ITI HiFunMat Master Internship Proposal

X M 1 X M 2

Title:

How do Molecules Process Information : Conformational Spread in Giant Megamer Proteins

Internship supervisor

Name, first name	KULIC Igor & SCHMATKO Tatiana
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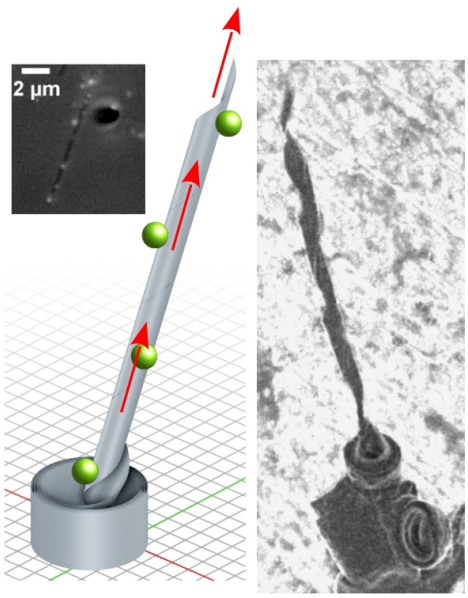
Laboratory	Institut Charles Sadron, CNRS, Strasbourg
Collaboration with a HiFunMat member (*please indicate their name*)	☐ No X Yes: I. KULIC , T. SCHMATKO, L. PIEUCHOT

Student profile looked for

Master program (*more than one box can be ticked)*	X Material science and engineering ☐ Chemistry X Physics
Other indications if necessary	

Internship description*

In Nature, we are surrounded by giant protein machines consisting of a large number of subunits that synergistically work together to achieve a common task. In our laboratory at ICS, CNRS in Strasbourg, we investigate the world's biggest synergistic protein network consisting of several millions of identical units. This supramolecular megastructure , called the "R body", once triggered by external stimuli cooperatively and rapidly switches its shape, from a compact scroll cylinder to a long tubular needle on sub-second timescales. Because of their enormous size , the shape transformations of R bodies can be followed in real time under the microscope, turning them into a unique model system for understanding the mystery of "conformational spread" – propagation of cooperative states in large multiprotein complexes.



In this combined theory/experiment M1 or M2 internship the student will learn how to quantitatively investigate and practically manipulate the conformational dynamics of R bodies and help us develop a computation model describing their collective lattice states. The internship will be in close collaboration with our partner Laurent Pieuchot (IS2M, CNRS, Mulhouse) and take place within a vibrant, growing environment of enthusiastic students and researches working together towards understanding the inner workings of this fascinating biomachine.

Requirements:

We are looking for a highly motivated, curious, analytical thinker from physics, cell physics, biophysics, polymer science and related fields with a taste for interdisciplinarity and learning new things. Experimental skills in (bio)polymers and Python programming are welcome but not mandatory.

The internship will take place at the Institut Charles Sadron, CNRS, Strasbourg with frequent meetings and some exchange visits to IS2M, CNRS, Mulhouse.

Contact: Applications to Tatiana SCHMATKO and Igor KULIĆ

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**** This internship may give rise to a Doctor thesis in continuation***