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Local Berry curvature signatures from dichroism in angular-resolved photoelectron spectroscopy

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概　要

Two-dimensional (2D) materials with topologically nontrivial character hold great promise for next-generation technological applications. However, measuring the Hall or spin-Hall response is often a challenge and practically limited to the ground state. Hence, an experimental technique for tracing the topological character in a differential fashion – momentum- and possibly even time-resolved – would provide deep insights. Extending the idea of circular dichroism in photoabsorption developed in the context of cold atoms, we show that the circular dichroism in angle-resolved photoelectron spectroscopy (ARPES) provides a powerful tool which can resolve the topological and quantum-geometrical character in momentum space and potentially out of equilibrium in a time-resolved fashion. In particular, we investigate how to map out the signatures of the *local* Berry curvature due to its intimate connection to the orbital angular momentum. Assuming spin-resolved detection of the photoelectrons allows the extension to spin-Chern insulators. Our predictions are corroborated by state-of-the-art *ab initio* simulations employing time-dependent density functional theory, complemented with model calculations.

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