

بسمه تعالی

اطلاعیه برگزاری سمینار علمی

عنوان:

Two-Color Photoionization Experiments with Ultrashort Light Pulses on Small Atomic Systems

ارائه دهنده:

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Abstract:

The photoionization of atoms can reveal invaluable information about their underlying electronic structure and dynamics. For decades, such studies at synchrotron light sources and with optical lasers have substantially contributed to our today's knowledge of nature's fundamental building blocks. With the advent of ultrashort and ultraintense X-ray pulses generated by free-electron lasers, new fields of science such as non-linear physics, ultrafast physical chemistry as well as ultrafast bio-chemistry have evolved. This thesis is dedicated to investigations of fundamental processes in non-linear light interaction with small atomic targets in the gas phase. Especially in two-color experiments with ultrashort extreme ultraviolet (XUV) and near infrared (NIR) laser pulses, the structure and dynamics of electrons can be studied in an unprecedented way by obtaining their spectra by means of different kinds of spectrometers. In particular the study of the electrons' angular distributions and their dependences on the intensity of a dressing laser field opens the door for e.g. polarization dependent partial wave analysis studies. In the laboratory these type of experiments can be realized using XUV pulses generated by the process of high order harmonic generation (HHG). Such a set-up has been built up during this thesis. Using the world's first circularly polarized, ultraintense FEL, FERMI in Italy, oriented ion-electron pairs were created and probed by superimposed NIR pulses of co- or counter-rotating helicities. Using this method, the obtained circular dichroism was used to determine the actual degree of circular polarization at the experimental endstation LDM at FERMI. Further aspects of the underlying light-matter interaction with particular interest in the dependence of the circular dichroism on the NIR intensity are discussed in this thesis. As concluding chapter, a two-color multi-photon ionization experiment on the intensity dependence of a dichroic AC Stark shift will be presented.

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