Contribution ID: **1** Type: **not specified**

Electric Conductivity and Chiral Anomaly - perturbative and holographic perspectives

Monday, 13 March 2023 14:10 (20 minutes)

In this talk, I would like to discuss the calculations of electric conductivity under a strong magnetic field. When the coupling constant is small enough, the perturbative approach should be useful, but the resummation is indispensable for the electric conductivity. I will explicate some technical details and investigate the subtle point in connection to the chiral anomaly. That is, it is necessary to treat the chirality as a hydrodynamical mode to incorporate the chiral anomaly, which requires nontrivial extensions. In contrast, in the holographic approach, the coupling to the chiral anomaly appears more explicit, and I will present the demonstration of the concrete calculation using the Sakai-Sugimoto model in a simple setup of the probe approximation which corresponds to the quenched approximation. However, even though the Sakai-Sugimoto model has desirable properties with respect to chiral symmetry, it is problematic that the model has only massless flavors. Chiral quarks make the electric conductivity diverge. Thanks to the fact that the contribution from the chiral anomaly looks explicit in the Sakai-Sugimoto model, the divergence associated with the chiral anomaly is reasonably identified. Then, it is possible to subtract the anomaly-induced divergence and estimate the finite part of the electric conductivity that corresponds to the Ohmic conductivity. The magnetic field dependence in the Ohmic conductivity turned out to be nontrivial. Consistency with the perturbative approach is still an open question.

Presenter: FUKUSHIMA, Kenji (The University of Tokyo)

Session Classification: New perspectives on chiral transport