

Physical models of proton-pumping complexes in mitochondria membranes

Lev Mourokh

Queens College of CUNY, 65-30 Kissena Blvd, Queens, USA

Living objects at the nanoscale can be viewed as molecular complexes, whose dynamics is often controlled by the transfer of single charges or single-photon absorption events. In many senses, it is similar to the principles of operation of semiconductor nanostructures and elements of molecular electronics. Correspondingly, well-established methods of condensed matter and statistical physics can be applied. In this talk, I address proton-pumping complexes and proton-driven nanomotor of the mitochondria membranes. These systems convert the energy obtained from the food to the proton gradient across the membrane, to the mechanical rotation of the nanomotor, and, finally, to the energy of chemical compounds. We propose simple physical models for these complexes which not only allow the quantitative description but can inspire the implementations in nanoelectronics as well.