

October 22nd, 2010, 10.00 a.m. – DESY Bldg. 49, Room 108

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Inclusion of static Stark shifts in models for strong-field ionization

One way to obtain molecular-frame ionization cross-sections is to confine the target molecules in space prior to the interaction with the laser field. Making use of the large polarizabilities and dipole moments of the target molecules it is possible to adiabatically orient them with the fixed head-to-tail ratio before the interaction with the strong-field laser pulse [1]. Strong-field ionization of oriented molecules that possess large dipole moments and polarizabilities leads to large modulations of the ionization potential due to the Stark shifts. We include the static Stark shifts in the tunneling model [2] and in the strong-field approximation [3]. We find very good agreement between the results obtained from our models and the experiment. The modification of molecular orbitals in strong fields is also discussed and in case of extreme polarization of the inner electrons a simple model is devised. In addition, we present evidence that the Stark shifts could be significant in strong-field ionization of atoms.

[1] L. Holmegaard et al., Photoelectron angular distributions from strong-field ionization of oriented molecules, *Nature Physics* 6, 428 (2010)

[2] Supplementary information to [1]

[3] D. Dimitrovski, C. P. J. Martiny, and L. B. Madsen, Strong-field ionization of polar molecules: Stark-shift-corrected strong-field approximation, to appear in *Phys. Rev. A* (2010)

