

Abstract Submitted
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Applications of the diffraction and interference of light and electronic waves¹ CRISTIAN BAHRIM, ROBERT LANNING, Lamar University — As part of a NSF sponsored program, called STAIRSTEP, at Lamar University we work on improving the basic knowledge of our physics majors in topics with broader impact in various areas of science and engineering [1]. The purpose is to facilitate a deeper understanding of some fundamental concepts in the field of optics through hands-on experience [2]. We choose to study the interference/diffraction of light and matter waves, because of its fundamental importance in physics with many applications. We target multiple goals in our field of study such as to understand the formation of electronic waves (wave packets) and their interaction with atoms in crystals (electron diffraction); the Fourier analysis of light with applications in spectroscopy, etc. We can show that a crystal lattice Fourier transforms the sinusoidal waves associated to free electrons fired toward the crystal. Our studies led to a simple and instructive recipe for discovering the arrangement of atoms in crystals from the analysis of the diffraction patterns produced by radiation or by electrons transmitted through crystals. [1] Doerschuk P. *et al.*, **39th ASEE/IEEE Frontiers in Education Conference**, San Antonio 2009, M3F-1. [2] Bahrim C, **Innovation 2006 – World Innovations in Engineering Education and Research**, Chapter 17, *iNEER Innovation Series*, ISBN 0-9741252-5-3.

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