BESIII Oxford Group Meeting

Martin Tat

Oxford LHCb

8th April 2021

Introduction

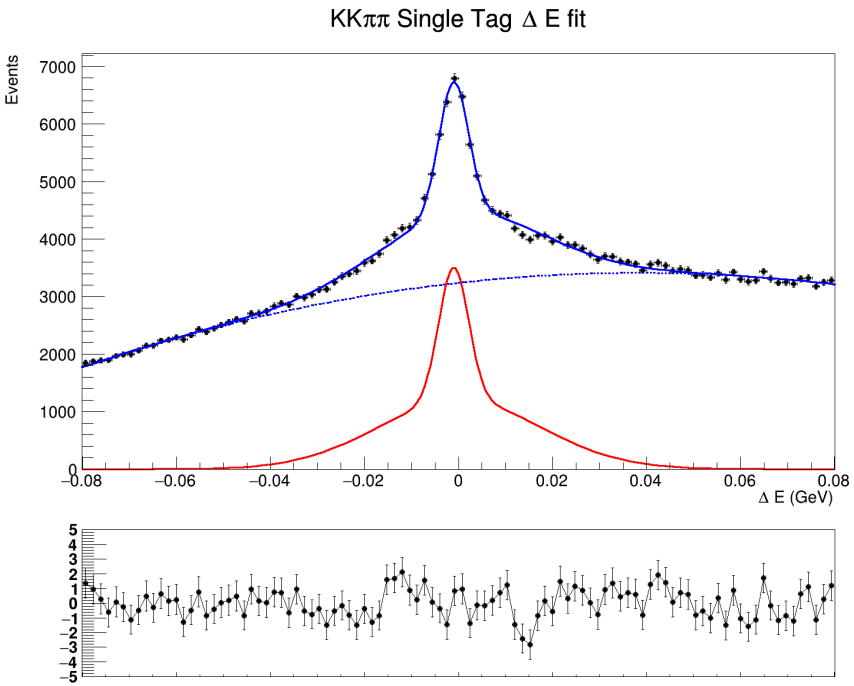
- $D \to K^+K^-\pi^+\pi^-$ analysis
- Previously: Fit to ΔE and m_{BC} to get ST yield in MC
- Current progress:
  - Finished code for all tag modes
  - Run over all MC and data
  - Studied $KK\pi\pi$ single tag backgrounds
- Tag modes:
  - Flavour: $K\pi$, $K\pi\pi^0$, $K\pi\pi\pi$, $Ke\nu$
  - CP even: KK, $\pi\pi$, $KS\pi^0\pi^0$, $K_L\pi^0$, $K_L\omega$, $\pi\pi\pi^0$
  - CP odd: $K_S\pi^0$, $K_S\eta(\gamma\gamma, \pi\pi\pi^0)$, $K_S\omega$, $K_S\eta'(\pi\pi\eta, \pi\pi\gamma)$, $K_S\phi$, $K_L\pi^0\pi^0$
  - CP conjugate: $K_S\pi\pi$, $KK\pi\pi$

MC samples

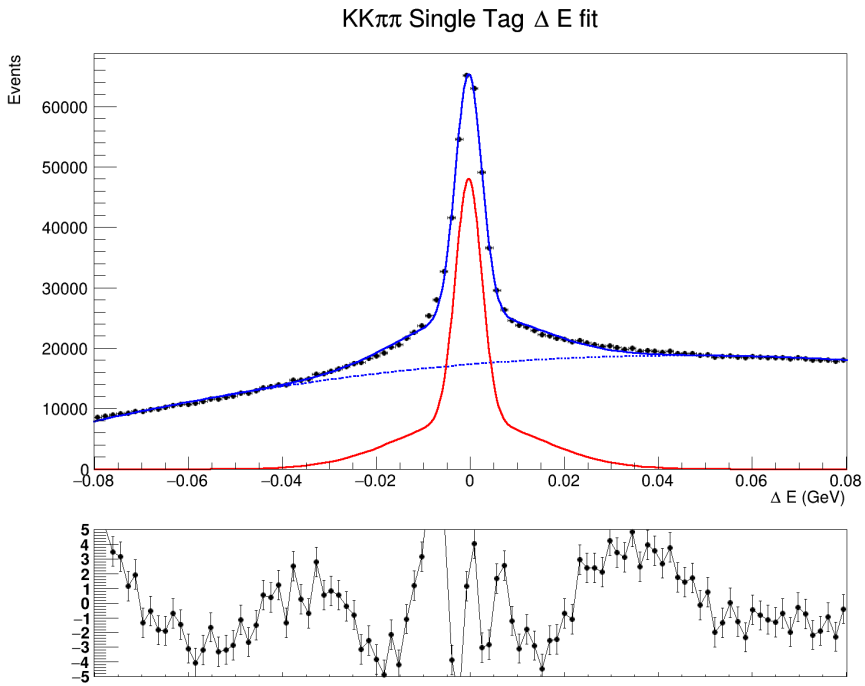
MC sample	Events (10^6)	Luminosity scale (2010/2011)
$D^0\bar{D}^0$	74	21.8/21.8
D^+D^-	29	10.9/10.8
$q\bar{q}$	122	7.8/7.3
$\psi(2S)\gamma$	34	10.8/10.1
$J/\psi\gamma$	22	10.8/10.1
$\tau\tau$	60	10.8/10.1
non-$D\bar{D}$	10	10.8/10.1

- Did not run over ee and $\mu\mu$ MC

ΔE fit in data vs MC



(a) ΔE, data



(b) ΔE, MC

Why are the MC pulls wrong?
Does ΔE for data look sensible?

$KK\pi\pi$ single tag backgrounds

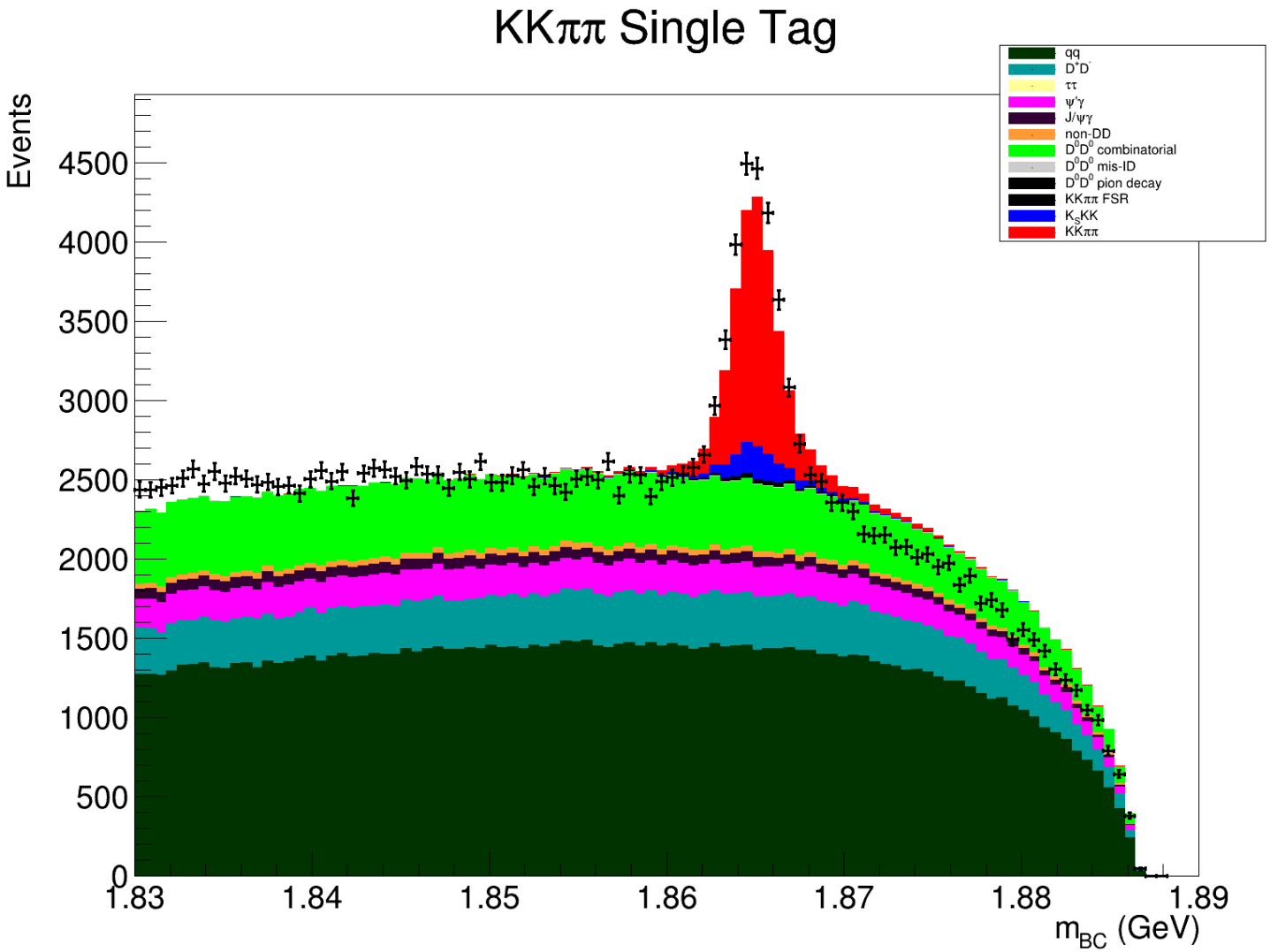


Figure 2: $KK\pi\pi$ single tag m_{BC} components

Next steps

- Account for peaking backgrounds with Gaussian and fit for ST yields
- Study backgrounds for all other modes
- Start with DT yields, check with expectation from amplitude model