

Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Detecting Electron Motion in Atoms and Molecules¹ HUA-CHIEH SHAO, ANTHONY STARACE, University of Nebraska-Lincoln — Ultrafast electron pulses have been proposed to observe time-dependent phenomena in atoms and molecules [1]. Detection of spatial and temporal electronic motion by scattering of sub-fs pulses of 10 keV electrons from coherent superpositions of electronic states of both H and T₂⁺ is investigated [2]. In such pump/probe calculations for the H atom, we predict measurable changes of the diffraction images that reflect the time-dependent effective radius of the electronic charge density. For an aligned T₂⁺ molecule, we predict diffraction image changes that reflect the time-dependent localization (de-localization) of the electronic charge density about one (two) of the nuclei.

[1] P. Baum and A.H. Zewail, Proc. Natl. Acad. Sci. U.S.A. **104**, 18409 (2007); S.A. Hilbert, C. Ulterwaal, B. Barwick, H. Batelaan, and A.H. Zewail, Proc. Natl. Acad. Sci. U.S.A. **106**, 10558 (2009).

[2] H.-C. Shao and A.F. Starace, Phys. Rev. Lett. **105**, 263201 (2010).

¹This work is supported in part by NSF Grant PHY-0901673 and by a Nebraska Research Initiative grant.

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Date submitted: 01 Feb 2011

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