

Supplementary material for LHCb-PAPER-2018-024

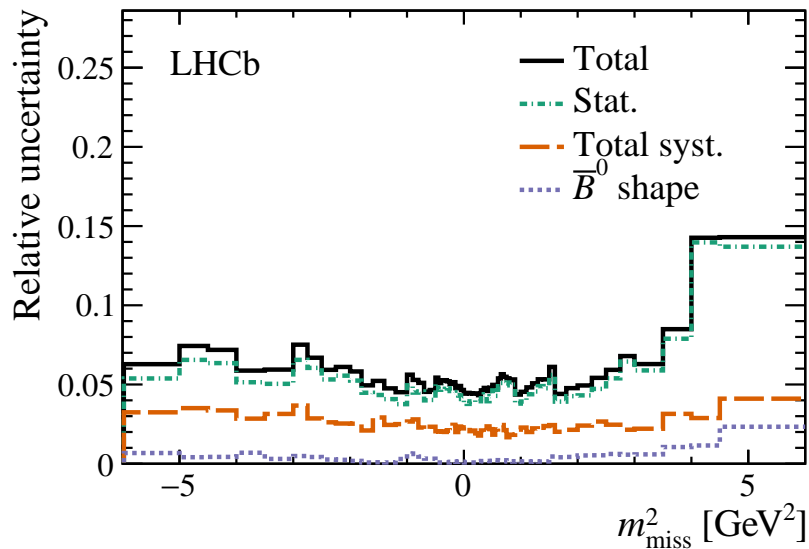


Figure 1: Relative uncertainty of the combined semileptonic B^- and \bar{B}^0 background template. The total uncertainty, as well as the individual contributions from the statistical uncertainty of the same sign kaon control sample, the sum of all systematic uncertainties, and the largest single systematic uncertainty from the \bar{B}^0 missing mass shape are also shown.

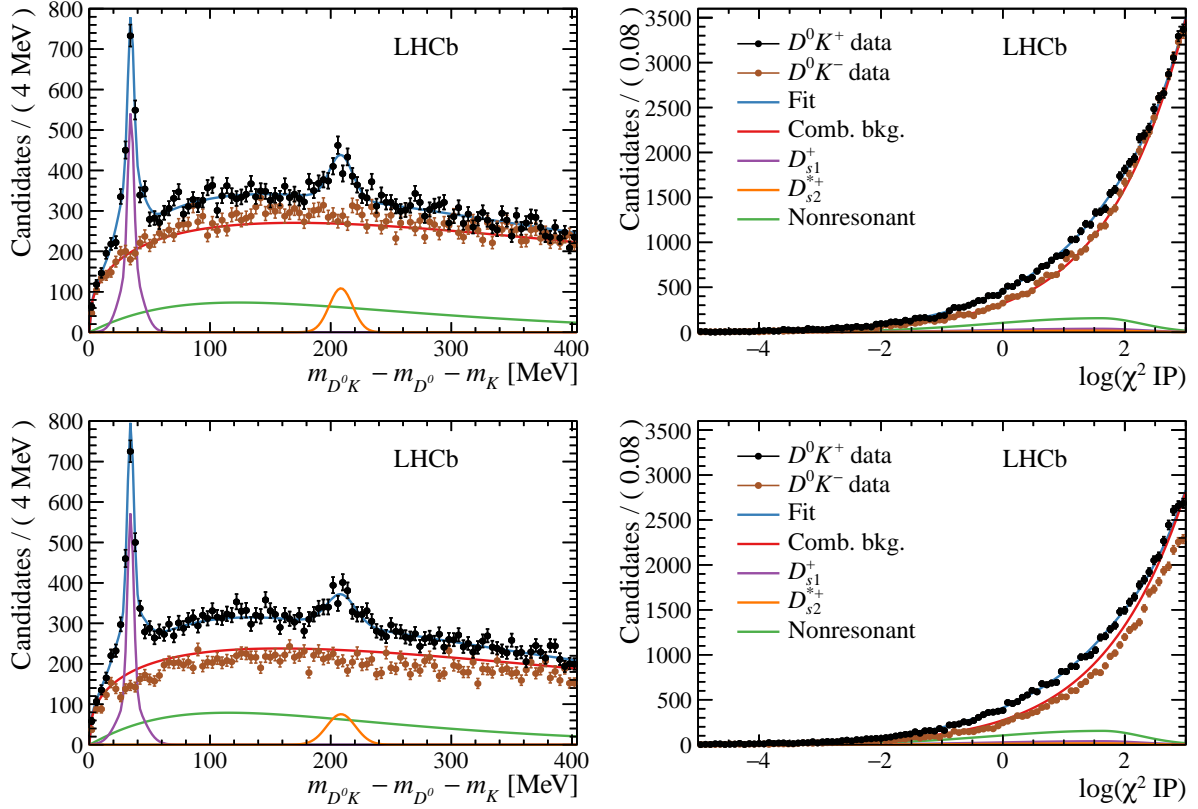


Figure 2: Fits to the $\bar{B}_s^0 \rightarrow D^0 K^+ \mu^- X$ control samples. The projections of the two-dimensional fit in (left) the $D^0 K$ mass difference and (right) the logarithm of the impact parameter χ^2 of the kaon candidate with respect to the $D^0 \mu$ vertex are shown for (top) \bar{B}_s^0 candidates with an opposite-sign prompt kaon attached and (bottom) \bar{B}_s^0 candidates with a same-sign prompt kaon attached. The left plots show a zoomed-in view of the low-mass region, but the fit includes candidates with mass differences up to 2 GeV. The wrong-sign $D^0 K^-$ candidates are used to model the combinatoric background, but the normalization of their contribution to the right-sign $D^0 K^+$ sample is allowed to vary.

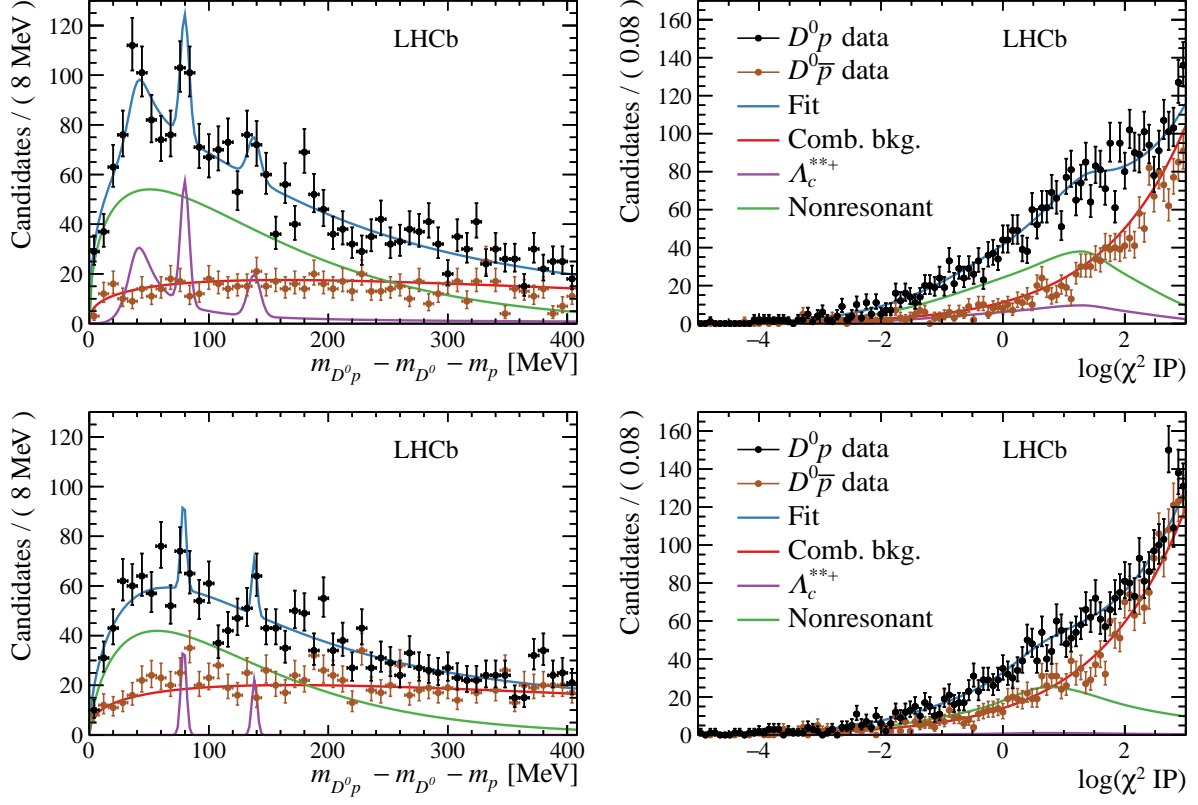


Figure 3: Fits to the $\Lambda_b^0 \rightarrow D^0 p \mu^- X$ control samples. The projections of the two-dimensional fit in (left) the $D^0 p$ mass difference and (right) the logarithm of the impact parameter χ^2 of the proton candidate with respect to the $D^0 \mu$ vertex are shown for (top) Λ_b^0 candidates with an opposite-sign prompt kaon attached and (bottom) Λ_b^0 candidates with a same-sign prompt kaon attached. The left plots show a zoomed-in view of the low-mass region, but the fit includes candidates with mass differences up to 2 GeV. The wrong-sign $D^0 \bar{p}$ candidates are used to model the combinatoric background, but the normalization of their contribution to the right-sign $D^0 p$ sample is allowed to vary.

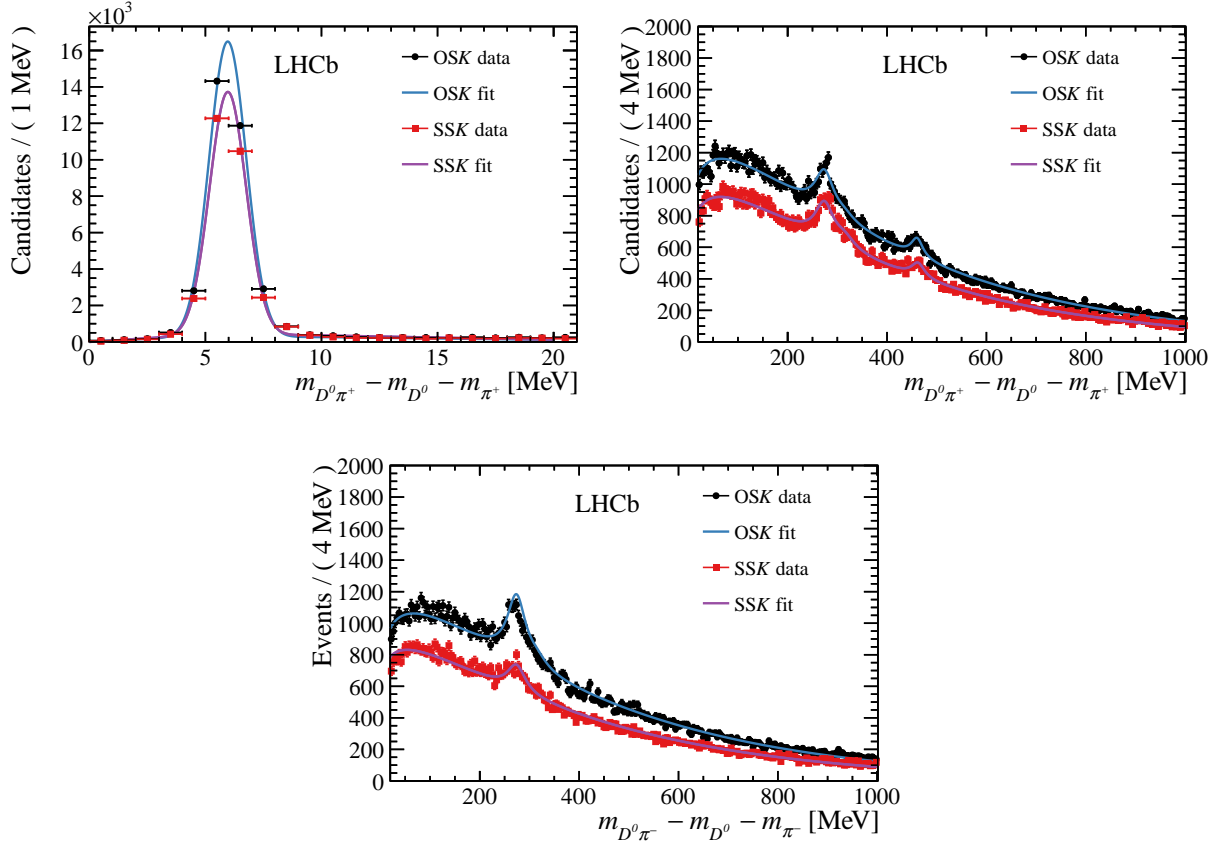


Figure 4: Mass difference distributions for the $\bar{B} \rightarrow D^0 \pi^\pm \mu^- X$ control samples; (top left) the $D^0 \pi^+$ distributions in the region around the D^{*+} mass, (top right) the $D^0 \pi^+$ distributions at higher mass, and (bottom) the $D^0 \pi^-$ distributions. In each figure, the opposite-sign and same-sign prompt kaon distributions are compared. The fits to the D_1^+ and D_2^+ to $D^{(*)0} \pi^+$ peaks in the center figure are used to estimate the OSK/SSK ratio for \bar{B}^0 mesons.