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INSTITUTE OF PHYSICS IPHYS

Seminar in Biological and Statistical Physics

Mardi 29 octobre 2019 à 14h00

Salle BSP 727
(Cubotron) EPFL

Prof. Dean Astumian

(Prof., Dept. of Physics University of Maine)

Kinetic asymmetry allows macromolecular catalysts to drive an information ratchet

Abstract:

Molecular machines carry out their function by equilibrium mechanical motions in environments that are far from thermodynamic equilibrium. The mechanically equilibrated character of the trajectories of the macromolecule has allowed development of a powerful theoretical description, reminiscent of Onsager's trajectory thermodynamics, that is based on the principle of microscopic reversibility. Unlike the situation at thermodynamic equilibrium, kinetic parameters play a dominant role in determining steady-state concentrations away from thermodynamic equilibrium, and kinetic asymmetry provides a mechanism by which chemical free-energy released by catalysis can drive directed motion, molecular adaptation, and self-assembly. Several examples drawn from the recent literature, including a catenanebased chemically driven molecular rotor and a synthetic molecular assembler or pump, will be discussed.

Host: Prof. De Los Rios
Institute of Physics and Institute of Bioengineering