Search for the Chiral Magnetic Effect by Event Shape Engineering Differential in Invariant Mass in Au+Au Collisions at $\sqrt{s_{NN}}$ = 200 GeV from STAR

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Chiral Magnetic Effect (CME) is a phenomenon in which electric charge is separated by a strong magnetic field from local domains of chirality imbalance and parity violation in quantum chromodynamics (QCD). The CME-sensitive observable, charge-dependent three-point azimuthal correlator $\Delta\gamma$, is contaminated by a major physics background proportional to the particle elliptic anisotropy (v_2). In this talk, we report a brand-new analysis from STAR on charge separation using the Event Shape Engineering (ESE) approach [1], projecting $\Delta\gamma$ to zero v_2 to obtain the CME-sensitive intercept. Our approach has several novel aspects: (1) we use three subevents to select on dynamical fluctuations of v_2 by separating particles of interest from ESE selection; (2) we apply the ESE method differentially as a function of the pair invariant mass (m_{inv}) since CME is a low-pT phenomenon and hence more sensitive to lower mass; and (3) we consider remaining nonflow contamination in the extracted intercept from two and three-particle correlations using data-driven approach and HIJING simulations [2], and also report measurement using the zero-degree calorimeter that largely supresses nonflow. We validate our differential ESE method with a toy model and simulations by Anomalous-Viscous Fluid Dynamics (AVFD) [3]. We report preliminary results in Au+Au collisions at $\sqrt{s_{\rm NN}}$ = 200 GeV from STAR.

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