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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. These photon-photon interactions could provide a novel probe to the Quark-Gluon Plasma (QGP) since the very-low- p_T dileptons are produced at the early stage of the collisions. Furthermore, the linearly polarized photons will lead to angular modulations of produced dileptons, which is related to vacuum birefringence. Theoretical calculations predict that the angular modulation of $\mu^+\mu^-$ pairs is different from e^+e^- pairs due to the different masses. Therefore, measurements of $\mu^+\mu^-$ pairs provide new insight to these phenomena in heavy-ion collisions.

In 2014 and 2016, the STAR experiment recorded large samples of Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV. In this presentation, we will present the first measurements of photo-produced $\mu^+\mu^-$ pairs at STAR. Physics implications will be discussed together with model comparisons.

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