# DY 56: Posters - Granular and Particulate Matter

Time: Thursday 17:00–19:30 Location: P1A

DY 56.1 Thu 17:00 P1A

**Sound absorption of stratified and blent granulates** — •Hannes Pravida[1] and Thomas Grillenbeck[1,2] — [1]Iganz-Günther-Gymnasium Rosenheim — [2]Fakultät für angewandte Natur- und Geisteswissenschaften, Fachhochschule Rosenheim

We examine the sound absorption coefficient of granulates. We are especially interested in how the sound absorption depends on the mixture and the size of the granular materials. Our experiment is implemented by a variant of "Kundt's Tube" which sends an acoustic signal to granulates and appraises the reflected sound wave.With these data we can calculate the sound absorption coefficient. Moreover we analyze how and why the sound absorption coefficient changes when we blend sound-absorbing and sound-reflecting granular materials.

DY 56.2 Thu 17:00 P1A

**The magic of staples** — •Quirin Koller[1], Barbara Maier[1], Adrian Ebert[2,3], and Thomas Grillenbeck[1,2] — [1]Ignaz-Günther-Gymnasium Rosenheim — [2]Fakultät für angewandte Natur- und Geisteswissenschaften, Fachhochschule Rosenheim — [3]Universität Bayreuth

A qualified, high-grade silo has to have an immaculate bottom and stable, dense walls. If the wall is not built well enough, it might burst.

To avoid such problems, you can explore different kinds of granulates. In my experiments I want to find out which form and kind of granular materials exert the less force to the walls. Therefore, I use different kinds of granulates such as staples, drawing pins or balls made by wood.

DY 56.3 Thu 17:00 P1A

**Dropping eggs** — •Anna Treffurth[1], Thomas Grillenbeck[1,2], and Adrian Ebert[3] — [1]Ignaz Günther Gymnasium Rosenheim — [2]Rosenheim University Of Applied Sciences — [3]Universität Bayreuth

Eggs will be dropped from a certain height. These eggs should be protected from breaking by developing a device which is as small as possible. However, there are different ways to define *small*. I therefore tested different, after categorising each, designs on their reliability. The certainty and the reproducibility were also investigated.

DY 56.4 Thu 17:00 P1A

**Radiography and tomography of fluidized granular beds** — •Manuel Baur and Matthias Schröter — MSS, FAU, Germany

We examine fluidized beds using an x-ray tomograph. In a first step we focus on particle trajectories, the mean square displacement (MSD) and fluctuations in the particle density. These parameters are extracted from transmission radiograms. The further aim of the project is to study the translation and rotation of particles simultaneously. Therefore tomograms of a fluidized bed containing Janus particles are taken. A comparison to results obtained by diffusing wave spectroscopy (DWS) will be drawn.

DY 56.5 Thu 17:00 P1A

**Densest Local Structures and Packing Properties of Uniaxial Ellipsoids** — •Robert F. B. Weigel, Fabian M. Schaller, and Sebastian C. Kapfer — Institut für Theoretische Physik, FAU Erlangen-Nürnberg, 91058 Erlangen, Germany

The relationship between local structure and macroscopic properties is a current research focus in granular matter. We study the distribution of local packing fractions (defined via Voronoi cell volumina) which is a sensitive observable for characterizing these systems. Previously, mainly packings of spherical particles were considered. Here, we focus on packings of uniaxial ellipsoids as an instance of aspherical particles [1]. In particular, we generalize the famous "kissing problem" and report numerical results on the densest local structures of ellipsoids with aspect ratio between 0.7 (oblate) and 1.4 (prolate). Like in the spherical case, these packings locally exceed the density of known ellipsoid crystals. Analogous to results for lattice packings [2], we find that ellipsoids pack denser than spheres, and with more neighbors. In dense disordered packings of ellipsoids, distorted variations of some of our densest packing motifs can be identified. Our results permit us to generalize and test the $k$-Gamma model for local packing fraction distributions, previously only applicable to spherical particles [3].

[1] Fabian Schaller *et al.*, Phys. Rev. X 6, 041032 (2016)
[2] Yoav Kallus, Adv. Math. 264, 355–370 (2014)
[3] Tomaso Aste *et al.*, Europhys. Lett. 79, 24003 (2007)

DY 56.6 Thu 17:00 P1A

**Shape, Friction and Cohesion in Granular Packings** — •Simon Weis[1], Fabian Schaller[1], Gerd Schröder-Turk[1,2], and Matthias Schröter[3] — [1]Theoretische Physik1, FAU Erlangen, Germany — [2]School of Engineering and IT, Murdoch University, Australia — [3]Institute of Multiscale Simulations, FAU Erlangen, Germany

Friction and adhesive forces are important parameters for the stability of granular packings. We analyze packings of wetting and non wetting spheres and triaxial ellipsoids with different aspect ratios. The structural properties of packings are analyzed with respect to friction and adhesive forces. Interparticle friction is changed by grinding the particles with different abrasives and by applying liquid and dry lubricants, which also changes adhesive forces. Adhesive forces are changed by adding water with a surfactant to the packing. Various packings with a range of friction coefficients and liquid contents are prepared at various packing fractions.

To obtain structural properties, the packings are recorded by X-ray tomography and particles as well as liquid clusters are detected. Structural characterization includes mean and local packing fractions, contact numbers as well as Voronoi cell anisotropy by Minkowski tensors.

We show that, although friction has an impact on the mechanical characteristics, the analyzed local structural features remain unchanged.

DY 56.7 Thu 17:00 P1A

**The effect of electrostatics on the clustering in granular gas** — •Chamkor Singh, Stephan Herminghaus, and Marco G. Mazza — Max-Planck-Institut für Dynamik und Selbstorganisation, Göttingen

The ubiquity of granular materials around us makes them a subject of fundamental interest. Flows of such large ensembles of particles exhibit a range of peculiar physical behaviors such as spontaneous fluctuations, self-assembly, self-organized shocks and much more. The mechanisms behind are the dissipative collisions, short range cohesive forces and the ones which are still not well understood. One such phenomenon is the local electrostatic charging and discharging in the naturally occurring granular gas flows. We investigate its effects on the dynamics of granular gas by performing direct numerical simulations of hydrodynamic equations coupled with Maxwell equations. We analyze the influence of these long range forces on the clustering in the system. Finally, we compare the formation of clusters with and without the presence of electrostatic charges.

DY 56.8 Thu 17:00 P1A

**Coarsening dynamics of ferromagnetic networks: experimental results and simulations** — Armin Kögel[1], •Tom Dumont[1], Elena Pyanzina[2], Sofia Kantorovich[3], and Reinhard Richter[1] — [1]Experimentalphysik 5, University of Bayreuth, 95440 Bayreuth, Germany — [2]Ural Federal University, Lenin av. 51, Ekaterinburg, 620000, Russia — [3]University of Vienna, Sensengasse 8, Vienna, 1090, Austria

We investigate the phase separation of a shaken mixture of glass and magnetized steel spheres after a quench of the shaker amplitude. Then transient networks of the magnetic dipoles emerge in the experiment. We characterize the networks by the distribution of its number of neighbours, and its number of loops. For the emerging network clusters we estimate the number of spheres, the gyration radii, and the characteristic path lengths. We find that all three quantities follow a log-normal distribution function. Moreover, we study the temporal evolution of the mean number of neighbours and of the efficiency of the networks. We observe a sudden increase and than a moderate growth of both order parameters. This two distinct time scales are indicating an elastic and an hydrodynamic regime of the viscoelastic phase separation predicted by H. Tanaka (2000) for dynamically asymmetric mixtures. Eventually we use a simple simulation approach to understand the influence of the nonmagnetic spheres on the cluster structures formed by magnetic dipolar particles in quasi 2 dimensions. Not aiming at describing the experimental results we rather use the simulation approach to define the key interactions in the experimental system.