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Low-p_T $\mu^+\mu^-$ pair production in Au+Au collisions at $\sqrt{s_{\rm NN}}$ = 200 GeV at STAR

Tuesday 2 June 2020 11:00 (20 minutes)

In high energy heavy-ion collisions, the strong electromagnetic (EM) fields of the nuclei can produce energetic, high-density photon fluxes, leading to photon-induced interactions. Recently, significant enhancements of e^+e^- pair and J/ψ production at very low transverse momentum (p_T) were observed by the STAR [1, 2] and ALICE [3] collaborations in peripheral hadronic A+A collisions. The excess yields exhibit a much weaker centrality dependence compared to the expectation for hadronic production, and are consistent with coherent photon-photon and photon-nucleus interactions. The measured p_T broadening for e^+e^- pairs may indicate the existence of a strong magnetic field in the medium. Measurements with $\mu^+\mu^-$ pairs provide a complementary channel to investigate these phenomena.

In 2014 and 2016, the STAR experiment at RHIC recorded large samples of Au+Au collisions at $\sqrt{s_{\rm NN}}$ = 200 GeV with di-muon triggers utilizing the Muon Telescope Detector. In this talk, we will present invariant mass and yield distributions as a function of centrality for inclusive $\mu^+\mu^-$ pair production at \mbox{p_T $<$ 0.15 GeV/c} in the mass range between 2.6 and 10 GeV/c^2. The p_T^2 distribution of the excess yields for these very low p_T $\mu^+\mu^-$ pairs will also be shown. Physics implications will be discussed together with model comparisons.

References:
[1] J. Adam et al. (STAR Collaboration), Low-p_T e^+e^- Pair Production in Au + Au Collisions at $\sqrt{s_{\rm NN}}$ = 200 GeV and U + U Collisions at $\sqrt{s_{\rm NN}}$ = 193 GeV at STAR, Phys. Rev. Lett. 121, 132301 (2018).
[2] J. Adam et al. (STAR Collaboration), Observation of excess J/ψ yield at very low transverse momenta in Au + Au Collisions at $\sqrt{s_{\rm NN}}$ = 200 GeV and U + U Collisions at $\sqrt{s_{\rm NN}}$ = 193 GeV at STAR, arXiv: 1904.11658.
[3] J. Adam et al. (ALICE Collaboration), Measurement of an Excess in the Yield of J/ψ at Very Low p_T in Pb-Pb Collisions at $\sqrt{s_{\rm NN}}$ = 2.76 TeV, Phys. Rev. Lett. 116, 222301 (2016).

Collaboration (if applicable)

STAR

Track

Electroweak Probes

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