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# The chiral magnetic effect and its search in heavy ion collisions

*Wednesday, 3 August 2022 09:00 (25 minutes)*

The strong interaction of quarks and gluons is governed by quantum chromodynamics (QCD). The QCD Lagrangian contains a theta-term that describes the topological feature of the gluon field of the vacuum. Interactions with this term will change the relative numbers of left- and right-handed quarks and antiquarks. This chirality imbalance will yield an electric current along a strong magnetic field because of the (anti-)quark's magnetic moment, either parallel or antiparallel to its spin dependent of its charge sign. This phenomenon is called the chiral magnetic effect (CME). Such an electric current, or a charge separation, can be experimentally observable in off-center relativistic heavy ion collisions where a magnetic field as strong as 10^14 Tesla can be produced by the passing protons. Because the theta-term explicitly breaks the charge-parity (CP) symmetry, an observation of the CME could provide the large CP-violation needed to explain the matter-antimatter asymmetry in our present universe. In this talk, I will review the status of a decade-long search for this fascinating physics of the CME in heavy ion collisions, from Au+Au collisions at the Relativistic Heavy Ion Collider (RHIC) and Pb+Pb collisions at the Large Hadron Collider (LHC) up to the most recent effort of a blind analysis of isobar collisions at RHIC. I will outlook what may lie ahead in the next 3-4 years regarding the prospect of a CME discovery.

## Preferred track

High-temperature QCD

## Subfield

Heavy-ion experiment

## Attending in-person?

Yes

## On behalf of collaboration?

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