BESIII Oxford Group Meeting

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Introduction

- $K_S KK$ double tag yields for $\delta_D^{K\pi}$ measurement
- Selected $K_{S,L} KK$ events tagged with $K\pi$, $K\pi\pi^0$, $K\pi\pi\pi$ and $Ke\nu$
- Peaking background subtraction

Partially reconstructed double tags

- $K_L KK$ vs $K\pi$, $K\pi\pi^0$, $K\pi\pi\pi$
- More peaking backgrounds
- More sophisticated sideband subtraction (from $K_S KK$ MEMO):
- S: Signal region, L: Lower sideband, H: Upper sideband

$$Y_S = \frac{(N_S - N_S^P) - \delta(N_L - N_L^P) - \gamma(N_H - N_H^P)}{1 - \delta\alpha - \gamma\beta}$$

$$\delta, \gamma = \frac{\text{Flat background in S}}{\text{Flat background in L, H}}, \quad \alpha, \beta = \frac{\text{Signal in S}}{\text{Signal in L, H}}$$

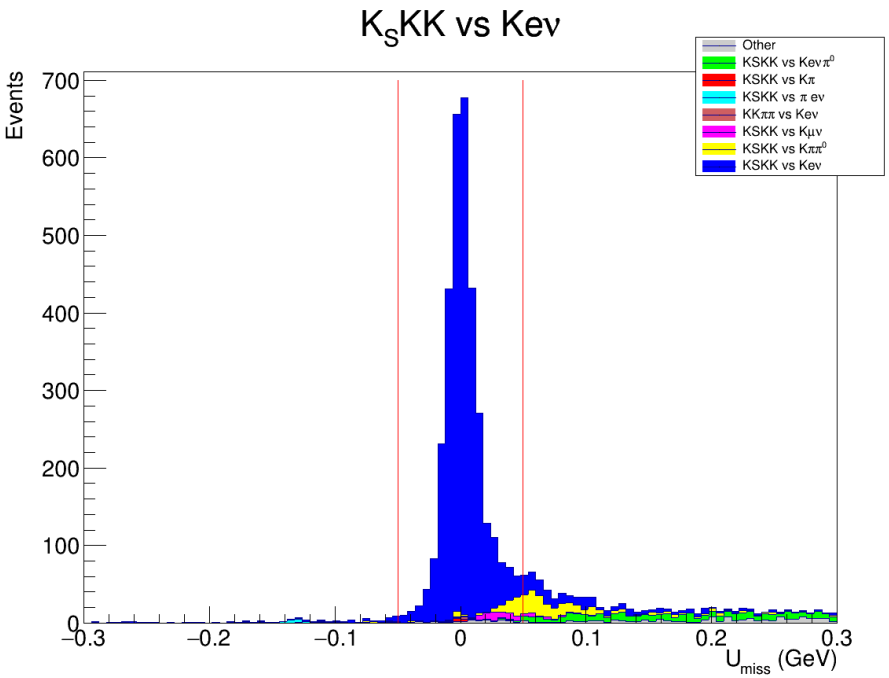
Peaking backgrounds

- Peaking backgrounds fixed from inclusive MC
- Correct outdated branching fractions

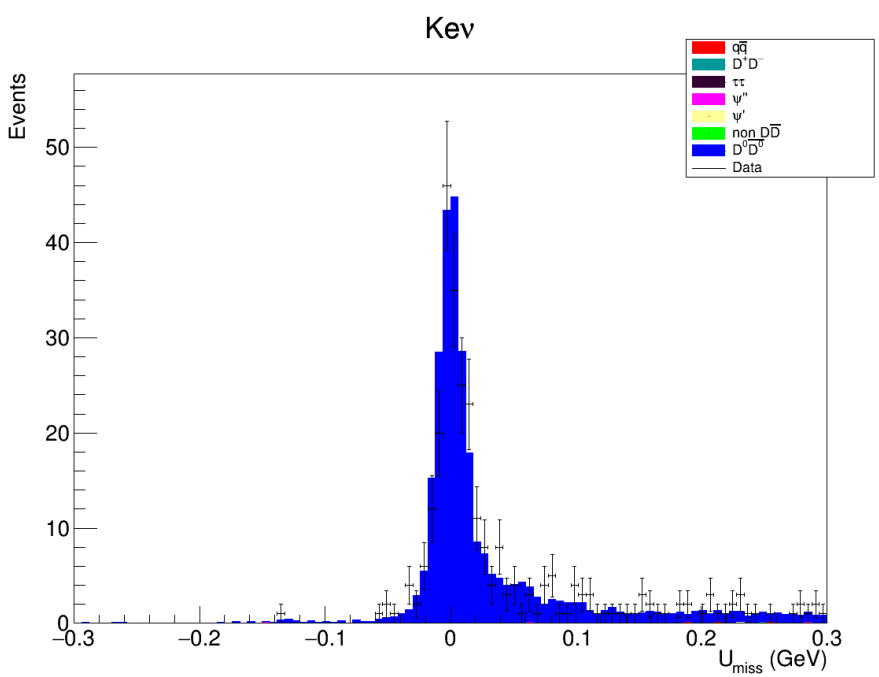
Mode	Branching fraction correction
$K_{S,L}$	1.44
$KK\pi\pi$	1.14
$K\pi\pi\pi$	1.03
$K_S K\pi$	0.68
$K\pi\pi^0$	1.04

- $K_S KK$ backgrounds in $K_L KK$:
  - Get fraction of $K_L KK$ to $K_S KK$ from signal MC
  - Scale the corresponding double tag yield of $K_S KK$

$K_S KK$ vs $Ke\nu$



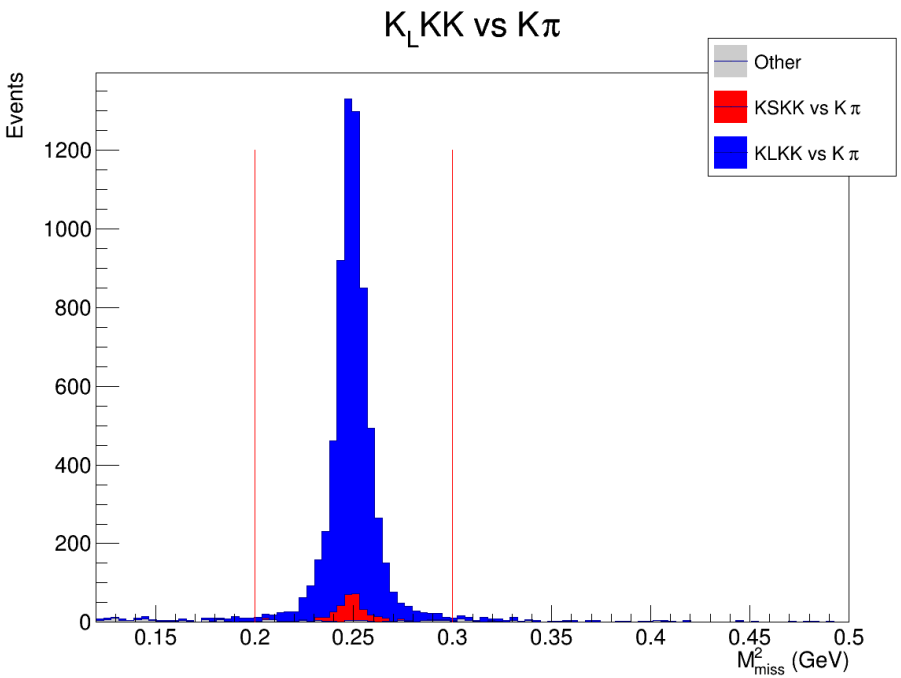
(a) $D^0\bar{D}^0$ peaking backgrounds



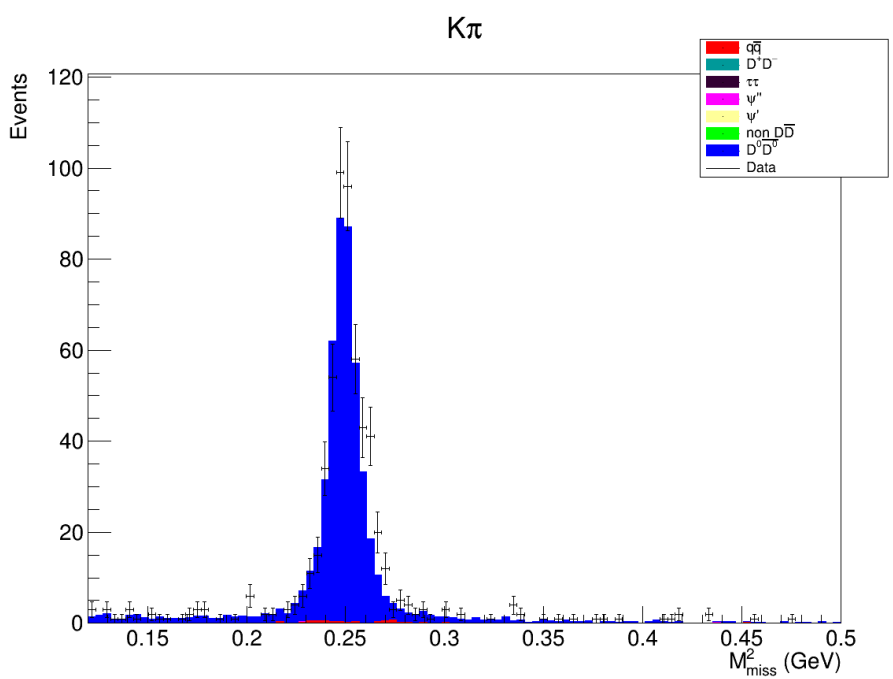
(b) Full inclusive MC

Figure 1: U_{miss} for $K_S KK$ vs $Ke\nu$

$K_L KK$ vs $K\pi$



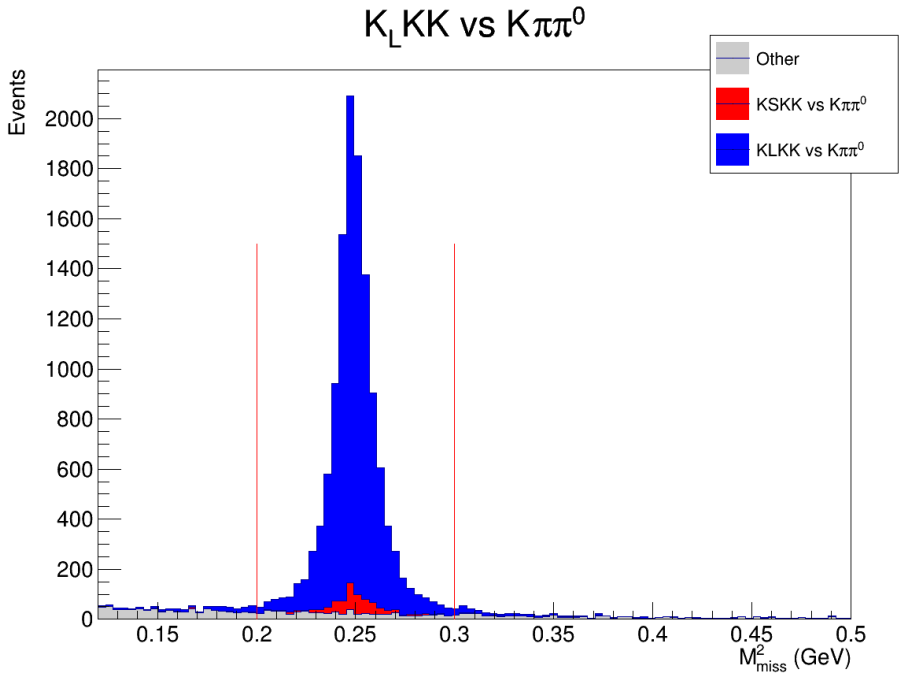
(a) $D^0\bar{D}^0$ peaking backgrounds



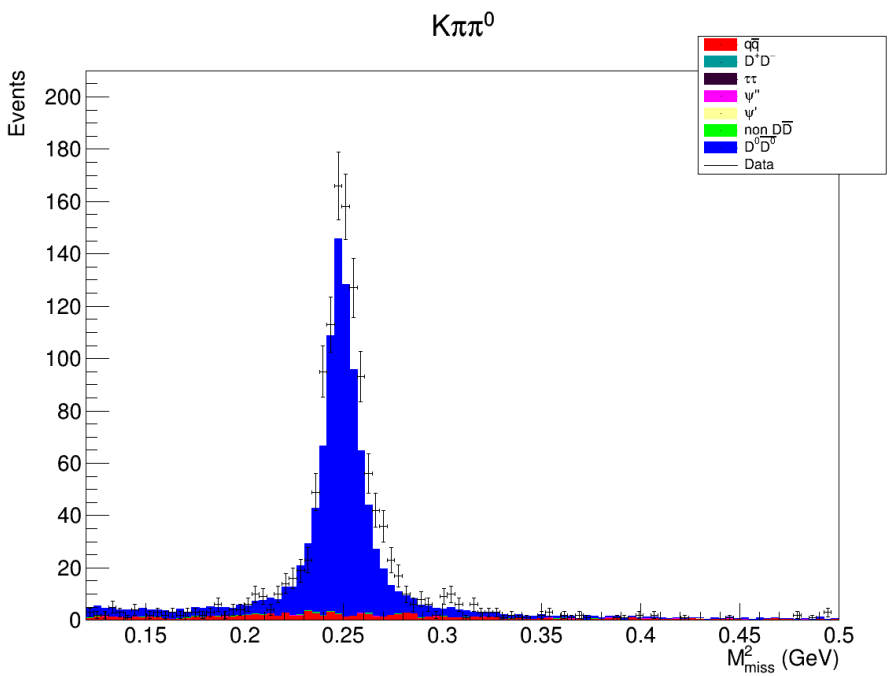
(b) Full inclusive MC

Figure 2: M^2_{miss} for $K_L KK$ vs $K\pi$

$K_L KK$ vs $K\pi\pi^0$



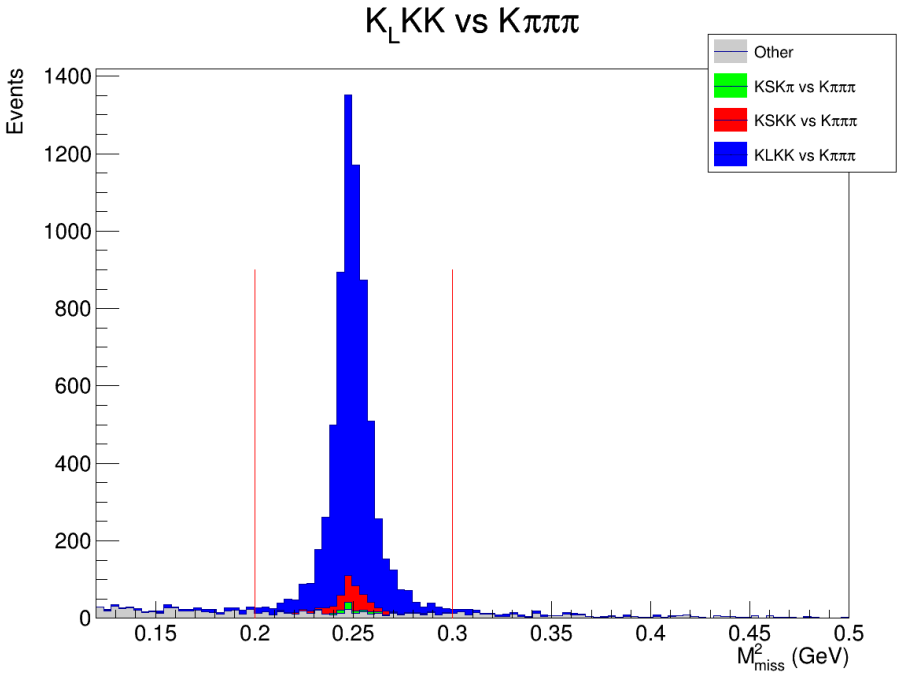
(a) $D^0\bar{D}^0$ peaking backgrounds



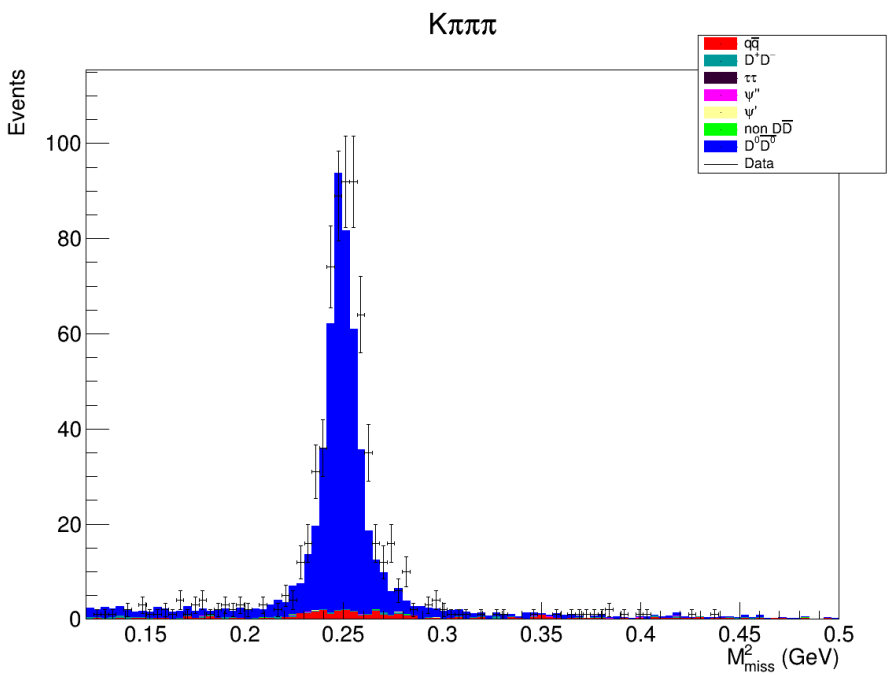
(b) Full inclusive MC

Figure 3: M^2_{miss} for $K_L KK$ vs $K\pi\pi^0$

$K_L KK$ vs $K\pi\pi\pi$



(a) $D^0\bar{D}^0$ peaking backgrounds



(b) Full inclusive MC

Figure 4: M^2_{miss} for $K_L KK$ vs $K\pi\pi\pi$

$K_S KK$ double tag yields

Bin	1	2	−1	−2
$K_S KK$ vs $K\pi$ raw yield	89	72	94	69
$K_S KK$ vs $K\pi$ corrected yield	641.0	641.0	683.3	628.9
$K_S KK$ vs $K\pi$ normalized yield	0.247	0.247	0.263	0.242
$K_S KK$ vs $K\pi\pi^0$ raw yield	156	101	201	140
$K_S KK$ vs $K\pi\pi^0$ corrected yield	2840.7	2139.3	3565.0	3138.6
$K_S KK$ vs $K\pi\pi^0$ normalized yield	0.243	0.183	0.305	0.269
$K_S KK$ vs $K\pi\pi\pi$ raw yield	117	68	135	88
$K_S KK$ vs $K\pi\pi\pi$ corrected yield	1674.6	1103.9	1858.9	1444.8
$K_S KK$ vs $K\pi\pi\pi$ normalized yield	0.275	0.181	0.306	0.238
$K_S KK$ vs $Ke\nu$ raw yield	51	46	63	53
$K_S KK$ vs $Ke\nu$ corrected yield	442.2	579.7	542.1	671.5
$K_S KK$ vs $Ke\nu$ normalized yield	0.198	0.259	0.243	0.300

$K_S KK$ double tag yields

Bin	1	2	-1	-2
$K_L KK$ vs $K\pi$ raw yield	148	102	144	130
$K_L KK$ vs $K\pi$ corrected yield	957.6	811.6	995.9	1194.3
$K_L KK$ vs $K\pi$ normalized yield	0.242	0.205	0.252	0.302
$K_L KK$ vs $K\pi\pi^0$ raw yield	302	234	319	264
$K_L KK$ vs $K\pi\pi^0$ corrected yield	3541.7	3612.4	3588.9	4475.6
$K_L KK$ vs $K\pi\pi^0$ normalized yield	0.233	0.237	0.236	0.294
$K_L KK$ vs $K\pi\pi\pi$ raw yield	182	134	175	136
$K_L KK$ vs $K\pi\pi\pi$ corrected yield	2444.8	2326.8	2553.2	2641.8
$K_L KK$ vs $K\pi\pi\pi$ normalized yield	0.253	0.231	0.254	0.262

Next steps

- Errors!