

Supplementary material for LHCb-PAPER-2019-016

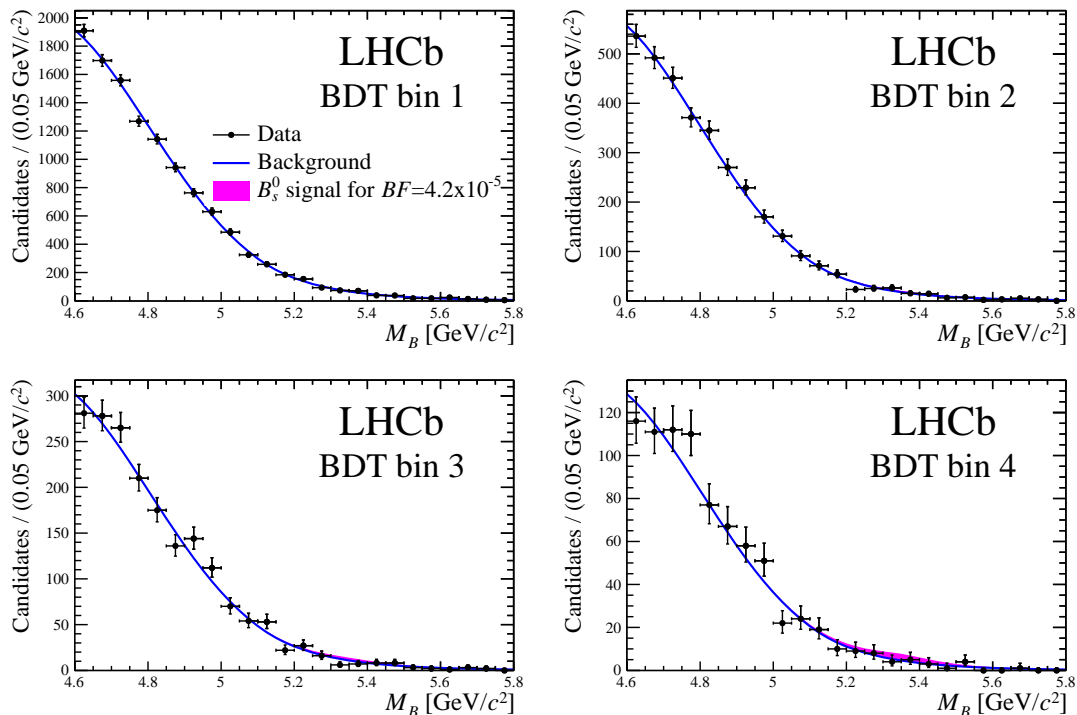


Figure 1: Distributions of the reconstructed B invariant mass in data in the four final BDT bins together with the projections of a background-only fit to the data, and, for illustrative purposes, a B_s^0 signal component corresponding to a branching fraction of $\mathcal{B}(B_s^0 \rightarrow \tau^\pm \mu^\mp) = 4.2 \times 10^{-5}$.

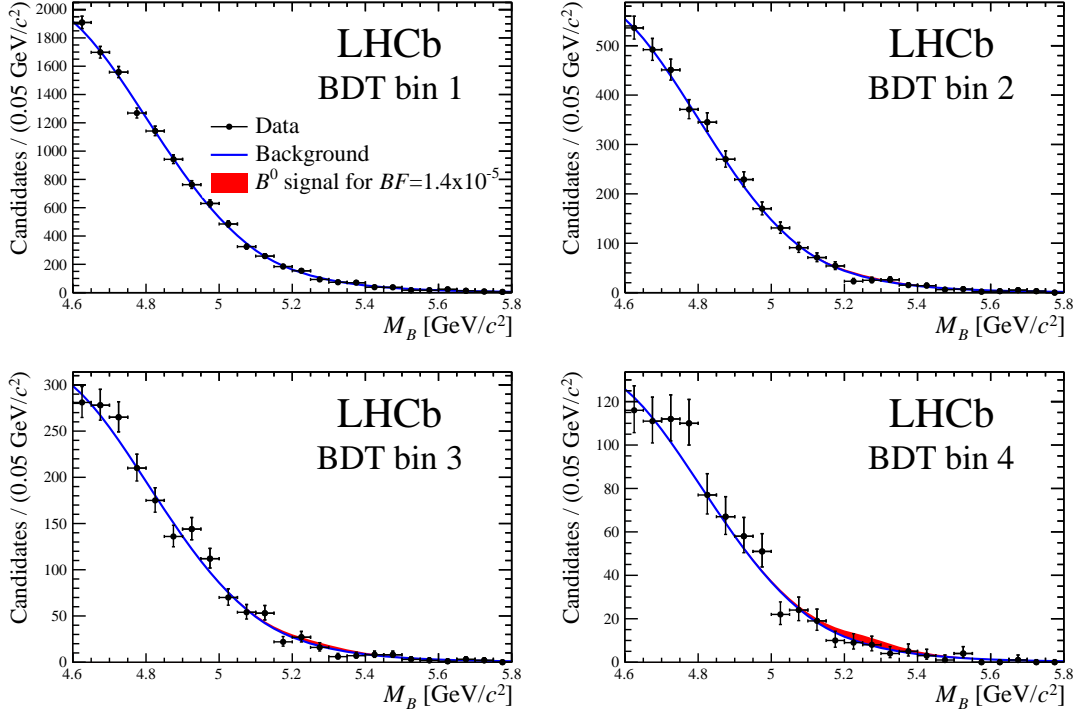


Figure 2: Distributions of the reconstructed B invariant mass in data in the four final BDT bins together with the projections of a background-only fit to the data and, for illustrative purposes, the B^0 signal component corresponding to a branching fraction of $\mathcal{B}(B^0 \rightarrow \tau^\pm \mu^\mp) = 1.4 \times 10^{-5}$.

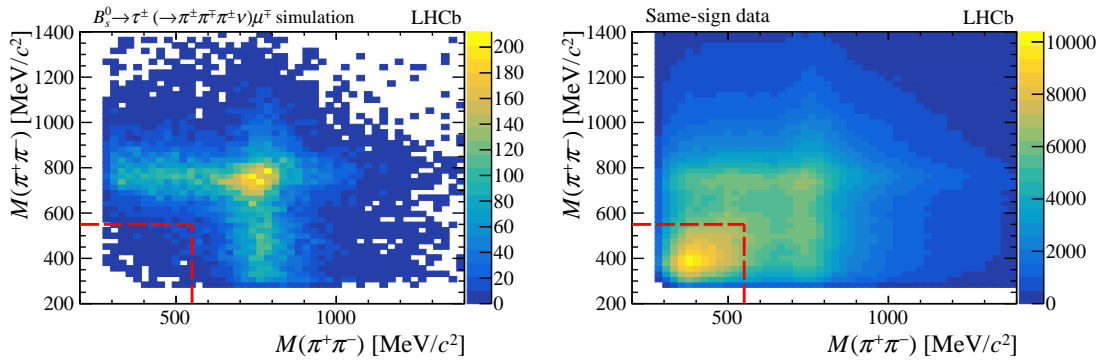


Figure 3: Dalitz plane for $B_s^0 \rightarrow \tau^\pm (\rightarrow \pi^\pm \pi^\mp \pi^\pm \nu_\tau) \mu^\mp$ simulation and same-sign data candidates. The low $M_{\pi^+\pi^-}$ region (inside the red dashed line) is discarded in the preselection.

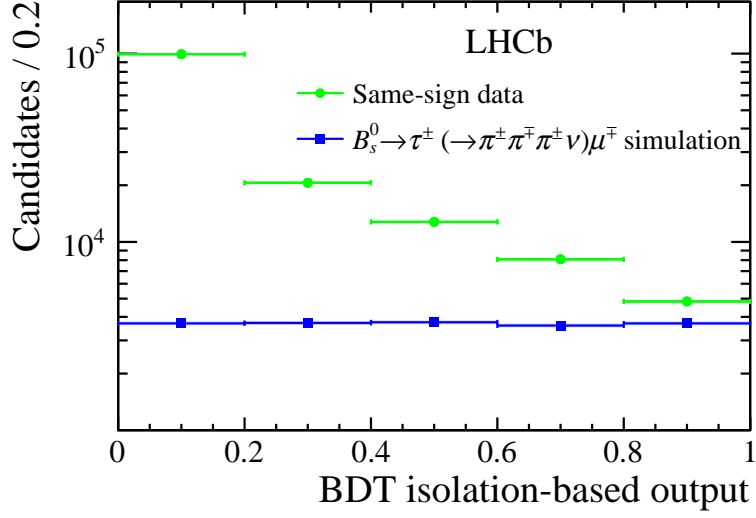


Figure 4: Isolation based BDT output distributions for $B_s^0 \rightarrow \tau^\pm \mu^\mp$ signal simulation and same-sign data candidates.

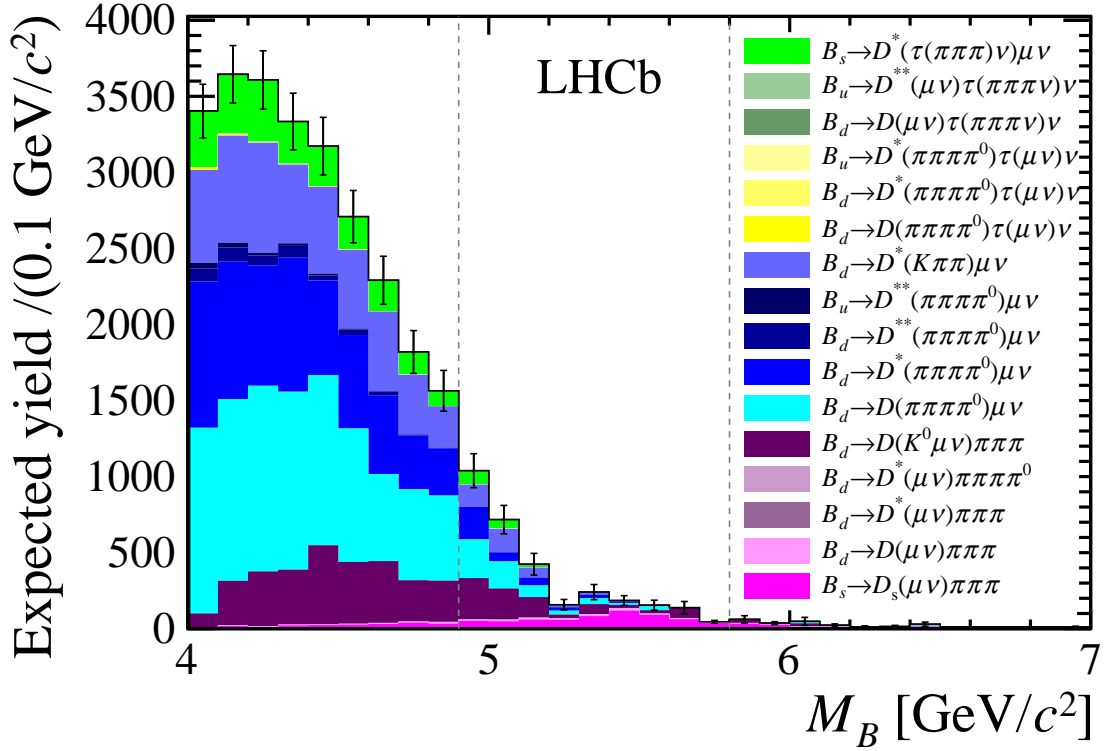


Figure 5: Distribution of the reconstructed B invariant mass of all reconstructed candidates from simulated background samples, normalised to the expected yields for a dataset corresponding to 3fb^{-1} . The vertical dashed lines show the boundaries of the fit region.

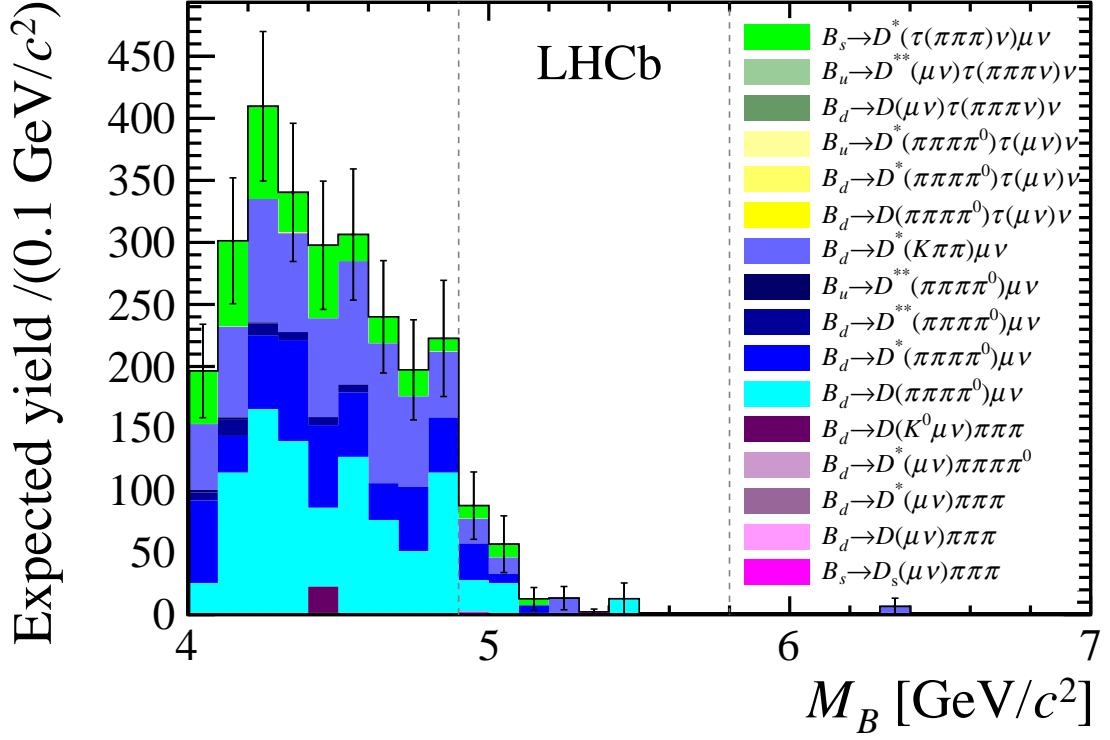


Figure 6: Distribution of the reconstructed B invariant mass for simulated background samples normalised to the expected yields for a dataset corresponding to 3 fb^{-1} . The full offline selection is applied. The vertical dashed lines show the boundaries of the fit region.

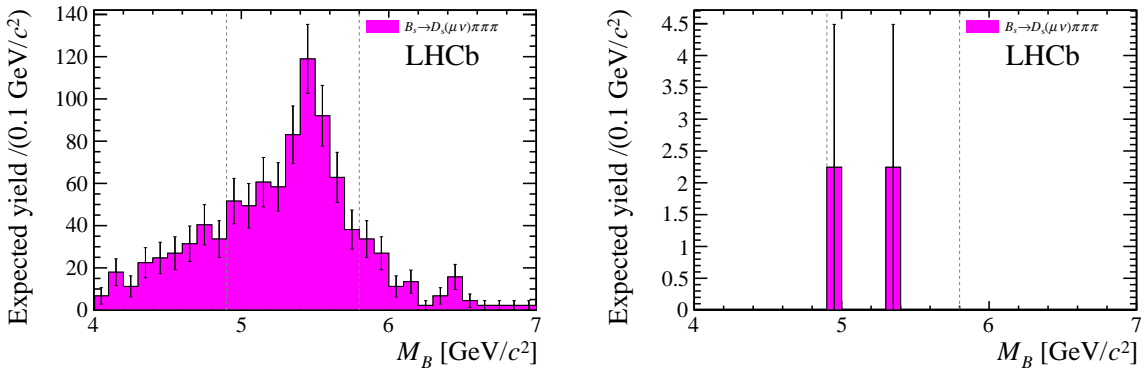


Figure 7: Distribution of the reconstructed B invariant mass for the peaking simulated sample $B_s^0 \rightarrow D_s^-(\mu^-\bar{\nu})\pi^+\pi^-\pi^+$, (left) for all reconstructed candidates and (right) after the full selection is applied. The expected yield for a dataset corresponding to an integrated luminosity of 3 fb^{-1} is shown. The vertical dashed lines show the boundaries of the fit region.