Comparison of BES-II Data to BES and Estimation of the Number of J/ψ Evenets within one Run Data Taken

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INTRODUCTION

- BES-II has been accumulated about 2011 runs (Run13500–15511, from 11 Nov., 1999 to 12 Mar., 2000) data taken at 3.097 GeV. What quality are the data with? Is it worse or better than BES data taken at the energy?

- How manny J/ψ events are accumulated within one run data taken in general?

- To answer the two typical questions, we examined both the BES-II and the BES data, and made an estimation of the number of J/ψ events accumulated in every run data taken (about 30000 events collected online).

COMPARISON OF BES-II DATA TO BES

- BES-II 579 Data

  579 runs Data (Run13700–14279) taken at 3.097 GeV.

- BES Data

  Data taken at 3.097 GeV. Data set 1, 2 & 3.

  8.6×10^6 J/ψ accumulated.

- $J/\psi \to \phi\pi^+\pi^-$

  Looked at the decay $J/\psi \to \phi\pi^+\pi^-$.

  See plots ...

- $J/\psi \to \phi f_0(980)$

  Looked at the decay $J/\psi \to \phi f_0(980)$

  See plots ...

ESTIMATION OF THE NUMBER OF J/ψ EVENTS

- The Data Sample

  Run13700-14279, 579 runs data taken at 3.097 GeV.

- Examined the decay $J/\psi \rightarrow \phi\pi^+\pi^-$

  with $Br(J/\psi \rightarrow \phi\pi^+\pi^-) = (8.0 \pm 1.2) \times 10^{-4}$

- Search for the decay $J/\psi \rightarrow \phi\pi^+\pi^-$, $\phi \rightarrow K^+K^-$

  $\epsilon_{(\mathrm{J}/psi \rightarrow \phi\pi^+\pi^-)=0.0825}$

  $N_{data}^{observed}(\mathrm{J}/\psi \rightarrow \phi\pi^+\pi^-, \phi \rightarrow K^+K^-) = 352 \pm 19$

$$N_{j/\psi}^{prod} = 5.3 \times 10^6 j/\psi \quad \text{in 579 run data}$$

$$N_{j/\psi}^{prod/run} = 9150 j/\psi \quad \text{in one run data}$$

Considering the uncertainty in the branching fraction used in the calculation for decay the $J/\psi \rightarrow \phi\pi^+\pi^-$, we estimate

$$N_{j/\psi}^{prod/run} = (9150 \pm 1400).$$

We may conservatively estimate the number of j/ψ events, by shifting down 1σ error in value of branching fraction used in the calculation, within one run data of

$$N_{j/\psi}^{prod/run} = 8000.$$

DISCUSSION

The BES-II data taken at 3.097 GeV is with better quality. The number of events observed for the decay $J/\psi \to \phi\pi^+\pi^-$ is almost double in number for the same size of data sample accumulated.

In the estimation of the number of j/ψ events, we only used the measured 3-momentum vactors, without using the Kinematic Fitting.

The uncertainties in MC efficiency is not included in the number of j/ψ events estimated.