

Tutorial Lecture No. 1:

“Tutorial on Atomic Photoionization with Applications to Harmonic Generation and Multiphoton Ionization”

Anthony F. Starace
The University of Nebraska-Lincoln

I will review basic features of atomic photoionization [1,2] and then illustrate how knowledge of atomic photoionization can be employed to interpret and predict features that occur in harmonic generation [3-7] and multiphoton ionization [8, 9].

References:

- [1] A.F. Starace, “Theory of Atomic Photoionization,” *Handbuch der Physik*, Vol. **31**, Edited by W. Mehlhorn (Springer-Verlag, Berlin, 1982), pp. 1-121.
- [2] S.T. Manson and A.F. Starace, “Photoelectron Angular Distributions: Energy Dependence for s-Subshells,” *Rev. Mod. Phys.* **54**, 389 (1982).
- [3] M.V. Frolov, N.L. Manakov, T.S. Sarantseva, M.Yu. Emelin, M.Yu. Ryabikin, and A.F. Starace, “Analytic description of the high-energy plateau in harmonic generation by atoms: Can the harmonic power increase with increasing laser wavelengths?,” *Phys. Rev. Lett.* **102**, 243901 (2009).
- [4] M. V. Frolov, N. L. Manakov, and A.F. Starace, “Potential Barrier Effects in High Harmonic Generation by Transition Metal Ions,” *Phys. Rev. A* **82**, 023424 (2010).
- [5] J.M. Ngoko Djiokap and A.F. Starace, “Evidence of the $2s2p(^1P)$ Doubly Excited State in the Harmonic Generation Spectrum of He,” *Phys. Rev. A* **84**, 013404 (2011).
- [6] J.M. Ngoko Djiokap and A.F. Starace, “Resonant Enhancement of the Harmonic Generation Spectrum of Beryllium,” *Phys. Rev. A* **88**, 053412 (2013).
- [7] M. V. Frolov, T. S. Sarantseva, N. L. Manakov, K. D. Fulfer, B. P. Wilson, J. Troß, X. Ren, E. D. Poliakoff, A. A. Silaev, N. V. Vvedenskii, A. F. Starace, and C. A. Trallero-Herrero, “Atomic Photoionization Experiment by Harmonic-Generation Spectroscopy,” *Phys. Rev. A* **93**, 031403(R) (2016).
- [8] L.-W. Pi and A.F. Starace, “Potential Barrier Effects in Two-Photon Ionization Processes,” *Phys. Rev. A* **82**, 053414 (2010).
- [9] L.-W. Pi and A.F. Starace, “Potential Barrier Effects in Three-Photon Ionization Processes,” *Phys. Rev. A* **90**, 023403 (2014).