Statistical and Biological Physics

Module No.: MN-P-SP-StatBio, MN-P-PN-StatBio, MN-P-WaMa Version: 26.06.2018 MS

Course:
Physics of Granular Matter

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Category	Type	Language	Teaching Hours	CP	Semester
Specialized Course	Lecture	English	2+1	4.5	WiSe

Requirements for participation:

Statistical Mechanics on the bachelor level

Type of module examinations:

Oral Examination or Term Paper

Duration of the course:

1 semester

Aims of the course:

Granular matter is an example for a physical system far from equilibrium: Dissipative collisions among the constituent particles break time reversal symmetry and a constant energy input is necessary to establish a non-equilibrium steady state. The course shall give an overview of the current understanding of the physics of granular materials comprising theory, computer simulation as well as laboratory and microgravity experiments. Beyond the current state of the art, open research questions shall be reviewed as well as implications for applications.

Contents of the course:

- Granular Gases: Kinetic Theory, Computer Simulation, and Experiments in Microgravity
- Granular Fluids: Dissipation, Agitation and Rheology
- Granular Packings: Critical Behavior and Non-Destructive Techniques
- Exemplary Applications: Process Engineering and 3D Printing
- Granular Phenomena in Nature: Formation and Migration of Dunes

Recommended literature:

N. V. Brilliantov and T. Pöschel, Kinetic Theory of Granular Gases, Oxford University Press (2004).
Research papers.