Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Control of photoemission delay in resonant two-photon transitions[1] L. ARGENTI, Univ. Central Florida, FL, USA; Univ. Autonoma de Madrid, ES, EU (UAM), A. JIMENEZ GALAN, Max Born Inst., Berlin, D, EU; UAM, R. TAIEB, J. CAILLAT, A. MAQUET, Sorbonne Univ.; UPMC Univ. Paris 6, FR, EU, F. MARTIN, UAM; IMDEA-Nanociencia, IFIMAC, Madrid, ES, EU —
The emission time delay τ in one-photon absorption, which coincides with half the Wigner scattering delay τ_W, is a fundamental descriptor of the photoelectric effect. While it is hard to access τ in a direct way, it is possible to extrapolate it from the delay in two-photon transitions, $\tau^{(2)}$, measured with attosecond pump-probe schemes, provided that the contribution of the probe stage can be factored out. In absence of resonances, τ can be expressed as the energy derivative of the dipole ionization amplitude, $\tau = \partial_E \arg D_{Eg}$, and $\tau \simeq \tau^{(2)} - \tau_{cc}$ where τ_{cc} is associated to the dipole transition in the continuum. Here we show that in the presence of a resonance the correspondence between τ and $\partial_E \arg D_{Eg}$ is lost. Furthermore, while $\tau^{(2)}$ still coincides with $\partial_E \arg D^{(2)}_{Eg}$, it does not have any scattering counterpart. Indeed, $\tau^{(2)}$ can be much larger than the lifetime of an intermediate resonance in the two-photon process, or more negative than the lower bound imposed on scattering delays by causality. Finally, $\tau^{(2)}$ is controlled by the probe frequency. By varying ω_{IR}, therefore, it is possible to radically alter a photoelectron group delay.

[1]NSF Grant No. 1607588, ERC Grant No. 290853 XCHEM, MINECO FIS2013-42002-R/FIS2016-77889-R, e-COST Action XLIC CM1204.

Luca Argenti
Univ of Central Florida

Date submitted: 26 Jan 2017 Electronic form version 1.4