BESIII Oxford Group Meeting

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Introduction

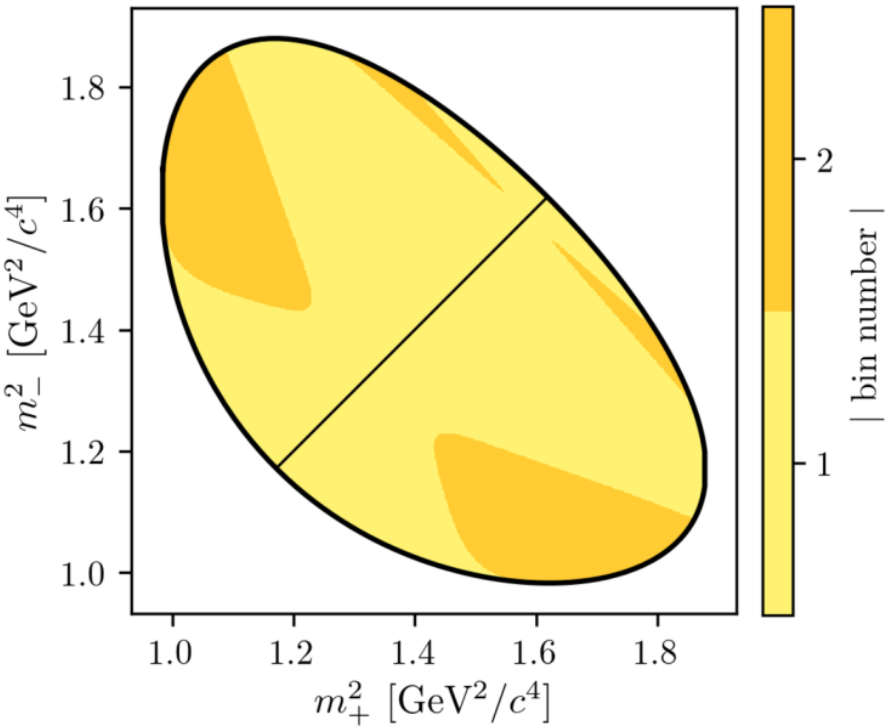
- $K_{S,L}KK$ double tag yields for $\delta_D^{K\pi}$ measurement

- Procedure:
  1. Select $K_{S,L}KK$ events tagged with $K\pi$, $K\pi\pi^0$, $K\pi\pi\pi$ (and $Ke\nu$)
  2. Use $K\pi$ tag to find double tag yield Y_i
  3. Use the other tags to find K_i
  4. Fit for $r_D^{K\pi}\cos\left(\delta_D^{K\pi}\right)$ and $r_D^{K\pi}\sin\left(\delta_D^{K\pi}\right)$

Selection

- I've mostly followed the selection from $K_S KK$
- ΔE cuts taken from $K_S KK$ MEMO, except for $K\pi\pi\pi$
- Question: Is K_S veto/flight significance cut needed for $K\pi\pi\pi$?

Binning scheme



- Generated events outside phase space?
- Reconstructed events outside phase space, should I ignore?

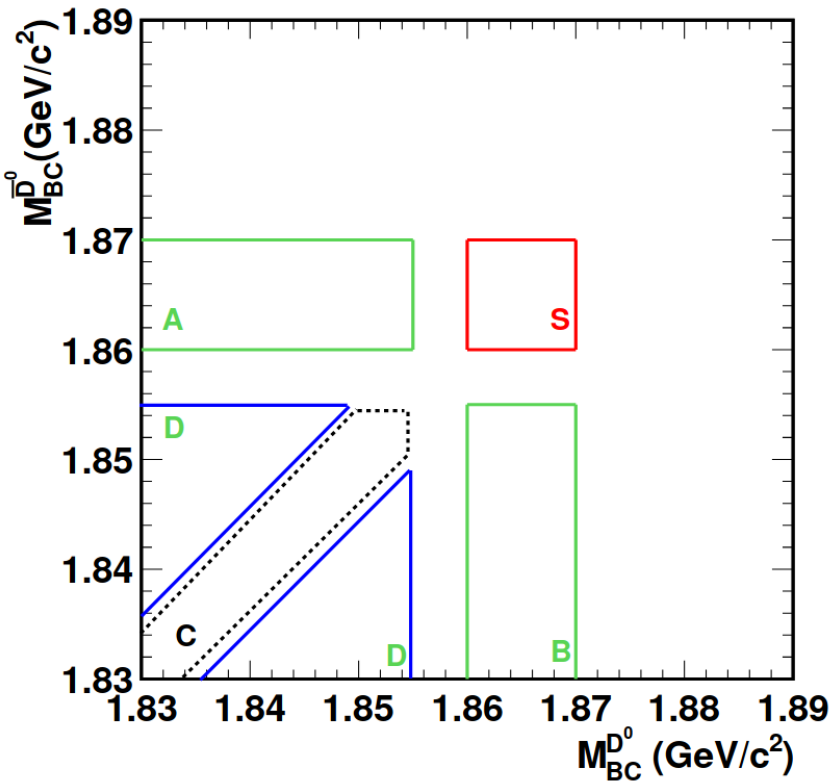
Bin migration

- Bin migration for $K_S KK$ vs $K\pi$:

Generated/Reconstructed	1	2	−1	−2
1	5233	194	69	0
2	298	4087	0	0
−1	68	0	4998	215
−2	0	0	217	2782

- Question: Do I need any m_{BC} requirements when constructing this matrix?

Sideband background subtraction method



$$B = \frac{a_S}{a_D} Y_D + \sum_{i=A,B,C} \frac{a_S}{a_i} \left(Y_i - \frac{a_i}{a_D} Y_D \right)$$

Question: How do I calculate errors (low number statistics)?

$K\pi$ double tag yield results

- Bin efficiency:
  1. Count number of generated events in each bin
  2. Count number of truth matched events in each bin after full selection (including sideband subtraction)

Bin	1	2	−1	−2
Yield in signal region	89	72	94	69
Sideband subtracted yield	88.4	71.4	94.0	69.0
Bin migration corrected	89.0	70.1	95.2	67.0
Bin efficiency	9.3%	7.8%	9.7%	7.3%
Final double tag yield	0.255	0.240	0.261	0.245

- Question: Do I use $\sqrt{N}$ for signal MC yield errors?

$K\pi\pi^0$ double tag yield results

Bin	1	2	−1	−2
Bin migration corrected ($K\pi\pi^0$)	154.6	96.4	201.7	131.7
Bin efficiency ($K\pi\pi^0$)	3.8%	2.9%	3.7%	3.0%
Final double tag yield (K_i)	0.239	0.192	0.316	0.254

Next steps

- Tuple for $K_S KK$ vs $Ke\nu$ ready, combine with $K\pi\pi^0$ and $K\pi\pi\pi$
- Study peaking backgrounds in inclusive MC
- Repeat with $K_L KK$