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Creation and Characterization of Multi-Hole Molecular Wave Packets via Strong Field Ionization DOMINIK GEISSLER, SUNY Stony Brook, TAMAS ROZGONYI, Chemical Research Center of the Hungarian Academy of Sciences, THOMAS WEINACHT, SUNY Stony Brook — We use strong field ionization to create superpositions of electronic and vibrational states in small polyatomic molecules (CH2XY, with X, Y = Br, I). We focus on characterizing the relative phase and amplitude of these superposition states. Our pump-probe measurements with a variable pump pulse chirp demonstrate the ability to create superpositions of electronic states with variable amplitudes. By combining velocity map imaging and wave packet holography for momentum resolved interference measurements, we are working toward measuring and controlling the phase between electronic states in the ionic wave packet. The pump and probe pulses are generated from a single ultrafast laser pulse using an AOM based ultrafast pulse shaper, allowing us to create a shaped initial wave packet and to maintain a phase stability between pulses better than lambda/400. This corresponds to a time stability of a few attoseconds, which is suitable for characterizing electronic wave packets having an energy spread on the order of an eV.

Dominik Geissler
SUNY Stony Brook

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