CFEL SCIENCE

SEMINAR

19th December 2019 - 10:00 h

CFEL – Building 99, seminar room I+II (ground floor)

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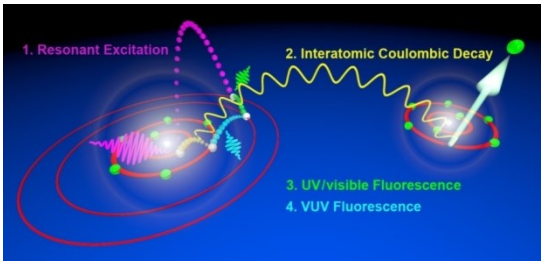
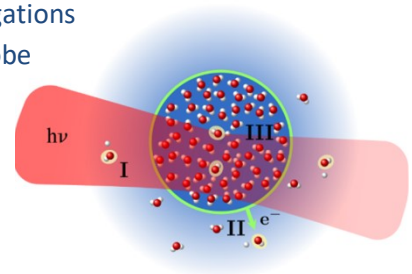
Unravelling ultra-fast energy transfer processes in real-life resembling samples

Understanding and quantitative description of fundamental processes in nature is the goal of physics. My research focuses on ultra-fast dynamics in dense media. In tailored prototype systems, i.e. noble gas clusters, energy transfer processes can be identified, and fingerprints of such processes can be revealed. With the help of these signatures we search for ultra-fast processes in biologically relevant dense media, e.g. liquid water.



After an extended introduction, I will discuss the interatomic Coulombic decay (ICD) and the radiative charge transfer (RCT) in homogenous and heterogeneous Ne and Ar clusters upon inner-valence and inner-shell excitation. The main results are that both processes show a large probability and an easily detectable fingerprint emission. Such an emission of a more realistic system, i.e. liquid water in a liquid micro jet excited with soft X-rays, will be presented as an example for an ultra-fast process. To unravel such processes, we develop state-of-the-art fundamental atomic and molecular physics experimental techniques and benchmark those on simple perfectly characterizable atomic and molecular systems. These include coincidence and time dependent investigations of molecular systems, exemplified by an X-ray FEL pump-probe experiment on chiral molecules. Here, I will illustrate that advanced machine learning based data evaluation is necessary and a scientific endeavor itself.



Figures from:
J. Chem. Phys., 2017, 482, pp 165–168
J. Phys. Chem. B, 2017, 121, pp 2326–2330

Host: Melanie Schnell / CFEL Molecular and Ultrafast Science Seminar