Master *Matière Condensée et Nanophysique*

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Title : Active biomimetic cell compartments

Recently, we have experimentally investigated the interaction between active microparticles and empty cells made of lipid membranes. Several physical aspects of this interaction are important in processes such as viral infections, drug delivery and toxicity from nanomaterials. Lipid membranes can deform and wrap solid particles as a result of a delicate balance between adhesion, particle activity and membrane properties (tension, bending and charge).[1,2,3]
Now, we aim at studying giant lipid vesicles (GUV), which are not empty but filled with self-propelled particles. This internship is dedicated to the fabrication of biomimetic cells able to show active motion and dynamics such as giant fluctuations, cell division and tube formations.
Phospholipids and microparticles (made of silica, copper and gold) will be investigated to fabricate giant vesicles containing microparticles, which are able to self-propel and impart forces on lipid membranes. Bright-field and fluorescence microscopy will be used together with particle tracking and image treatment analysis.

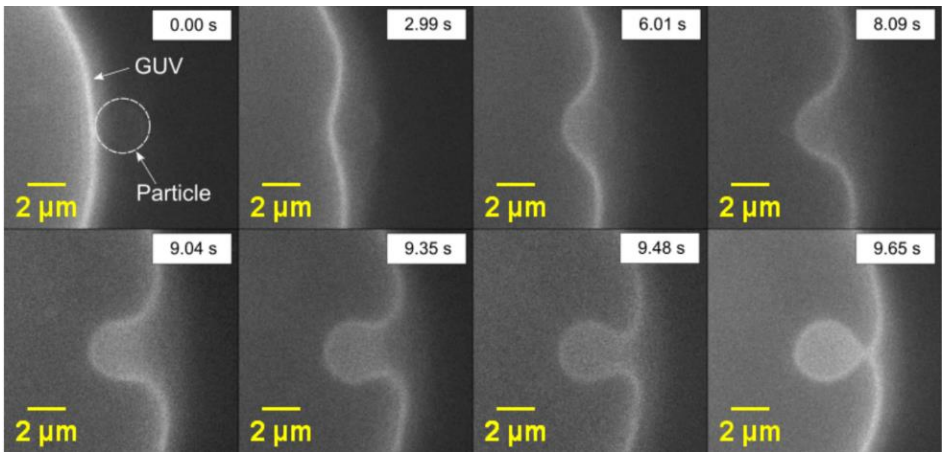

Figure. Giant unilamellar vesicle (GUV)-Particle interaction by optical trapping / fluorescence microscopy .

REFERENCES:
1. Active colloids orbiting giant vesicles, V. Sharma et al. Soft Matter 2021.
2. Entry of microparticles into giant lipid vesicles by optical tweezers, F Fessler et al. PRE 2023
3. Driven engulfment of Janus Particles by Giant Vesicles in and out of thermal equilibrium, V. Sharma et al. Nanomaterials 2022