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Suppressed ionization in polyatomic molecules MICHAEL C.H. WONG, J.-P. BRICHTA, V.R. BHARDWAJ, Department of Physics, University of Ottawa, 150 Louis Pasteur, Ottawa, Ontario, K1N 6N5, Canada — Orbital symmetry plays a critical role in molecular ionization and influences the high-harmonic generation (HHG) process. Since ionization occurs predominantly from a molecule's highest occupied molecular orbital (HOMO), nodal planes in the HOMO lead to destructive interference resulting in suppression of ionization. The degree of suppression should depend on the complexity of the molecular orbital and its signatures can be observed in extension of cut-offs in HHG spectra. We conduct experimental studies of HHG using 800nm and 1300nm infrared light in different sets of molecules where the targets have similar ionization potential but differing electronic structure. The three sets are A) non-planar chloromethanes (CH_2Cl_2, $CHCl_3$, CCl_4), B) ethylene (C_2H_4) and methanol (CH_4O), and C) water (H_2O), oxygen (O_2) and xenon atom (Xe). For each case we can link the degree of suppressed ionization to the number of nodal planes present in a molecule's HOMO. We expect this trend to be extendable to larger molecules with more complex orbitals where multi-electron dynamics play a larger role.

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