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Generation of circularly polarized XUV and soft-x-ray high-order harmonics by homonuclear and heteronuclear diatomic molecules subject to bichromatic counter-rotating circularly polarized intense laser fields[1]

JOHN HESLAR, National Taiwan University, DMITRY A. TELNOV, St. Petersburg State University, SHIH-I CHU, University of Kansas — Recently, the studies of bright circularly polarized high-harmonic beams from atoms in the soft X-ray region as a source for X-ray magnetic circular dichroism measurement in a tabletop-scale setup have received considerable attention. Here, we address the problem with molecular targets and perform a detailed quantum study of H_2^+, CO, and N_2 molecules in bichromatic counter-rotating circularly polarized laser fields where we adopt wavelengths (1300 nm and 790 nm) and intensities ($2x10^{14}$ W/cm^2) reported in a recent experiment. Our treatment of multiphoton processes in homonuclear and heteronuclear diatomic molecules is nonperturbative and based on the time-dependent density functional theory for multielectron systems. The calculated radiation spectrum contains doublets of left and right circularly polarized harmonics with high-energy photons in the XUV and soft X-ray range. Our results reveal intriguing and substantially different nonlinear optical responses for homonuclear and heteronuclear diatomic molecules subject to circularly polarized intense laser fields. We study in detail the below- and above-threshold harmonic regions and analyze the ellipticity and phase of the generated harmonic peaks.

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