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Real-time simulations of anomaly induced transport in external magnetic field

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One of the macroscopic manifestations of the Chiral anomaly in a matter with Dirac fermions is a large negative magnetoresistivity in strong magnetic fields, which is common feature of Weyl- and Dirac semimetals and QCD. However, most of previous studies have been done in the linear response approach in non-interacting theory. We study Magnetoresistivity in a model of Dirac semimetal using Wilson-Dirac lattice fermions with on-site four-fermion interactions in the background of magnetic field in the framework of mean-field theory and classical-statistical real-time simulations with arbitrary external electric fields. We investigate the phase diagram of the model and discuss the fate of dynamically generated chiral imbalance in the system, as well as manifestations of dynamical axion field.

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