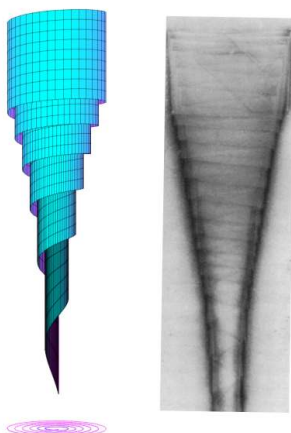




## Research Internship Master 1 or 2: Deciphering the R-body Extension-Retraction Mechanism



**The Institut Charles Sadron (Strasbourg) and the Institut de Sciences des Matériaux de Mulhouse (Mulhouse) are looking for a master student (first year or second year level) in experimental physics or biophysics.**

**The 4-6 month internship could start as soon as February 2023 and takes place at Institut Charles Sadron in Strasbourg with occasional trips to our Mulhouse lab.**

### Internship Description

R-bodies are unique molecular pistons produced by endosymbiotic bacteria that can switch in a fraction of second from self-enrolled 500nm ribbons to 20 microns membrane-perforating needles. Their extension is triggered by pH variation via a mechanism that remains unclear.

Within this internship the student will decipher R-bodies' extension-retraction cycle dynamics and mechanism by combining microfluidics, high speed imaging, force spectroscopy methods and theoretical models. The R-bodies are produced in *E. coli* and will be immobilized inside microfluidic chambers allowing rapid buffer exchange. We will assess the influence of buffer viscosity on R-bodies dynamics and the force generated during retraction using high speed imaging and optical tweezers. R-bodies will be trapped into giant unilamellar vesicles together with photoacid molecules and oscillatory rapid actuation will be triggered by light. The longer term vision is to develop a biophysical model integrating the experimental results and to ultimately tame this powerful and unique, nanomachine as a workhorse of future nanotechnology.

### Supervision/Contact:

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