



Contribution ID: 16

Type: **Regular talk**

## Solitons in driven overdamped Brownian motion

*Tuesday, 20 September 2022 09:55 (25 minutes)*

In systems with inertia, solitons are waves whose dispersion is suppressed by nonlinear effects. We demonstrate that solitons can occur also in the absence of inertia in overdamped dynamics of Brownian hard spheres driven through periodic potentials at high density. In such systems, the dispersion of density waves is suppressed due to the fact that particles keep together in clusters and external forces are not able to separate them. The motion of clusters can induce particle currents even in the zero-noise limit, where transport of single particles over potential barriers is not possible. The structure of the particle current suggests that solitons dominate the particle current also at high noise. The predicted effects can occur in a broad class of periodic systems.

1. Solitons in overdamped Brownian dynamics,  
Alexander P. Antonov, Artem Ryabov, and Philipp Maass,  
to appear in *Phys. Rev. Lett.* (2022)  
arXiv:2204.14181, DOI: 10.48550/arXiv.2204.14181
2. Collective excitations in jammed states: ultrafast defect propagation and finite-size scaling,  
Alexander P. Antonov, David Voráč, Artem Ryabov, and Philipp Maass,  
arXiv:2203.06372 (2022), DOI: 10.48550/arXiv.2203.06372

**Primary authors:** RYABOV, Artem (Charles University); ANTONOV, Alexander (Universität Osnabrück); MAASS, Philipp (Universität Osnabrück)

**Presenter:** RYABOV, Artem (Charles University)

**Session Classification:** Tuesday session