flows in sheared granular materials — •David Fischer[1], Tamás Börzsönyi[2], and Ralf Stannarius[1] — [1]Institute of Experimental Physics, Otto von Guericke University, Universitätsplatz 2, D-39106 Magdeburg, Germany — [2]Institute for Solid State Physics and Optics, Wigner Research Center for Physics, Hungarian Academy of Sciences, PO Box 49, H-1525 Budapest, Hungary

In granular matter, grain shape may have important consequences on macroscopic physical behaviour. Cylindrical split-bottom containers are well established experimental devices to shear granular materials in a continuous way, and to generate well-defined localized shear bands in the granular bed. In such shear experiments, shape-anisotropic grains develop a "secondary flow" profile in radial direction which leads to the formation of a considerable heap of material in the center of the container. We describe the quantitative influence of geometric and dynamic parameters.

DY 40.2 Wed 16:45 ZEU 118

Axial segregation of shape-anisotropic granular particles — •Tina Hanselka, Tilo Finger, and Ralf Stannarius — Otto-von-Guericke-Universität Magdeburg

When a granular mixture is rotated in a horizontal cylindrical drum, it shows radial and axial segregation. Most experimental observations of these effects were performed with spherical particles. Several models have been proposed to describe the mechanism of axial segregation. In our experiments, we compare the behaviour of a mixture of spherical and elongated particles to mixtures with only spherical grains. We discuss the conformity of the proposed models with our experimental results.

DY 40.3 Wed 17:00 ZEU 118

Energy Partition During Cooling of Granular Gases of Rod-like Grains in Microgravity — •Kirsten Harth[1,2], Torsten Trittel[1], Sandra Wegner[1], and Ralf Stannarius[1] — [1]Otto von Guericke Univesität Magdeburg, Institut für Experimentelle Physik — [2]Univesiteit Twente, Physics of Fluids

Granular gases are loose emsembles of grains interacting by dissipative collisions. They represent one of the simplest and most fundamental granular many-particle systems and thus the topic of manifold theoretical investigations. The collective loss of energy of granular gases from an initially excited state is termed granular cooling, and is probably the most frequently theoretically investigated aspect of granular gases. Experimental realizations minimizing disturbances from the container boundaries and minimal spatial inhomogeneities oft he initial state require microgravity. For 3D granular gases, the use of rodlike grains instead of spheres proves advantageous as rotational as well als translational motions are accessible and the spatial distributions are more uniform than those of spherical grains. Here, we address the granular cooling of gases of rodlike grains in micro-gravity. We focus on the evolution oft he decay and the partition of kinetic energy on the different degrees of freedom. Drop tower experiments offer fundamental insights into the energy equilibration and homogeneous cooling of a 3D granular gas.

DY 40.4 Wed 17:15 ZEU 118

Energy dissipation in sheared wet granular piles — •Anna-Lena Schuhmacher[1], Marc Schaber[1], Somnath Karmakar[1], Mario Scheel[3], Marco DiMichiel[3], Martin Brinkman[1,2], and Ralf Seemann[1,2] — [1]Experimental Physics, Saarland University, 66041 Saarbruecken, Germany — [2]MPI for Dynamics and Self-Organization, 37077 Goettingen, Germany — [3]European Synchrotron Radiation Facility, 38000 Grenoble, France

The resistance of granular bead packs is explored when being sheared with a parabolic profile at constant shear volume. The dissipated energy can be determined from the measured differential pressure and increases about linearly with confining pressure for both dry and wet bead packs. However, the dissipated energy for wet beads has a finite value for vanishing external pressure and increases slower with external pressure compared to dry beads.

Using a downsized version of the shear cell the reorganization of beads and liquid is imaged using ultrafast x-ray micro-tomography. The movement of each bead can be tracked during the shear process. The relative movement of the beads causes the breakup of liquid capillary bridges. The contribution of the breaking capillary bridges to the dissipated energy can be quantified by directly detecting individual rupture events.