# BESIII Oxford Group Meeting

Martin Tat

Oxford LHCb

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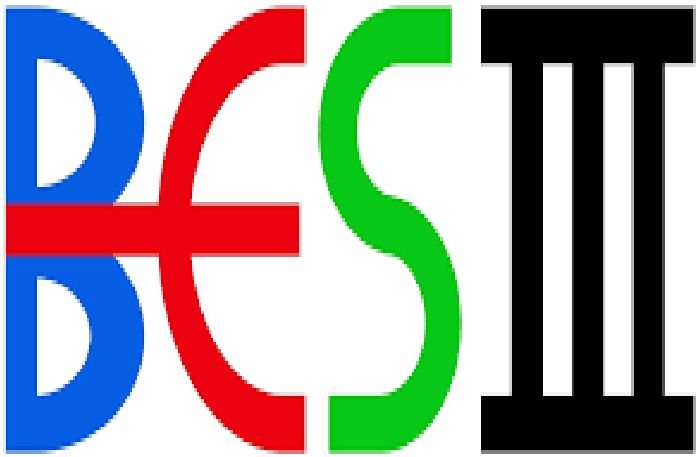
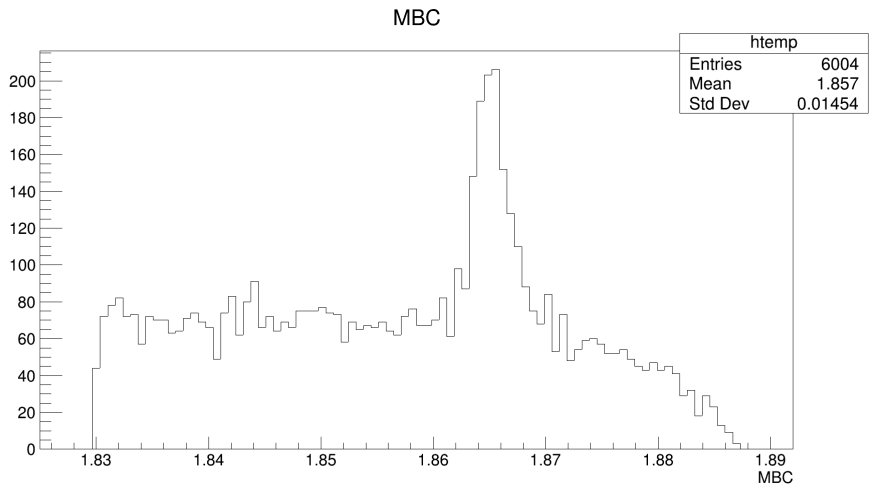


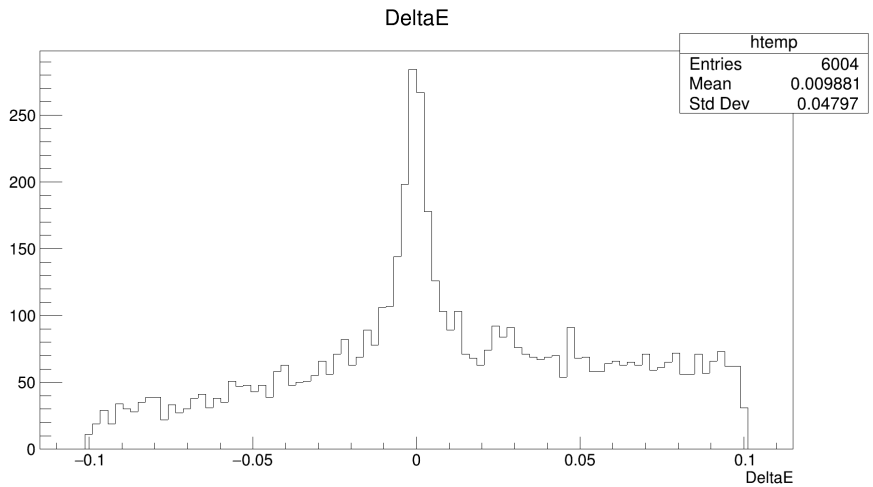
# Introduction

- Aim: Measure $c_i$ and $s_i$ in the decay $D \to K^+K^-\pi^+\pi^-$, $D = D^0, \bar{D}^0$
- End goal: Model independent binned analysis to measure $\gamma$ at LHCb
- So far:
  - Familiarized myself with BOSS and BESIII analysis
  - Ran a single tagging on 2% of the 2010 MC inclusive sample ($20x$ luminosity)
  - Sorted events into signal and background categories

# Initial single tagging




**(a)** $m_{BC}$, beam constrained mass



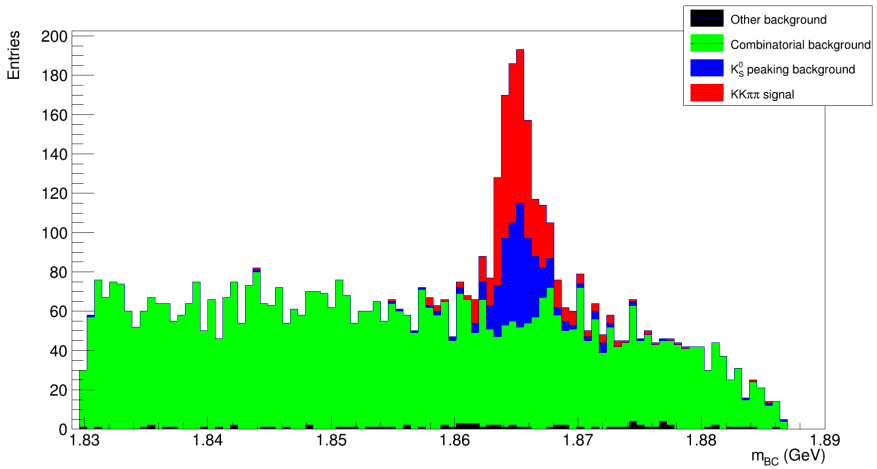

**(b)** $\Delta E$, missing energy

**Figure 1:** Initial single tagging

# Separation into categories

- Compared MC truth on energy, momentum and particle ID to reconstruction to sort events into categories
- Matched four-momentum by minimizing the squared deviation
- Categories:
  - $K^+K^-\pi^+\pi^-$ signal
  - $D \to K^0_S K^+ K^-$ peaking background
  - Combinatorial background
  - Other backgrounds
- Kalman kinematic fitting, constrain $D$ mass and daugther track origins

# Separation into categories

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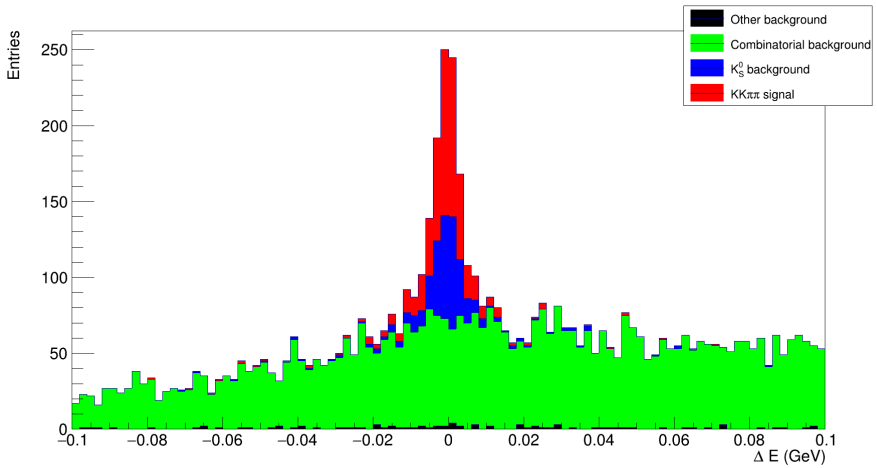
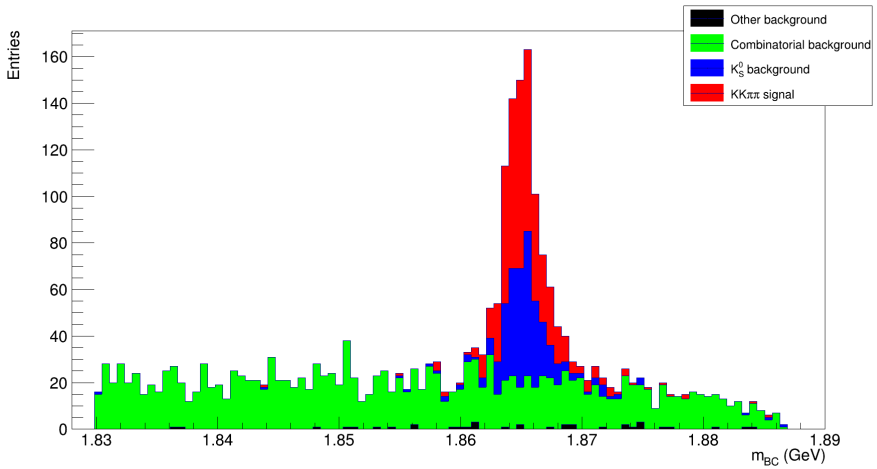



**(b)** $\Delta E$, missing energy

**Figure 2:** Signal and background categories

# Kalman fit

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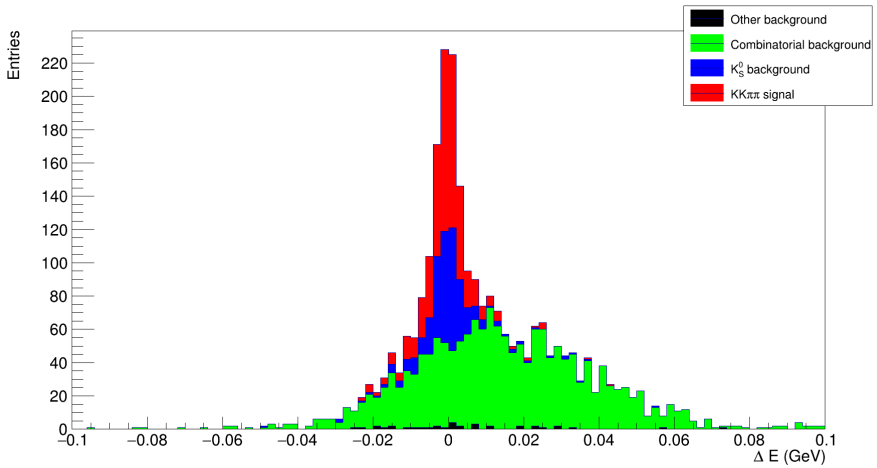


**(b)** $\Delta E$, missing energy

**Figure 3:** Kalman kinematic fitting

# $K_S^0$ veto

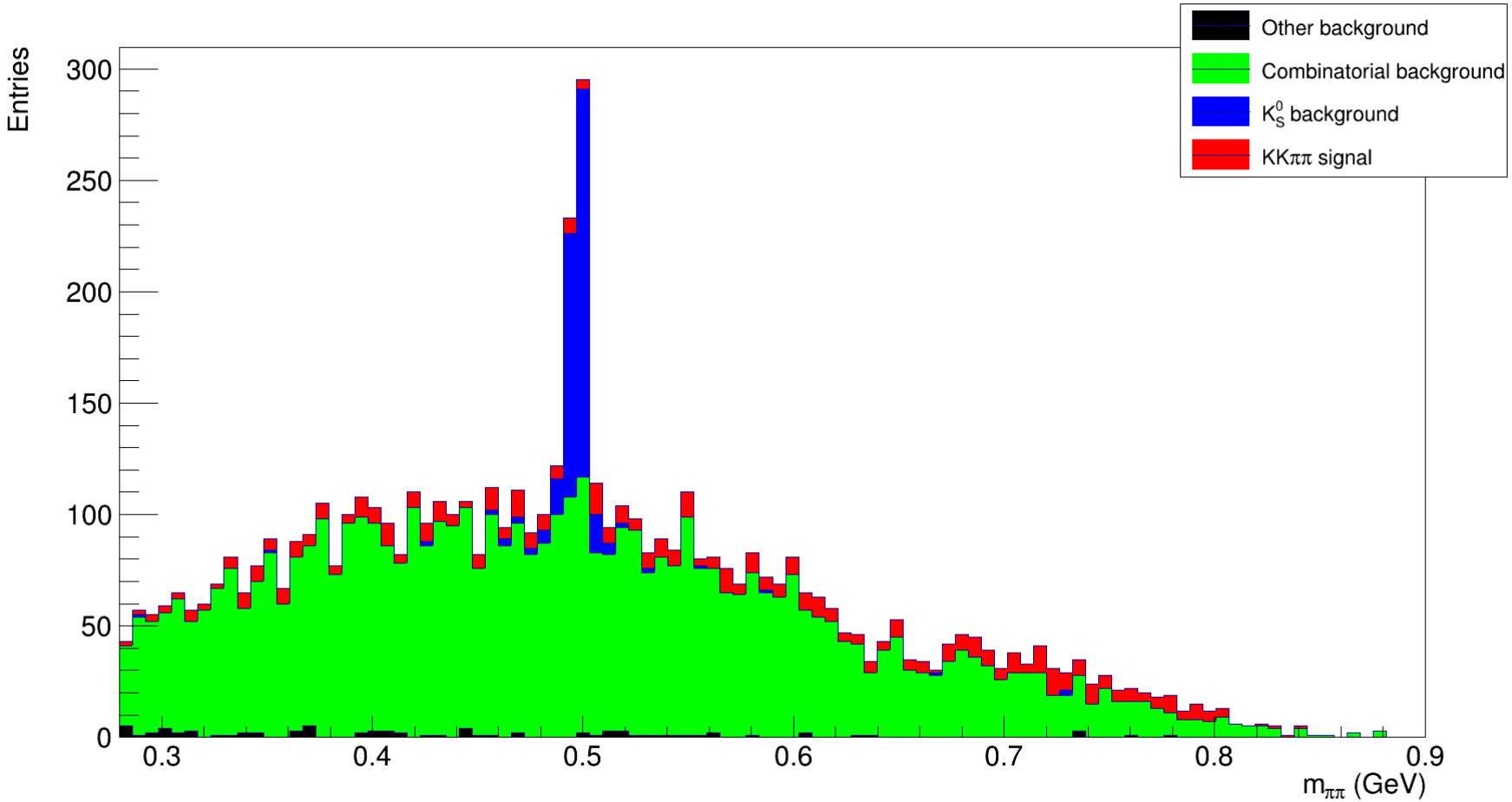


**Figure 4:** $\pi^+\pi^-$ invariant mass spectrum

# Next steps

- Double tags (which tag modes should I use?)
- $K^0_S$ reconstruction?
- Detailed study of background