

Resonant Effects in High-order ATI Spectra of Atoms and Molecules

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Abstract

We report the results of an extensive survey for various atomic and molecular targets as a function of laser parameters dedicated to understanding the long standing issue of resonances (see Fig. 1) in strong field ionization. First reported in the case of argon at 0.8 μm in 1997 [1], these resonances received significant attention over the years [2-6]. These studies have revealed a non-yet-understood complex mechanism, where channel closing [2], Rydberg states and multiple returns [3] as well as quantum interferences [4] play a role. Greatly expanding the range of laser parameters we investigate the role of these effects.

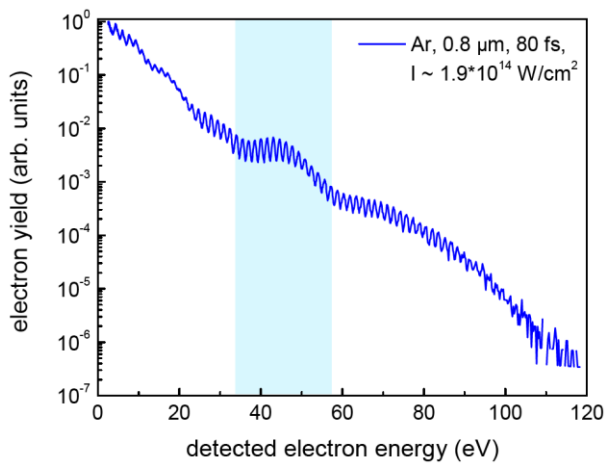


Fig. 1. Example of resonant effects (blue area) in the photoelectron spectrum of argon, recorded along the laser polarization in the case of argon irradiated with linearly polarized, 0.8 μm , 80 fs pulses at an intensity of $1.9 \cdot 10^{14} \text{ W/cm}^2$. In this presentation we present the results of an extended survey studying the dependence of such resonances on various targets for a wide range of laser parameters.

References

- [1] M.P. Hertlein, P.H. Bucksbaum, and H.G. Muller, *J. Phys. B* **30**, L197 (1997).
- [2] G.G. Paulus et al., *Phys. Rev. A* **64**, 021401(R) (2001).
- [3] J. Wassaf et al., *Phys. Rev. A* **67**, 053405 (2003).
- [4] F. Grabson et al., *Phys. Rev. Lett.* **91**, 173003 (2003).
- [5] C. Cornaggia, *Phys. Rev. A* **82**, 053410 (2010).
- [6] C. Wang et al., *Phys. Rev. A* **90**, 023405 (2014).