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Angle- and internuclear separation- resolved strong field processes in molecules[1] GEORGE GIBSON, University of Connecticut, LI FANG, LCLS and Western Michigan University — Strong field ionization of molecules is considerably more complicated than atoms, depending on both angular orientation and internuclear separation R. Unfortunately, ground state molecules are localized in R and are randomly oriented, making measurements as a function of angle and R difficult. However, by simply exciting iodine to the B state of the neutral molecule with a pump pulse, we can study ionization processes from this state with a probe pulse as a function of both of these variables. Because the X to B transition dipole lies along the internuclear axis, the B state population is very well aligned, without the need for impulsive or adiabatic aligning pulses. By changing the delay of the probe, we control the internuclear separation, as the vibrational wavepacket evolves in the B state, and by changing the polarization of the probe, we can study the dependence on molecular orientation. With these techniques, we measure R-critical in a neutral molecule, the first time, as a function of angular orientation.

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