

Energy dependence of J/ψ production in Au+Au collisions at $\sqrt{s_{NN}} = 14.6, 19.6$ and 27 GeV with the STAR detector

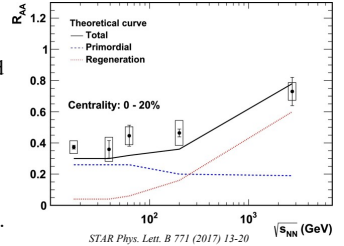
Wei Zhang (wzhang@m.scnu.edu.cn), for the STAR Collaboration
South China Normal University



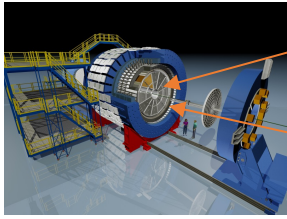
Abstract: Measurements of heavy quarkonia in heavy-ion collisions play a crucial role in studying the properties of the quark-gluon plasma (QGP). The dissociation of J/ψ , caused by the color screening effect, was proposed as a direct signature of the QGP formation. However, recombination of deconfined charm-anticharm pairs complicates the interpretation of the observed J/ψ suppression in heavy-ion collisions, and its contribution is expected to be smaller at lower collision energies. Therefore, measuring the beam energy dependence of J/ψ production will help disentangle different effects. In this poster, we report the measurements of inclusive J/ψ production in Au+Au collisions at $\sqrt{s_{NN}} = 14.6, 19.6$ and 27 GeV using the Beam Energy Scan Phase II (BES-II) data recorded by the STAR experiment. The J/ψ invariant yields and nuclear modification factors (R_{AA}) are presented as a function of centrality and transverse momentum (p_T).

1. Motivation

- In relativistic heavy ion collisions, J/ψ R_{AA} can be affected by various effects, including dissociation, regeneration, and cold nuclear matter effects^{[1][2][3]}.
- Variation of these effects with collision energy enables the possibility to disentangle them by measuring energy dependence of J/ψ production.
- Data collected by the STAR experiment during BES-II provide a valuable opportunity to carry out such measurements.



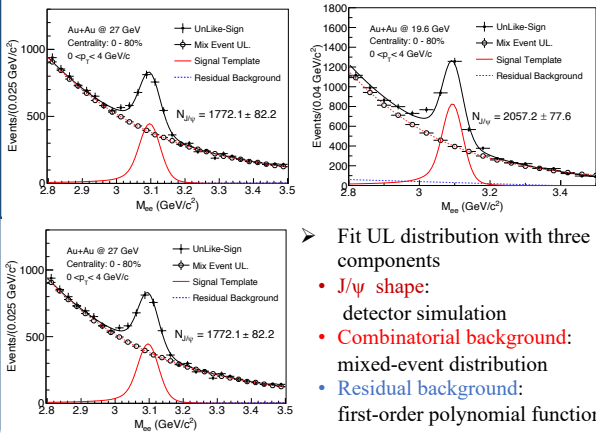
2. STAR detector



- Time Projection Chamber
 - Tracking
 - PID with dE/dx
- Time Of Flight Detector
 - Particle identification

3. Analysis procedure

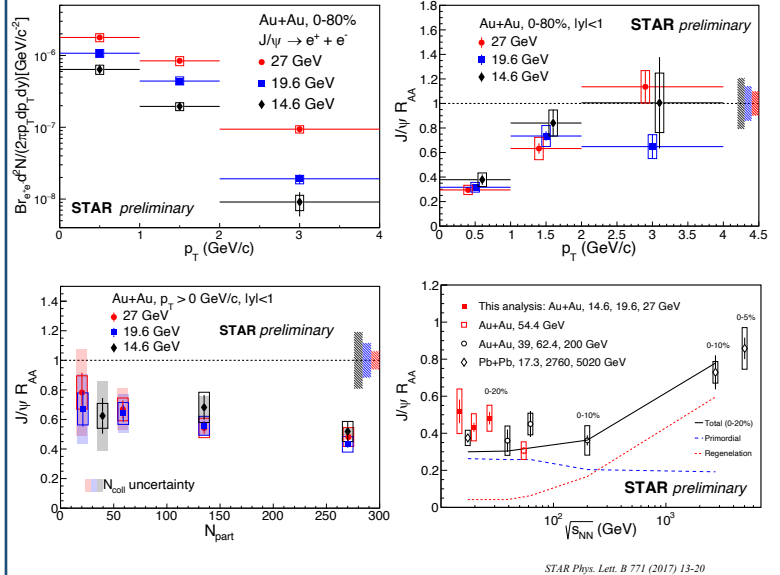
- $J/\psi \rightarrow e^+ + e^-$ (B.R. = 5.971 ± 0.032) %, $|y| < 1$



Reference

- [1]: X. Zhao, R. Rapp, Phys. Rev. C 82 (2010) 064905
- [2]: L. Kluberg, Eur. Phys. J. C 43 (2005) 145
- [3]: NA50 Collaboration, Phys. Lett. B 477 (2000) 28
- [4]: ALICE Collaboration, Phys. Lett. B 734 (2014) 314
- [5]: STAR Collaboration, Phys. Lett. B 771 (2017), 13-20
- [6]: STAR Collaboration, Phys. Lett. B 797 (2019), 134917
- [7]: ALICE Collaboration, Nucl. Phys. A 1005 (2021) 121769

4. Results and conclusions



- We measure inclusive J/ψ R_{AA} as a function of p_T and $\langle N_{part} \rangle$ at mid-rapidity in Au+Au collisions at 14.6, 19.6 and 27 GeV, which extends the previous measurements to lower energy and fills the gap between 17.3 and 39 GeV^{[3][4][5][6][7]}.
- Significant suppression of J/ψ
 - R_{AA} increases with p_T
 - No significant energy dependence
 - Hint of R_{AA} decreasing with $\langle N_{part} \rangle$
- Outlook: Inclusive J/ψ R_{AA} in Au+Au collisions at 17.3 GeV.

Supported in part by the



华南师范大学
SOUTH CHINA NORMAL UNIVERSITY



The STAR Collaboration
<https://drupal.star.bnl.gov/STAR/presentations>