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Evidence of the $2s2p(^1P)$ Doubly-Excited State in the Harmonic Generation Spectrum of Helium[1] JEAN MARCEL NGOKO DJIOKAP, ANTHONY F. STARACE, The University of Nebraska-Lincoln, USA — By solving the two-active-electron time-dependent Schrö dinger equation in an intense, ultrashort laser field, we investigate effects of electron correlation and of doubly excited states of helium on high-order harmonic generation. For a fundamental frequency of the driving laser in the range of the third and the fourth harmonics of the Ti:Sapphire laser, one can put several harmonics (e.g., the 9th, 11th, and 13th) in resonance with the transition between the ground state and the isolated $2s2p(^1P)$ autoionizing state of helium. For a moderate peak laser intensity of 10^{14} W/cm^2, we analyze the role of the monochromatic driving laser pulse shape on the intensity of the generated harmonics. In a multiphoton regime in which intermediate Rydberg states are accessible, the intensity of harmonics in resonance with the He($2s2p$) autoionizing state is found to increase by a factor of more than 3. For the case of the resonant 11th harmonic, we find that strong coupling between autoionizing states can reduce its enhancement in the vicinity of the $2s2p(^1P)$ resonance.

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