Very low-p_T di-muon production in peripheral Au+Au collisions at $\sqrt{s_{\rm NN}} = 200$ GeV at STAR

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Abstract

The strong electromagnetic field generated by the colliding nuclei in heavy-ion collisions can be represented by a spectrum of photons, leading to photon-induced interactions. While such interactions are traditionally studied in ultra-peripheral collisions (UPC) without any nuclear overlap, significant enhancements of dilepton pairs and J/ψ production at very low transverse momentum (p_T) above the expected hadronic interaction yields have been observed experimentally. The observed excess yields exhibit a much weaker centrality dependence compared to the hadronic production and are consistent with photon-induced interactions. The measurements of very-low-p_T vector meson and dilepton production in peripheral heavy-ion collisions provide a unique opportunity to study photoproduction in collisions with well-defined and smaller impact parameters compared to that of UPC.

In 2014 and 2016, the STAR experiment recorded large samples of Au+Au collisions at $\sqrt{s_{\rm NN}} = 200$ GeV. In this presentation, we will present new measurements of very-low-p_T dilepton and J/ψ production in peripheral Au+Au collisions via the $\mu^+\mu^-$ channel using these datasets, which are complementary to the previous dielectron results. Distributions of invariant mass, p_T^2 and angular modulation will be shown. Physics implications will also be discussed together with model comparisons.