Proposed Detector Upgrade for Measuring Low-Mass Lepton Pairs in PHENIX

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Abstract

The measurement of low-mass lepton pairs provides a unique opportunity to study in-medium effects of vector meson production and the possibility of chiral symmetry restoration in heavy ion collisions. However, this measurement is extremely difficult experimentally due to the large combinatorial background produced by Dalitz decays and conversions. The PHENIX collaboration has proposed constructing a new detector as part of its future upgrade program that would provide a high level of rejection against the Dalitz decay and conversion backgrounds, while at the same time preserving good efficiency for measuring vector mesons and low-mass electron pairs. This device would consist of a hadron-blind detector that would identify electrons by detecting Cherenkov light produced in a gas radiator, and could also incorporate the features of a Time Projection Chamber that would serve as a tracking detector to track low-momentum particles in a low- magnetic-field region produced in the central PHENIX spectrometer. The strategy for identifying and rejecting Dalitz pairs and conversions using this technique will be discussed, along with some of the ongoing R&D efforts.