Abstract Submitted
for the TSS13 Meeting of
The American Physical Society

**Electron transmission through a graphite crystal**[1] CRISTIAN BAHRIM, ROBERT NICK LANNING, Department of Physics, Lamar University — The analysis of the diffraction pattern produced by electrons transmitted through crystals provides information about the length of the chemical bonds, the distance between the atomic layers, and the lattice constant of the crystal. Here we report experimental results for electron diffracted by a graphite crystal. From the Lorentzian profile of the central maximum of diffraction we calculate the characteristic time of interaction between the electron projectile and the Carbon atoms of graphite. The Carbon atom acts as a pinhole and Fourier transforms the incident electron beam into a broad diffraction pattern. This characteristic time is shorter than one femtosecond because of the Pauli Exclusion Principle which forbids the projectile electrons to inhabit the ground state atoms of graphite. Our apparatus can produce relativistic projectile electrons. Using a relativistic approach and the Heisenberg uncertainty principle, from the width of the central maximum of diffraction we extract the spreading, $\Delta\lambda$, of the de Broglie wavelength of the projectile electron inside the crystal. We also calculate the relativistic values of the spreading in the linear momentum and kinetic energy while the electron is passing through the crystal.

[1]Project sponsored by the NSF-STEP program, award # DUE 0757057.

Cristian Bahrim
Department of Physics, Lamar University

Date submitted: 04 Mar 2013 Electronic form version 1.4