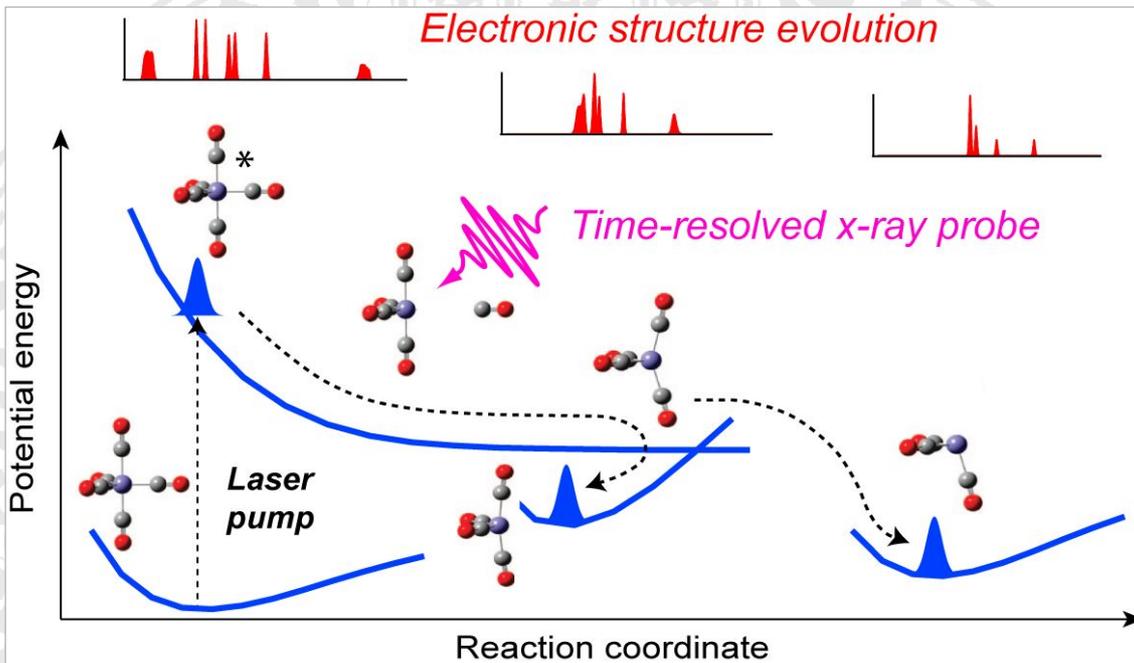




SONDERKOLLOQUIUM

AM 25. JUNI 2014 UM 12 UHR S.T.

IM HÖRSAAL II IM PHYSIKHOCHHAUS



Where are the electrons? Resolving molecular excited-state behaviour with time-resolved x-ray spectroscopy

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Photochemically activated molecules catalyze chemical reactions, but a molecular-level understanding of how these short-lived and reactive intermediates catalyze reactions has remained elusive. A lack of suitable probes has limited the detail of our understanding due to the difficulties related with characterizing electronic excited states. We exploit the new opportunities provided by time-resolved x-ray spectroscopy to reveal the coupling of nuclear dynamics and transient electronic structure in molecular systems. Based on a fundamental understanding of local atomic and intermolecular interactions we aim at a novel characterization of chemical interactions on atomic length and time scales of Ångströms and femtoseconds. Corresponding examples ranging from small molecules in the gas phase, to coordination complexes in solution and complex biomolecules will be discussed. I will show how this is directed at answering the following questions: Can we find simple rules to understand, predict, and control the behavior of molecular excited states? How do transient molecular states govern photochemical selectivity and rate? Can we use this knowledge to develop novel concepts for the photocatalytic conversion of light into chemical energy?