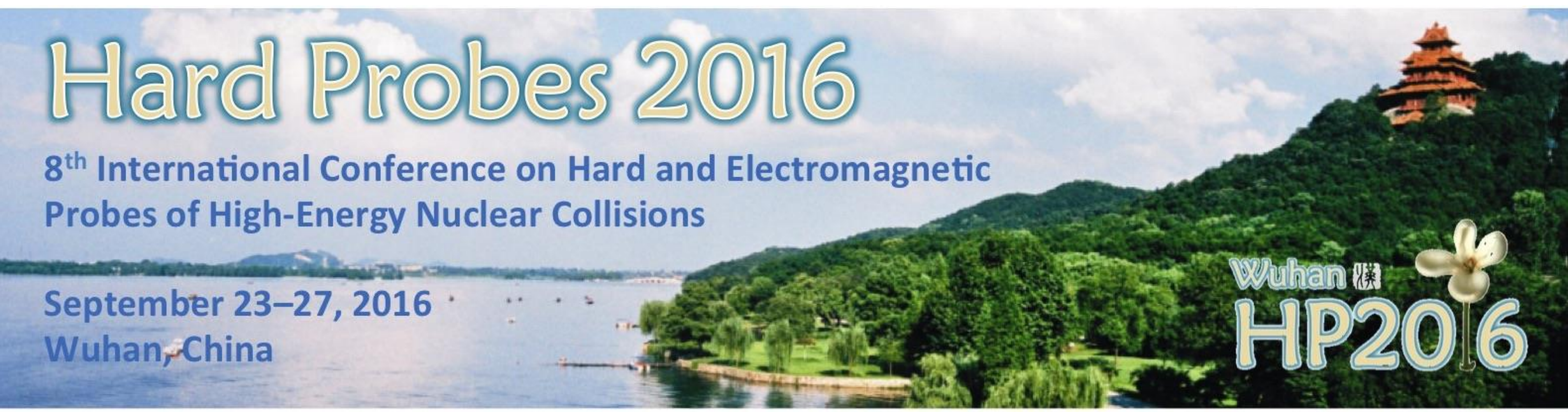
Measurement of J/ψ production in Au+Au collisions at $\sqrt{s_{NN}}$ = 200 GeV by the STAR experiment

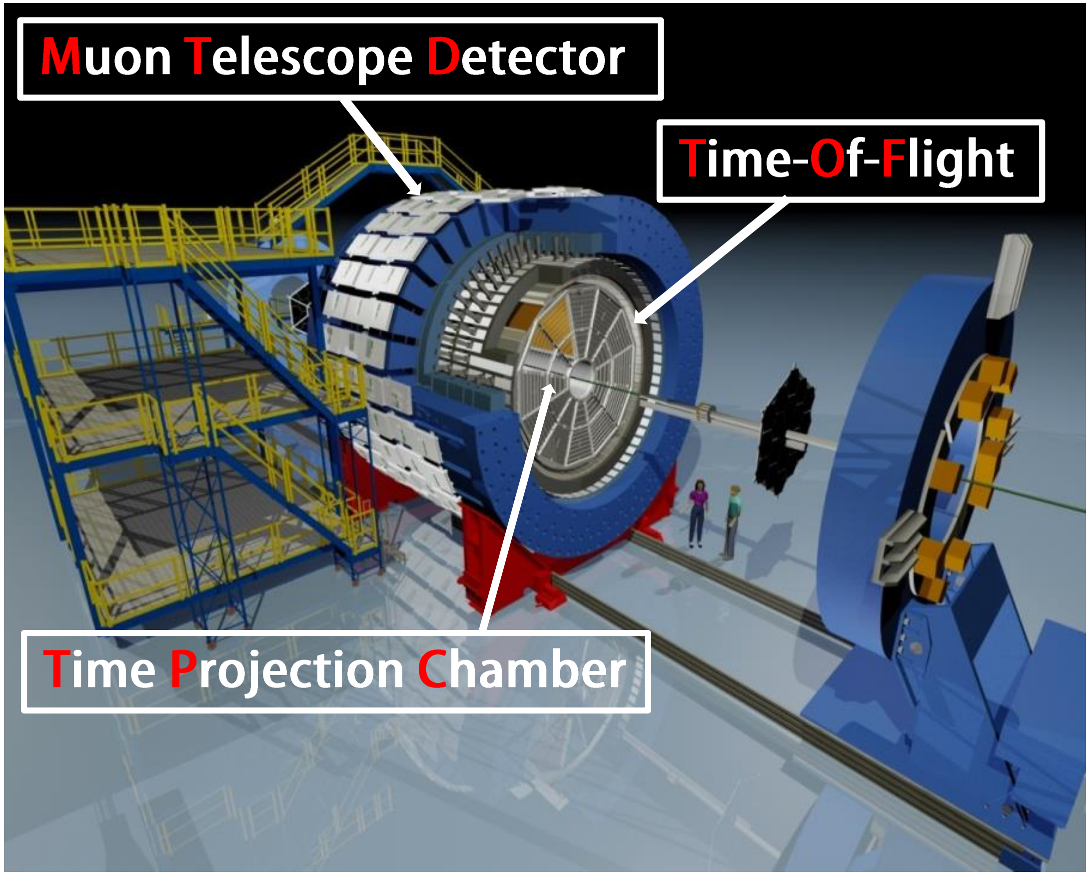
Xinjie Huang (Tsinghua University)
on behalf of the STAR Collaboration



The STAR detector

Mid-rapidity detector: $|\eta| < 1$, $0 < \phi < 2\pi$

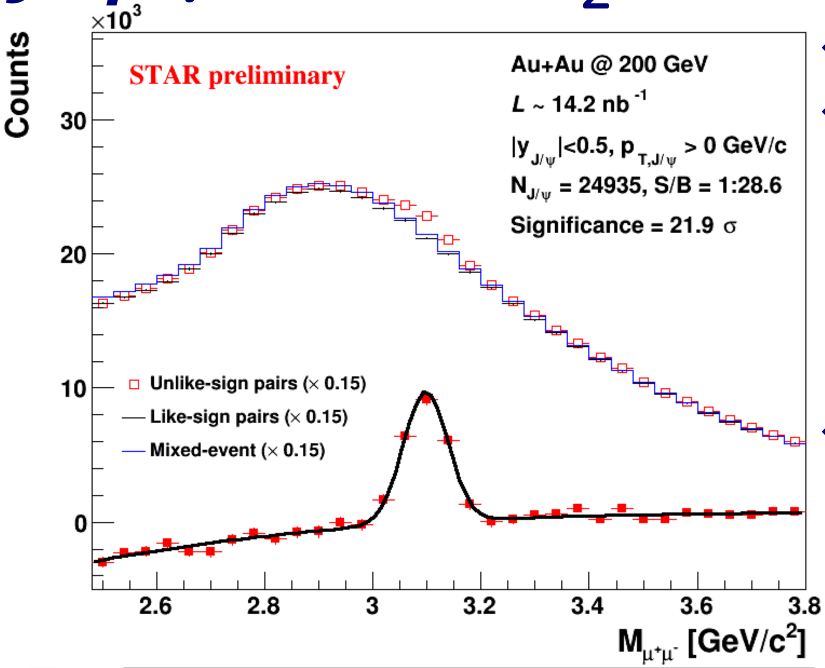
- TPC: measure momentum and energy loss.
- TOF: measure time-of-flight.
- MTD ($|\eta|<0.5$) : identify and trigger on muons:
  – fully installed in 2014 behind magnet
  – Precise timing measurement (σ~100 ps)
  – Hit position measurement(σ~1 cm)



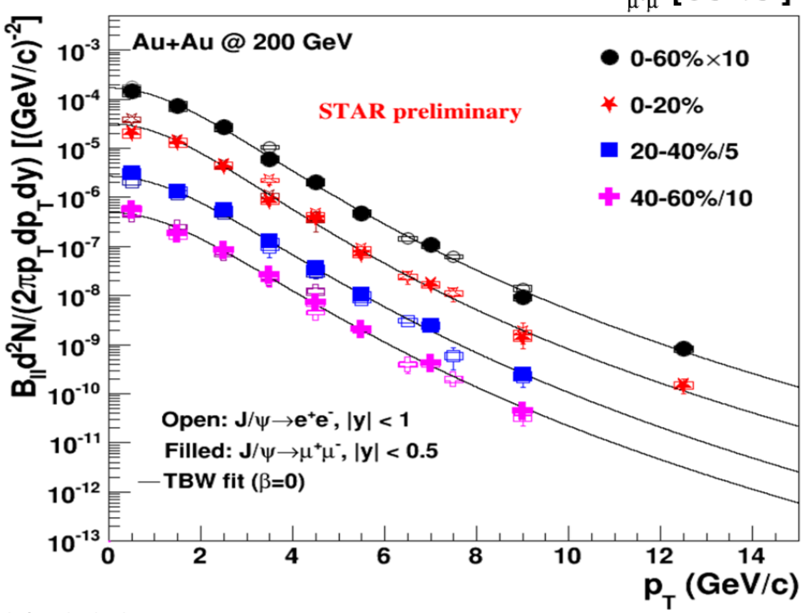
- Muon identification: based on energy loss measured by TPC and the position/time differences between MTD measurements and TPC track projection.

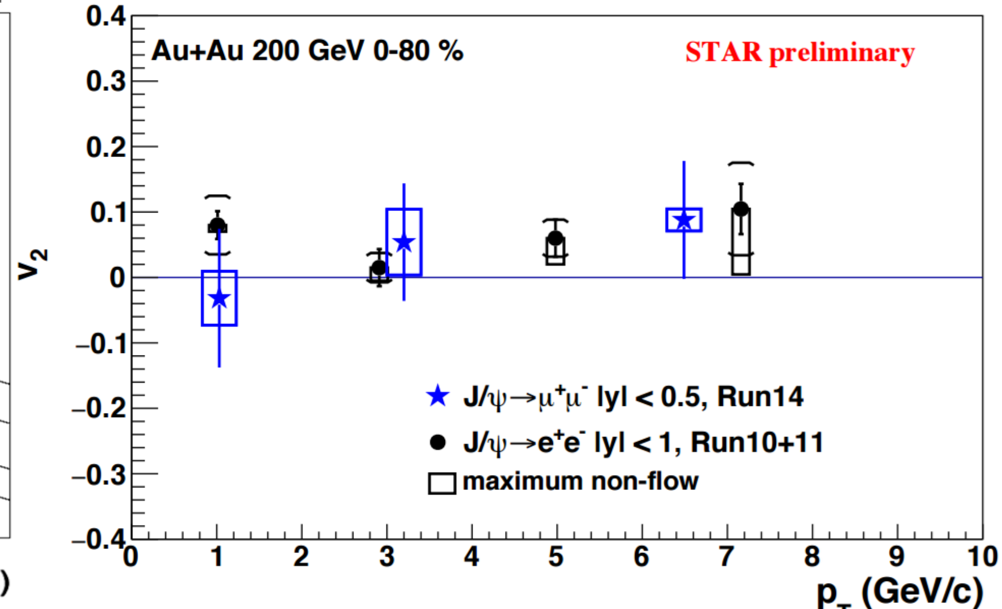
J/ψ yield and v_2

Di-electron: STAR PRL 111 (2013) 052301 PLB 722 (2013) 55, PRC 90, 024906 (2014)
TBW: Z. Tang et al., PRC 79,051901(2009)



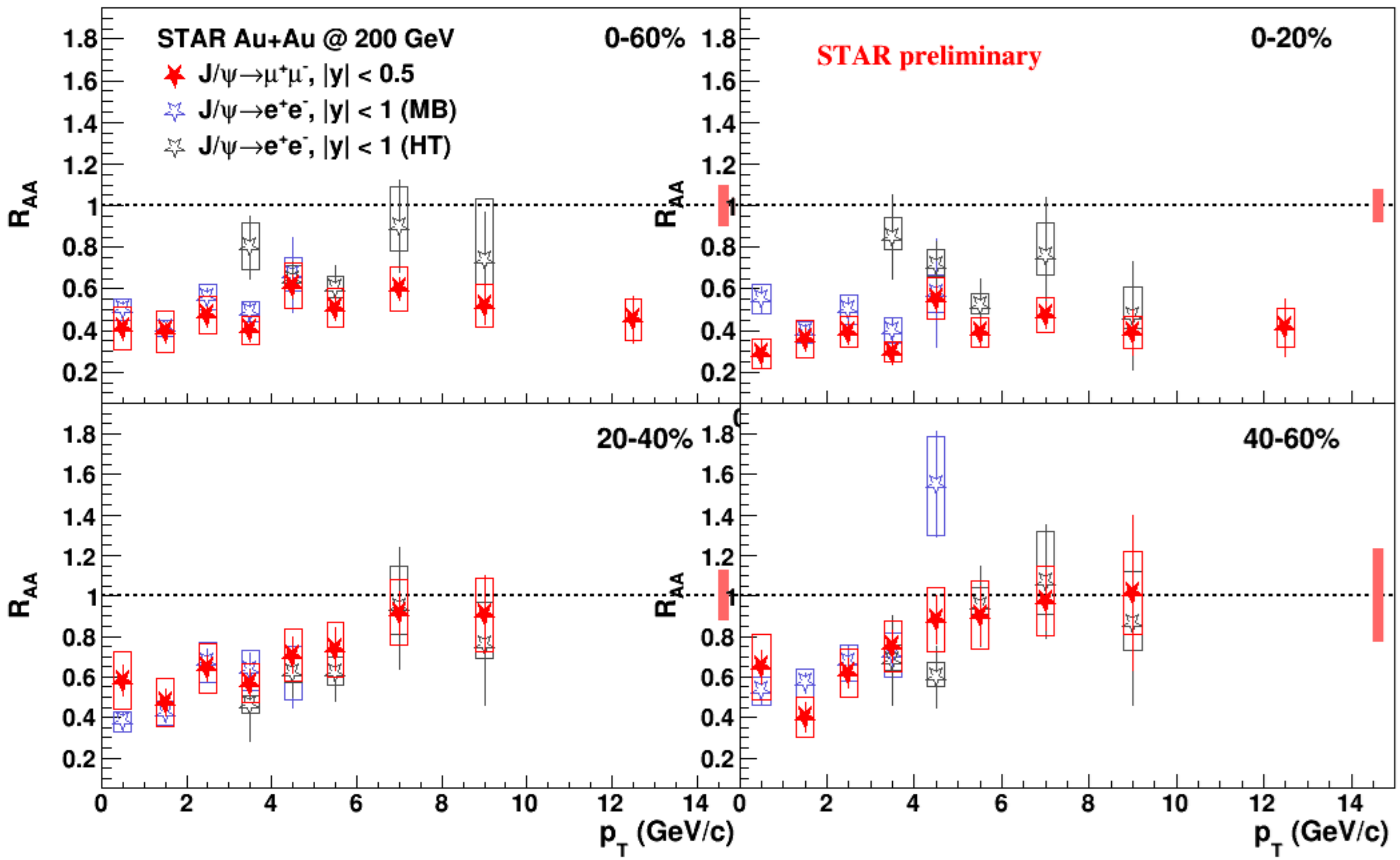
- ~25000 J/ψ from Run14 MTD triggered data
- J/ψ invariant yield vs. pt :
  – consistent with the published di-electron channel results.
  – well described by Tsallis Blast-Wave (TBW) function assuming zero J/ψ velocity.
- J/ψ v_2 :
  – consistent with zero within uncertainties for p_T > 2GeV/c, favoring small contribution from regeneration of thermalized charm quarks.





J/ψ R_{AA} vs. p_T

Di-electron: STAR PLB 722 (2013) 55, PRC 90, 024906 (2014)

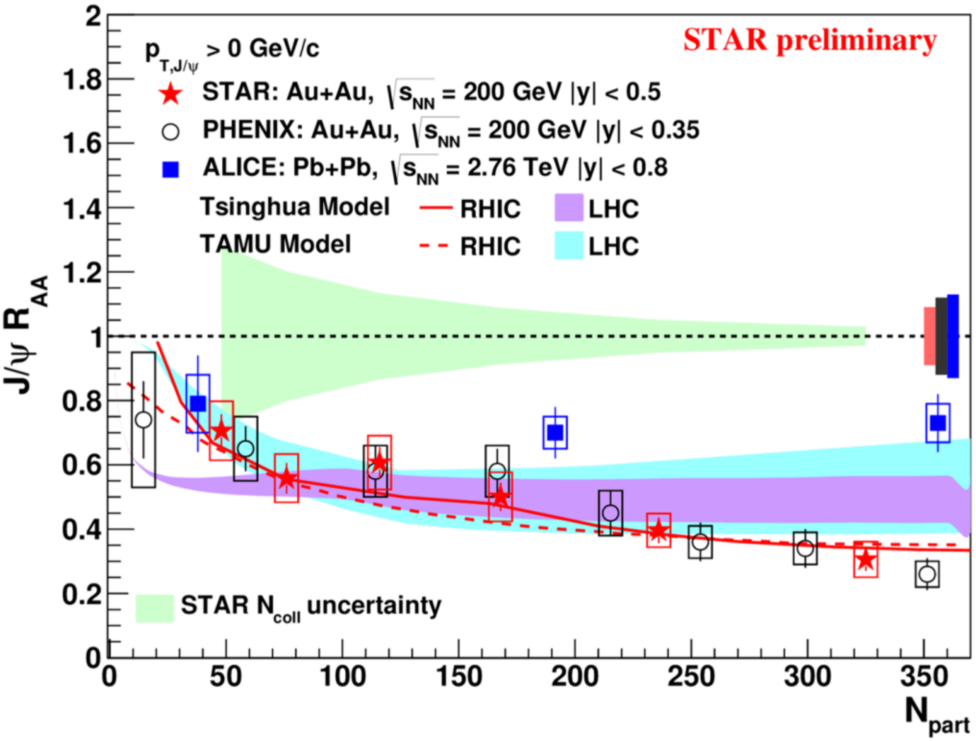


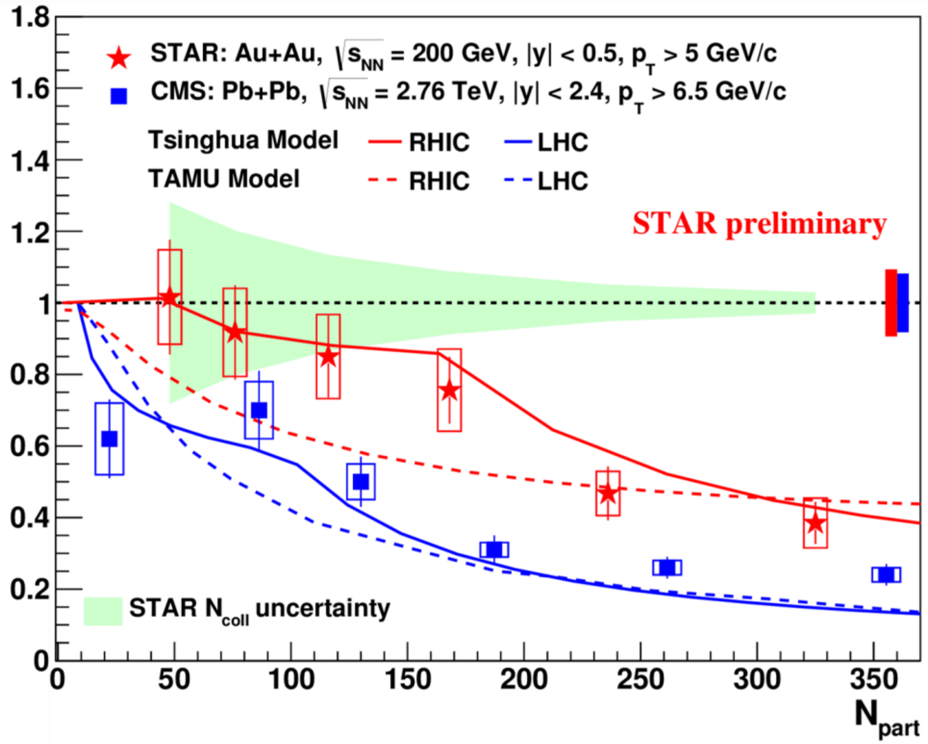
- Strong suppression at low p_T: dissociation and CNM effects.
- Strong suppression at high p_T in central collisions: a clear signal of dissociation.
- Rising R_{AA} with p_T in 20 - 60% centrality: formation time effects and B-hadron feed-down.

J/ψ R_{AA} vs. N_{part}

PHENIX: PRL 98 (2007) 232301
ALICE: PLB 734 (2014) 314
CMS: JHEP 05 (2012) 063

THU Model: Y. Liu, et al., PLB 678 (2009) 72
K. Zhou, et al., PRC 89 (2014) 054911
TAMU Model: X. Zhao, et al., PRC 82 (2010) 064905
X. Zhao, et al., NPA 859 (2011) 114





- Less suppression at LHC at low p_T in central collisions: larger regeneration contribution due to higher charm quark production cross-section.
- Stronger suppression at LHC at high p_T in central collisions: larger dissociation rate due to higher medium temperature.
- J/ψ R_{AA} can be qualitatively described by both transport models including dissociation and regeneration effects. However, there is tension at high p_T.