

# Quantum Path Interference in HHG for Bi-Elliptical Drivers

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If a bi-elliptical two-color laser field (Fig. 1(a)) is used to drive high-harmonic generation (HHG), the emitted harmonics are – in general – elliptically polarized. However, the ellipticity seems unpredictable and unrelated to the driving beams' ellipticities. Using the quantum orbit approach, we can explain this behaviour by the quantum path interference between the various trajectories involved in the process of HHG.

When employing rather complex laser fields to drive HHG, the multiple ionization bursts yield electron trajectories of different shapes (Fig. 1(b)). Those trajectories of the liberated electron in the continuum barely change from one harmonic order to its neighbour. The polarization ellipse of the harmonic field induced by each trajectory can be predicted from the electron's velocity at recombination. Therefore, for simple fields, where the trajectories within one laser cycle have the same shape, the field ellipse of the harmonics can be easily deduced.

However, for driving laser fields with more complex structures, like bi-elliptical two-color laser fields, the trajectories recombining within one laser cycle may have very different shapes and phases. When combining their contributions to the field of the harmonic, their interference causes the harmonic ellipticity to be rapidly changing for subsequent orders.

We will also report on recent and ongoing work regarding the coalescence of trajectories at the harmonic cutoff.

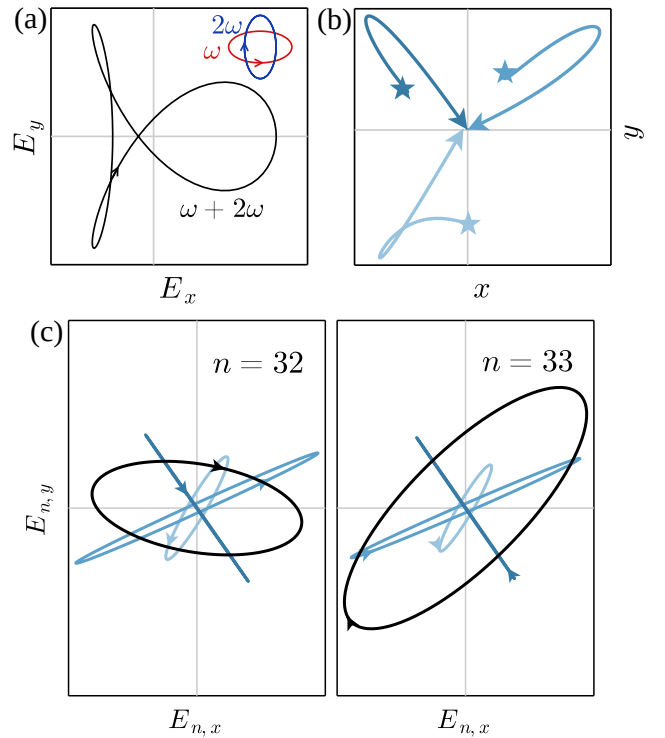


Figure 1: Driving HHG by a bi-elliptical  $\omega$ - $2\omega$  laser field, shown in (a), yields multiple electron trajectories of different shapes (b). The overall harmonic field (black curves in (c)) then collects contributions from all the possible trajectories (The lightest shaded harmonic field ellipse is scaled up by a factor of 10 for better visibility)