中国高能核物理网络论坛
HIGH ENERGY NUCLEAR PHYSICS IN CHINA

HENPIC

# The 178th HENPIC seminar

# Anomalous Transport in Chiral Matter


## Speaker: Jinfeng Liao（廖劲峰）


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## ABSTRACT:

Gauge fields provide the fundamental interactions in the Standard Model of particle physics. Gauge field configurations with nontrivial topological windings are known to play crucial roles in many important phenomena, from matter-anti-matter asymmetry of today's universe to topological phases in condensed matter. Their presence is however elusive for direct detection in experiments. It turns out that measurements of the so-called chiral magnetic effect (CME) in heavy ion collisions can be used to access and manifest gauge field topology. The CME is a nontrivial macroscopic transport process arising from microscopic quantum anomaly of underlying chiral fermions in chiral matter (e.g. a Dirac/Weyl semimetal or a quark-gluon plasma), which has been in the spotlight lately across disciplines of physics. Potential discovery of CME in heavy ion collisions is of utmost significance, with extensive experimental searches carried out over the past decade. Some twelve years after the first hint of a possible CME signal at the Relativistic Heavy Ion Collider (RHIC), important new measurements from a dedicated search via isobar collisions were released in 2021. After discussing the exciting physics of anomalous transport in chiral matter, this talk will focus on what we know (and don't know) about the CME search, with an emphasis on the key implications of the latest isobar dataset.


## ABOUT THE SPEAKER:

Jinfeng Liao is a nuclear theorist and Professor of Physics at the Indiana University Bloomington, USA. He obtained Ph.D. in 2008 from Stony Brook University, after studying for B.S. and M.S. at Tsinghua University. He held postdoctoral positions at LBNL and BNL before joining the Physics Department of Indiana University as a junior faculty in 2011. He was a RBRC Fellow and a recipient of the NSF CAREER Award. His recent research interest focuses on novel phenomena related to gluon topology, quark chirality as well as vorticity and magnetic fields in heavy ion collisions.

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