

Heavy dilepton in nucleus nucleus collision at LHC energy

We present a study of $\tau^+\tau^-$ lepton pair production in Pb + Pb collisions at $\sqrt{s_{NN}} = 5.5$ TeV. The larger mass of tau lepton compared to electron and muon leads to considerably small hadronic contribution to the $\tau^+\tau^-$ pair invariant mass (M) distribution relative to the production from thermal partonic sources. The quark-anti-quark annihilation processes via intermediary virtual photon, Z and Higgs bosons have been considered for the tau lepton production. The contribution from Drell-Yan process is found to dominate over thermal yield for $\tau^+\tau^-$ pair mass from 4 to 20 GeV at the LHC energy. We also present the ratio of τ lepton pair yields for nucleus-nucleus collisions relative to yields from p + p collisions scaled by number of binary collisions at LHC energies as a function τ lepton pair invariant mass. The ratio is found to be significantly above unity for the mass range 4 to 6 GeV. This indicates the possibility of detecting $\tau^+\tau^-$ pair from quark-gluon plasma (QGP) in the mass window 4 to 6 GeV.

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