Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Effect of wave-function localization on the time delay in photoemission from surfaces[1] UWE THUMM, CHANH-HUA ZHANG, Kansas State University — We investigated streaking time delays in the photoemission from a solid model surface as a function of the degree of localization of the initial-state wave functions [1]. We consider a 1D slab with lattice constant a_{latt} of attractive Gaussian-shaped core potentials of width σ. The parameter σ / a_{latt} thus controls the localization of the electronic eigenfunctions. Small values of σ / a_{latt} $<<1$ yield lattice eigenfunctions that consist of localized atomic wave functions modulated by a "Bloch-envelope" function, while the eigenfunctions become delocalized for larger values of σ / $a_{latt} > 0.4$. From calculated photoemission spectra we deduced a characteristic *bimodal* shape of the band-averaged photoemission time delay: as the slab eigenfunctions become increasingly delocalized, the time delay quickly decreases near σ / $a_{latt} = 0.3$. This change in wave-function localization facilitates the interpretation of a recently measured apparent relative time delay [2] between the photoemission from core and conduction-band levels of a tungsten surface [3].

[1] C.-H. Zhang and U. Thumm, Phys. Rev. A **84**, 065403 (2011).
[2] C.-H. Zhang and U. Thumm, Phys. Rev. A **84**, 033401 (2011).
[3] C.-H. Zhang and U. Thumm , Phys. Rev. Lett. 102, 123601 (2009).

[1]Supported by NSF and DOE.

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Date submitted: 26 Jan 2012 Electronic form version 1.4