

Shaped intense laser pulse interaction with molecular anions

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I will present experimental studies of the interaction of shaped intense laser pulses with molecular anions using fast ion beam methods. Dedicated photofragment spectrometer that allows to detect and resolve the charge over mass ratio of neutral and cationic products will be described. In the case of SF_6^- molecular anion, dissociative ionization channels that lie more than 20eV above the threshold energy for double detachment are reported and saturation intensities are determined for the observed final channels. Product yields are analyzed as a function of the femtosecond laser pulse energy, pulse shape and polarization ellipticity to reveal the nature of the efficient non-sequential multiple detachment mechanism. The observed strong suppression of multiple detachment by pre-pulses, induced with negative third order dispersion of the transform limited fs laser pulse is interpreted as suppression of a non-sequential process by early single detachment. Furthermore, in contrast to the relatively simple picture of a rescattering mechanism characterized by acute sensitivity to polarization ellipticity that dominates double ionization of neutral species and was reported for the atomic F^- anion, multiple detachment of the molecular anion is found to exhibit only mild ellipticity dependence. In addition, preliminary data of SF_6^- based cluster anions will be presented and discussed.