# Strong-field Effects on Time Delays in Correlated Ionization

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The ionization time delays in photoionization of helium are studied in the strong-field regime at an XUV photon energy of 40 eV, using our state-of-the-art numerical scheme of solving the full-dimensional time-dependent Schrodinger equation. The strong-field effects in ionization time delays can be interpreted as a consequence of the 2-electron wavepacket dynamics driven by the strong XUV pulse significantly modifying the time delay typically observed in the linear response regime. Consequently, the ionization time delay is sensitive to the intensity and duration of the XUV pulse. Such strong-field dynamics is generally beyond the prediction of the SAE theory. Even qualitative differences in pulse-intensity and pulse-duration dependence are found when comparing the SAE and two-electron results [1]. We present a theoretical framework for analyzing time delays in strong-field ionization observed by streaking or RABBIT processes in terms of the decomposition into a linear-response contribution into a linear-response contribution representing Eisenbud-Wigner-Smith (EWS) type delays [2] and non-linear (NL) response corrections accounting for the transient nonlinear response of the atomic system to be ionized.

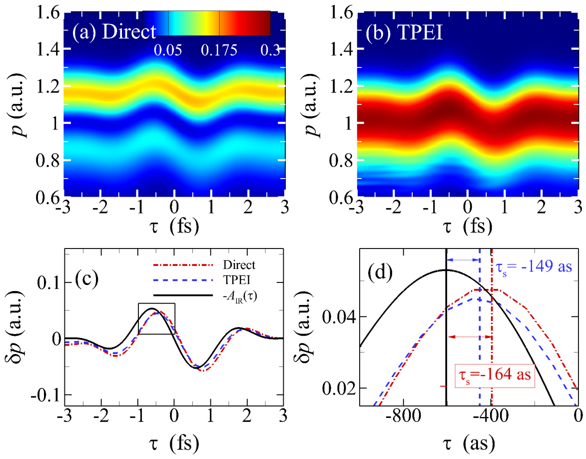


Figure 1: The streaking spectrogram for the one-photon direct (a) and the two-photon excitation ionization (TPEI) (b) channels along the polarization axis. The momentum shifts $\delta p$ extracted from (a) and (b) are shown in (c) together with the IR (800 nm) streaking vector potential $-A_{\mathrm{IR}}(\tau)$. The magnification of the black box in (c) is given in (d), where the streaking time delays of the direct channel ($-164$ as) and the TPEI channel ($-149$ as) are marked. The intensity and the FWHM duration of the Gaussian-shaped XUV pulse are $I_{\mathrm{X}} = 2.0 \times 10^{16}$ W/cm$^2$ corresponding to a Keldysh parameter $\gamma = 2.6$ and $T_{\mathrm{X}} = 300$ as, respectively

## References

[1] W Jiang *et al.*, in preparation

[2] R Pazourek, S Nagele and J Burgdörfer, Rev. Mod. Phys. **87**, 765 (2015)