BESIII Oxford Group Meeting

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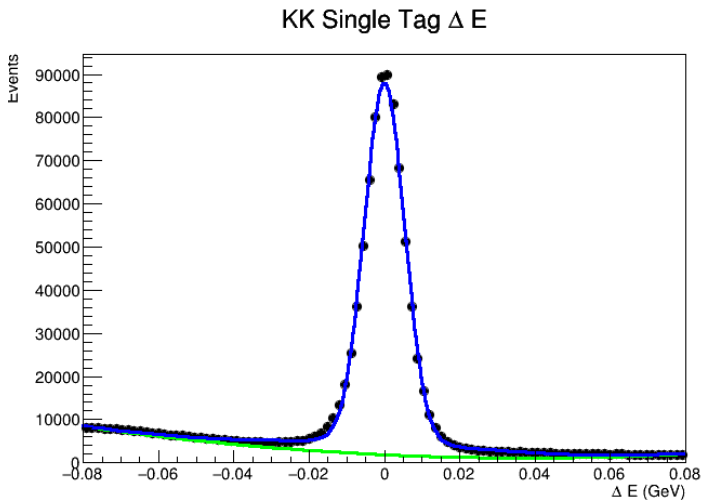
25th March 2021

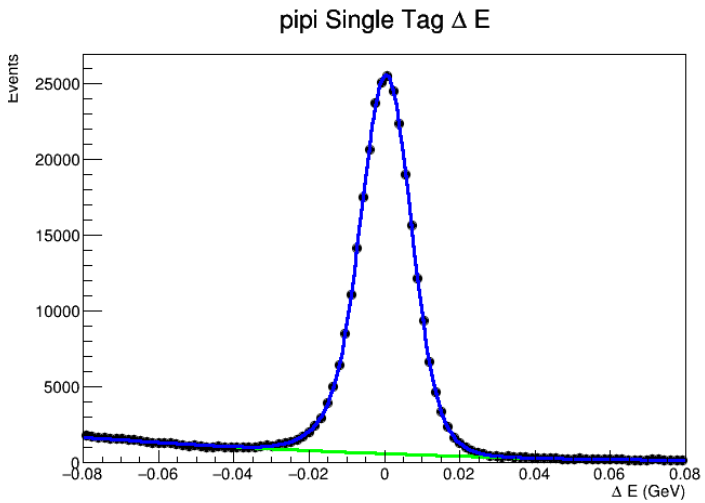
Introduction

- Double tagged $D \to K^+K^-\pi^+\pi^-$ events
- Previously: Fit ΔE in double tagged events
  - Fixed to single tagged events, much better fit!
- Fit to m_{BC} of single tags to get ST yield
- Got TopoAna and MC truth matching working $\Longrightarrow$ to study backgrounds

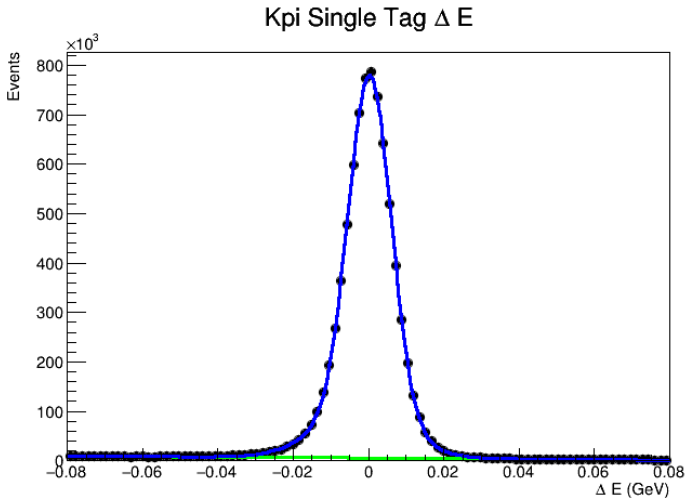
Double tag ΔE fit



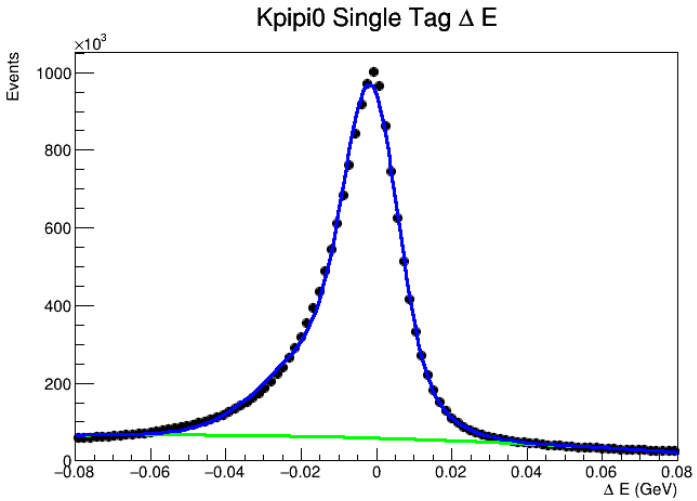
(a) ΔE, KK



(b) ΔE, $\pi\pi$

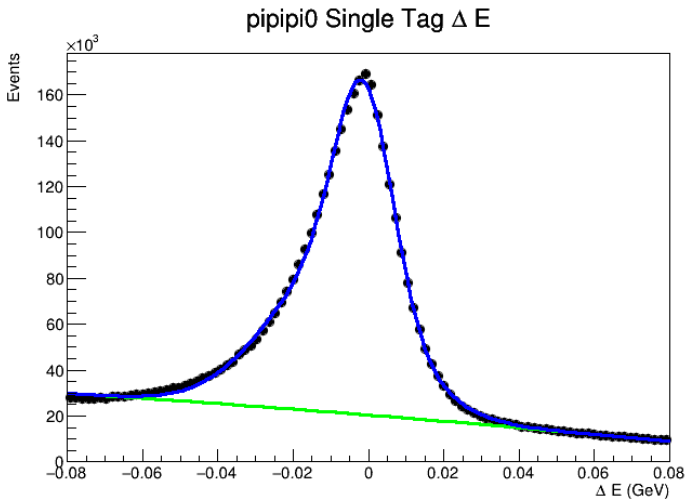


(c) ΔE, $K\pi$

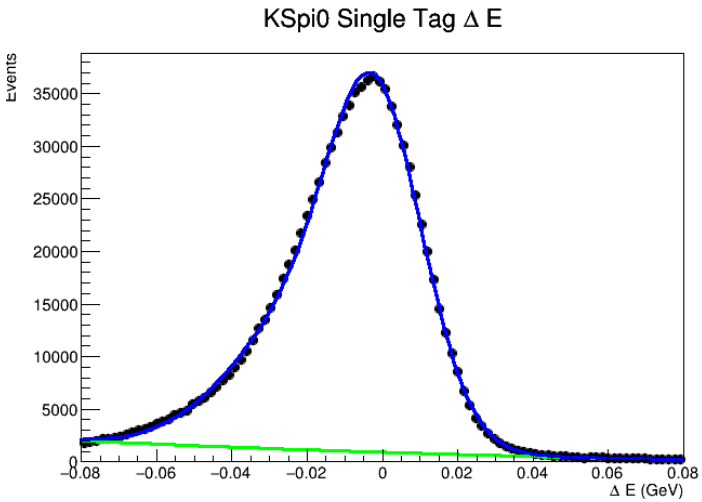


(d) ΔE, $K\pi\pi^0$

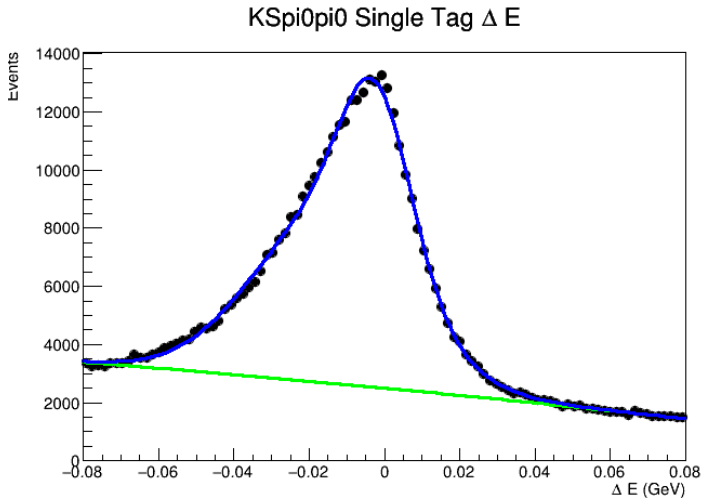
Double tag ΔE fit



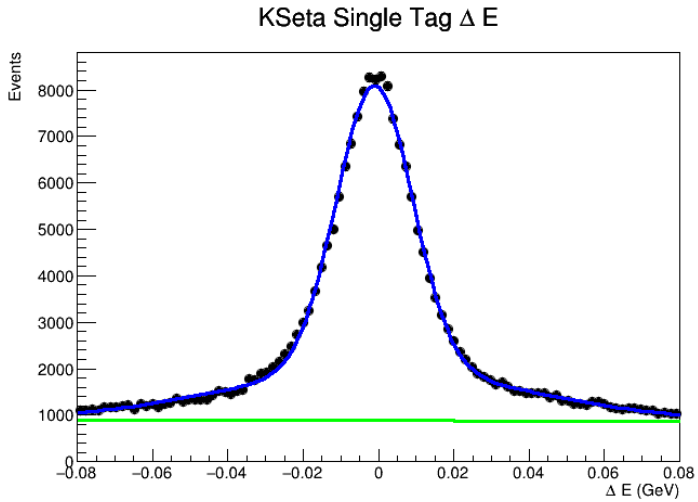
(a) ΔE, $\pi\pi\pi^0$



(b) ΔE, $K_S\pi^0$

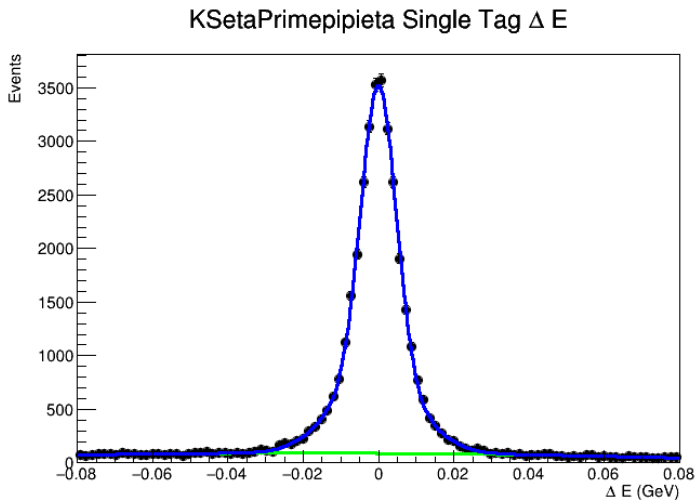


(c) ΔE, $K_S\pi^0\pi^0$

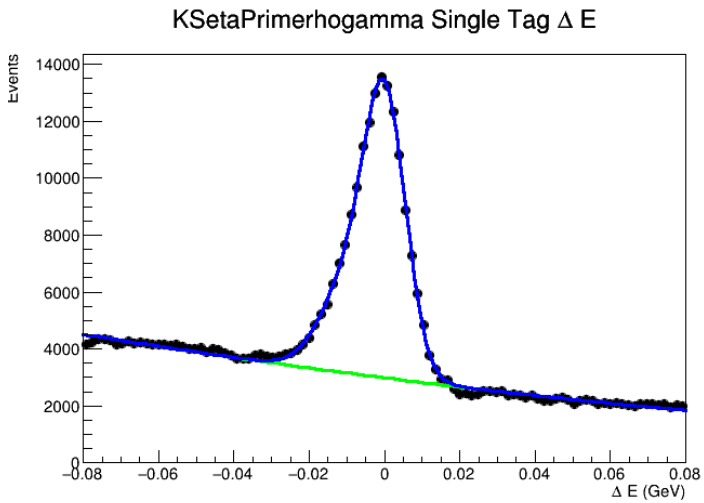


(d) ΔE, $K_S\eta$

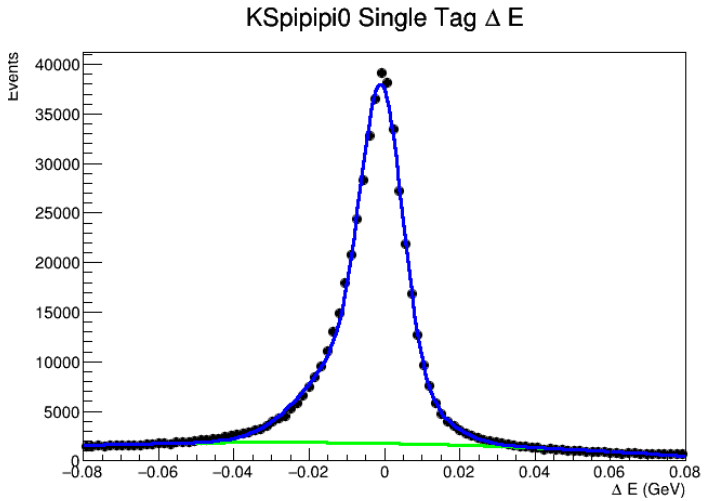
Double tag ΔE fit



(a) ΔE, $K_S\eta'(\pi\pi\eta)$

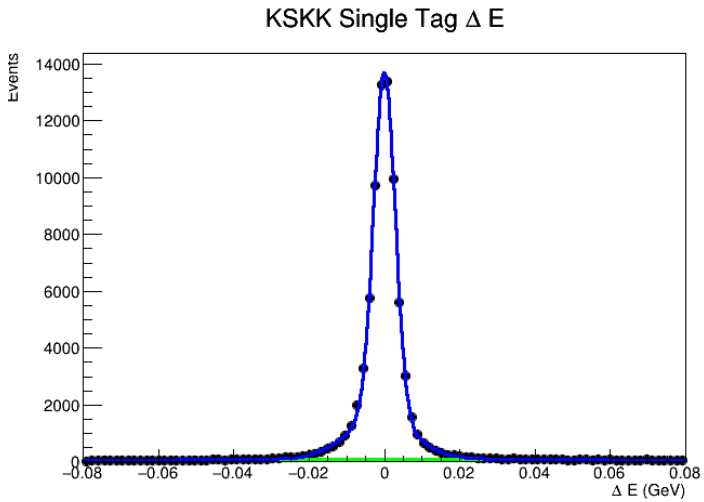


(b) ΔE, $K_S\eta'(\pi\pi\gamma)$

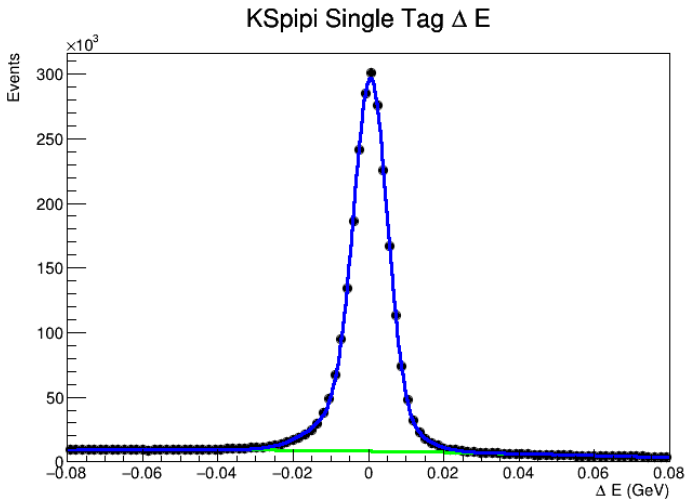


(c) ΔE, $K\pi\pi\pi^0$

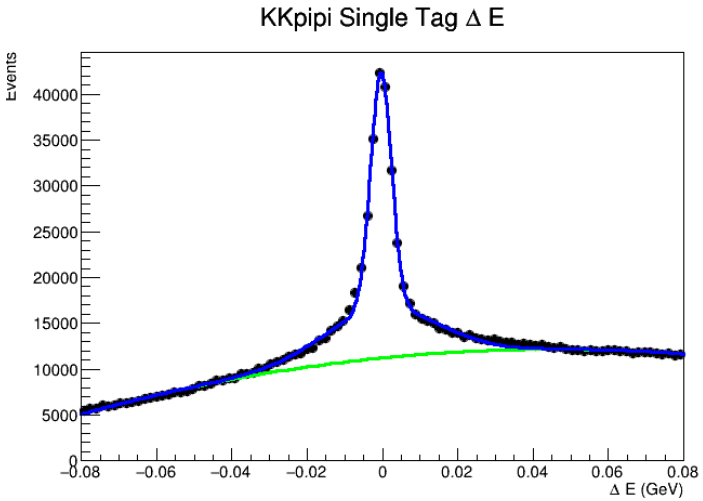
Double tag ΔE fit



(a) ΔE, $K_S KK$

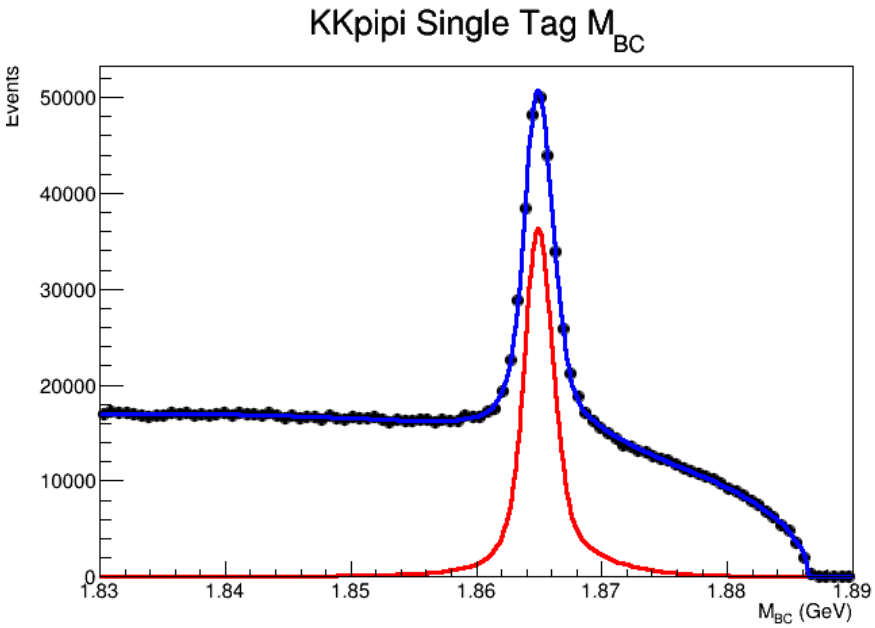


(b) ΔE, $K_S \pi\pi$

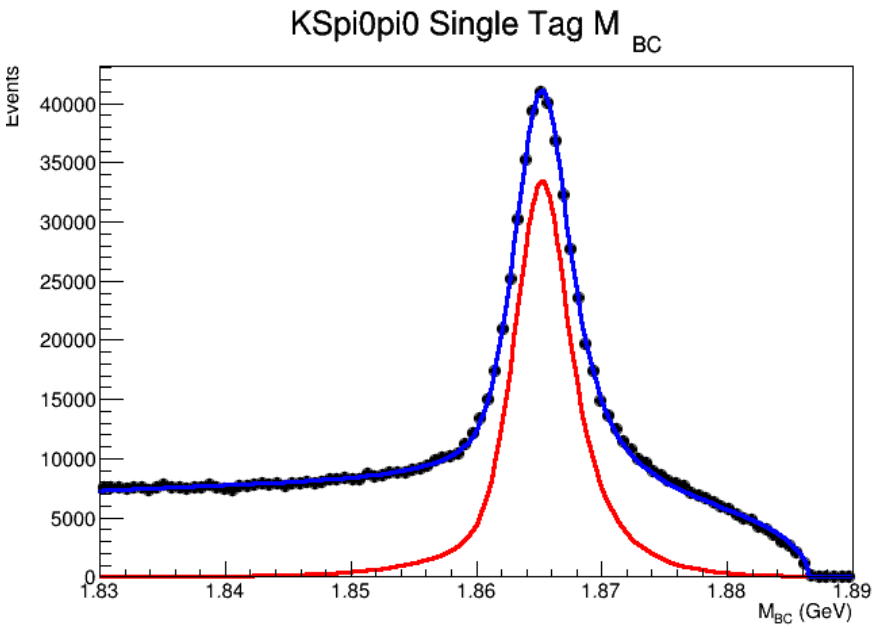


(c) ΔE, $KK\pi\pi$

Single tag m_{BC} fit



(a) m_{BC}, $KK\pi\pi$



(b) m_{BC}, $K_S\pi^0\pi^0$

Question: MC samples for signal shape?

Backgrounds

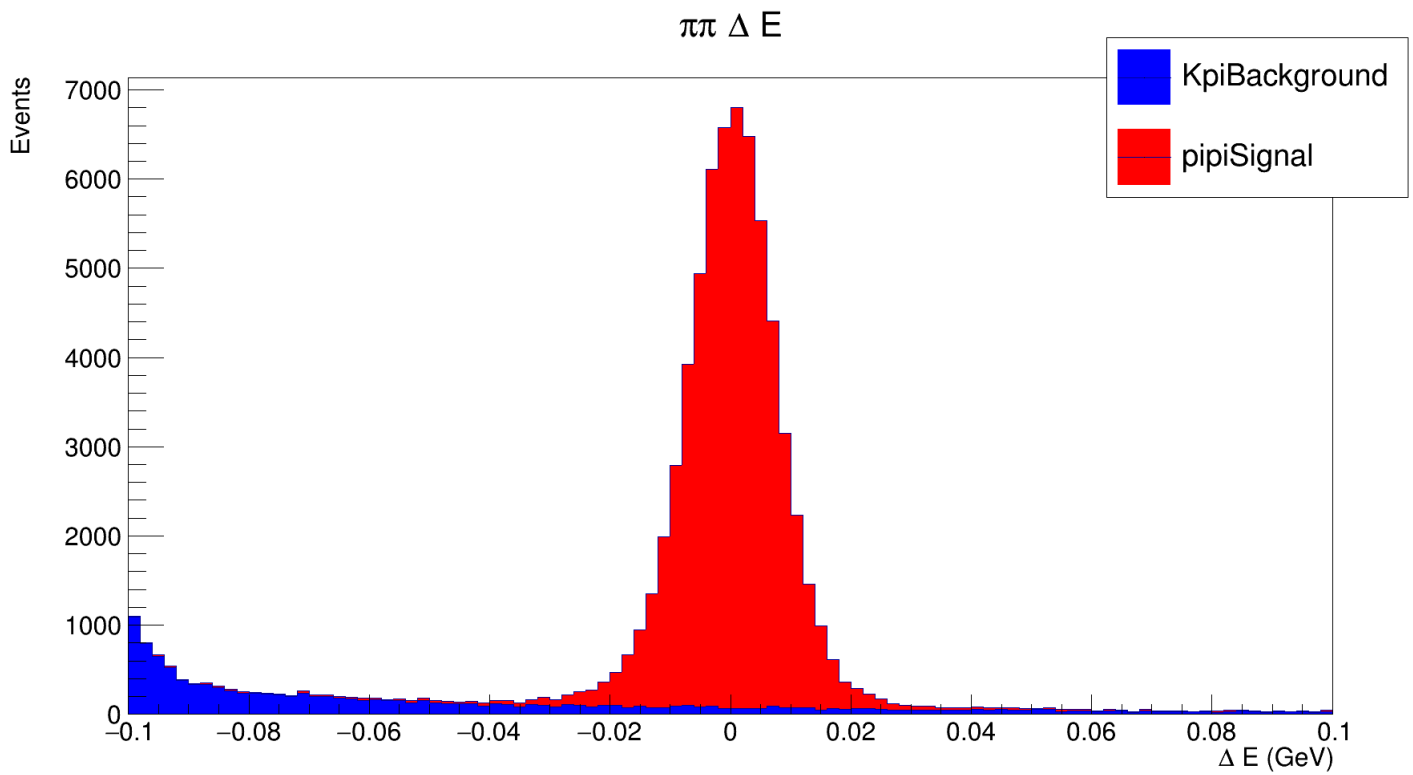
- MC truth matching: Check for mis-ID and combinatorial
- TopoAna: Check peaking backgrounds
  - Had to remove intermediate resonances from decay tree

Example: $\pi\pi$ single tag

Table 1: Decay trees and their respective initial-final states.

rowNo	decay tree (decay initial-final states)	iDcyTr	nEtr	nCcEtr	nAllEtr	nCEtr
1	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^0\pi^+K^-, \bar{D}^0 \to \pi^+\pi^-$ $(\psi(3770) \dashrightarrow \pi^0\pi^+\pi^+\pi^-K^-)$	1	6781	6810	13591	13591
2	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^+\pi^-, \bar{D}^0 \to \pi^+\pi^-\pi^-K^+$ $(\psi(3770) \dashrightarrow \pi^+\pi^+\pi^-\pi^-\pi^-K^+)$	10	3655	3700	7355	20946
3	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^+\pi^-, \bar{D}^0 \to \pi^0\pi^0\pi^-K^+$ $(\psi(3770) \dashrightarrow \pi^0\pi^0\pi^+\pi^-\pi^-K^+)$	12	3484	3535	7019	27965
4	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^0K^0_L\pi^+\pi^-, \bar{D}^0 \to \pi^+\pi^-$ $(\psi(3770) \dashrightarrow \pi^0K^0_L\pi^+\pi^+\pi^-\pi^-)$	3	3249	3171	6420	34385
5	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^+K^-, \bar{D}^0 \to \pi^0\pi^-K^+$ $(\psi(3770) \dashrightarrow \pi^0\pi^+\pi^-K^+K^-)$	37	2611	2580	5191	39576
6	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^0\pi^+\pi^-K^0_S, \bar{D}^0 \to \pi^+\pi^-, K^0_S \to \pi^+\pi^-$ $(\psi(3770) \dashrightarrow \pi^0\pi^+\pi^+\pi^+\pi^-\pi^-\pi^-)$	27	2408	2401	4809	44385
7	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^+\pi^-, \bar{D}^0 \to \pi^0\pi^+\pi^-\pi^-K^+$ $(\psi(3770) \dashrightarrow \pi^0\pi^+\pi^+\pi^-\pi^-\pi^-K^+)$	20	2265	2277	4542	48927
8	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^+\pi^-, \bar{D}^0 \to \pi^-K^+$ $(\psi(3770) \dashrightarrow \pi^+\pi^-\pi^-K^+)$	17	1909	1834	3743	52670
9	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^+\pi^-, \bar{D}^0 \to e^-\bar{\nu}_eK^+$ $(\psi(3770) \dashrightarrow e^-\bar{\nu}_e\pi^+\pi^-K^+)$	28	1677	1579	3256	55926
10	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^+\pi^-, \bar{D}^0 \to \mu^-\bar{\nu}_\mu K^+$ $(\psi(3770) \dashrightarrow \mu^-\bar{\nu}_\mu\pi^+\pi^-K^+)$	23	1564	1618	3182	59108
11	$\psi(3770) \to D^0\bar{D}^0, D^0 \to K^0_L\pi^+\pi^-, \bar{D}^0 \to \pi^+\pi^-$ $(\psi(3770) \dashrightarrow K^0_L\pi^+\pi^+\pi^-\pi^-)$	38	1331	1325	2656	61764
12	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^0\pi^+\pi^-, \bar{D}^0 \to \pi^+\pi^-$ $(\psi(3770) \dashrightarrow \pi^0\pi^+\pi^+\pi^-\pi^-)$	8	1154	1148	2302	64066
13	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^0\pi^+\pi^-K^0_S, \bar{D}^0 \to \pi^+\pi^-, K^0_S \to \pi^0\pi^0$ $(\psi(3770) \dashrightarrow \pi^0\pi^0\pi^0\pi^+\pi^+\pi^-\pi^-)$	21	1088	1068	2156	66222
14	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^+\pi^-K^0_S, \bar{D}^0 \to \pi^+\pi^-, K^0_S \to \pi^+\pi^-$ $(\psi(3770) \dashrightarrow \pi^+\pi^+\pi^+\pi^-\pi^-\pi^-)$	0	1016	1063	2079	68301
15	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^+K^-, \bar{D}^0 \to \pi^-K^+$ $(\psi(3770) \dashrightarrow \pi^+\pi^-K^+K^-)$	4	2059	—	2059	70360
16	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^+\pi^-, \bar{D}^0 \to \pi^0\pi^0\pi^+\pi^-$ $(\psi(3770) \dashrightarrow \pi^0\pi^0\pi^+\pi^+\pi^-\pi^-)$	70	1053	994	2047	72407
17	$\psi(3770) \to D^0\bar{D}^0, D^0 \to \pi^+\pi^+\pi^-K^-, \bar{D}^0 \to \pi^-K^+$ $(\psi(3770) \dashrightarrow \pi^+\pi^+\pi^-\pi^-K^+K^-)$	42	815	834	1649	74056

Example: $\pi\pi$ single tag



Question: How to fit this?