Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Compression of Electron Pulses for Femtosecond Electron Diffraction OMID ZANDI, JIE YANG, MARTIN CENTURION, University of Nebraska-Lincoln — Our goal is to improve the temporal resolution in electron diffraction experiments to 100 fs by compressing the electron pulses using a time-varying electric field. The compressed pulse can be used for a better understanding of the dynamics of molecules under study. A bunch of 3 million electrons is generated at a photocathode by femtosecond UV laser pulses and accelerated to 100 keV in a static electric field. Then, the longitudinal component of the electric field of a microwave cavity is employed to compress the bunch. The cavity's frequency and phase are accurately tuned in such a way that the electric field is parallel to the bunch motion at its arrival and antiparallel to it at its exit. Compression in the transverse directions is done by magnetic lenses. Simulations have been done to predict the bunch profile at different positions and times by General Particle Tracer code. A streak camera has been built to measure the duration of the pulses. It uses the electric field of a discharging parallel plate capacitor to rotate the bunch so that angular spreading of the bunch is proportional to its duration. The capacitor is discharged by a laser pulse incident on a photo switch.

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Date submitted: 30 Jan 2014 Electronic form version 1.4