
Gerhard Kahl – Soft Matter Theory

**SOFT MATTER SYSTEMS UNDER NON-EQUILIBRIUM
CONDITIONS**

OPEN PhD POSITION

Soft matter systems are ubiquitous in our daily lives, with examples ranging from biology to technological applications. As a research field soft matter physics is to a high degree interdisciplinary, involving scientists not only from physics, chemistry, or biology, but also from mathematics and informatics and engineering departments.

This project offers the possibility to work on interdisciplinary and bio-related soft matter systems under non-equilibrium conditions. To be more specific we will use external fields such as fluid flow and external forces to induce these conditions, motivated by experimental conditions where shear forces and gravity strongly influence their behavior. Typical systems cover (active or passive) colloids [1], polymeric chains [2], or DNA [3].

The figure below visualizes one of the problems we would like to address: we consider a transient network formed by semi-flexible polymeric chains, visualized via the blue and orange particles; the latter ones are randomly positioned cross-linking monomeric beads which can form via attractive interactions transient bonds between the polymeric chains. The green particle is a (medium-sized) colloidal particle which is either active (i.e., it has the propensity to move through the ensemble) or passive (i.e., it is dragged via an external force through the network). Using suitable computer simulation techniques we investigate the impact of the motion of this particle on the properties of the network and the interplay between the dynamics of the colloid and the network, of relevance for particle motion in biological fluids and for biotechnological applications.

Other problems deal with the conformation of complex molecules (such as DNA [3]) as they are exposed in confined geometries to shearing forces.

We are ready to welcome a highly motivated and enthusiastic new group member, with experience and skills in computational sciences. We are a very open group with possibilities for close interactions between the different scientific topics.

Financing is readily available and extends over three years. The salary for the position is compatible with the FWF-salaries of PhD students (i.e., currently 2237,60 Euro gross salary per month).

If you are interested in this position please contact Prof.Dr. Gerhard Kahl (gerhard.kahl@tuwien.ac.at)

Literature:

- 1 A. Zöttl and J. M. Yeomans, *J. Phys.: Condens. Matter* **31**, 234001 (2019).
- 2 A. Zöttl and J. M. Yeomans, *Nat. Phys.* **15**, 554 (2019).
- 3 J. Kalliauer, G. Kahl, S. Scheiner, and C. Hellmich, *J. Mech. Phys. Sol.* **143**, 104040 (1-19) (2020)

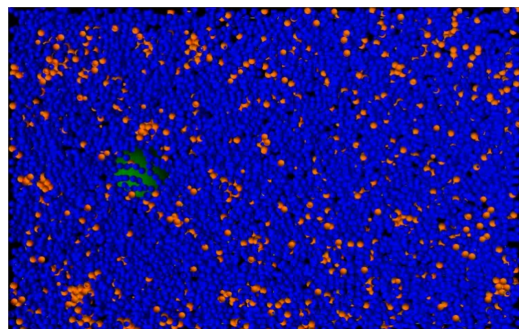


Figure 1: An (active or passive) colloidal particle (green) in a transient network formed by semi-flexible polymeric chains (blue and orange particles)