Abstract Submitted
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Optical Control of Electrons in Au Nanowires[1] ERIC JONES, University of Nebraska-Lincoln, GOBIND BASNET, Kansas State University, WAYNE HUANG, University of Nebraska-Lincoln, BRET FLANDERS, Kansas State University, HERMAN BATELAAN, University of Nebraska-Lincoln — Gold nanowires [1], with diameters less than 100 nm, are novel sources for electron field emission. Their geometry confines the propagation of conduction electrons, giving rise to effects not seen in the bulk, such as ballistic currents and surface plasmon polaritons (SPPs) [2]. Dynamics within the wire are probed with laser-induced field emission from the nanowire tip. A balanced Mach-Zehnder interferometer is used to split and delay pulses up to 170 ps from a Ti:Saph oscillator (800 nm, 50 fs) in a pump-probe scheme. The output beamsplitter of the interferometer is mounted on a translation stage to control the separation of the pump and probe beams with sub-micron precision. The beams are focused to 3 μm spots on the tip and shaft of a nanowire, mounted under vacuum at 2×10^{-7} mTorr, by an off-axis parabolic mirror. Field-emitted electrons are counted by a channel electron multiplier. We discuss experimental results of our pump-probe experiments taken at different pump positions. Optical control of electron dynamics within these nanowires may lead to a truly on-demand source of single and multiple electron pulses. [1] B. Ozturk, I. Talukdar, and B. N. Flanders, Nanotechnology **18**, 365302 (2007). [2] B. Barwick, D. J. Flannigan, and A. H. Zewail, Nature **462**, 902 (2009).

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