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PHYSIKALISCHES KOLLOQUIUM

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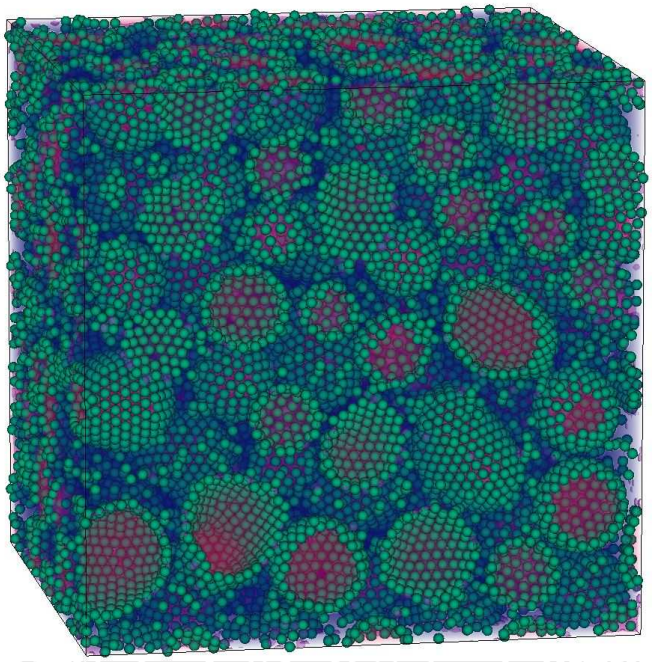

SOFT MATTER INTERFACES: COMPUTER SIMULATIONS OF EMULSIONS, VESICLES AND BIOLOGICAL CELLS

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Interfaces are ubiquitous in soft matter systems and appear in various shapes and sizes. Prominent examples are vesicles (closed membrane defined by a bilayer of phospholipid molecules), capsules (closed polymeric membrane), and all kinds of biological cells. Understanding the dynamics of membranes is important for disease detection, targeted drug delivery, and predicting the viscosity of biofluids, such as blood. Other classes of fluid-fluid interfaces can be found in emulsions, foams, and liquid aerosols. These are of central importance for food processing, cosmetics and pharmaceutics, or even enhanced oil recovery.

We investigate the underlying physical properties of soft matter interfaces by means of state-of-the-art computer simulations. These are based on algorithms combining a multiphase lattice Boltzmann solver for the involved fluids with molecular dynamics or immersed boundary methods to describe (colloidal) particles or deformable membranes. An overview on recent applications will be given ranging from rheological and structural properties of particle stabilized fluid interfaces and emulsions towards microfluidic transport of vesicles and biological cells.