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STRONG-FIELD PROCESSES INDUCED BY TAILORED LASER FIELDS

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Abstract. When atoms or molecules are exposed to a strong laser field, many interesting processes can be induced. Particularly prominent examples include high-order above-threshold ionization (HATI) and high-order harmonic generation (HHG). The subtle control of the photoelectron and harmonic yields can be achieved by using tailored driving fields (see Habibović et al. 2021. and Habibović et al. 2024.). These fields provide various parameters which can be used as control knobs. We investigate different tailored fields with particular focus on the bichromatic linearly and elliptically polarized fields. These fields consist of two linearly or elliptically polarized components with commensurate frequencies. The components of the bichromatic linearly polarized field have mutually parallel polarizations, while for the bichromatic elliptically polarized field the semimayor axes of two components are orthogonal. Particularly useful parameter is the relative phase between the field components which can be employed as control parameter for both the HHG and HATI processes. The example presented in Figure 1 shows the dependence of the HHG yield on the phase between the laser-field components for long (left panel) and ultrashort (right panel) driving field.

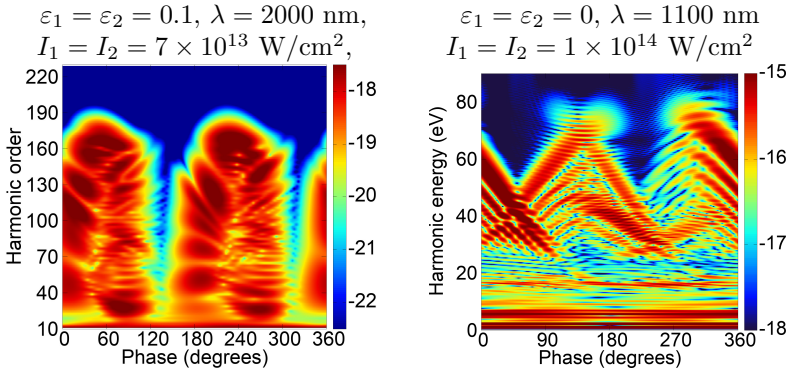

Figure 1: High-order harmonic yield as a function of the harmonic order and the phase between the field components for CO molecule exposed to ω–2ω long bichromatic elliptically polarized field (left panel) and for the Ar atom exposed to ω–2ω ultrashort (four cycles) linearly polarized pulse (right panel).

References

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