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Jet Physics with the Novel Calorimeter System for the sPHENIX Detector at RHIC

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The sPHENIX experiment at RHIC will collect high statistics proton-proton, proton-nucleus and nucleus-nucleus data, starting in the early 2020's. The sPHENIX capabilities enable state-of-the-art studies of jet modification, upsilon suppression and open heavy flavor production to probe the microscopic nature of the strongly-coupled Quark Gluon Plasma, and will allow a broad range of cold QCD studies.

The sPHENIX detector will provide precision vertexing, tracking and electromagnetic and hadronic calorimetry in the central pseudorapidity region $|\eta| < 1.1$, with full azimuth coverage, at the full RHIC collision rate, delivering unprecedented data sets for hard probe tomography measurements at RHIC.
In this talk we will present a brief overview of the sPHENIX detector design with emphasis on calorimetry. The novel design of the sPHENIX calorimeters includes a tungsten/scintillating fiber electromagnetic calorimeter and two steel/scintillating tile hadronic calorimeter sections. The design is optimized for high jet energy resolution, while special attention to possible biases resulting from the combination of a relatively thin hadronic calorimeter and the large fluctuations in hadronic shower composition and shower development that usually limit calorimeter performance in large systems. The solution we have chosen –deep longitudinal segmentation with towers in each longitudinal section overlapping in azimuth and rapidity –was extensively simulated within the GEANT4 simulation framework and repeatedly tested in particle beams in the T1044 test beam facility at FNAL. Both simulation data and test beam data, and the resulting jet physics performance, will be presented in this talk.

Content type

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