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Formation of wave packets in electron diffraction on crystals ROBERT LANNING, CRISTIAN BAHRIM, Department of Physics, Lamar University — Measurements of electron diffraction typically reveal the atomic structure of crystals and allow finding the length of chemical bonds. The effective electronic charge of each atom in the crystal acts upon the incident electron beam as a netting of narrow pinholes, and Fourier transforms the unique deBroglie wavelength of the projectile electron accelerated at fixed voltage into a wave packet. Using the uncertainty principle one can understand the mechanism that makes an incident electron to become a wave packet travelling inside the crystal at a group velocity identical with the initial speed of the projectile electron. Furthermore, the Pauli Exclusion Principle allows us to understand the fast passage of the projectile electron through the crystal and also, it allows the evaluation of the characteristic time for electron transmission. The project was sponsored by the STAIRSTEP program under the NSF-DUE grant# 0757057.

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