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(G*) Artificial electric field and electron hydrodynamics

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In the electron dynamics in quantum matter, the Berry curvature of the electronic wave function provides the artificial magnetic field in momentum space, which leads to nontrivial contributions to transport coefficients. It is known that in the presence of electron-electron and/or electron-phonon interactions, there is an extra contribution to the electron dynamics due to the artificial electric field (AEF) in the momentum space. In this work, we construct hydrodynamic equations for the electrons in time-reversal invariant but inversion-breaking systems and find the novel hydrodynamic coefficients related to the AEF. Furthermore, we investigate the novel linear and nonlinear transport coefficients in the presence of the AEF.

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