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Berry curvature and 4-dimensional monopole in relativistic chiral kinetic equation JIUNN-WEI CHEN, National Taiwan U. — We derive a relativistic chiral kinetic equation with manifest Lorentz covariance and a 4-dimensional Euclidean Berry monopole. The theory is based on Wigner functions of spin-1/2 massless fermions in a constant electromagnetic background. By integrating out the p_0-component of the 4-momentum p, the previous 3-dimensional results derived (without vorticity) from the Hamiltonian approach is reproduced. The phase space continuity equation has a source term proportional to the product of the vorticity and electric field while the axial anomaly arises from the flux of the monopole. This makes the chiral magnetic effect, vorticity, chiral anomaly, Berry phase, and the monopole can all be described in a unified way by Wigner functions.

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