Study of the possibility of extracting single-atom photo-recombination cross sections from macroscopic high harmonic spectra generated by lasers.[1] CHENG JIN, ANH-THU LE, CHII-DONG LIN, Kansas State University — We examined the possibility of extracting photo-recombination dipole moment of single atoms from high-order harmonics generation (HHG) after the harmonics have propagated through the macroscopic medium. We compare the HHG spectra of Ar by solving the propagation equations using single-atom harmonics calculated from the strong field approximation (SFA), the quantitative rescattering model (QRS) and the time-dependent Schrödinger equation (TDSE). We further show that the macroscopic HHG spectra can be expressed as the product of a macroscopic wave packet with the single-atom recombination cross section, and the extracted wave packet for Ar, Xe and Ne, under the same laser condition are almost the same, and independent of whether SFA, QRS or TDSE are used for the single-atom calculations. This theoretical result confirms that one can extract photo-recombination cross section from macroscopic HHG spectra by comparing spectra from different targets.

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