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Book of Abstracts

phase- behavior in the thermodynamic limit [3]. To what extent this relation is valid in more complex systems, such as the two-dimensional Ising model, is a topic of future research.

[1] C. Flindt, and J. P. Garrahan, Trajectory Phase Transitions, Lee-Yang Zeros, and High-Order Cumulants in Full Counting Statistics, Phys. Rev. Lett. 110, 050601 (2013)
[2] K. Brandner, V. F. Maisi, J. P. Pekola, J. P. Garrahan, and C. Flindt, Experimental Observation of Dynamical Lee-Yang Zeros, Phys. Rev. Lett. 118, 180601 (2017)
[3] A. Deger, K. Brandner, and C. Flindt (2017 - In preparation)

Session 3 / 11

Characterizing rare fluctuations in soft particulate flows

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Soft particulate media include a wide range of systems involving athermal dissipative particles both in non-living and biological materials. Characterization of flows of particulate media is of great practical and theoretical importance. A fascinating feature of these systems is the existence of a critical rigidity transition in the dense regime dominated by highly intermittent fluctuations that severely affects the flow properties. Here, we unveil the underlying mechanisms of rare fluctuations in soft particulate flows. We find that rare fluctuations have different origins above and below the critical jamming density and become suppressed near the jamming transition. We then conjecture a time-independent local FR, which we verify numerically, and that gives rise to an effective temperature. We discuss similarities and differences between our proposed effective temperature with the conventional kinetic temperature in the system by means of a universal scaling collapse.

Session 12 / 29

Translational and rotational Brownian motion of particles of complex shapes

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The characteristic time scales of the translational and rotational Brownian diffusion for nanoparticles are typically much smaller than time resolution of the experiments. In this case, nanoparticles can be treated as point-like, and described by the standard Brownian theory. However, for microparticles, the characteristic Brownian time scales are of the order of seconds, and therefore non-negligible in comparison to the typical time scales of the measured Brownian motion. For microparticles of complex shapes, a more general theoretical approach is needed. The exact analytical expressions for the time-dependent cross-correlations of the translational and rotational Brownian displacements of a particle with arbitrary shape have been recently derived [1,2], and it has been demonstrated how to benefit from these results while analyzing experimental data [3].

[1] Cichocki B., Ekiel-Jeżewska M. L., Wajnryb E., J. Chem. Phys. 142, 214902, 2015.
[2] Cichocki B., Ekiel-Jeżewska M. L., Wajnryb E., J. Chem. Phys. 144, 076101, 2016.
[3] Cichocki B., Ekiel-Jeżewska M. L., Wajnryb E., Arch. Mech. 69, 1. 2017.