High-order harmonic generation in graphene quantum dots in the field of an elliptically polarized optical pulse

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We study theoretically the generation of high-order harmonics in graphene quantum dots placed in the field of an elliptically polarized ultrashort pulse. The generated high-order harmonics are sensitive to the pulse's ellipticity and amplitude. The intensities of high-order harmonics become very sensitive to the ellipticity of an incident pulse when its polarization gets close to a circular one, and some high-order harmonics become strongly suppressed for a circularly polarized incident pulse. The suppressed harmonic orders depend on the symmetry of the quantum dot systems. Every third harmonic is suppressed for triangular quantum dots, which have D_{3h} symmetry. In contrast, for hexagonal quantum dots with D_{6h} symmetry, such suppression is observed for every sixth harmonic, and the even-order harmonics are suppressed for all ellipticities of the incident pulse due to an additional inversion symmetry of the hexagonal quantum dots. The ellipticities of the generated high-order harmonics also show strong nonmonotonic dependence on the ellipticity of an incident pulse, in which the dependence becomes stronger for high pulse amplitudes.