

**Ph.D. position in theoretical/computational Physics**  
**“Forces induced by artificial random light fields”**  
**Physics department, University of Fribourg, Switzerland.**

**Research.** Dynamical effects on material particles due to electromagnetic radiation have been recognized since the early observations of Johannes Kepler in the seventeenth century on the tails of comets. Since these primal intuitive ideas, scientific knowledge has evolved to the point of having a precise and fundamentally based knowledge of the interactions between radiation and matter. To the point that we have demonstrated that a random optical field can induce a prescribed interaction between pairs of small particles if the power spectrum of light is appropriately chosen among many other intriguing phenomena.

However, despite of the theoretical and experimental advances in the understanding of interactions induced by artificial random optical fields, there are still many questions that deserve further research.

Our aim is filling the current fundamental knowledge gaps and attempt a systematic theoretical and numerical study of the many body interactions induced by random optical fields for large assemblies of particles of any size shape, and optical properties. We also devise a very interesting emerging phenomenology when the isotropy of the optical field is not complete and its polarization degree is not fully randomized. We plan to consider the relation between the statistical properties of the optical field, the structural properties of the interacting system of particles and the optical properties of the structures themselves.

**About the Ph.D. project.** The Ph.D. project will be performed in the previous context. The successful candidate will push forward the frontiers of current knowledge in optically induced forces by devising methods to tailor the statistical properties of light such that optical interactions, including many body effects, are tuned in advance.

We seek a motivated and enthusiastic Ph.D. student eager to learn everything about radiation-matter interactions, to develop numerical models and software to tackle our challenging problems and to expand the theory of optically induced interactions to a new level.

The Ph.D. plan includes a solid additional formation plan and international exposure through the attendance to several international schools and scientific conferences.

**The group.** You will be part of the theory branch of the Soft Matter and Photonics group in the department of Physics of the University of Fribourg (<https://www3.unifr.ch/phys/en/>). The Ph.D. candidate will be under the direct supervision of Dr. Luis Froufe and in close collaboration with a postdoc working on the same the project.

**Job requirements.** The candidate must hold a MSc degree (or equivalent) in Physics or Engineering. Please notice that the project is essentially theoretical/numerical and hence we seek for motivated students with strong background in computational and/or theoretical physics.

**Conditions of employment.** 3 years full time Swiss National Science Foundation doctoral appointment. Total annual salary in the range from CHF 47,000 to CHF 50,000 + social security contributions + other allowances and benefits if applicable. Possible extension by 6-12 months. The candidate should not hold a a PhD.

**Apply** By sending

- Cover letter explaining your personal motivations, goals and research interests.
- CV
- List of credits and grades including MSc thesis.

to [luis.froufe@unifr.ch](mailto:luis.froufe@unifr.ch)

**Contact.** For further information, please contact Dr. Luis S. Froufe-Pérez, [luis.froufe@unifr.ch](mailto:luis.froufe@unifr.ch).