

GAS-PHASE AND CLUSTER SCIENCE USING FELS

Nora Berrah

*Physics Department,
Western Michigan University*

The development of high-field and femtosecond lasers brought advances in time-resolved investigations in the IR, visible and UV as well as enabling the capabilities of non-linear spectroscopies.

The advent of ultrafast vuv-x-ray light sources is timely since we lack a detailed understanding of the mechanisms of interaction of radiation at very short times following vuv-x-ray energy depositions in an isolated system. We also lack understanding of the time-dependent energy dissipation. Comprehensive information on the interaction and decay pathways following energy deposition is much needed in gas-phase systems such as atoms, molecules, clusters, and their ions. Time-dependent studies of carefully selected systems and comparison with the results of forefront theoretical methods will provide the basic knowledge of the behavior of matter in the ultrafast and ultra-intense regime accessed by vuv-x-ray FELs.

We plan an experimental program in high-field and ultrafast physics of atoms, molecules, clusters, and their ions using vuv-x-ray FELs. We hope during this workshop to discuss future science that can be done with the new FEL sources as well as develop a strong connection with theoretical groups, in order to better understand many body-processes in photoionization and their various dynamic manifestations. Specifically, we seek to understand the dynamics and competing mechanisms that lead to various phenomena when the inner-shell electrons of these complex systems are excited with ultrafast and ultra-intense linearly and circularly polarized light.