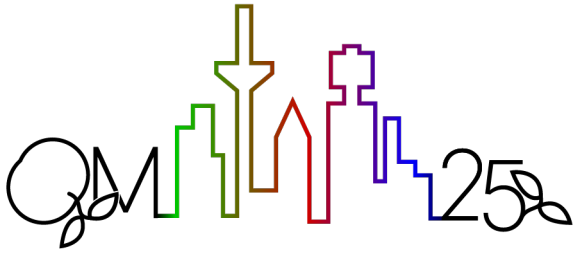

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Unlocking “imprints” of conserved charges in the initial state of high-energy collisions with dissipative hydrodynamics evolution

We propose a novel set of flow observables designed to probe event-by-event fluctuations of conserved charges in relativistic high-energy collisions. We find that, in Pb+Pb collisions at the LHC $\sqrt{s_{NN}} = 5.02$ TeV, our observables are sensitive to local fluctuations in baryon number (B), strangeness (S), and electric charge (Q), which in turn lead to measurable effects in the anisotropic flow of identified hadrons when two particles of interest (2POI) are considered. Using a newly developed framework, we demonstrate that the observables reduce to 0 or 1 in the absence of BSQ fluctuations but deviate from these values by up to 10\% when such fluctuations are present. Future high luminosity runs at the LHC will provide the necessary statistics to conduct experimental analyses with multiple particles of interest. Experimental validation of our findings will therefore offer an opportunity to place additional constraints on the charge fluctuations produced in the initial states of relativistic heavy-ion collisions.

Category

Theory

Collaboration (if applicable)

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