Supplementary material for LHCb-PAPER-2017-018

Apart from the plots shown here, a gif animation is also contained in the supplementary zip file, which can be obtained from CDS. This animation shows the $\Xi_{cc}^{++} \to \Lambda_c^+ K^- \pi^+ \pi^+$ mass peak emerging from the background over the course of the 2016 data taking.
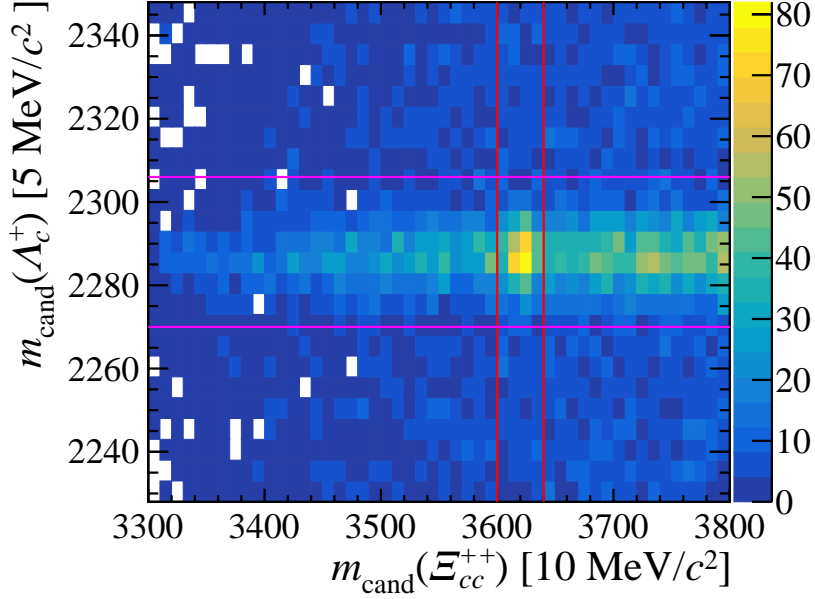

Figure 1: Invariant mass distribution of the Λ_c^+ versus that of the Ξ_{cc}^{++} candidates in the 13 TeV data sample. The areas between the two vertical or horizontal bars indicate the signal regions ($\approx \pm 3\sigma$) for Ξ_{cc}^{++} and Λ_c^+, respectively.
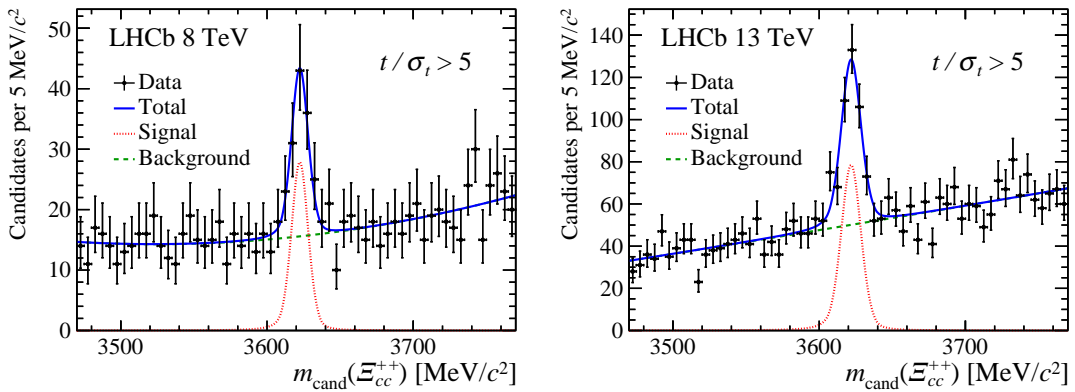

Figure 2: Invariant mass distribution of the $\Xi_{cc}^{++} \to \Lambda_c^+ K^- \pi^+ \pi^+$ candidates in the (left) 8 TeV and (right) 13 TeV samples with an additional requirement that the significance of the proper decay time exceeds 5 standard deviations. The statistical signal significance is above 7σ (12σ) for the 8 TeV (13 TeV) samples.
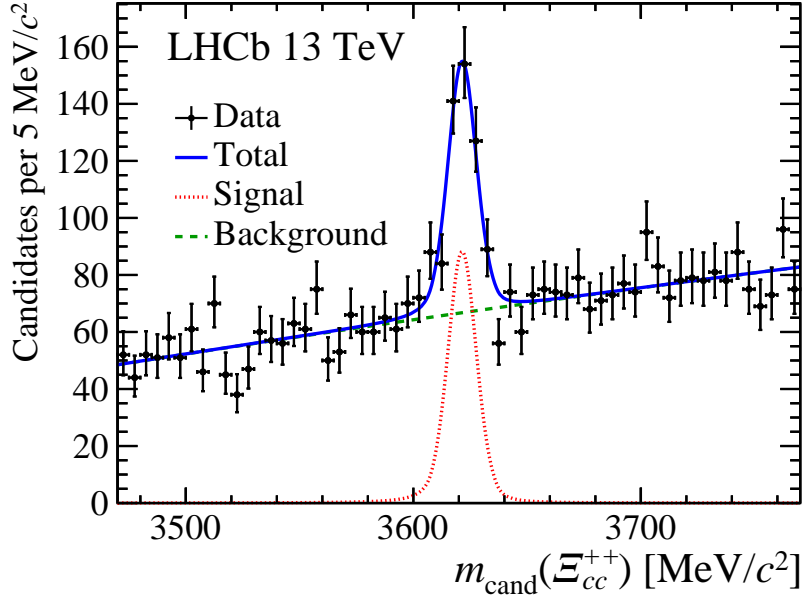
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Figure 3: Invariant mass distribution of the Ξ_{cc}^{++} candidates with a cut-based selection instead of the multivariate selector.
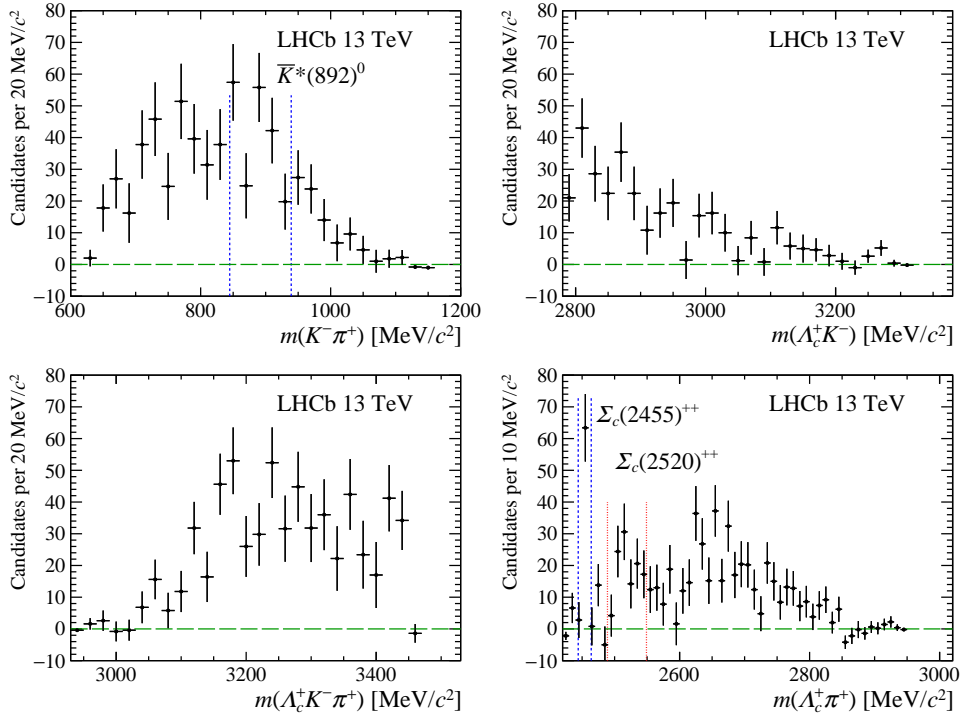

Figure 4: Invariant mass distributions for combinations of decay products in the $\Xi_{cc}^{++} \rightarrow \Lambda_c^+ K^- \pi^+ \pi^+$ decay in the 13 TeV data. The plots involving π^+ directly from the Ξ_{cc}^{++} decay (the bottom two) have two entries per event. The blue vertical bars in the top-left plot indicate the position of the $\overline{K}^*(892)^0$ resonance, and those in the bottom-right plot indicate the $\Sigma_c(2455)^{++}$ and $\Sigma_c(2520)^{++}$ resonances. The background is subtracted using sideband candidates.

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