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(VAH)-Vortical Waves in a plasma with massless fermions

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Due to the spin-orbit coupling, Dirac fermions, submerged in a thermal bath with finite macroscopic vorticity, exhibit a spin polarisation along the direction parallel to the vorticity vector Ω . Due to the symmetries of the Lagrangian for free massless Dirac particles, there are three independent and classically conserved currents corresponding to the vector, axial, and helical charges. We consider the mode structure of the corresponding hydrodynamical theory and derive collective excitations associated with coherent fluctuations of all three charges, recovering the known Chiral Vortical Wave as a particular case. We discuss phenomenological implications for the Quark-Gluon plasma.

session

G. Heavy Ion Physics

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