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Heavy di-lepton pair production in nucleus-nucleus collisions at LHC energy

Content :

Di-lepton production in nucleus-nucleus collisions has provided valuable insight for physics behind the in-medium modifications to various properties of vector mesons. They have also provided information on collectivity and temperature of the system produced in the collisions. So far within the available centre of mass energy range of nucleus-nucleus collisions the measurements are concentrated on detection of di-electron and di-muon pairs. Due to small mass of these leptons one has to deal with considerable sources of backgrounds and hadronic contributions to filter out the contribution from thermal partonic sources. Collisions at LHC energies provide an opportunity to look at tau (mass ~ 1.77 GeV) dilepton pairs. In this work we present a case study where the different sources of tau production for partonic matter, Drell Yan and tau production from the annihilation of pions are studied.

The contributions to tau production through intermediary Z-boson, photon and Higgs boson are calculated. The ratio of tau di-lepton pair yields for nucleus-nucleus collisions relative to p+p collisions at LHC energies as a function of tau dilepton pair mass is shown to be a good observable to study the thermal contribution from quark-gluon plasma.

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