

Supplementary Information
Photo-induced Manipulation and Relaxation
Dynamics of Weyl-semimetals

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1 TaAs crystal structure

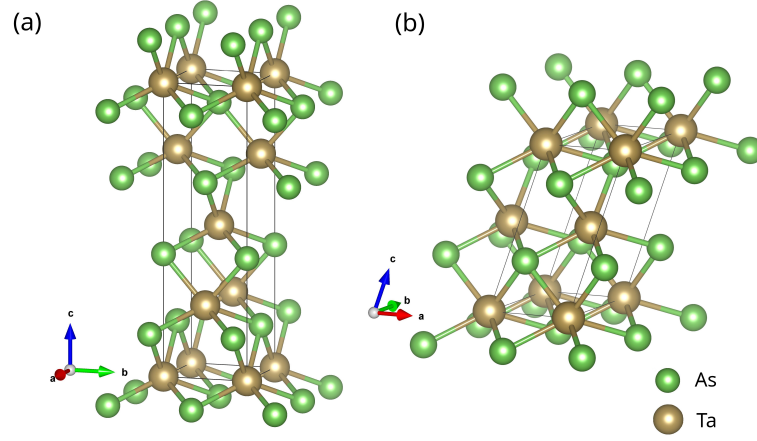


Fig. SI1 TaAs crystal structure. (a) tetragonal cell, (b) primitive cell used in Elk calculations. [1]

2 Numerical stability with the respect to the time step

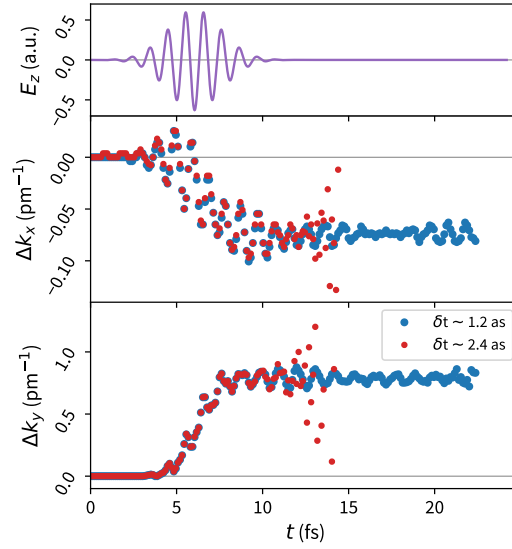


Fig. SI2 Extracted Weyl node (WN) W1 position for different TDDFT time step length δt . Laser pulse P_A is considered.

3 Total phase difference convergence

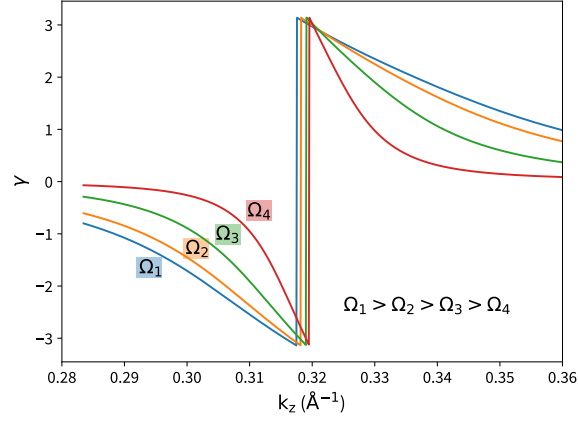


Fig. SI3 The effect of the Wilson loop size on the integrated total phase difference γ as a function of the k_z position. Ω_i denotes the area of the loop.

4 Dynamics in the k-space of the selected Weyl nodes across the Brillouin zone

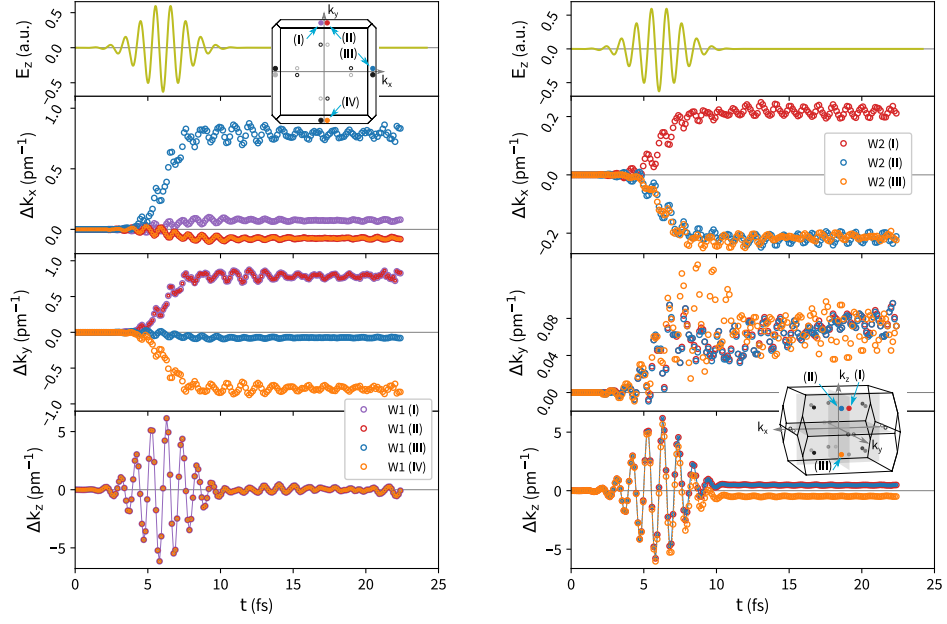


Fig. S14 Comparison of time-dependent dynamics at different Weyl nodes. (left) W1 nodes, (right) W2 nodes. Laser pulse P_A is considered.

5 Inter Weyl node distance

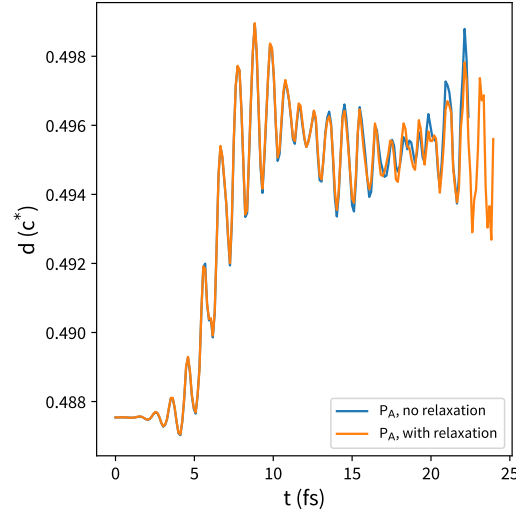


Fig. SI5 Laser pulse induced change of the k-space distance between the nearest W1 and W2 Weyl nodes of the different chirality. Both data for the evolution with and without the atomic site relaxation are depicted. Laser pulse P_A is considered.

6 Time-dependent current

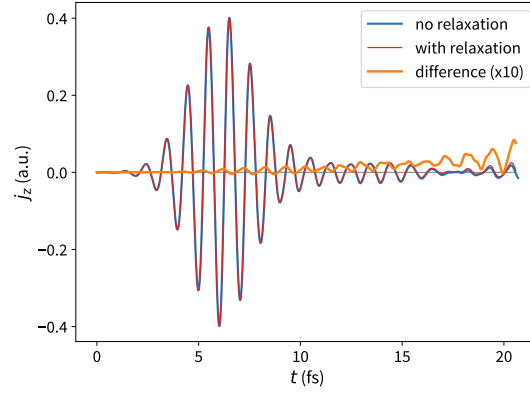


Fig. SI6 Time-dependent laser pulse induced total current. The j_z component parallel to the field is depicted. (red) current with atomic sites relaxation, (blue) current without relaxation, (orange) difference magnified by the factor 10.

References

- [1] Momma, K., Izumi, F.: *VESTA3* for three-dimensional visualization of crystal, volumetric and morphology data. *Journal of Applied Crystallography* **44**(6), 1272–1276 (2011) <https://doi.org/10.1107/S0021889811038970>