

Abstract Submitted
for the NWS05 Meeting of
The American Physical Society

Anomalous Hydrodynamics and Magneto hydrodynamics

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Our goal is to examine the role of anomalies in the hydrodynamic regime of field theories. We employ methods based on gauge/gravity duality to examine R-charge anomalies in the hydrodynamic regime of strongly t'Hooft coupled, large N , $\mathcal{N} = 4$ SYM. We use a quasiparticle treatment based on the familiar “level-crossing” picture of chiral anomalies to investigate thermalized massless QED. In each case we find the same result. Regardless of whether a particular current is anomalously non-conserved or not, as long as it participates in an anomalous 3-pt. correlator, its constitutive relation receives a new term: $\vec{j}^a \propto -d^{abc} \vec{B}^b \rho^c$. We include a general argument for the presence of such terms, based on the formulation of hydrodynamics as an effective classical field theory.

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Date submitted: 07 Apr 2005

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