BES II Data quality check

K_S^0, K^*, ϕ, Λ and η' signal

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Content

Introduction

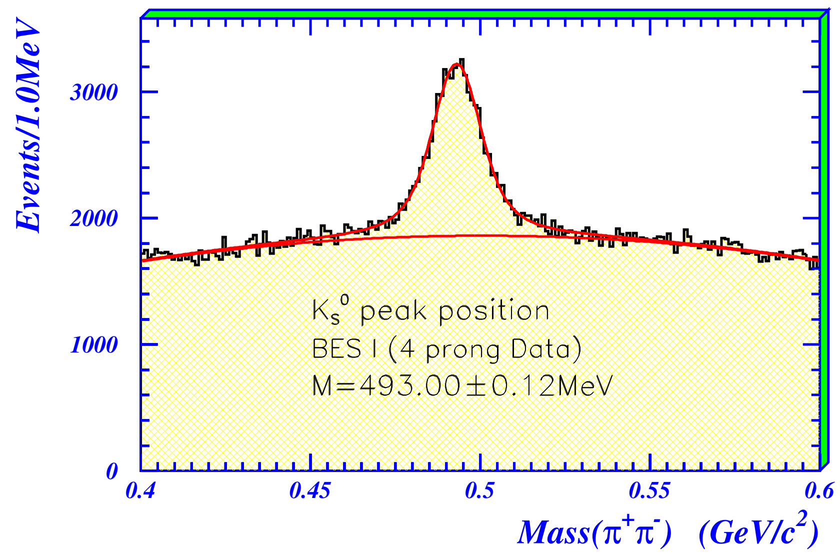
1. **Check BES II J/ψ data from RUN 13700 to 15000, totally 1281 runs.**
2. **Use V102 under linux.**
3. **Content of this talk.**
   - **Check the inclusive K_S^0, K^*, ϕ and Λ peak position of BES I and BES II data.**
   - **Check Lu Feng's dE/dX and magnetic field correction.**
   - **Check the ϕ and $\gamma\phi$ mass of $J/\psi \to \gamma\gamma\phi$.**
   - **Check the η' and $\gamma\rho$ mass of $J/\psi \to \gamma\gamma\rho$.**
   - **Determine the total J/ψ events number from $J/\psi \to \gamma\eta'$.**
   - **Check the ϕ and $\pi^+\pi^-$ mass of $J/\psi \to \phi\pi^+\pi^-$.**
4. **Conclusion :**
   The dE/dX correction for momentum needs to be checked carefully for hadrons, specially for the case of lower momentum.

2.1
Check the inclusive K_S^0, K^*, ϕ and Λ peak position of BES I and BES II data.

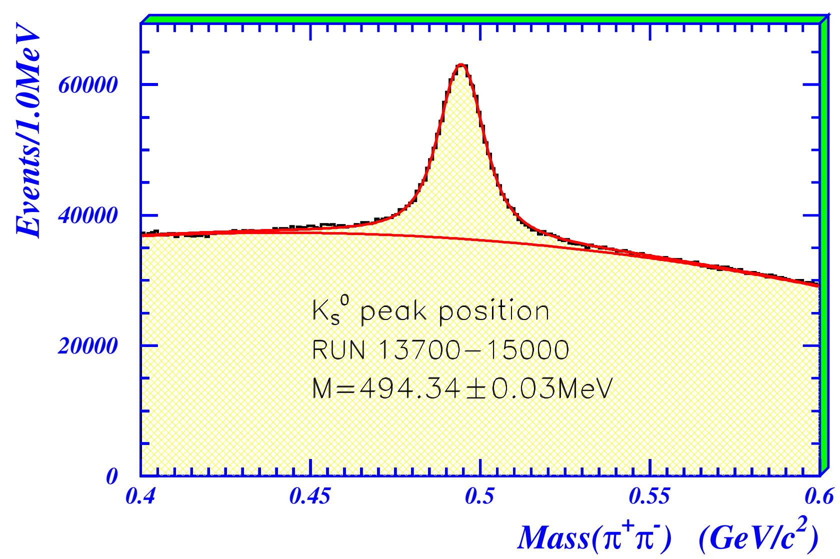
$$J/\psi \to K_S^0 X,\ \ X \to \textbf{anything}$$
$$J/\psi \to K^* X,\ \ X \to \textbf{anything}$$
$$J/\psi \to \phi X,\quad X \to \textbf{anything}$$
$$J/\psi \to \Lambda X,\quad X \to \textbf{anything}$$

- **The momentum is directly from MDC subtype3 of the TRKLST.**
- **No dE/dX and magnetic field correction is made.**

Inclusive K_S^0 signal of BES I and II



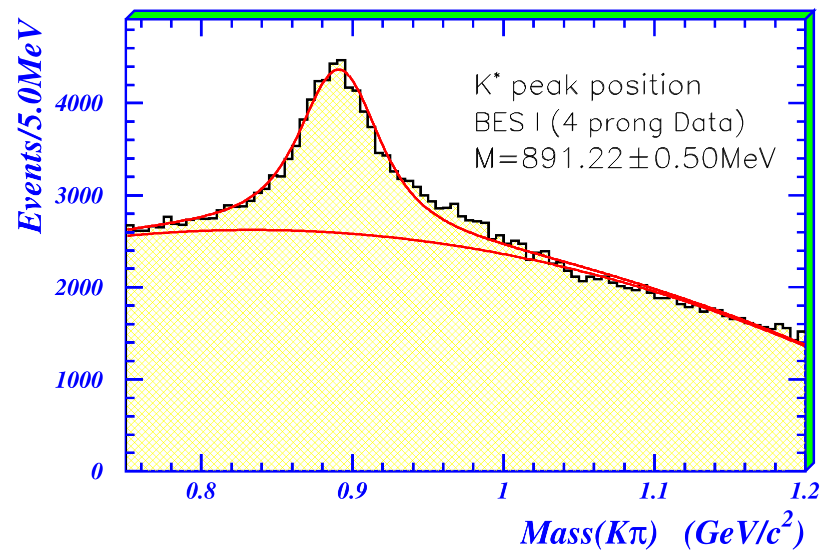
Inclusive K_S^0 signal of BES I 4 prong data



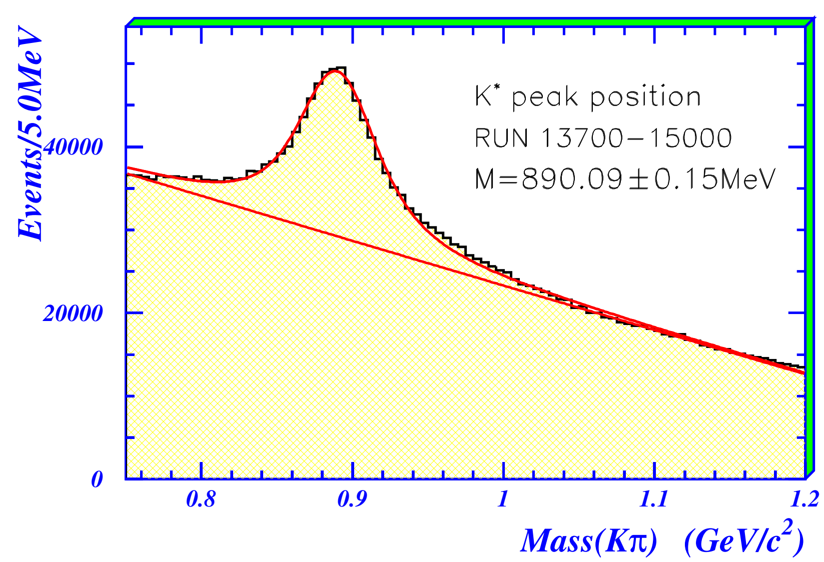
Inclusive K_S^0 signal of BES II data

2. Inclusive K_S^0, K^*, ϕ and Λ signal

Inclusive K^* signal of BES I and II



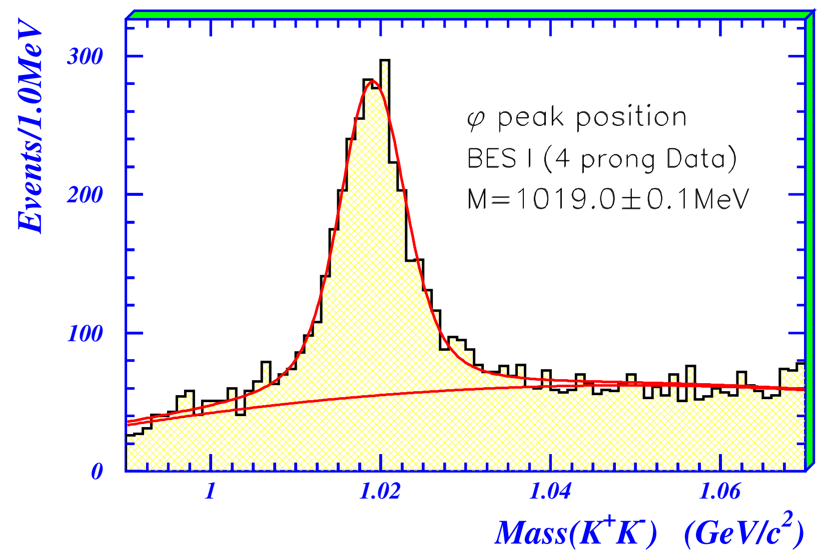
Inclusive K^* signal of BES I 4 prong data



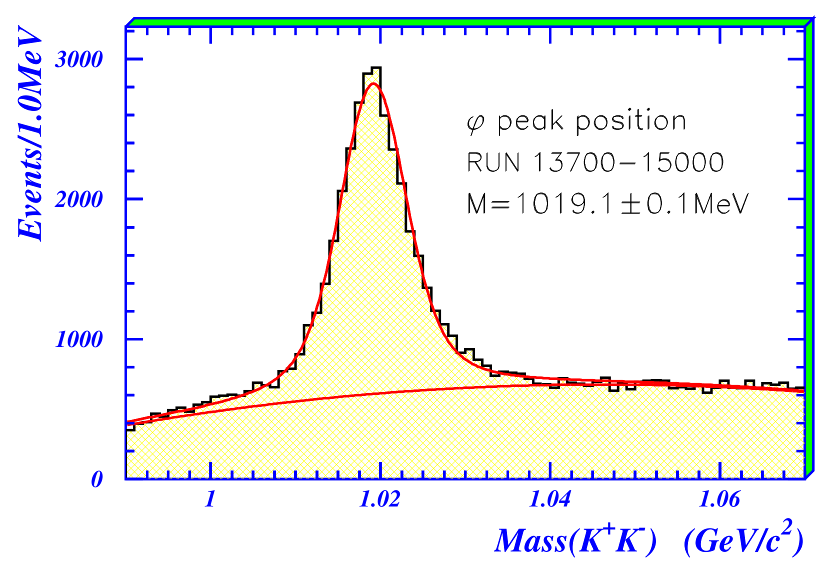
Inclusive K^* signal of BES II data

2. Inclusive K_S^0, K^*, ϕ and Λ signal

Inclusive ϕ signal of BES I and II



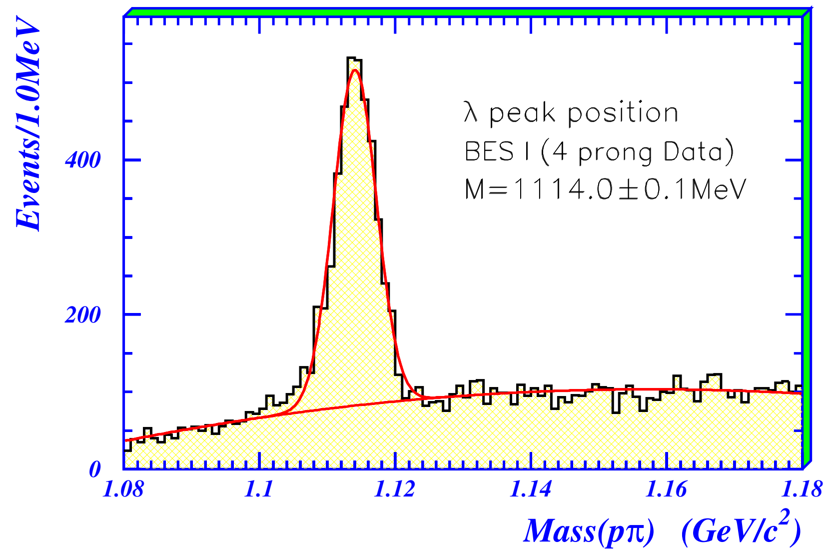
Inclusive ϕ signal of BES I 4 prong data



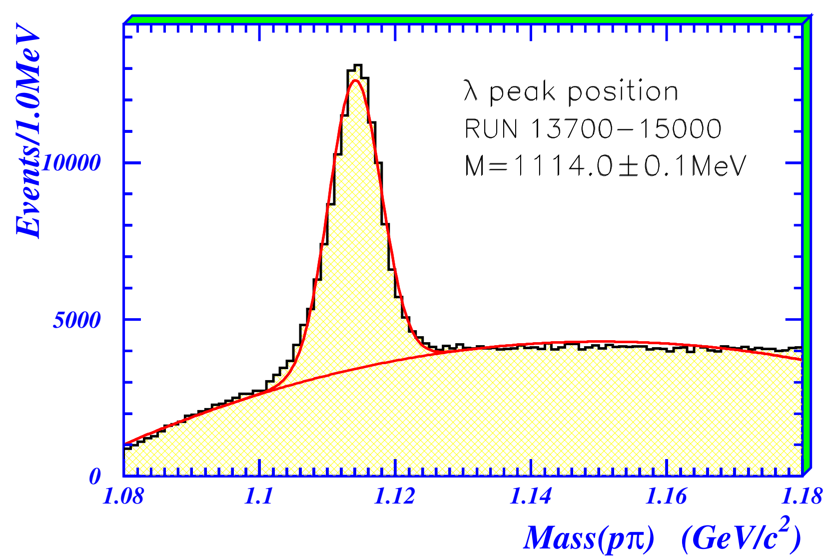
Inclusive ϕ signal of BES II data

2. Inclusive K_S^0, K^*, ϕ and Λ signal

Inclusive Λ signal of BES I and II



Inclusive Λ signal of BES I 4 prong data

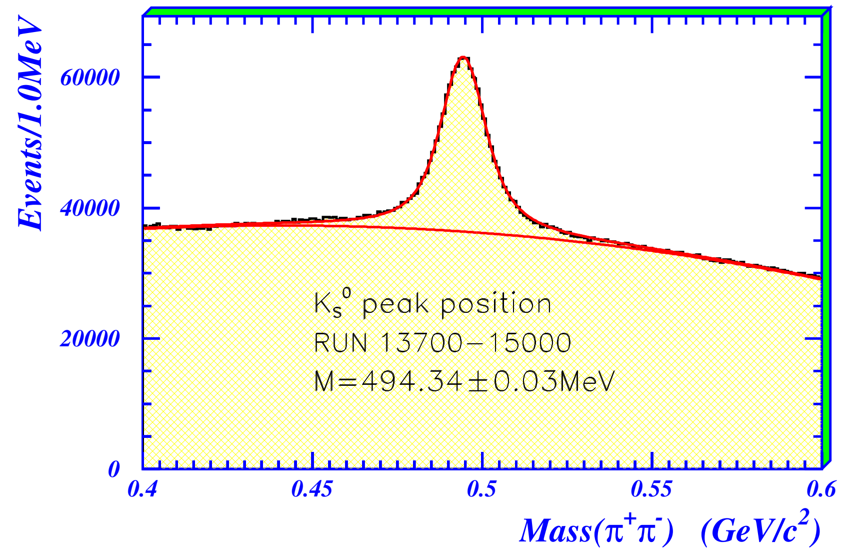


Inclusive Λ signal of BES II data

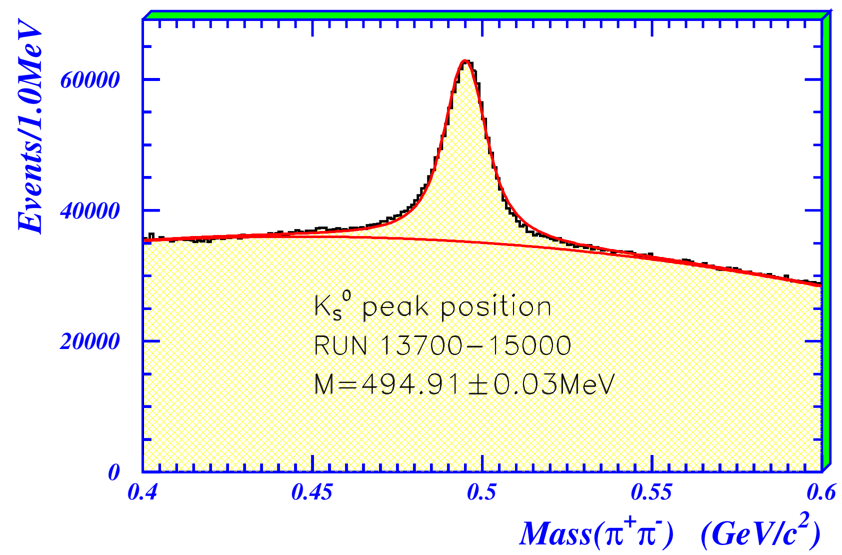
2.2
Check Lu Feng's dE/dX and magnetic field correction.

- **Add Lu Feng's dE/dX and magnetic field correction.**

Inclusive K_S^0 signal of BES II



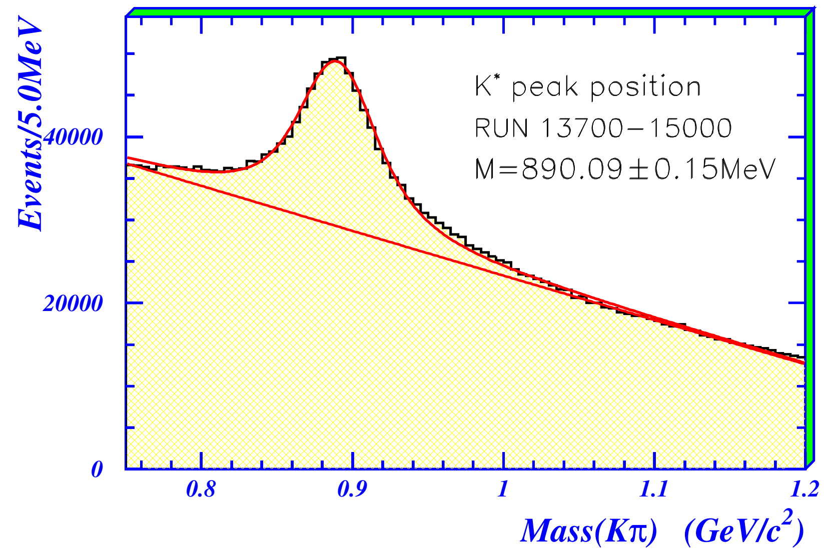
Before dE/dX and magnetic field correction



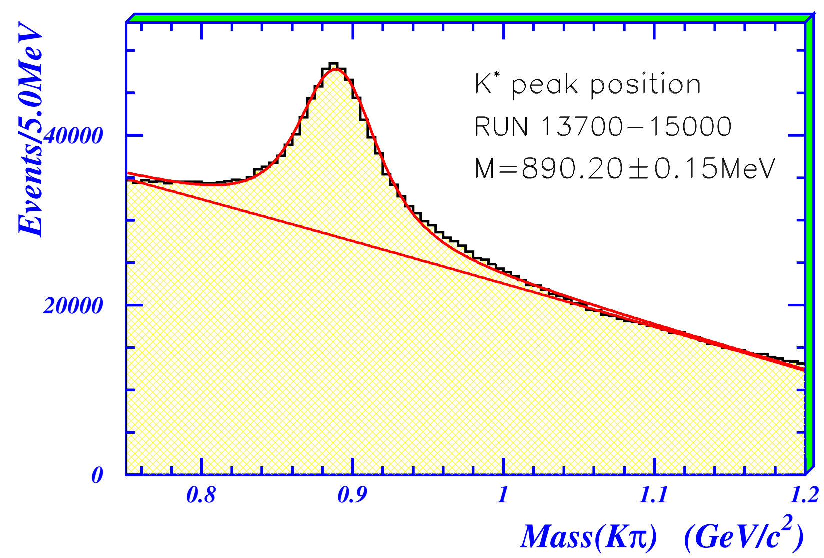
After dE/dX and magnetic field correction

2. *Inclusive K_S^0, K^*, ϕ and Λ signal*

Inclusive K^* signal of BES II



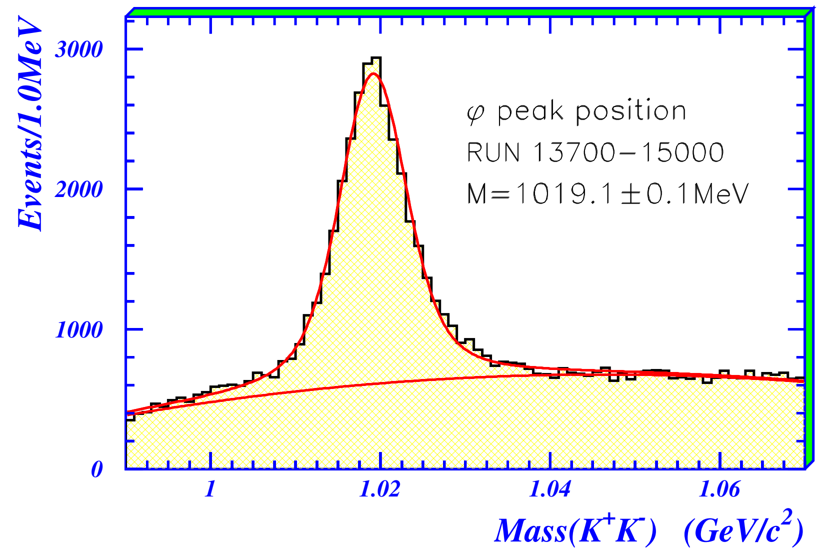
Before dE/dX and magnetic field correction



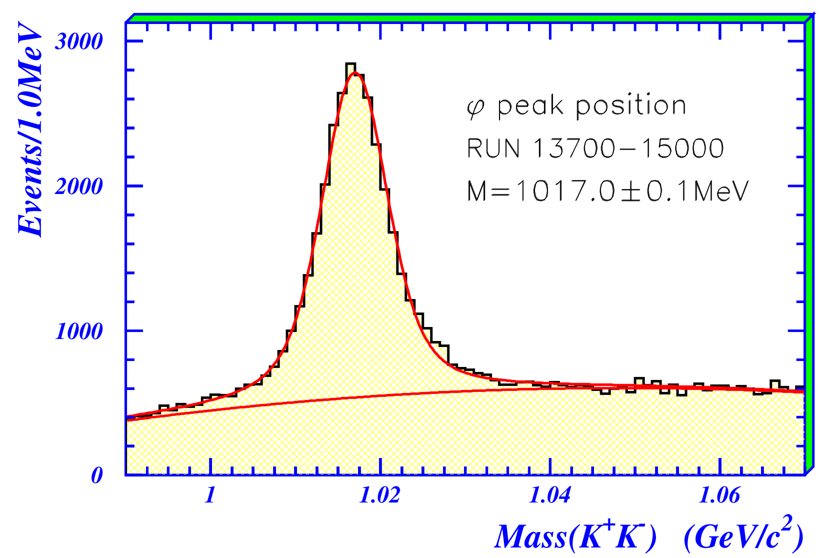
After dE/dX and magnetic field correction

2. Inclusive K_S^0, K^*, ϕ and Λ signal

Inclusive ϕ signal of BES II



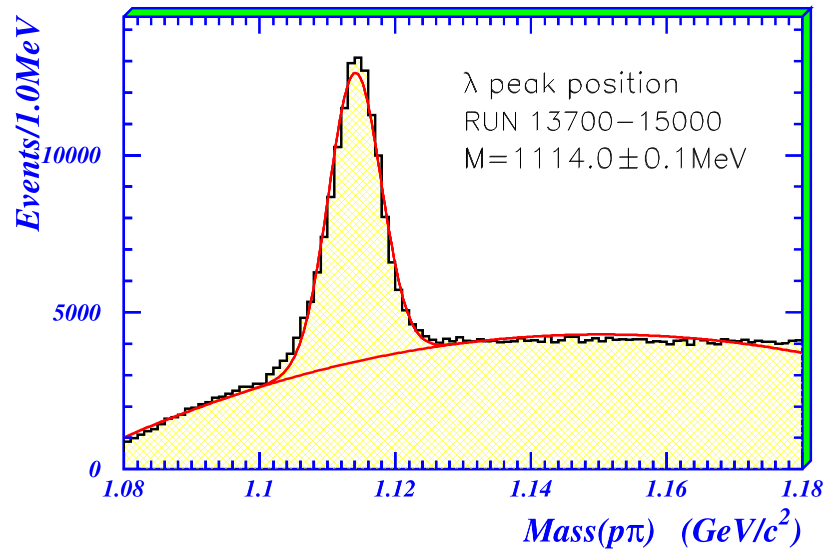
Before dE/dX and magnetic field correction



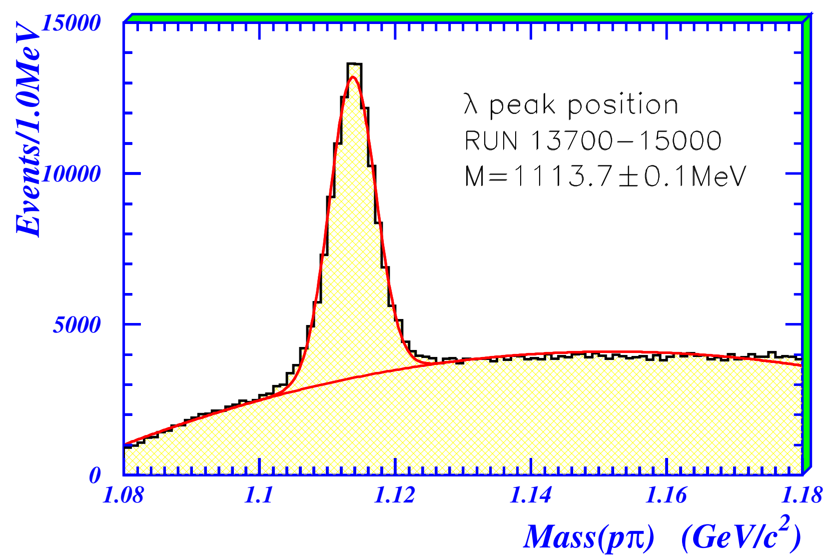
After dE/dX and magnetic field correction

2. *Inclusive K_S^0, K^*, ϕ and Λ signal*

Inclusive Λ signal of BES II



Before dE/dX and magnetic field correction



After dE/dX and magnetic field correction

2. Inclusive K^0_S, K^*, ϕ and Λ signal

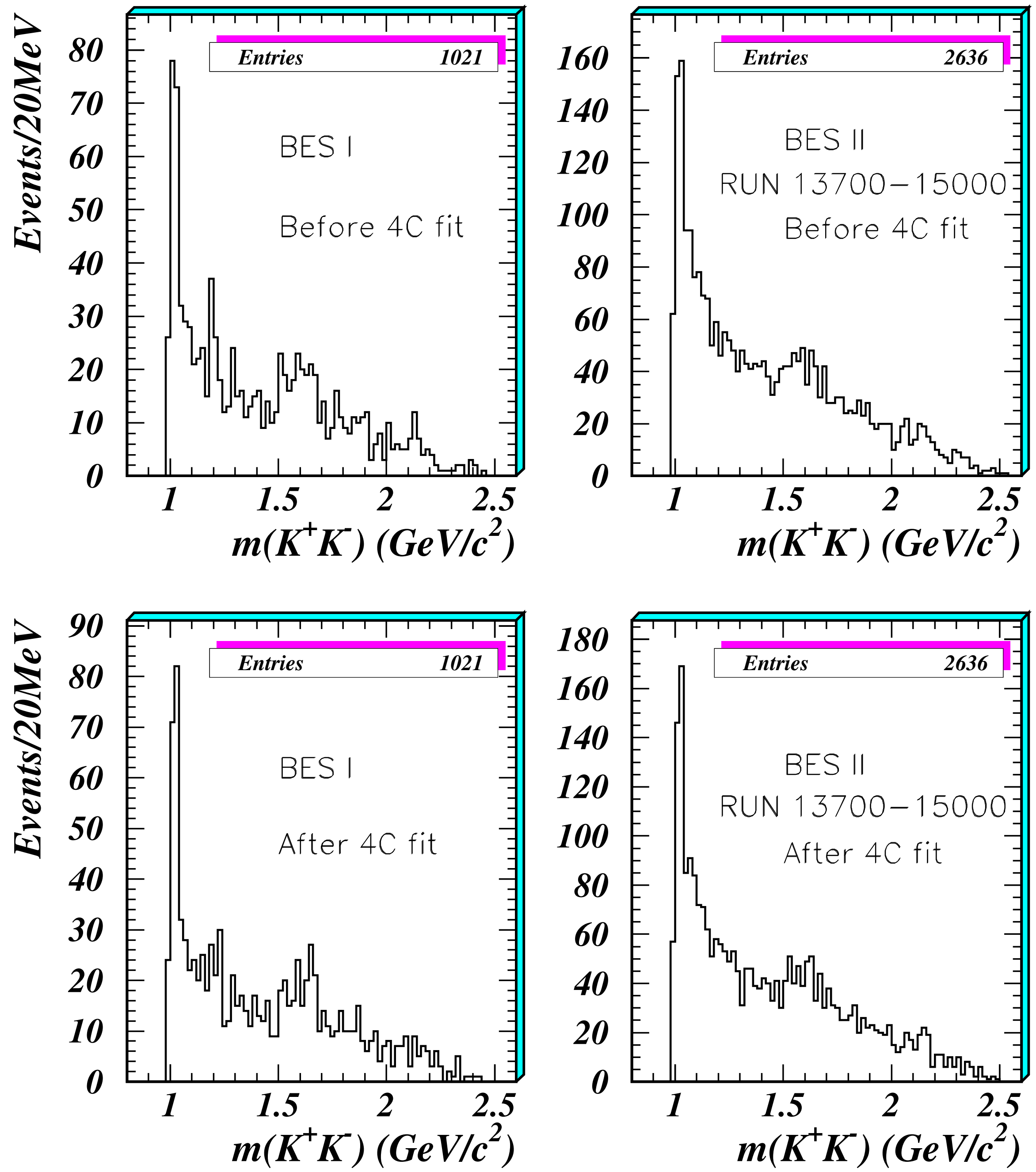
Results

Signal	**BES I** no correction	**BES II** no correction	**BES II** correction	**PDG 98**
K^0_S	493.00 ± 0.12	494.34 ± 0.03	494.91 ± 0.03	497.672
K^*	891.22 ± 0.50	890.09 ± 0.15	890.20 ± 0.15	896.10
ϕ	1019.0 ± 0.1	1019.1 ± 0.1	1017.0 ± 0.1	1019.413
Λ	1114.0 ± 0.1	1114.0 ± 0.1	1113.7 ± 0.1	1115.683

The dE/dX correction for momentum needs to be checked carefully for hadrons, specially for the case of lower momentum.

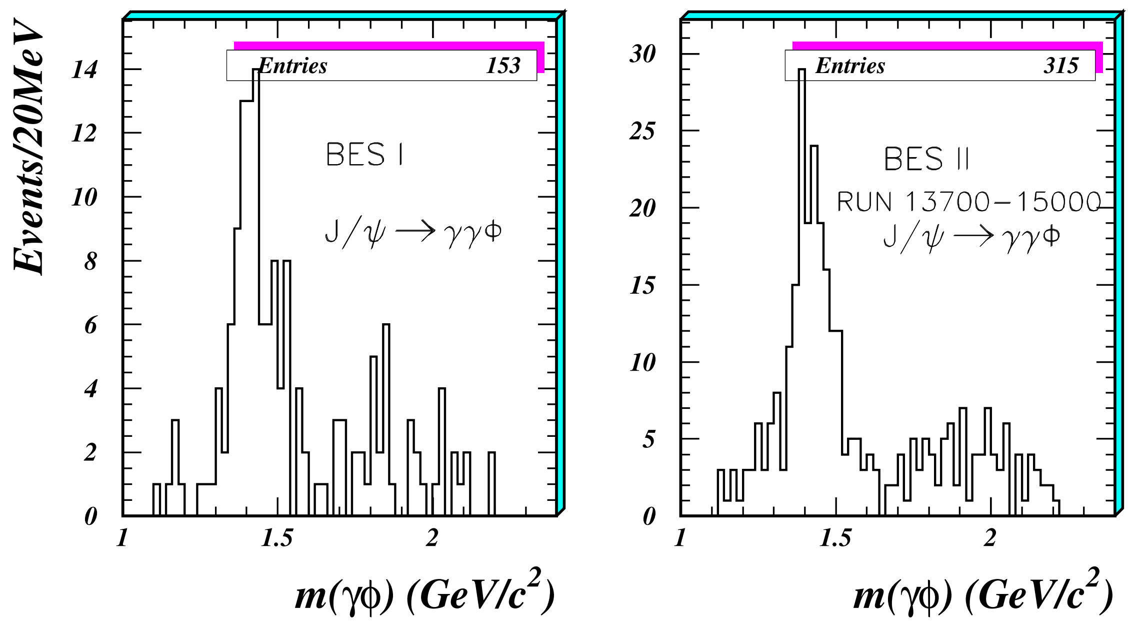
3. Check from $J/\psi \to \gamma\gamma\phi$

ϕ signal from $J/\psi \to \gamma\gamma\phi$



3. Check from $J/\psi \to \gamma\gamma\phi$

$\gamma\phi$ **mass from** $J/\psi \to \gamma\gamma\phi$

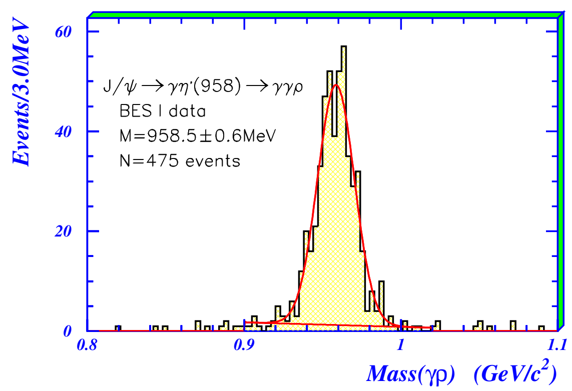


conclusion

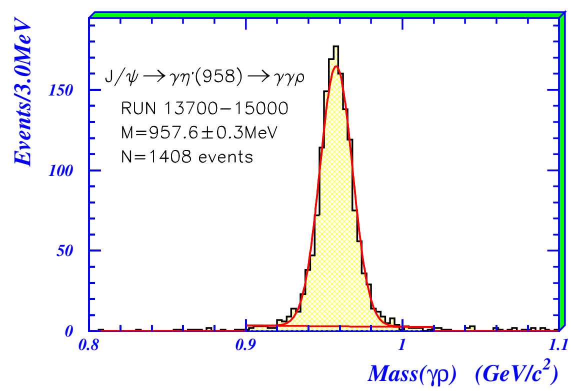
- **The** $\gamma\phi$ **mass distribution of BES II data is the same as BES I.**
- **The BES II** $\frac{\textbf{signal}}{\textbf{noise}}$ $<$ **BES I** $\frac{\textbf{signal}}{\textbf{noise}}$**.**

4. Check from $J/\psi \to \gamma\gamma\rho$

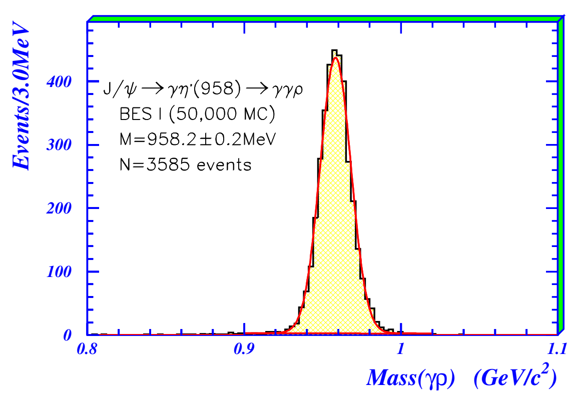
η' signal from $J/\psi \to \gamma\eta' \to \gamma\gamma\rho$



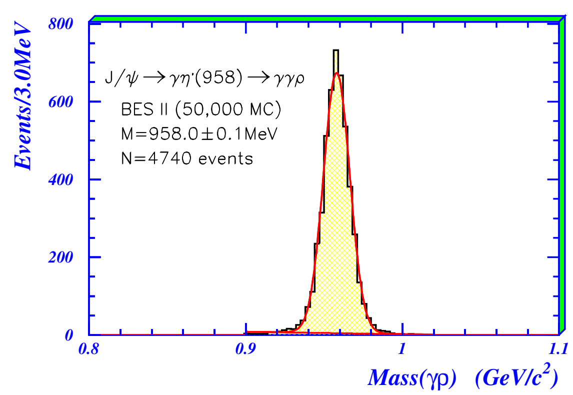
BES I Real Data



BES II Real Data



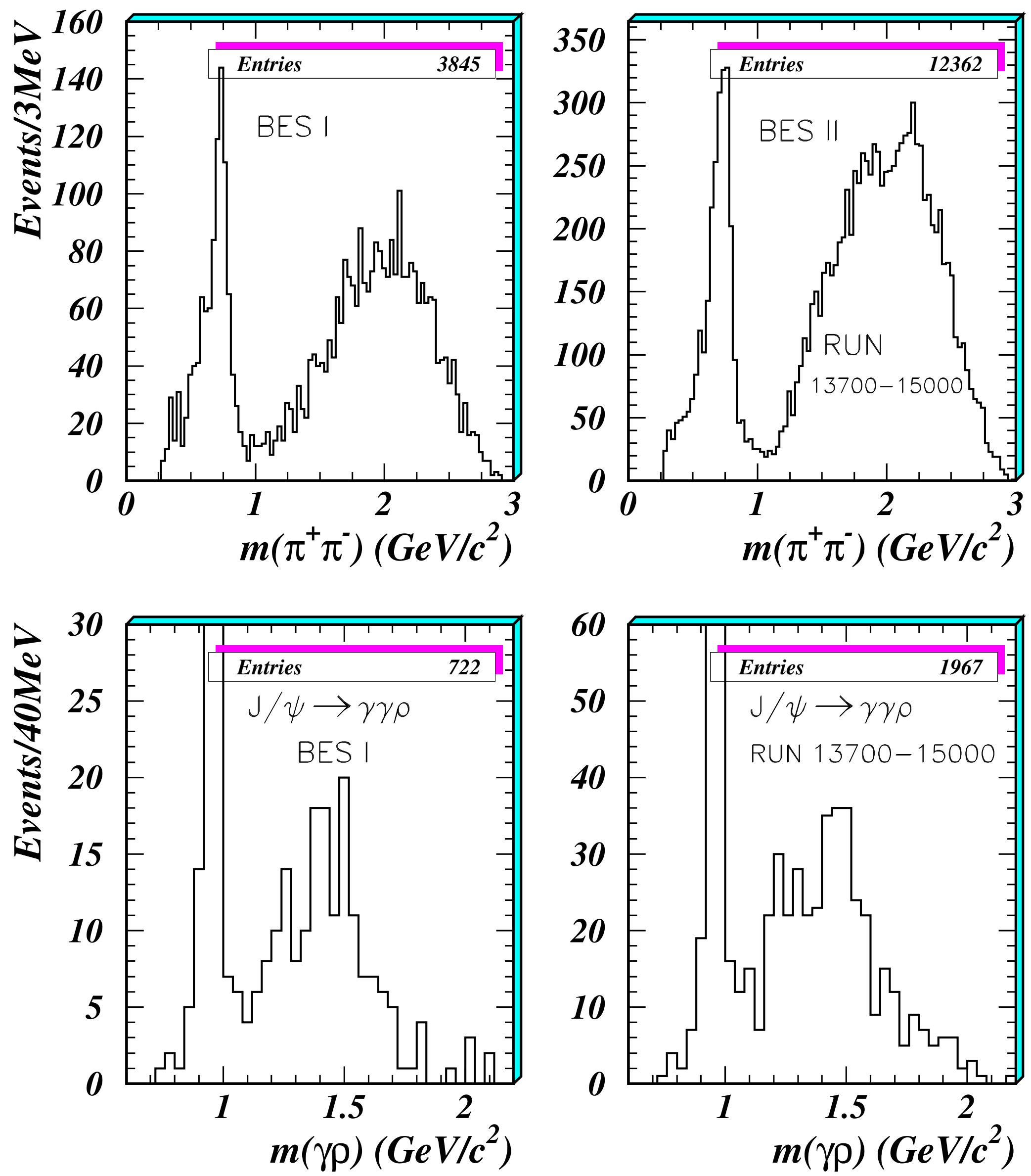
BES I Monte Carlo



BES II Monte Carlo

4. Check from $J/\psi \to \gamma\gamma\rho$

ρ and $\gamma\rho$ mass from $J/\psi \to \gamma\gamma\rho$



Conclusion

- **The $\gamma\rho$ mass distribution of BES II data is the same as BES I.**
- **The BES II MC efficiency > BES I MC efficiency.**
- **Determine the total J/ψ events number from $J/\psi \to \gamma\eta'$.**

$Br(J/\psi \to \gamma\eta') = (4.31 \pm 0.30) \times 10^{-3}$ — **PDG 98**
$Br(\eta' \to \gamma\rho^0) = (30.2 \pm 1.3)\%$ — **PDG 98**

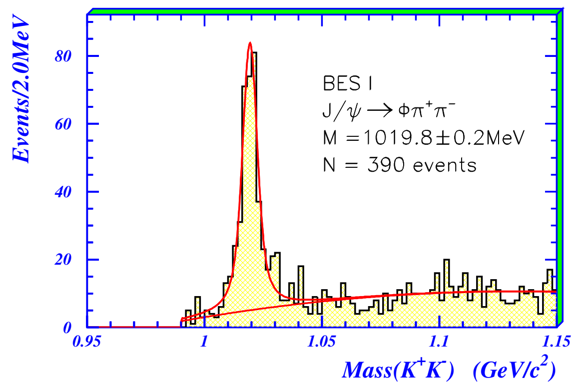
$$\Longrightarrow Br(J/\psi \to \gamma\eta') \times Br(\eta' \to \gamma\rho^0)$$
$$= 1.30 \times (1 \pm 8.2\%) \times 10^{-3}$$

So, for run 13700 to 15000, the total J/ψ events number is :

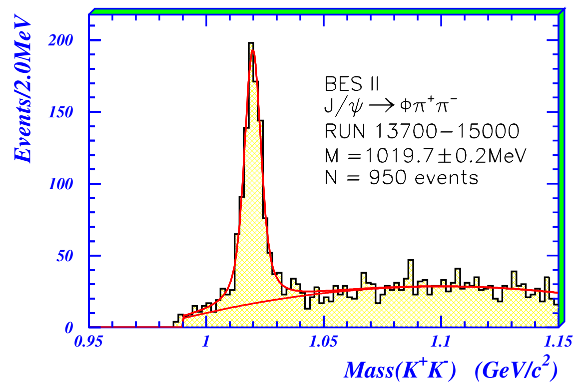
$$N_{J/\psi} = \frac{N_{\eta'}}{Br(J/\psi \to \gamma\eta') \times Br(\eta' \to \gamma\rho^0) \times \textbf{efficiency}}$$
$$= \frac{1408}{1.30 \times (1 \pm 8.2\%) \times 10^{-3} \times (\frac{4740}{50000})}$$
$$= (1.14 \pm 0.03 \pm 0.09) \times 10^7$$

5. Check from $J/\psi \to \phi\pi^+\pi^-$

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

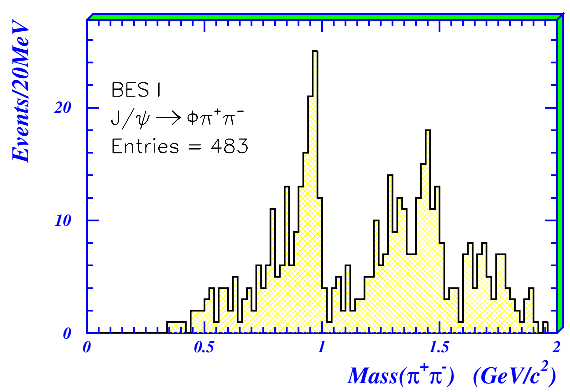


K^+K^- **mass**
BES I Real Data

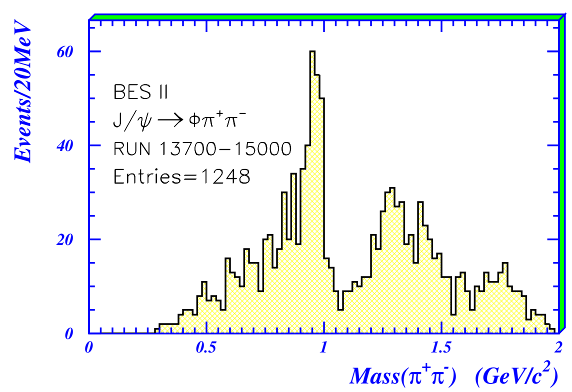


K^+K^- **mass**
BES II Real Data

The M_ϕ of BES I and BES II are agree with PDG 98.



$\pi^+\pi^-$ **mass**
BES I Real Data



$\pi^+\pi^-$ **mass**
BES II Real Data

Discussion

- The results from BES II data are almost the same as BES I data.

- The dE/dX correction for momentum needs to be checked carefully for hadrons, specially for the case of lower momentum..