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Linear magnetoresistance as a Berry phase effect HUA CHEN, University of Tennessee at Knoxville, University of Texas at Austin, DI XIAO, Oak Ridge National Lab, ZHENYU ZHANG, University of Science and Technology of China, Harvard University, University of Texas at Austin, QIAN NIU, University of Texas at Austin — Conventional theory of charge carrier dynamics in metals and semiconductors predicts a quadratic field dependence in the magnetoresistance (MR) in the weak field limit. A linear dependence is usually explained as a quantum effect known as weak localization. However, in systems with time reversal symmetry breaking, a linear dependence can be observed even above room temperature, where quantum coherence is absent. Here we show that linear MR can arise from the Berry curvature modified semiclassical dynamics of the charge carriers, and evaluate its magnitude in several model systems and make preliminary comparisons with experimental results.

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