

Abstract Submitted
for the DAMOP07 Meeting of
The American Physical Society

Progress report on the applications of an ultrafast electron source¹ SHAWN HILBERT, BRETT BARWICK, ADAM CAPREZ, CORNERLIS UITERWAAL, HERMAN BATELAAN, University of Nebraska–Lincoln — Femtosecond laser pulses are used to create ultrafast electron pulses from a tungsten nanometer field emission tip. The emission process is rich in features and allows the study of thermionic emission, multi-photon over-barrier emission, ATI-emission, and field induced tunneling [1]. Evidence for the first three processes are presented. The application of the source for interaction between free electrons and laser light [2], and its relation to dispersion compensation for electron wave packets will be discussed. The use of the source to study low energy with high resolution electron physics is presented. The application of the source to investigate the macroscopic limit of the Aharonov-Bohm effect is tested. And finally, attempts to observe diffraction-in-time as a means to probe attosecond physics are reported. [1] Peter Hommelhoff, et al. Phys. Rev. Lett. **97**, 247402 (2006), [2] Kapitza-Dirac diffraction without standing waves: diffraction without a grating? O. Smirnova, D. L. Freimund, H. Batelaan, M. Ivanov, Phys. Rev. Lett. **92**, 223601/1 (2004).

¹This work is supported by the NSF under Grant No. 0354940 and Grant No. 0355235.

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Date submitted: 02 Feb 2007

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