Supplementary Information for

Spatiotemporal imaging and shaping of electron wave functions using novel attoclock interferometry

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I. Saddle-points of strong-field ionization by 400 nm circular fields

We numerically solve the saddle-point equation in single 400 nm circular fields for each final momentum $\boldsymbol{p}$ and present the saddle-points with their real part t_r confined within [0, T_{400}] as shown in Fig. S1. It is clear that the ionization time t_r is uniformly mapped to the emission angle. And it does not depend on the photoelectron energy. While for the imaginary part t_i, it reveals an isotropic property along different emission angles and tightly depends on the photoelectron energy. As t_i quantifies the time the electron spends under the potential barrier, the result in Fig. S1b indicates that the low-energy electrons spend more time to pass through the barrier than the high-energy electrons.

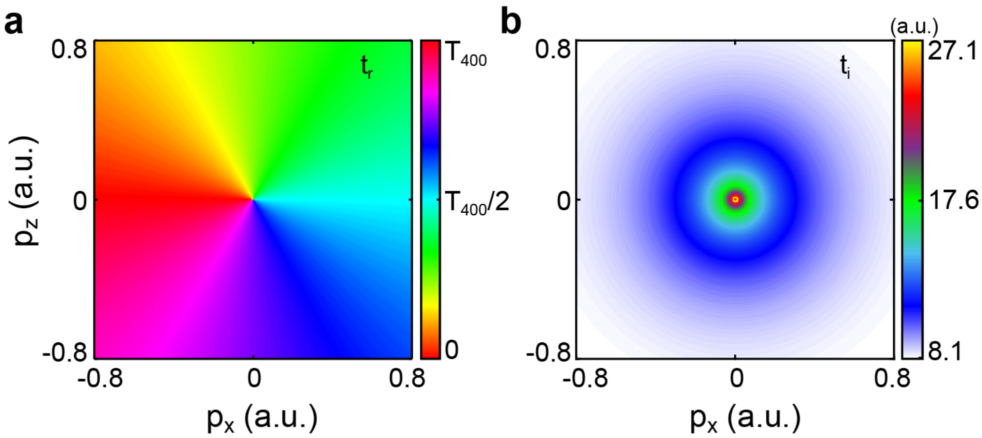

Fig. S1|Derived momentum-resolved saddle-points t_s for strong-field ionization by 400 nm circular fields within [0, T_{400}]. **a** Real part t_r of the saddle-point. **b** Imaginary part t_i of the saddle-point.

II. Calculated temporal evolution of electron wave functions in parallel and perpendicular configurations

Based on the derived analytical formulas as presented in Eq. (4) in Methods in the main text, we can directly calculate the two-color phase-dependent Im[σ] and Re[σ] spectra for the parallel and perpendicular configurations. The corresponding spectra are displayed in Fig. S2. They show good agreement with the retrieved results from the SFA calculations in the main text (as shown in Fig. 3a,b and Fig. 4a,b), demonstrating the validity of the Fourier transform analysis in retrieving the amplitude and phase modulations of the electron wave function.

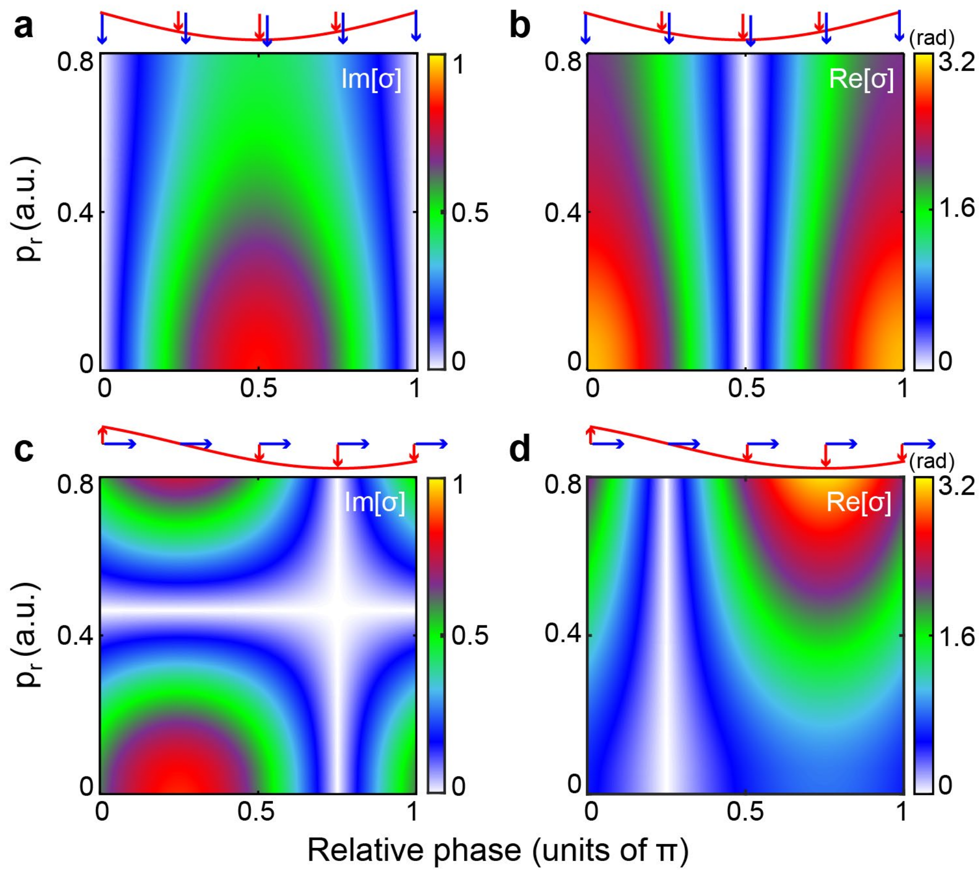

Fig. S2| Calculated temporal evolution of electron wave function in parallel and perpendicular configurations using the SFA model. a, b Calculated amplitude modulation Im[σ] and phase modulation Re[σ] for parallel configuration. **c, d** Same as **a, b** but for perpendicular configuration. The two-color field configurations have been depicted with red and blue arrows.