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Coherent very low transverse momentum e^+e^- pair production in hadronic Au+Au collisions at $\sqrt{s_{NN}}$ = 200 GeV and U+U collisions at $\sqrt{s_{NN}}$ = 193 GeV at STAR

Dileptons (l^+l^-) are produced in all the stages of the heavy-ion collisions, and escape with minimum interaction with the strongly interacting medium. Thus, l^+l^- pair measurements play an essential role in the study of hot and dense nuclear matter, created in heavy-ion collisions. Recently, a significant excess of J/ψ yield at very low transverse momentum ($p_T < 0.3$ GeV/c) was reported by the ALICE [1] and STAR collaborations in peripheral A+A collisions. These observations may point to evidence of coherent photoproduction of J/ψ in violent hadronic interactions while traditionally coherent photoproduction is thought to only exist in ultra-peripheral heavy-ion collisions when the traversing nuclei remain intact. It is interesting to investigate the e^+e^- pair production in a wider invariant mass region ($M_{ee} < 4$ GeV/c^2) at very low p_T in heavy-ion collisions for different centrality bins. If the coherent photoproduction mechanism is confirmed, the coherently photoproduced e^+e^- pairs accompanying violent hadronic collisions may provide a novel probe of the hot and dense nuclear matter.

In this talk, we will present e^+e^- pair invariant mass spectra in three p_T bins (0-0.15, 0.15-1, and 1-10 GeV/c) and p_T spectra for $p_T < 0.3$ GeV/c in three mass regions (0.4-0.76, 1.2-2.6, and 2.8-3.2 GeV/c^2) in Au+Au collisions at $\sqrt{s_{NN}}$ = 200 GeV and U+U collisions at $\sqrt{s_{NN}}$ = 193 GeV. The structure of t ($t = p_T^2$) distributions of these three mass regions and comparisons with that in ultra-peripheral collisions will be shown. The centrality dependence of these e^+e^- pair measurements will be reported, and physics implications will be discussed.

[1] J. Adam *et al.* (ALICE Collaboration), Phys. Rev. Lett. 116, 222301 (2016).

Preferred Track

Electromagnetic Probes

Collaboration

STAR

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