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Chiral hydrodynamics of plasma in strong magnetic fields & quantum criticality

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In this presentation I will motivate and construct the hydrodynamic description of a chiral plasma subject to a strong magnetic field. Such a description can be applied to the quark gluon plasma or astrophysical plasma. Kubo formulae are computed which relate 22 transport coefficients to particular correlation functions. Among those transport coefficients, 8 are novel. Known transport coefficients, such as the Hall viscosity and Hall conductivity, are now splitting into two each, one longitudinal and one transverse to the magnetic field. We provide a successful validity check by computing all transport coefficients in a specific holographic model. In this holographic dual, at large chemical potential, a quantum critical point emerges. We compute the entanglement entropy and conjecture a c-function near this critical point, aiming eventually at a theoretical description of quantum critical transport. An experimentally accessible system from condensed matter physics displaying these featurs are Weyl semimetals.

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