Group Meeting

2024.12.6

Belle II

- Control sample

$$B^+ \to D^0(\to K^+\pi^-\pi^0)\pi^+$$

signal-enhanced

$$(|\Delta E| < 0.05 \text{ GeV}, M_{bc} > 5.27 \text{ GeV}/c^2)$$

background-enhanced

$$(|\Delta E| > 0.05 \text{ GeV}, M_{bc} < 5.27 \text{ GeV}/c^2)$$

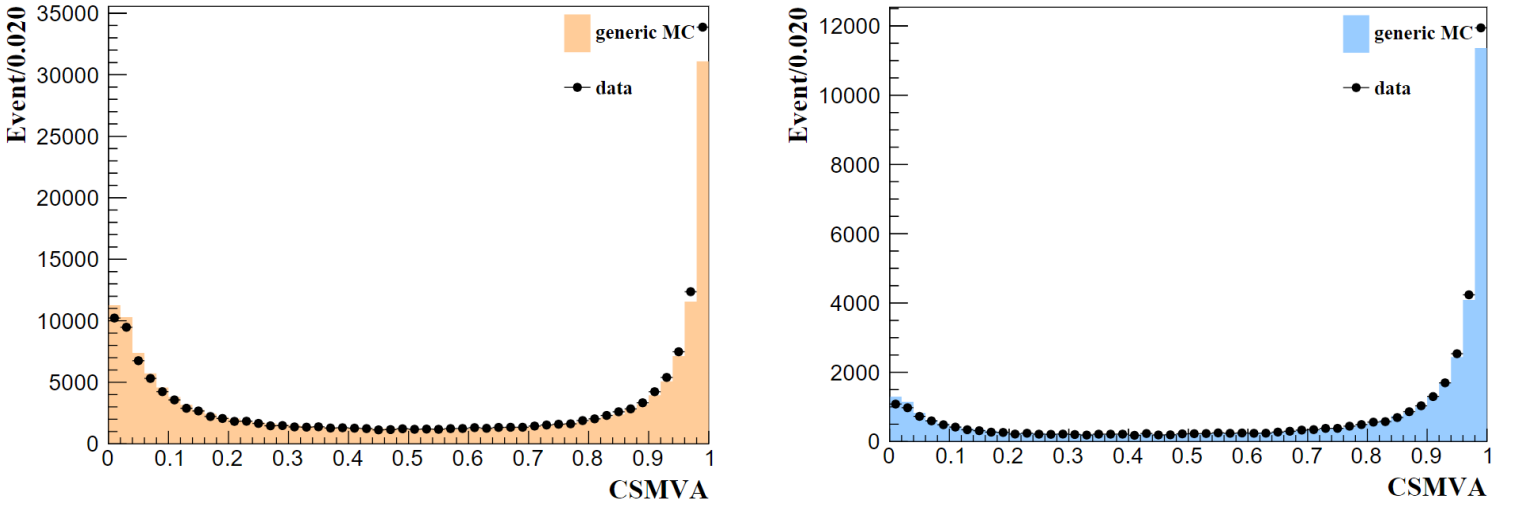
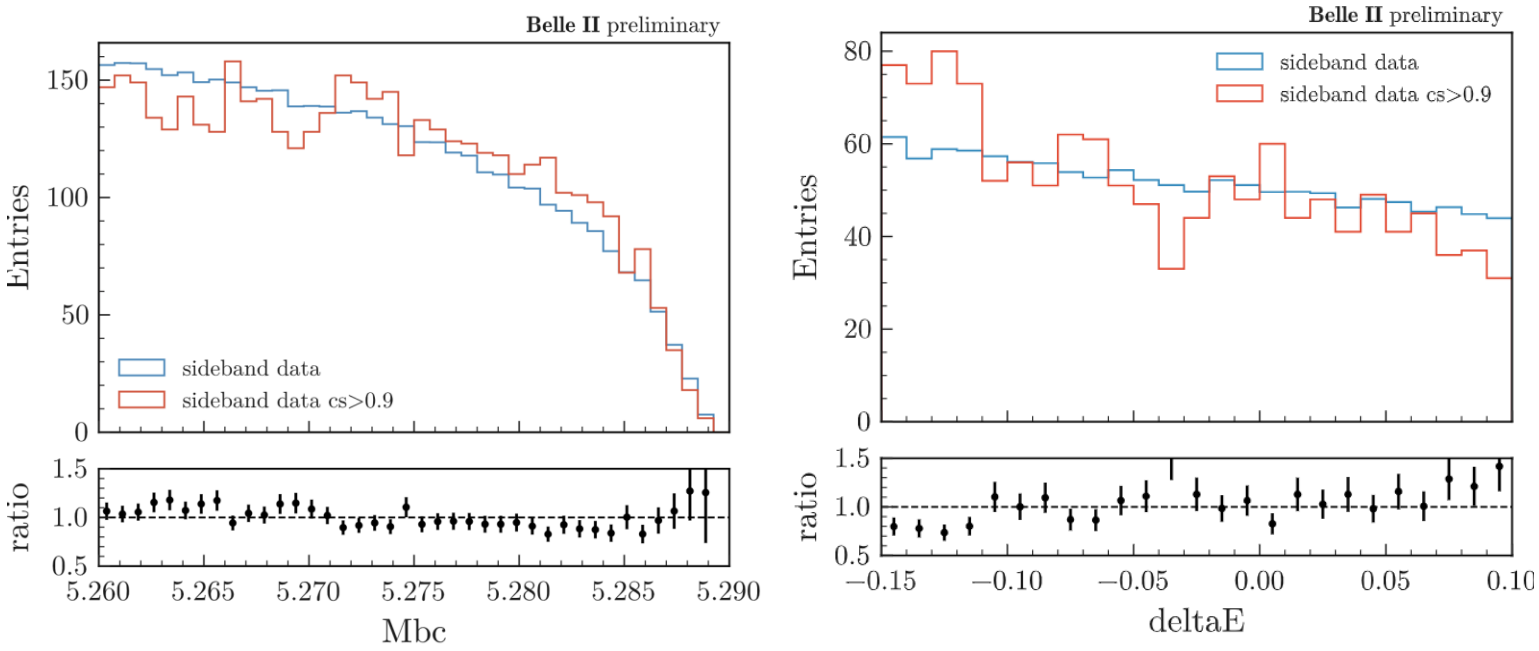


FIG. 10. Data-simultaion comparison of the FBDT output on (left) background-enhanced and (right) signal-enhanced $B^+ \to \bar{D}^0(\to K^+\pi^-\pi^0)\pi^+$ candidates. MC is normalized to the total number of data events for better comparison.

- Check Sculptrue with sideband data



Event Selection

Belle

- $B^0 \to K^+K^-\pi^0$
  - ***Tracks***
    - dr < 0.2 cm & |dz| < 5 cm
    - thetaInCDCAcceptance
  - B^0
    - 5.25 $< M_{bc} <$ 5.289 GeV/c^2
    - -0.3 GeV $< \Delta E <$ 0.15 GeV
    - treefit
  - $K^{\pm}$
    - nTracks ≥ 2
    - $L(K/\pi) > 0.6$
  - $\pi^0 \to \gamma\gamma$
    - 0.113 < InvM <0.152 GeV/c^2
    - kFit
    - pi0_MassChi2 < 6
    - daughterAngle < 0.4
    - |coshelicityAnlgeMomentum| < 0.97
  - γ
    - Cluster E in different area:
      - E_γ in forward endcap > 0.1 GeV
      - E_γ in barrel > 0.05 GeV
      - E_γ in backforward endcap > 0.15 GeV

After selection:

$\varepsilon = 22.80\%$ SCF = 4.00%

Cut from Belle note

- ***Tracks***
  - dr < 0.2 cm & |dz| < 5 cm
  - thetaInCDCAcceptance
- B^0
  - 5.23 $< M_{bc} <$ 5.289 GeV/c^2
  - -0.3 GeV $< \Delta E <$ 0.15 GeV
  - vertexfit
- $\pi^0 \to \gamma\gamma$
  - 0.112 < InvM <0.156(GeV/c^2)
  - pi0_MassChi2 < 50
  - Cluster E in different area:
    - E_γ in forward endcap > 0.1(GeV)
    - E_γ in barrel > 0.06(GeV)
    - E_γ in backforward endcap > 0.1(GeV)
  - π^0 decay helicity angle $|\cos\theta_{\mathrm{hel}}| < 0.95$
- $K^{\pm}$
  - $L(K/\pi) > 0.6$

After selection:

$\varepsilon = 24.08\%$ SCF = 6.37%