Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Molecular Ionization of Chloromethane in Strong Fields: Nearest Neighbor Gateway to Highly Charged Ions[1] BARRY WALKER, PAT GRUGAN, NAGITHA EKANAYAKE, SAM WHITE, SIYU LUO, PANPAN RUAN, University of Delaware — The strong and ultrastrong field-molecule interaction is a complex, many-body process involving multiple ionization processes that evolve during an ultrafast laser pulse. We present ion yields and molecular fragment energies for the ionization of chloromethane (CH_3Cl) in a laser field with intensities spanning from 10^{14} W/cm^2 to 10^{17} W/cm^2. As the laser intensity increases, ionization of CH_3Cl is observed to pass from molecular tunnelling, to enhanced ionization, to an atomic-like response. The energy spectra of the ions show no dependence on the intensity and have their source in dissociative molecular ionization. A classical model of an aligned C-Cl ion is used to dynamically model the interaction. Following an initial molecular ionization process, our results show enhanced ionization is a driving influence in the formation of low charge states until ionization become atomic-like and involves tightly bound ion states whose ionization is unaffected by nearest neighbor ions of similar ion charge.

[1]This material is based upon work supported by the National Science Foundation under Grant No. 1607321.

Barry Walker
University of Delaware

Date submitted: 06 Feb 2019 Electronic form version 1.4