

RESCATTERING IONIZATION OF D₂ IN INTENSE LASER FIELD.*

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We have used coincident momentum spectroscopy to identify and isolate the rescattering process leading to double ionization of D₂ in intense laser. In this process, the active electron is promoted to the continuum by the laser field (tunnel ionization) and, while oscillating in the laser field, it returns and further ionizes the parent ion. A combination of time and position measurements determines the vector momentum of the ion fragments at the instance of ionization. A Ti: sapphire laser producing 40 fs pulses of 800nm radiation with laser intensities ranging from 0.9-5x10¹⁴ Watt/cm² at the region of interaction has been used. For linearly polarized light, we observed D⁺ ions with energy sum between 10 and 20 eV, separated from those resulting from CREI (energy sum ~5 eV). Using circularly polarized light, we confirm that these ions originate from the rescattering mechanism. Fig. 1 shows the difference between linear and circular polarization, where the high-energy ions (10-20 eV) disappear in the case of circular polarization. This observation is understood, given the fact that, rescattering is inhibited in the circular polarization where the rotating electric field never drives the electron back to its origin.

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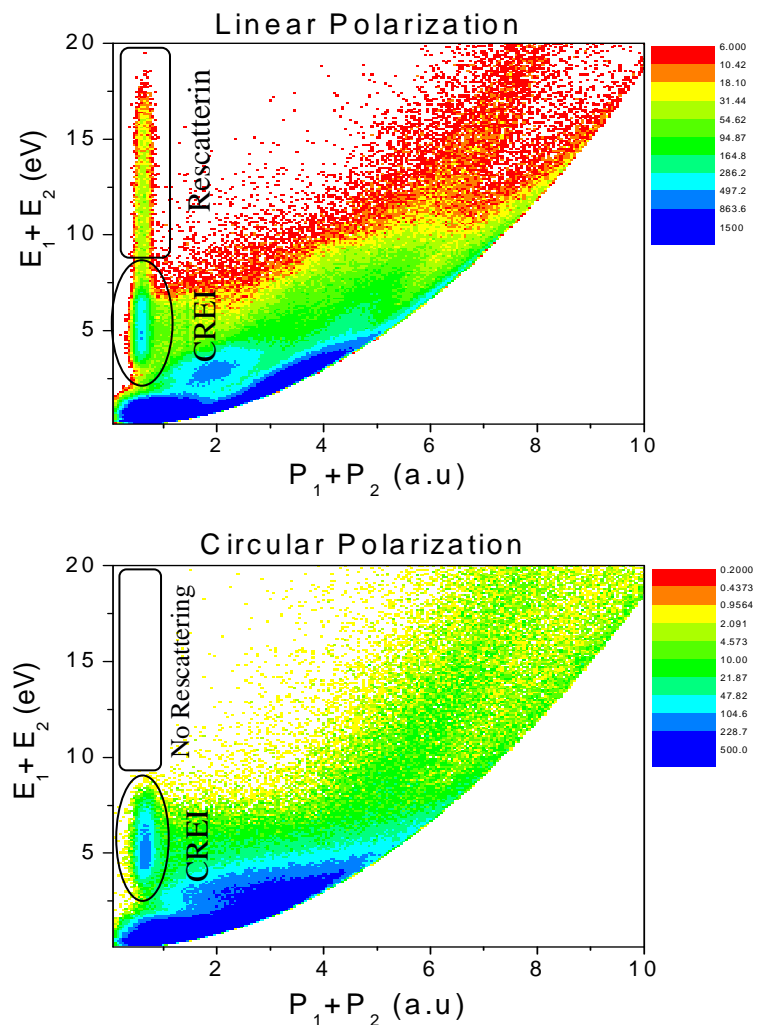


Fig. 1. The energy sum of the two fragment ions versus their momentum sum, for linear and circular polarized light.