Physikalisches Kolloquium

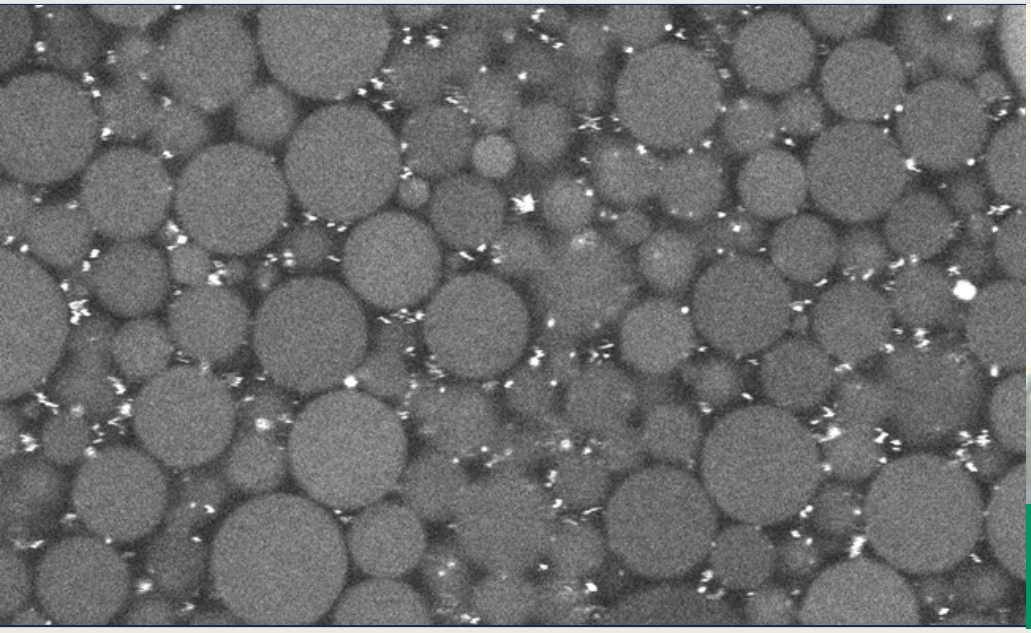
UNIVERSITÄT BAYREUTH
Physikalisches Institut

Elastohydrodynamics of microfluidic soft hydraulics and complex fluid slippage

Fluid-structure interactions proceed through a coexistence of elastic and hydrodynamic stresses. In this presentation, I will discuss two micro and nanoscale fluidic problems with EHD couplings at their root. First, the applied pressure driving a flow through an elastomeric microchannel also causes this latter to deform. This deformation gives rise to pressure-dependent channel resistance while the deformability engenders a fluid storage capacitance. These ingredients make the soft microchip an effective RC system with a pressure-dependent relaxation time [1]. After a brief discussion on these soft hydraulics with complex fluids, I will also discuss the slippage of jammed microgel suspensions. Microgel slippage is supposed to be piloted by a nanoscale EHD balance at the gel-solid interface, wherein a thin lubrication layer mediates the near-wall dynamics, and often completely determining the full, channel-scale flow. We use evanescent-wave microscopy to resolve nanoparticle dynamics near the gel-wall interface [2]. Our results offered a first look inside this layer, and open perspectives on heterogeneous, near-wall dynamics in complex systems [3].

[1] G. Guyard et al., Phys. Rev. Lett., 2022; [2] Gunny et al., arXiv 2609.03540, 2026; [3] JDM, Europhysics News, 2025

Dienstag, 01. Dezember 2026 | 17 Uhr s.t. | Hörsaal H18 (NW II)





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