

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Measurements of chemical bonds using diffraction of electronic waves traveling through crystals¹ ROBERT LANNING, CRISTIAN BAHRIM, Department of Physics, Lamar University — We propose a simple and intuitive procedure for discovering the atomic arrangement and the chemical bonds in transparent crystals using the diffraction of light or electronic waves by crystals. This study can help to improve methods of optical imaging, electronic microscopy, microbiology, and crystallography. Using fundamental principles of quantum mechanics, we also explain the formation of electronic wave packets when a free electronic beam passes through the atoms of a solid target. The atoms in solids act as the narrow slits of a diffraction grating producing a Fourier transform of the sinusoidal waves associated to free electrons incident on the solid target. Such a model allows measuring the chemical bonds within 1% precision. This research project was done under a NSF-DUE-sponsored program, called STAIRSTEP [1], which was designed to engage STEM undergraduate students in high-quality research in several fields of science including physics, at Lamar University.

[1] Doerschuk P, Bahrim C, Daniel J, Kruger J, Mann J, and Martin Ch, *39th ASEE/IEEE Frontiers in Education Conference*, San Antonio 2009, M3F-1-2.

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

Cristian Bahrim
Lamar University

Date submitted: 16 Dec 2010

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