Very low-p_T J/ψ production in Au+Au collisions at $\sqrt{S_{NN}}$ = 200 GeV at STAR

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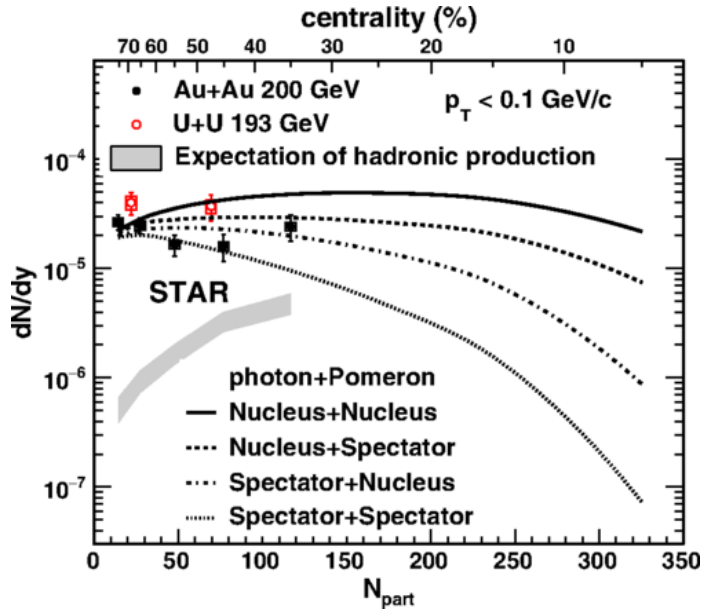
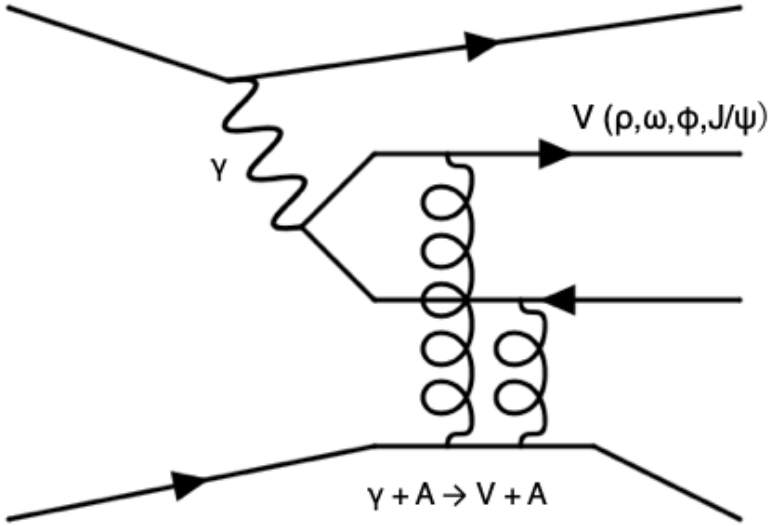
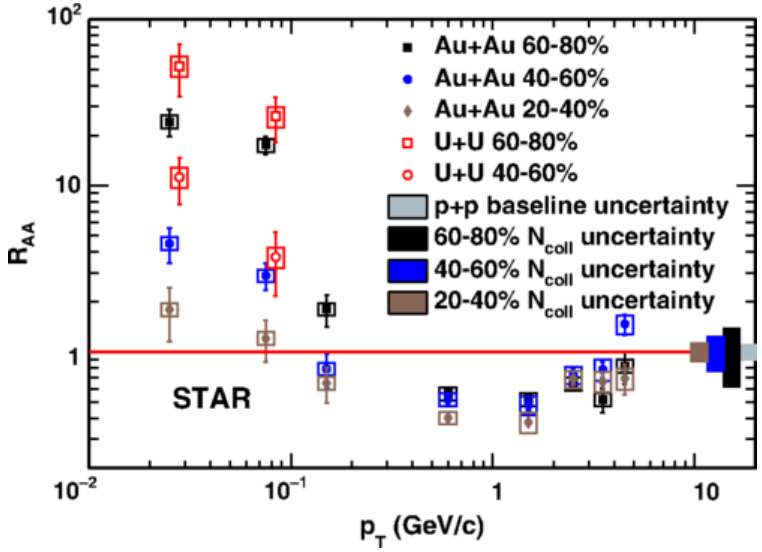
Motivation

J. Adam et al. (STAR Collaboration), Phys. Rev. Lett. 123, 132302.

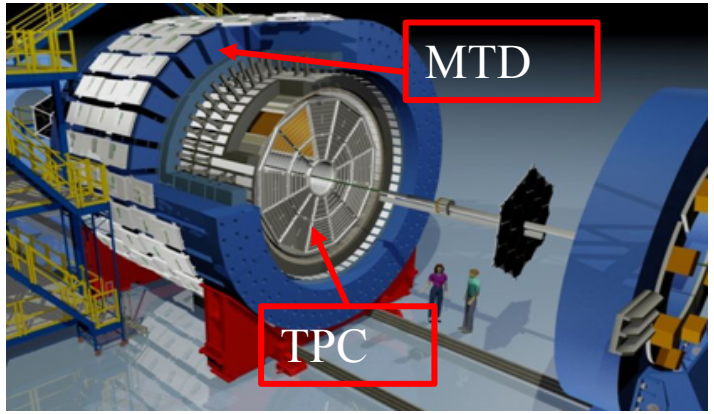




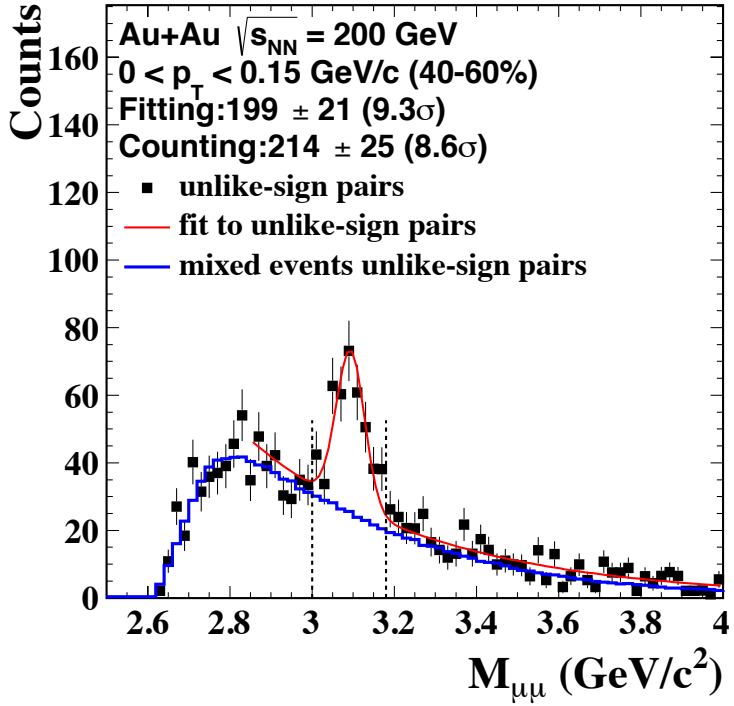


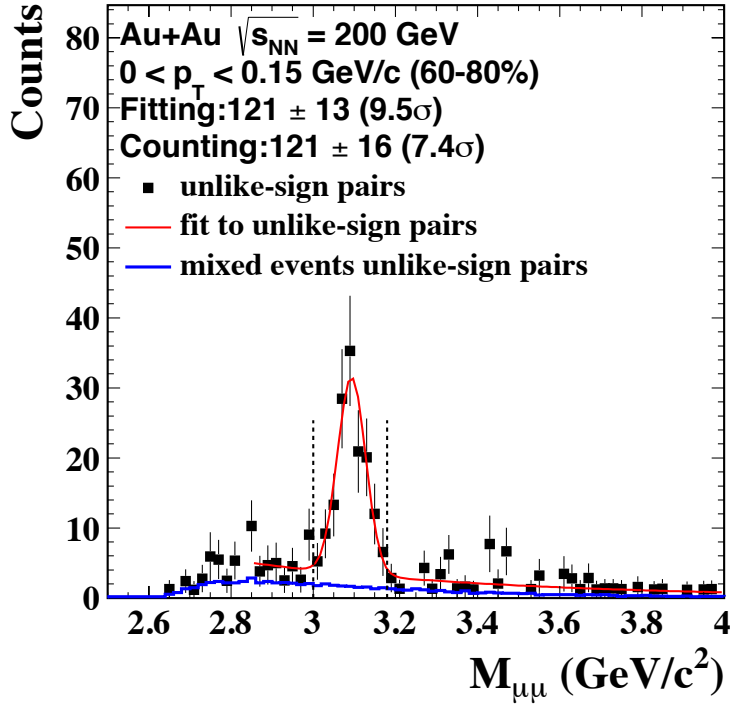
- Significant enhancements of the J/ψ production via e^+e^- decay channel at very low p_T observed by the STAR collaboration in peripheral Au+Au 200 GeV and U+U 193 GeV collisions.
  - Much weaker centrality dependence compared to the hadronic production.
  - Consistent with coherent photon-nucleus interactions.
- Measurement of J/ψ production via $\mu^+\mu^-$ decay channel can provide complementary information to the previous dielectron results.

The STAR detector and raw signal extraction



TPC : track reconstruction and particle identification.
(full ϕ coverage, |η| < 1)
MTD : triggering on and identifying muons
(45% in ϕ, |η| < 0.5)

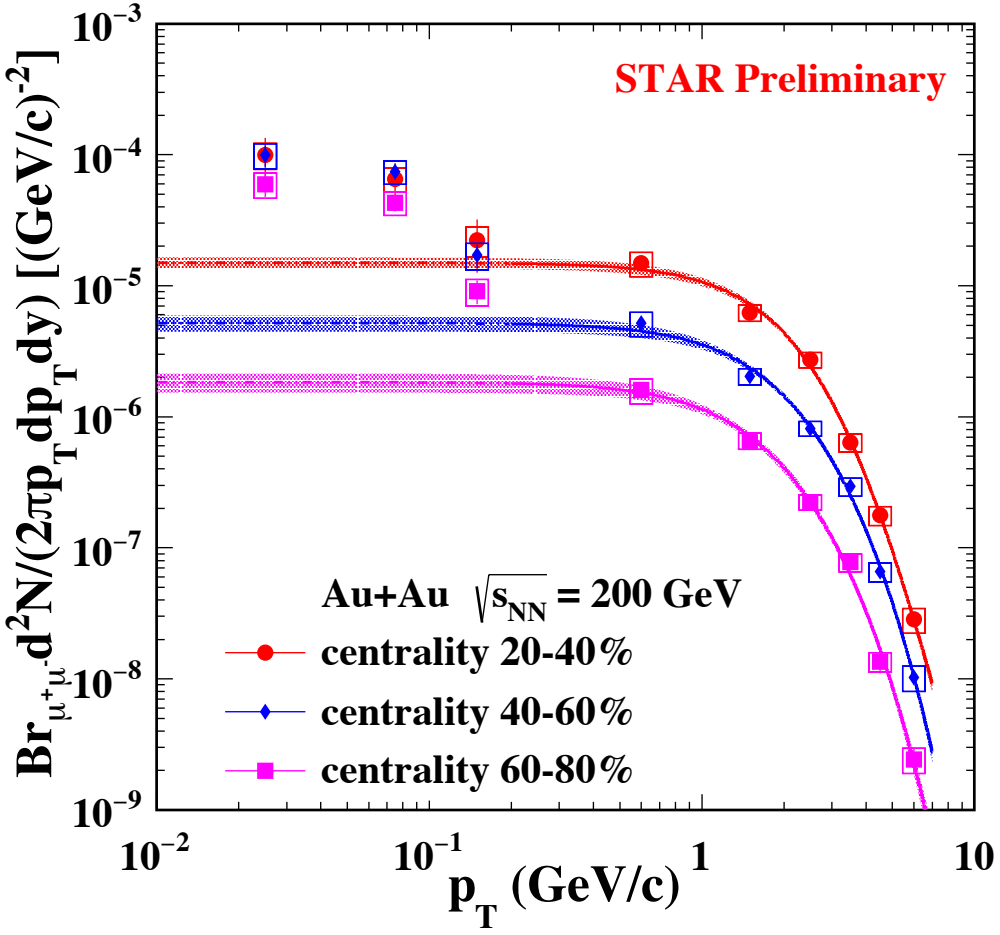


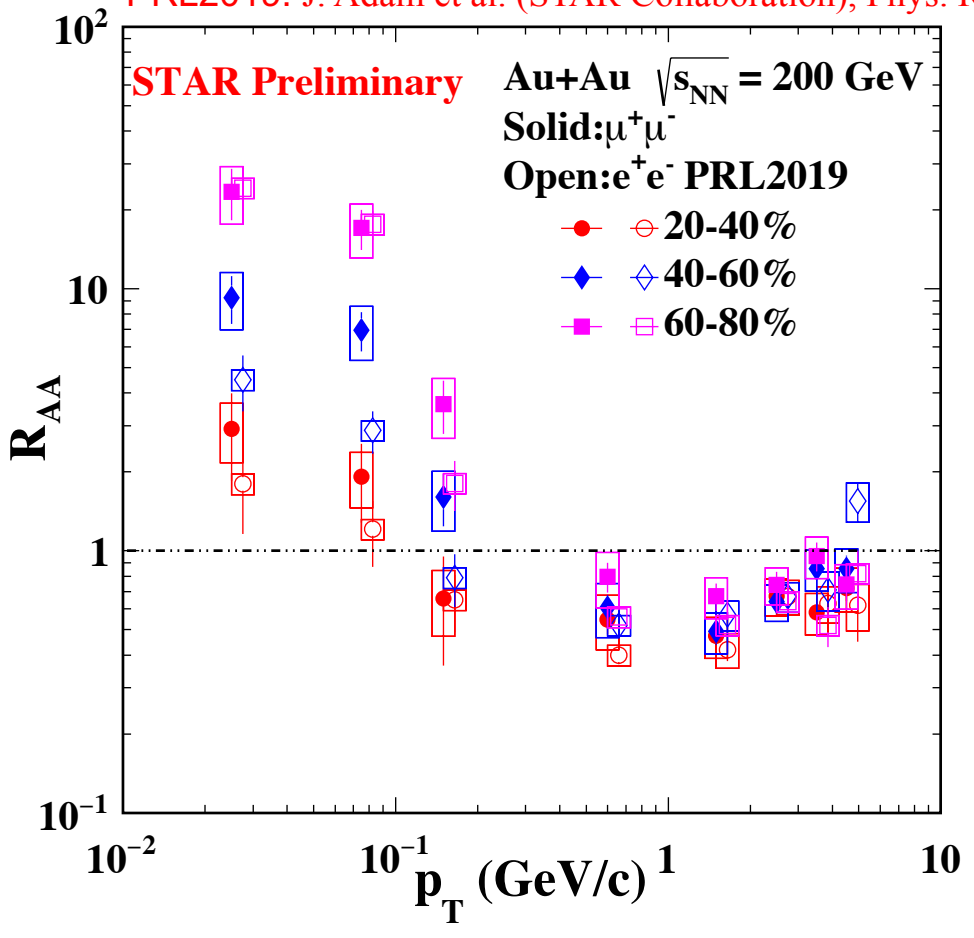


- Dataset : Au+Au collisions at $\sqrt{S_{NN}} = 200$ GeV in 2014, dimuon trigger.
- Maximum Likelihood method is used for raw signal extraction.

Invariant yield and R_{AA}

PRL2019: J. Adam et al. (STAR Collaboration), Phys. Rev. Lett. 123, 132302.



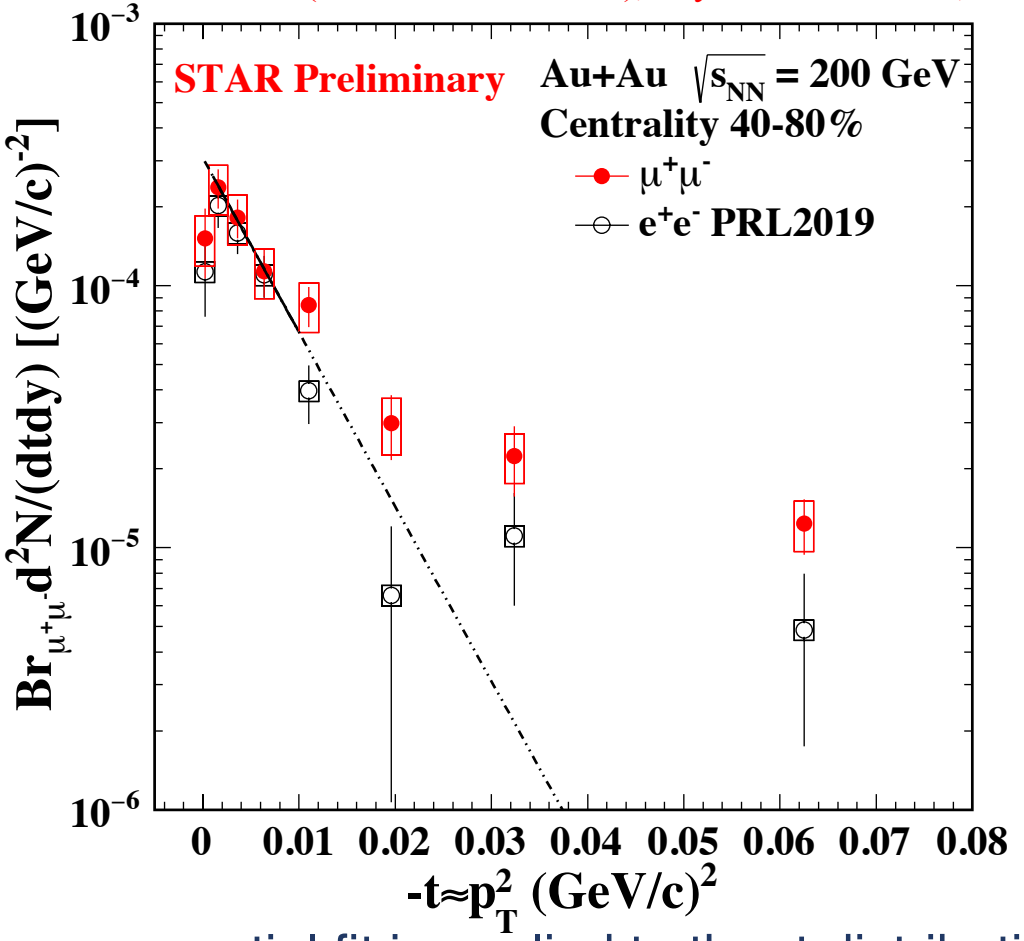


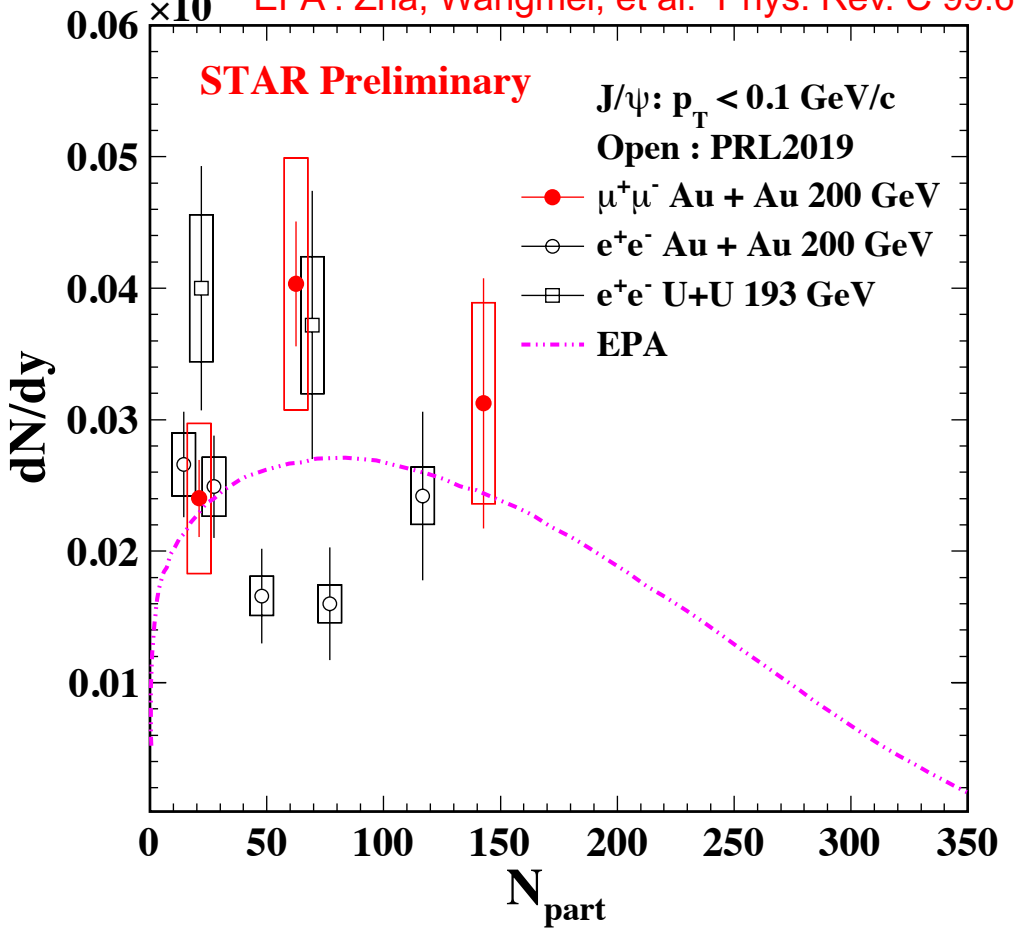
- Significant enhancement at $p_T < 0.2$ GeV/c is observed for J/ψ production with respect to the extrapolation of fit of data for $p_T > 0.2$ GeV/c, which is reflected in a large enhancement of R_{AA} above unity.

p_T^2 distribution and excess yield

PRL2019: J. Adam et al. (STAR Collaboration), Phys. Rev. Lett. 123, 132302.

EPA : Zha, Wangmei, et al. Phys. Rev. C 99.6 (2019): 061901.





- An exponential fit is applied to the -t distribution, and the slope parameter is 153 ± 55 (GeV/c)$^{-2}$, consistent with that expected for an Au nucleus [199 (GeV/c)$^{-2}$] within uncertainties. The slope parameter is 177 ± 23 (GeV/c)$^{-2}$ from published results via e^+e^- channel.
- Excess yield consistent with equivalent photon approximation (EPA) calculation.