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The Triple Differential Cross Section and Interference Effects of Electron-Impact Ionization of Molecules JUNFANG GAO, DON H. MADISON, JERRY PEACHER, Physics Department of University of Missouri-Rolla — The Highest Occupied Molecular Orbital (HOMO) is important for chemical reactions and some biological processes. Electron impact ionization of molecules (e,2e) is an effective probe for studying the important molecular interactions. Recently double slit type interference effects for diatomic molecules have also received considerable attention. For high incident-energy (keV range) electron-impact ionization, the Plane Wave Impulse Approximation (PWIA), which was developed in the 1970's, provides a good understanding of the experimental differential cross section data. However for lower incident-electron energies, no accurate theory exists to describe the ionization process. We have developed a Three-body Distorted Wave (3DW) approach which treats all continuum electrons as distorted waves and which also includes the final state electron-electron interaction (correlation) to all orders of perturbation theory. In addition, we have developed the Distorted Wave Impulse Approximation (DWIA) which is a distorted wave version of the PWIA. Both theories will be used to study triple differential cross sections and interference effects for electron-impact ionization of hydrogen and nitrogen molecules. Some results for large molecules will also be reported.

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