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The Chiral Magnetic Effect and How to Detect it

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Content

The chiral magnetic effect (CME) is a parity violating phenomenon in quantum chromodynamics resulting from topological vacuum fluctuations in the presence of a strong magnetic field. The CME has been searched for in relativistic heavy ion collisions where high-temperature quark-gluon plasma is created allowing appreciable vacuum fluctuations and where strong magnetic fields are produced at the initial stage. In this series of two lectures, I will first overview the general physics of the CME, the experimental variables to search for the CME, the early measurements in this search, and the difficulty in reaching a firm conclusion arising from major background contributions related to the elliptic flow anisotropy in heavy ion collisions. I will then move on to recent developments and improvements of data analysis techniques and methods, discuss the strengths and limitations of the various approaches, elucidate additional background contamination beyond the flow-induced ones, and offer a future experimental prospect in the search for the CME.

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