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Electron recollisions or precollisions in elliptically polarized laser fields[1]

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We have recently predicted [1] that the degree of elliptical polarization of intense short laser pulses is related to the timing of strong-field non-sequential double ionization (NSDI) of atoms, and that some of the correlated electron effects of NSDI unexpectedly show up in sequential double ionization (SDI). The agreement with recent ETH experimental SDI data [2] using elliptically polarized pulses calls into question the uncorrelated-electron assumption that drives the usual tunneling characterization of high-field ionization. We will report explanations [3] for an SDI "knee" and other intensity-dependent indications of pre-ionization correlation of the two electrons. Among these with observable consequences is a striking oscillation discovered [2] in the ratio of parallel to antiparallel peak heights of two SDI electrons emitted in and out of phase [4].

[1] X. Wang and J.H. Eberly, Phys. Rev. Lett. 105, 083001 (2010).
[2] A.N. Pfeiffer, et al. (submitted).
[3] X. Wang and J.H. Eberly, arXiv submit/0189750.
[4] X. Wang and J.H. Eberly, Phys. Rev. Lett. 103, 103007 (2009).

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