sPHENIX Report

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Measurement of $dE_T/d\eta$ with the sPHENIX detector using Run 2023 Au+Au data at $\sqrt{s_{\rm NN}} = 200$ GeV

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Abstract

The transverse energy in heavy ion collisions is one of the key observables characterizing global properties of the quark-gluon plasma (QGP). The transverse energy per unit pseudo-rapidity ($dE_T/d\eta$) probes the energy carried by the medium along the longitudinal rapidity, providing essential information related to the initial geometry and subsequent hydrodynamic evolution of the QGP. Such studies are facilitated using recent data collected by the sPHENIX detector from RHIC Run 23 with Au+Au collisions at nucleon-nucleon center-of-mass energy of 200 GeV. The sPHENIX calorimeter system, comprising electromagnetic and hadronic calorimeter detectors, covers a wide rapidity acceptance region as well as the full azimuthal phase space. This setup provides the capability of high-resolution measurements of photons, electrons, jets, and hadrons, which allow particularly detailed $dE_T/d\eta$ measurements with high precision. This talk reports preliminary measurements of $dE_T/d\eta$ with the sPHENIX experiment, which are the first results for that observable at RHIC from a hadronic calorimeter with full azimuthal coverage. The results are presented in various centrality intervals and compared to the latest theoretical models, which will impose strong constraints on centrality-dependent particle production and initial conditions of the collisions at RHIC energies.