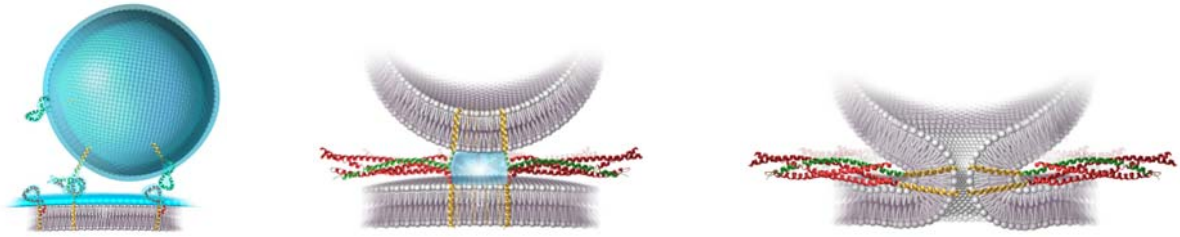
Title: The speed of thought - Mechanics of neurotransmission



Docking Close contact Fusion

Project:

Neurotransmitter release from synaptic vesicle is a fundamental biological phenomenon enabling the communication between neurons. Therefore a deep understanding of this process may have a dramatic impact on the treatment of many neurological pathologies.
For this mechanism to be efficient, a synchronized and explosive fusion of synaptic vesicles with the presynaptic neuron plasma membrane is required.
This process involves protein nanomachines called SNAREs whose role is to trigger the fusion process by deforming and pulling the vesicles towards the membrane in a cooperative manner.
Less than one millisecond is required for the fusion to occur in vivo and it is believed that this ultra-fast timescale can only be achieved through a smart mechanical design of the SNARE machinery, which remains to be revealed.

This post-doc aims at addressing this issue by (i) proposing a mechanical model of the action of the SNAREs and by (ii) studying the membrane response to this action.
Even though, this is a purely theoretical work, it will be in direct interaction with experiments performed at the LPS-ENS and at Yale University in James Rothman's lab (Nobel Prize in Medicine, 2013).

Profile:

This work requires a strong background in statistical physics, mechanics and numerical computation.
No particular knowledge in biology is required but for the project being at the interface between physics mechanics and biology, candidates should be willing to work in a highly interdisciplinary environment.

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