MPI-NAT SEMINAR SERIES

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Molecular Machines: Unidirectional Translocation of Ions powered by Light

When triggered by external stimuli, the appropriately designed molecules, “molecular machines”, can perform specific and directed translocation of molecular species and ions. Such machines can absorb the light quanta and use the energy achieved in excited-state reactions as their driving force. In this talk I will focus on unidirectional translocation of ions and show on several examples the successful employment for this purpose of excited-state reactions of isomerization, electronic charge and proton transfer. These reactions can form a new ion binding site distant from initial one, and upon its disappearance after the excited state decay the ion relaxes to its equilibrium state migrating to the sites of better electrostatic interactions or better solvation by the environment. It can return back to its initial high-affinity site, become released to bulk volume or starts participating in some coupled reaction. Particularly important is visualization of the process of ion translocation by recording the Stark-effect producing spectral shifts. We analyze different advantages and limitations of this approach and show that it is highly attractive for exploration in basic research and in different applications. One of these areas is the design of light-driven active ion transporters through biological membranes and membrane-like structures. A perspective view on future advances in this exciting research field is provided.

Thursday, 20.02.2025, 3:00 pm

Host:
Grazvydas Lukinavicius, Thomas Jovin

Manfred Eigen Lecture Hall, Faßberg Campus

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