Advanced Light Sources

ADLIS

Ultrafast Dynamics

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Fakultät für Chemie
FEMTO-PHYSIKALISCHE CHEMIE
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Einladung

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Quantum Control Spectroscopy of the fs-Dynamics in the Excited State of ß- Carotene

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Währingerstrasse 42, 1090 Wien

Abstract: The early steps of excited state dynamics of carotenoids play an eminent role in photosynthesis. Serving as antenna pigments in light harvesting complexes they highly enlarge the convertible spectrum to light. The absorbed energy subsequently is either transferred via intermolecular excitation energy transfer towards the reaction center, or is lost via intramolecular internal conversion. Based on quantum dynamics calculations, we present simulations and interpretations of control experiments of the excited states of ß-carotene. The experiments performed in the group of M. Motzkus (Heidelberg), were inspired by their successful control experiments on LH2 which managed to take influence on the carotenoid energy transfer ratio. In a modular model system, we unravel the mechanism of pulse train control first in di-atomic systems. Subsequently, we expand the mechanism towards the influence of dissipative environment, poly-atomic molecules and electronically coupled systems. The deduced findings allow us to interprete the ß-carotene control experiments and to answer open questions about the early photochemistry concerning the participation of additional excited states and the role of vibrational modes in the process of internal conversion. Perspectives are drawn for the interpretation of the above mentioned LH2 control experiments addressing the participation of long lasting coherences

Kauffmann & Gruppe