Linear Dichroism in Photoelectrons Angular Distribution as a Tool to Probe Orbital Texture and Topology – Combination of Experiment and Theory

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Abstract. The topological structure of the Weyl nodes is encoded in the momentum-dependence of the eigenstates, e.g. the electronic wave functions. It can be identified by the pseudospin or the Berry curvature that wind around the Weyl node and form a Berry flux monopole in three-dimensional reciprocal momentum space. The non-trivial winding of Berry curvature around the Weyl node is described by a topological invariant, a non-zero Chern number. Our linear dichroism measurements allow us to disentangle the signs of topological non-triviality as well as intrinsic and extrinsic effects in strongly anisotropic photoemission intensities. By comparing our experimental results with theoretical calculations based on both one-step model of photoemission and tight-binding model, we unambiguously demonstrate the link between the momentum-dependent orbital orientation and strong intrinsic linear dichroism in photoelectrons angular distribution as well as characteristic behaviour in the vicinity of Berry flux monopoles.