

Importance of atomic and molecular data in strong field laser matter interaction

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The past decade has shown an enormous progress in ultrafast laser technology. Extremely short pulses down to 0.2×10^{-15} s have become reality[1]. These pulses are now applied to unveil innermolecular electronic motion. Sub-femtosecond time resolved studies of inner-atomic transients have become reality. The extension of such technologies towards more complex systems like small to medium sized molecules, clusters and solid surfaces is presently pushed forward within our institute. On the very basis of this fascinating application of attosecond technology stands the recollision of the laser field liberated electron with its parent ion. Prediction and interpretation of experimental results is therefore strongly dependent on the availability of electron-ion collision data and xuv photoionization cross sections. As a feedback into the community we can presumably extract time dependent differential cross sections from such rescattering processes. We have suggested that we will be able to steer angle, timing and energy of the recollision processes with high precision[2]. Such measurements become possible when cold target ion recoil coincidence spectroscopy (COLTRIMS) can be successfully combined with strong laser field ionization based on sub-5 fs carrier-envelope phase stabilized laser fields.

[1] M. Drescher, et al., *Nature* **419**, 803 (2002)

[2] M. Kitzler, M. Lezius. *Phys. Rev. Letters*, **95** 253001 (2005).