The 14th Workshop on QCD Phase Transition and Relativistic Heavy-Ion Physics (QPT 2021)



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Magneto-vortical Effect in Strong Magnetic Field

We develop covariant chiral kinetic theory with Landau level basis. We use it to investigate a magnetized plasma with a transverse electric field and a steady vorticity as perturbations. After taking into account vacuum shift in the latter case, we find the resulting current and stress tensor in both cases can be matched consistently with constitutive equations of magnetohydrodynamics. We find the solution in the vorticity case contains both shifts in temperature and chemical potential as well as excitations of the lowest Landau level states. The solution gives rise to an vector charge density and axial current density. The vacuum parts coming from both shifts and excitations agree with previous studies and the medium parts coming entirely from excitations leads to a new contribution to vector charge and axial current density consistent with standard chiral vortical effect.

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