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Underlying event characterization in 200 GeV Au+Au collisions for jet measurements with the sPHENIX detector

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sPHENIX is a new experiment at the Relativistic Heavy Ion Collider (RHIC), designed with large-acceptance, hermetic EM and hadronic calorimeters to enable qualitatively new measurements of jet probes of the QGP at RHIC. Since jets in heavy ion collisions sit on top of large fluctuating backgrounds, these must be understood to carry out a precision program of jet physics. This talk reports a detailed characterization of the underlying event and jet background fluctuations at RHIC, as well as direct comparisons of the fluctuations resulting from methods typically used by different heavy ion experiments, using 200 GeV Au+Au collision data collected with the sPHENIX calorimeter system during its 2023 commissioning run. The characterization uses a multi-faceted approach, including unbiased sampling of calorimeter window areas and random cones, as well as methods sensitive to jet reconstruction effects such as embedding high-p_T probes from data or simulation into recorded minimum-bias Au+Au data. The non-Poissionian background fluctuations for several jet background subtraction methods envisioned for use in sPHENIX are also investigated. Finally, we discuss the sPHENIX physics enabled by rigorous description of these backgrounds.

Category

Experiment

Collaboration

sPHENIX

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