

# UCLA Nuclear Physics Seminar

## “Are there higher order corrections to Chiral Magnetic (vortical) Effects?”

Presented by Defu Hou

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Anomaly induced transport phenomena in systems with chiral fermions have attracted wide interests ranging from high energy physics to condensed matter physics. Because of the non-renormalization theorem of chiral anomalies, it is normally expected that the chiral magnetic (vortical) currents are free from higher order corrections. In this talk, I will present our study on the radiative corrections to chiral magnetic current at both zero and nonzero temperature. Our motivation is a radiative correction to the matrix element of the anomalous Ward identity in massless QED stemming from a three-loop diagram where the two photons coming from the one-loop anomalous triangle are re-scattered. Through the interplay between the Ward identity and the infrared subtlety of the fermion loop integral, we obtain the 3-loop corrections to the chiral magnetic current at zero temperature. The correction does not invalidate the Adler-Bardeen theorem but will contribute to the chiral magnetic current of massless fermions at zero temperature. At a nonzero temperature, the infrared subtlety disappeared in a static magnetic field and the three-loop diagram does not contribute to the chiral magnetic current any more. The generalization to all orders of the massless QED and the QCD corrections are discussed. We will also present possible higher-order corrections to the chiral vortical effect.

Location: Knudsen 4-134

Date: Friday, February 8, 2019

Time: 12:00 PM