UNIVERSITÉ DE FRIBOURG
UNIVERSITÄT FREIBURG

Three Ph.D. positions in the 'Soft Matter and Photonics' group @ Fribourg University, Switzerland

1. **Disordered photonics: Light transport, localization & bandgap formation.** Over the last decade, there has been a paradigm shift in the field of photonic materials. Several groups showed that disordered but highly correlated structures can display a photonic bandgap and non-iridescent structural colors. We have been at the forefront of research on such hyperuniform bandgap materials. In this project, you will use direct laser writing (DLW) nanolithography, colloidal assembly, and advanced coating techniques (ALD, CDV) to fabricate disordered photonic materials. You need a good command of programming in MatLab or Python as well as practical skills. This project has an emphasis on optics and photonics. The project builds on our previous work on photonic networks; see, for example, our articles in Optica 2017 and PNAS 2017, as well as PRL and Nature Communications 2020.

2. **Driven colloidal dynamics near the glass and jamming transition using monodisperse emulsions.** In this project, you will work with a unique model system composed of soft emulsion droplets that can be refractive index, buoyancy matched, and fluorescently labeled. See our 2016 article in J. Stat. Phys. We recently published a set of microrheology experiments where we reported driven motion of a tracer bead embedded in the emulsion, published in PRL 2019, and light scattering results, published in PNAS 2019. Using this unique model system, you will expand our research on the fascinating topic of 'glassy dynamics and jamming' by applying optical forces, adding droplet-droplet attraction, and monitoring the surrounding bath particles in real-time. This project emphasizes soft matter physics, microscopy, and fundamental theoretical questions in statistical physics. You need a good command of programming in MatLab or Python for particle tracking, practical skills, and an interest in theory.

3. **Jammed soft particles: Rheology and Effective interactions in Microgels using optical manipulation and superresolution microscopy.** Microgels are fascinating mesoscale-sized spongy soft spheres that serve as building blocks for viscous or viscoelastic bulk materials with a very low polymer mass density. Microgels are thermo-responsive and can thus be used as carriers, sensors, and tunable building blocks for 'smart' materials. You will study dense suspensions' microstructure using superresolution microscopy, diffusing wave spectroscopy and oscillatory shear. To this end you will explore various microgel architectures and the influence of charged groups (ionic microgels). For our earlier work, see, e.g., our articles in Science Advances 2017 or Nature Communications 2019 and 2020. This project emphasizes soft matter physics, microscopy and requires a good command of programming in MatLab or Python and practical skills.

The positions are funded for up to four years by the Swiss National Science Foundation in the project 'Soft condensed matter with correlated disorder'. The supervisors of these projects are Prof. Frank Scheffold, senior scientists Dr. Luis Froufe and Dr. Chi Zhang, supported by the other group members.

The University of Fribourg's National Center of Competence in Research (NCCR) Bioinspired Materials and the Fribourg node of the EU Innovation training network (ITN) SuperCol provides an excellent scientific environment for research and career development.

We have several chemists and materials scientists in the team, but these openings are now primarily for candidates with a physics background. Our team is very international, and more than a third of our team members are female. We are an equal opportunity employer and encourage applications from gifted candidates with all possible backgrounds.

To apply: To apply, please apply here https://tinyurl.com/PhDFribourg with the following documentation:
(a) Your CV in a single pdf file.
(b) A personal motivation describing why you want to join our research group (max 1 page).
(c) A full list of credits and grades, including (if finished) a copy of your MSc thesis.
Please be aware that the limit size for attachments is 25MB. Use several messages if needed.

Please submit your applications before the end of February 2021. Until we have filled all three positions, we will continue considering late applications arriving in March or April.