Analysis of crystals using electron diffraction

ROBERT NICK LANNING, CRISTIAN BAHRIM, Department of Physics, Lamar University — Measurements of diffraction patterns produced by electronic beams incident on crystals reveal their atomic arrangement and allow one to find the length of the chemical bonds with high precision. Using fundamental principles we can understand the formation of electronic wave packets when electron projectiles pass through the crystal. The effective electronic charge of the atoms in the crystal acts as an arrangement of narrow slits which generate the Fourier transform of the sinusoidal waves associated to the electron projectiles incident on the crystal. Our study has applications in electronic microscopy, microbiology, and crystallography. This project was sponsored by the STAIRSTEP program [1] under a NSF-DUE grant. The program is designed to engage STEM undergraduate students in high-quality research in several fields of science including physics, at Lamar University.