

Results of Recent Work

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Good Charged tracks selections

- $V_{xy} < 1cm$, $|V_z| < 10cm$ (except for the two tracks from K_S^0)
- $|\cos \theta| < 0.93$

Good photon selections($1 \leq N_\gamma \leq 20$)

- $E_\gamma > 25MeV$ for $|\cos \theta| < 0.8$
- $E_\gamma > 50MeV$ for $0.86 < |\cos \theta| < 0.92$
- $0 \leq TDC \leq 14$ (in unit of $50ns$)

Event Selections

To improve the efficiency of selections, we assume the following charged tracks as pions

K_S^0 Reconstruction ($N_{K_S^0 \geq 1}$)

- $L/\sigma_L > 2$ (L : decay length; σ_L : error of decay length)
- $|m_{\pi^+\pi^-}^{invariant} - m_{K_S^0}| \leq 20 \text{ MeV}$

$\gamma\pi^+\pi^-$ list

- $3.45 < m_{\pi^+\pi^-}^{recoil} < 3.65 \text{ GeV}$
- $2.8 < m_{\pi^+\pi^-}^{recoil} < 3.2 \text{ GeV}$

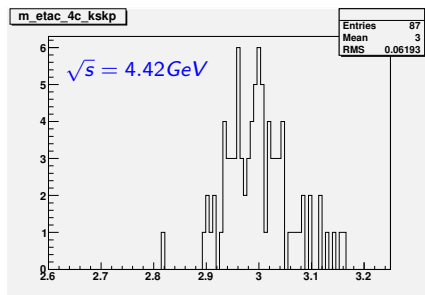
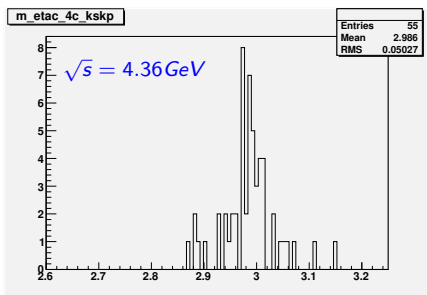
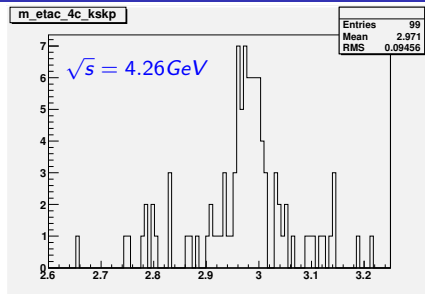
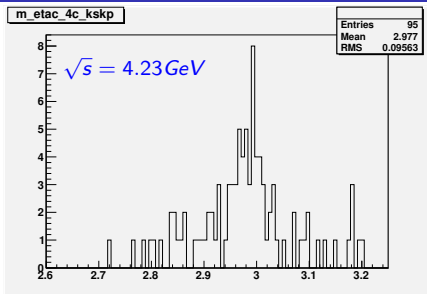
Combination with the minimum $\chi^2 = \chi_{4C}^2 + \sum_{i=1}^N \chi_{PID}^2(i)$ is kept

The χ^2_{4C} cut is optimized with the figure of merit(*FOM*) $\frac{S}{\sqrt{S+B}}$, and the optimized selections are presented following:

χ^2 Cut

- $\sqrt{s} = 4.23\text{GeV}$: $\chi^2_{4C} < 60$;
- $\sqrt{s} = 4.26\text{GeV}$: $\chi^2_{4C} < 110$;
- $\sqrt{s} = 4.36\text{GeV}$: $\chi^2_{4C} < 55$;
- $\sqrt{s} = 4.42\text{GeV}$: $\chi^2_{4C} < 60$;

Results of M_{η_c} after 4C kinematic fit



Event Selections

Good Charged tracks selections

- $V_{xy} < 1cm, |V_z| < 10cm$
- $|\cos \theta| < 0.93|$

Good photon selections($1 \leq N_\gamma \leq 20$)

- $E_\gamma > 25MeV$ for $|\cos \theta| < 0.8$
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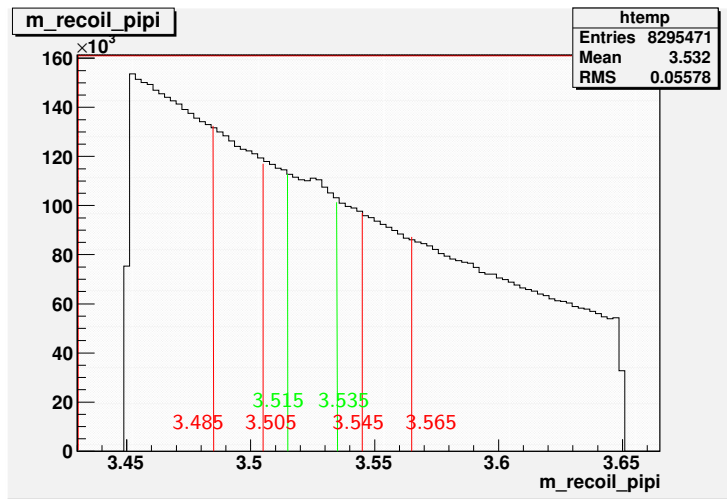
We use the $\gamma\pi^+\pi^-$ -list to recoil the η_c and h_c signal

$\gamma\pi^+\pi^-$ list

- $3.45 < m_{\pi^+\pi^-}^{recoil} < 3.65GeV$
- $2.8 < m_{\pi^+\pi^-}^{recoil} < 3.2GeV$

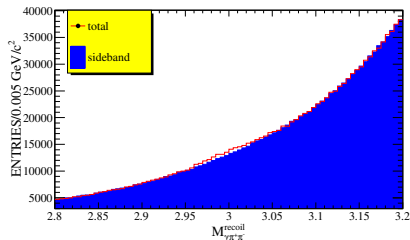
sideband of recoil of two pions

As we can not do topology analysis upon the inclusive MC, we use the sideband method to analyze the results

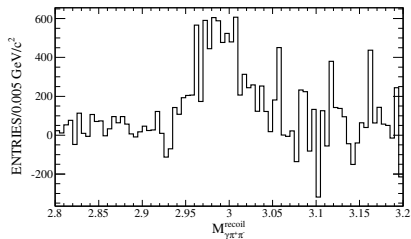
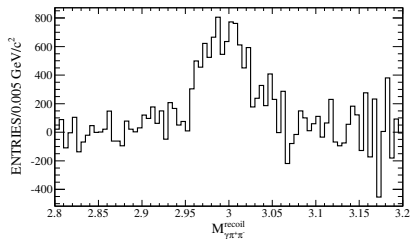
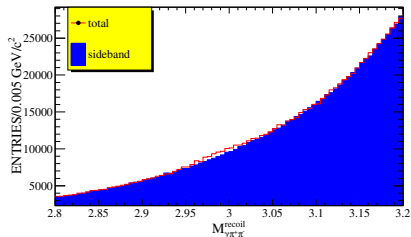


results of sideband η_c

$\sqrt{s} = 4.23 \text{ GeV}$



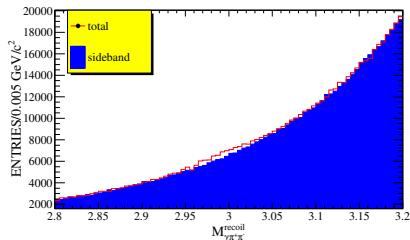
$\sqrt{s} = 4.26 \text{ GeV}$



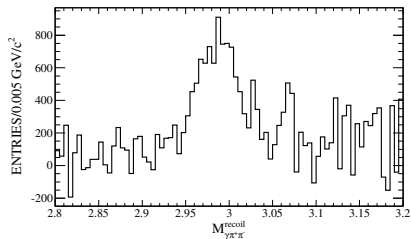
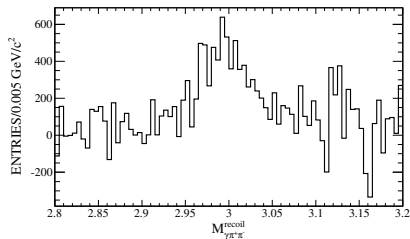
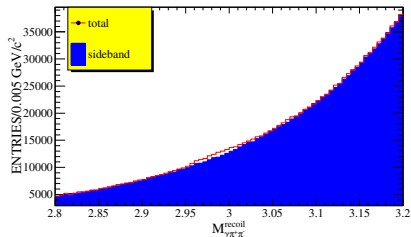
The upper ones draw the sideband and signal regions together, while the lower ones draw net events

results of sideband η_c

$\sqrt{s} = 4.36 \text{ GeV}$



$\sqrt{s} = 4.42 \text{ GeV}$



The upper ones draw the sideband and signal regions together, while the lower ones draw net events

summary of the exclusive process

- The signal of the exclusive process is clear, yet we don't know much about its background
- The number of the total signal events is about 350, which is less than the ψ' data.

summary of the exclusive process

- The signal of the inclusive process is observable, but the background is somehow too thick
- We have to deal with the significance of the signal
- The sideband results are rather crude.

If things are settled, we should start to fit the results and get the branching fraction