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

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Recently, significant enhancements of e^+e^- pairs at very low transverse momentum (p_T) were observed by the STAR collaboration in peripheral Au+Au collisions. The excess can be explained by photon-photon interactions induced by the extremely strong electromagnetic field produced by the fast moving heavy ions. While such photon-photon interactions were traditionally studied in ultra-peripheral collisions without any nuclear overlaps, they could provide a novel probe to the Quark Gluon Plasma (QGP) created in peripheral collisions since the very-low- p_T dileptons are produced in the early stage of the collisions. Furthermore, the photon-photon interactions could be used to probe the possible existence of strong magnetic field trapped in a conducting QGP medium. Measurements of $\mu^+\mu^-$ 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 $\sqrt{s_{NN}} = 200$ GeV. In this talk, we will present new measurements of invariant mass and yield distributions for $\mu^+\mu^-$ pair production at $p_T < 0.15$ GeV/c. The p_T^2 distribution of the excess yields will also be shown. Physics implications will be discussed together with model comparisons.

Collaboration

STAR Collaboration

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