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Generation of double attosecond pulses with the same intensity and carrier-envelope phase

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Abstract

In this paper, we theoretically study the generation of double attosecond pulses with the same intensity, a similar carrier-envelope phase, and controllable duration with arbitrary time delay. The desired pulses are generated in a high harmonic generation process on the interaction of a pulsed femtosecond driver laser by asymmetric molecular ion HeH^{2+} . High harmonic generation is investigated by numerical solving the one-dimensional-time dependent Schrödinger equation. To find out the optimized driving laser parameters an appropriate cost function is defined in genetic algorithm. The frequency spectrum of the desired pulses is selected from an appropriate part of high harmonics using a spectral filter. We show that the two mentioned pulses are generated at the time interval of one cycle of the laser electric field of the driving laser when the field direction is antiparallel to the molecule's permanent dipole moment. Finally, by calculating the characteristics of the generated pulses and comparing them with the desired ones, the efficiency of the presented method is fully confirmed.

Keywords: attosecond pulses, high harmonic generation, asymmetric molecule, carrier-envelope phase

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