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Electron Momentum Distributions from Strong-Field Ionization of Aligned Molecules DANIEL COMTOIS, HEIDI BANDULET, INRS-EMT, DOMAGOJ PAVICIC, National Research Council, MORITZ MECKEL, J.W. Goethe-Universitat, ANDRÉ STAUDTE, National Research Council, DIRK ZEIDLER, Carl Zeiss SMT, REINHARD DÖRNER, J.W. Goethe-Universitat, HENRI PÉPIN, JEAN-CLAUDE KIEFFER, INRS-EMT, DAVID VILLENEUVE, PAUL CORKUM, National Research Council — Using a velocity map imaging electron spectrometer, we measured the velocity distribution of electrons produced by strong laser field ionization of aligned molecules. By taking the ratio of velocity distributions obtained for different molecular orientation distributions, we are able to isolate the modulations due to molecular alignment. The low momentum part of the distributions is populated by electrons that are directly emitted from the molecule without subsequent rescattering with the ion core. For these electrons, the modulations of the electron velocity distribution are observed solely along the axis perpendicular to the laser field. They are caused by the projection of the ionized molecular orbital's wavefunction into the perpendicular momentum distribution of the ionized electron wavepacket. The high momentum part of the distributions is populated by electrons that have rescattered with the ion core. The modulations seen in the ratio of the velocity distributions for these electrons are believed to be due to diffraction of the electron wavepacket by its parent ion.

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