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Separating the Z^0 from Heavy Quark Background in Relativistic Heavy Ion Collisions[1] LEWIS SHARPNACK, Kent State University and Los Alamos National Labs — The Compact Muon Solenoid at the Large Hadron Collider (LHC) is scheduled to begin experimental operations in late 2007. At full power, Pb-Pb collisions at LHC will produce quark gluon plasma (QGP), as well as numerous particle jets. In order to determine the energies of these jets, Z^0 bosons coming out of the plasma on the opposite side of the jet are examined. Direct observation of the Z^0 particle is impossible because it decays before reaching the detectors. It is possible to measure the decay products of the Z^0 to reconstruct the particle's energy prior to exiting the QGP. Some of the most useful decay products of the Z^0 to study are dimuons produced as a particle antiparticle pair. Dimuons are also copiously produced from decays of other particles, most notably, decays of D and B mesons originating from heavy quark pairs. These false Z0s constitute the background for experiments. Using various simulations, the dimuon signals from the Z^0 decays and the D and B decays have been modeled. Based on the simulated data, a series of limits on accepted values for such physical quantities as opening angle and decay momentum asymmetry have been established to maximize the signal to background ratio for Z^0 particles in the detector.

[1]LANL Mentor Gerd J. Kunde

Lewis Sharpnack
Kent State University and Los Alamos National Labs

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