ATTOSECOND-PULSE PRODUCTIONUSING RESONANTLY ENHANCED HIGH HARMONICS

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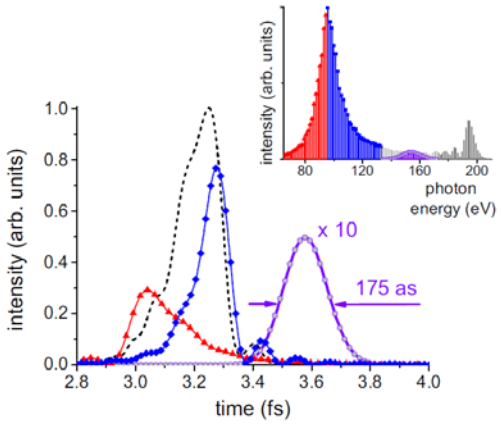
We study numerically and theoretically the effect of giant resonance in Xe on the phase difference between consecutiveresonantly enhanced high-order harmonics and calculate the duration of the attosecond pulses produced by theseharmonics. For certain conditions, resonantly induced dephasing compensates the phase difference which isintrinsic for off-resonance harmonics [1]. We find these conditions analytically and compare them with numericalresults. This harmonic synchronization allows attosecond-pulse shortening in conjunction with the resonance-inducedintensity increase of more than an order of magnitude [2], see Fig. The latter enhancement relaxes the requirements forthe UV filtering needed for attosecond-pulse production. Using a two-color driving field allows a further increaseof the intensity. In particular, a causticlike feature in the harmonic spectrum leads to a generation efficiencygrowth of up to two orders of magnitude, which is, however, accompanied by an elongation of the XUV pulse.



Attosecond pulses calculated using resonantly enhanced harmonics below the center of the resonance (red lines with triangles), above the center of the resonance (blue lines with diamonds), all resonantly enhanced harmonics (dashed black line),and the group of off-resonant harmonics chosen to minimize the attopulse duration (violet line with circles). The inset shows the harmonic spectrum; the spectral regions used to calculate the attosecond pulses are highlighted with the corresponding colors.

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References

[1] V V Strelkov, V T Platonenko, A F Sterzhantov, M Yu Ryabikin, *Phys. Usp.* 59 (5), 425 (2016)

[2] V.V. Strelkov, *Phys. Rev. A* 94, 063420 (2016)