

BP 63: Plenary Talk of Ben Schuler

Time: Thursday 14:00–14:45

Location: H15

Plenary Talk

BP 63.1 Thu 14:00 H15

Single-Molecule Spectroscopy of Biomolecular Dynamics at the Nanoscale — ●BEN SCHULER — University of Zurich, Switzerland

Proteins are the most versatile constituents of the molecular machinery of life. Understanding their remarkable mechanisms of self-organization and their functional properties requires detailed knowledge of their structure and dynamics. Single-molecule spectroscopy provides an opportunity for investigating these properties on nanometer lengthscales and down to nanosecond timescales. By probing individual molecules, both structural and dynamic heterogeneity, which

would be hidden in the ensemble average, can often be identified. Förster resonance energy transfer (FRET) combined with correlation spectroscopy, microfluidics, and the quantitative analysis of photon statistics enables us to probe distances, distance distributions, and both the equilibrium and non-equilibrium dynamics of biomolecules, even in complex environments, including live cells. A thorough understanding of the physics underlying biomolecular behavior is becoming accessible via the growing synergy of experiment with analytical theory and molecular simulations. I will present the basic conceptual and experimental ideas, and illustrate them with recent investigations of the dynamics, folding, assembly, and interactions of proteins in the context of their roles in living systems.