Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

Photoemission from femtosecond multiphoton ionization of bulk GaAs. EVAN BRUNKOW, NATHAN CLAYBURN, University of Nebraska- Lincoln, MICAH LEDOUX, Western Washington University, TIMOTHY GAY, University of Nebraska- Lincoln — GaAs photocathodes produce spin polarized electron beams when illuminated with circularly polarized light with photon energy approximately equal to the bandgap energy ($\lambda \approx 800$ nm) [1]. Such photocathodes are prepared with a negative electron affinity (NEA) in order to allow electrons excited to the conduction band to be emitted into the vacuum. We propose a novel source of spin polarized electrons based on multiphoton absorption in bulk GaAs using a 20 femtosecond pulse laser. Preliminary results are presented where linearly polarized light, incident on non-NEA bulk GaAs, produced a photocurrent that was measured using a channel electron multiplier. We determined that the number of photoemitted electrons per laser pulse, N, varies as $N=k*P^{3.72}$ where $k= 3*10^{-5}$ and P is the average power of the laser in mW. This result is expected because the spectral width of the laser is such that much of the spectrum has energies that require four photons to be absorbed to emit an electron but some of the energies require only three photons to emit an electron. Future experiments will use a Mott polarimeter and circularly polarized light to investigate the polarization of the emitted electron beam.

[1] D.T. Pierce, F. Meier, P. Zurcher, Appl. Phys. Lett. 26 670 (1975).

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Date submitted: 29 Jan 2013 Electronic form version 1.4