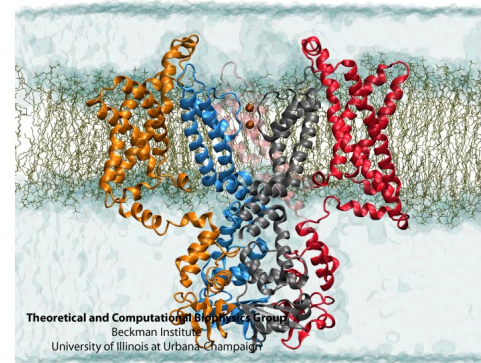


Training Program in *Computational Biophysics*

TFG/TFM proposal

Stochastic Dynamics of Ion Channels

Ion channels are protein structures on biological membranes that permit the crossing of specific ions, and that can open and close depending of diverse factors such as membrane potential, chemical concentrations or mechanical stresses. Ion channels are responsible for very important physiological processes, like action potential propagation, muscle contraction, electrical pacemaker, etc.



Stochastic differential equations constitute an appropriate theoretical framework for studying gating dynamics of ion channels. In this approach the dynamics of the channel is projected to a few relevant degrees of freedom. The presence of the many rapid variables that are hidden in the description appear as friction and fluctuating terms in the equation for these degrees of freedom. Stochastic processes theory can be applied, and simulations of real processes become feasible.

BSc / MSc Thesis Proposal

A TFG/TFM is offered for the study of stochastic models incorporating realistic characteristics of biological ion channels, and the comparison to other theories and to experimental results. The tasks will be: (1) development of the modeling, (2) designing of the code, (3) simulations, (4) Analysis of results.

Reference

Ramírez-Piscina, L. and Sancho, J.M.; Subconductance states in a semimicroscopic model for a tetrameric pore, Physical Review E 109, 044402 (2024).

DOI: <https://doi.org/10.1103/PhysRevE.109.044402>

TFG/TFM Supervisor: Laureano Ramírez de la Piscina Millán

Candidate Profile: Final-year BSc or MSc student of Engineering Physics, or Mathematics at UPC

Center: Escola Politècnica Superior de Barcelona EPSEB, Campus Sud (Barcelona).

Application: Send CV and a motivation letter to Laureano Ramírez (laure.piscina@upc.edu)

Funding: The selected student will be considered as candidate for an INIREC fellowship (<https://talenthub.upc.edu/en/jobs/r0-predoctoral>).