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Single Particle Simulation Studies of a Proposed Forward Calorimeter for the sPHENIX Experiment[1] YUXI XIE, University of Michigan — The sPHENIX experiment is designed to study the quark-gluon plasma, a state of hot nuclear matter created in heavy-ion collisions. A forward upgrade including tracking and calorimetry is proposed for sPHENIX to extend the range for cold nuclear matter measurements, in particular with direct photon and quarkonia, which can be used to constrain the gluon nuclear parton distribution function. The implementation of the plans on re-using the existing E864 hadronic calorimeter modules for the forward electromagnetic calorimeter requires a non-uniform tower structure. The calorimeter performance was studied with single-photon and single π^0 simulations, showing that the energy responses over pseudorapidity and azimuthal angle in the forward EMCal are uniform despite the nonuniformity of the tower size. Results on the fraction of π^0s that can be successfully reconstructed as a function of momentum will be presented. The single-particle simulation studies indicate that the proposed forward electromagnetic calorimeter upgrade has promising potential for use in extending the physics program of sPHENIX. Further studies involving full-event simulations will be performed to study the detector performance for distinguishing direct photons from photons decayed from π^0s.

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