

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

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Abstract

1 Recently, significant enhancements of e^+e^- pairs at very low transverse momen-
2 tum (p_T) were observed by the STAR collaboration in peripheral Au+Au colli-
3 sions. The excess can be explained by photon-photon interactions induced by the
4 extremely strong electromagnetic field produced by the fast-moving heavy ions.
5 These photon-photon interactions could provide a novel probe to the Quark-Gluon
6 Plasma (QGP) since the very-low- p_T dileptons are produced at the early stage
7 of the collisions. Furthermore, the linearly polarized photons will lead to angular
8 modulations of produced dileptons, which is related to vacuum birefringence. The-
9 oretical calculations predict that the angular modulation of $\mu^+\mu^-$ pairs is different
10 from e^+e^- pairs due to the different masses. Therefore, measurements of $\mu^+\mu^-$
11 pairs provide new insight to these phenomena in heavy-ion collisions.

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