**Keywords**: single-molecule FRET, single-particle tracking, signaling receptors, nanoscale conformations, protein clustering, non-equilibrium activity of proteins

## M2 internship & PhD positions available

**Topic:** Single-molecule biophysics of membrane proteins & emergent functionality

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Conformational changes and diffusion dynamics of membrane proteins are key in regulating fundamental cell physiology. Membrane proteins are involved in the transport of ions, drugs or molecules across the lipid bilayer using different sources of energy – during which they undergo specific conformations & spatial re-arrangement in membranes. **We are interested in deciphering nanoscale conformations and membrane organizing principles of cell-signaling receptors and membrane transporter proteins**. In this thematic, we have multiple openings to address biophysics question such as:

- How does mechanical stresses on bio membranes affect protein conformations and thus its activity?
- How does protein-protein interaction at the molecule level play a role in decision making at the cellular level?

We employ **transdisciplinary approach** combining biochemistry (for in-vitro protein reconstitution), synthetic biology (such as click-chemistry for site-specific fluorescence labeling), and **advanced optical methods (single-molecule FRET, single particle tracking**, fluorescence cross-correlation spectroscopy) **to explore the influence of conformations and protein-protein interactions in cell functions**. If any of these keywords interest you, and if you like working at the interface of physics and biology, please get in touch.

Key references:

- Srinivasan, S., Regmi, R., et al. "Ligand-induced transmembrane conformational coupling in monomeric EGFR." *Nature Communications* 13.1, 2022
- Damm, Alicia. *Interplay between the conformational dynamics of a transmembrane protein and the mechanical properties of its surrounding membrane*. Diss. Sorbonne Université, 2019
- Quemeneur, F.,… Bassereau, P., et al. "Shape matters in protein mobility within membranes." *Proceedings of the National Academy of Sciences* 111.14, 2014