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Single shot velocity map imaging of electrons from dopand-induced helium nanoplasmas in strong near-infrared laser pulses

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A doped helium nanodroplet irradiated by intense near-infrared (NIR) laser pulses forms a highly ionized nanoplasma even at laser intensities where the helium is not directly ionized. The dopant atoms provide first seed electrons which start the electron impact ionization avalanche of the whole droplet. The dynamics of ignition and explosion of the nanoplasma depends not only on the number and the kind of dopants but also on the droplet size and laser intensity. We present single shot velocity map imaging (VMI) measurements of electrons produced by irradiation of pure and xenon doped helium nanodroplets with intense NIR femtosecond laser pulses at various laser intensities for different helium and dopant cluster sizes. The salient structures of the electron spectra are discussed and compared to molecular dynamics simulations. Additionally, ion time of flight (TOF) spectra are recorded in parallel to the electron VMI.

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