J/ψ production in p+p Collisions at 500GeV from STAR

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Abstract
Quarkonium production in heavy-ion collisions is an important tool for studying the properties of quark-gluon plasma (QGP). Interpretation of the results in heavy-ion collisions requires a good understanding of the production mechanisms in p+p collisions, which include direct production via gluon fusion, parton fragmentation, and feed down from higher quarkonium states. Despite decades of efforts, the quarkonium production mechanism still remains an open question to date. New quarkonium measurements, especially at high transverse momentum and spin alignment for various beam energies, are necessary to constrain models. In this presentation we report on the new measurements of J/ψ and ψ(2s) invariant yields in a broad range of transverse momentum (4<p_T<20 GeV/c) at midrapidity (|y|<1.0) in p+p collisions at √s = 500 GeV from STAR.

STAR Detector
STAR has a large acceptance for electron identification:
- Large acceptance:
  - (ψ(2s): φ<2π, |η|<0.9)
  - Time Projection Chamber
    - Tracking – momentum, pathlength
    - Ionization energy loss – dE/dx (particle identification)
  - Barrel Electromagnetic Calorimeter
    - electron identification, triggering
  - Time Of Flight detector
    - Timing resolution <100ps

Electron Identification
High p_T:
- Online Adc cut (dsmadc>18)
- Offline Adc cut (adc>290)
- p/E cut (0.3<p/E<1.5)
- dE/dx cut (2 < n_d < 2)
Low p_T:
- dE/dx cut (-2 < n_d < 2)

J/ψ Spectrum and Efficiency
J/ψ raw spectrum
J/ψ reconstruction efficiency
ψ(2s) over J/ψ Ratio

Quarkonium Reconstruction
Dielectron invariant mass distribution
J/ψ → e^+e^- and ψ(2s) → e^+e^- channel used for reconstruction.
Combinatorial background reconstruction: Like-sign method (e^+e^- + e^-e^-).
Exponential and linear function are used to describe the J/ψ and ψ(2s) residual background.

J/ψ production in p+p 500GeV
J/ψ x_T distribution

Summary and Outlook
1) J/ψ production in the p_T range of 4-20 GeV/c in p+p collisions at √s = 500 GeV is measured.
2) J/ψ inclusive production cross sections follow x_T scaling for p_T larger than 4 GeV/c.
3) The measured ratio of ψ(2s) to J/ψ is consistent with previous measurements.

References

In this poster, only BHT1 data was used.

Dataset
Large BEMC triggered data samples in p+p collisions at √s = 500 GeV from the year of 2011.

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<th>Trigger Name</th>
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