

1 Supplementary material for LHCb-PAPER-2021-019

2 Figure 1 shows an example of a CLs scan performed at the Ξ_{cc}^+ mass of $3623 \text{ MeV}/c^2$,
 3 which has the smallest combined p -value, for a lifetime of 80 fs. Figure 2 shows the
 4 upper limits on R at 90% confidence level. Figures 3 and 4 show the p -value plots for
 5 the $\Xi_{cc}^+ \rightarrow \Xi_c^+ \pi^- \pi^+$ and $\Xi_{cc}^+ \rightarrow \Lambda_c^+ K^- \pi^+$ decays, respectively. Figure 5 (Fig. 6) shows
 6 the simultaneous fit to the $\Xi_c^+ \pi^- \pi^+$ and $\Lambda_c^+ K^- \pi^+$ final states and their corresponding
 7 invariant mass spectra using $10 \text{ MeV}/c^2$ ($5 \text{ MeV}/c^2$) wide bins, with the highlighted Ξ_{cc}^+
 8 and Ξ_{cc}^{++} states observed by the SELEX and the LHCb collaboration, respectively.

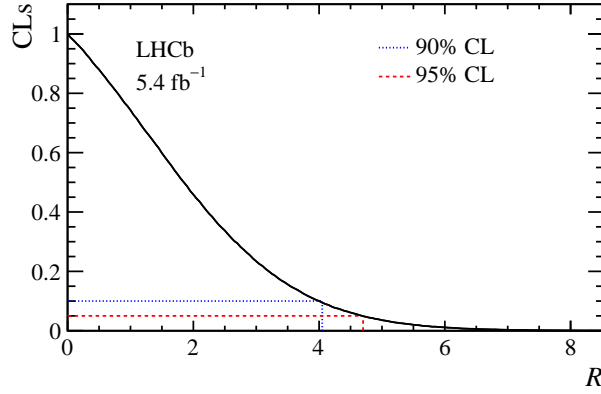


Figure 1: Calculated CLs values versus hypothetical values of R (black solid line), for the Ξ_{cc}^+ mass of $3623 \text{ MeV}/c^2$ and the lifetime of 80 fs, determined from 3×10^5 pseudoexperiments. The blue dotted (red dashed) line represents the 90% (95%) CL.

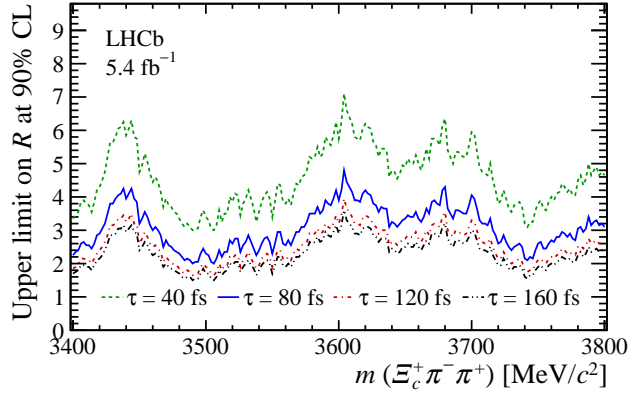


Figure 2: Upper limits on R as a function of mass for four different lifetime (τ) hypotheses at 90% CL.

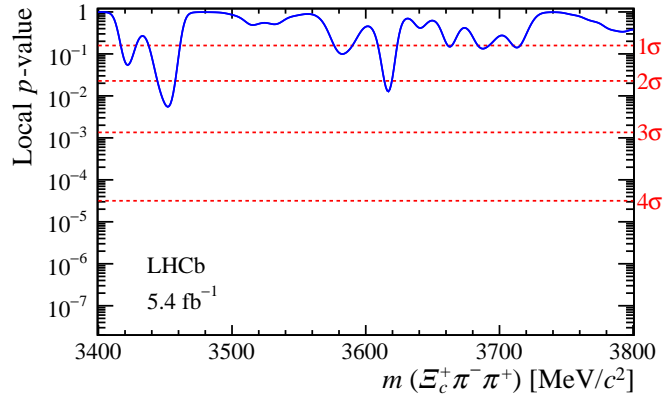


Figure 3: Local p -values as a function of the Ξ_{cc}^+ invariant mass for Ξ_{cc}^+ candidate decays reconstructed in the $\Xi_{cc}^+ \pi^- \pi^+$ final state in the extended trigger set. The horizontal dotted red lines represent the p -values corresponding to significances of 1, 2, 3 and 4σ . The systematic uncertainties are not taken into account.

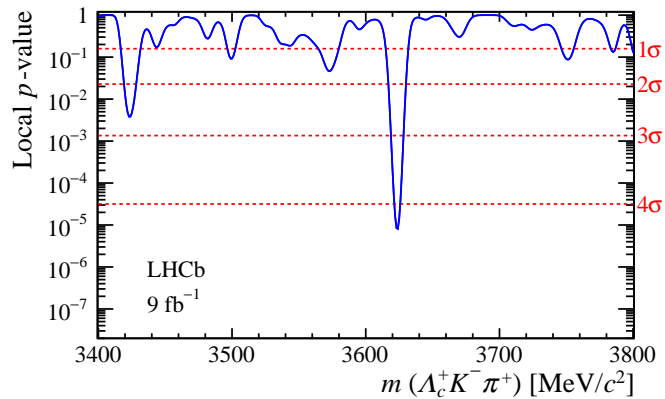


Figure 4: Local p -values as a function of the Ξ_{cc}^+ invariant mass for Ξ_{cc}^+ candidate decays reconstructed in the $\Lambda_c^+ K^- \pi^+$ final state. The horizontal dotted red lines represent the p -values corresponding to significances of 1, 2, 3 and 4σ . The systematic uncertainties are not taken into account.

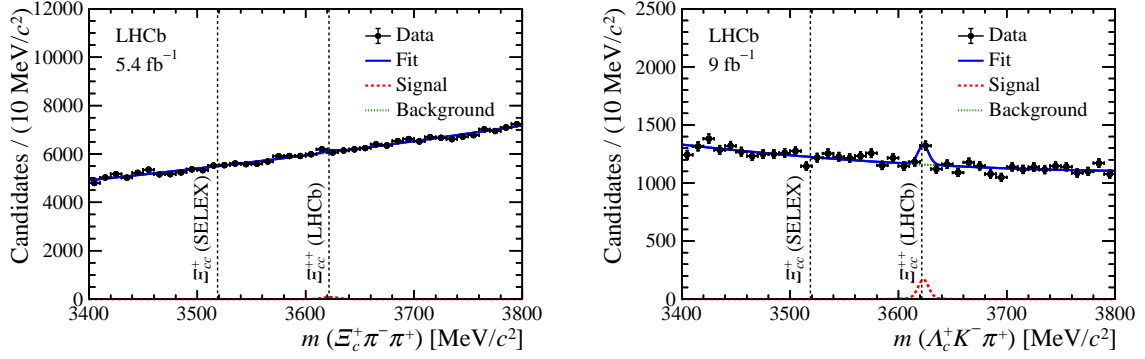


Figure 5: Invariant mass spectra for the (left) $\Xi_c^+ \pi^- \pi^+$ and (right) $\Lambda_c^+ K^- \pi^+$ final states. The blue solid curve represents the result of a simultaneous fit to the two spectra, with the red dashed (green dotted) curve showing the signal (background) component. The two black dashed vertical lines represent the Ξ_{cc}^+ and Ξ_{cc}^{++} states observed by the SELEX and the LHCb collaboration, respectively. The extended trigger set is used for the $\Xi_{cc}^+ \rightarrow \Xi_c^+ \pi^- \pi^+$ decay.

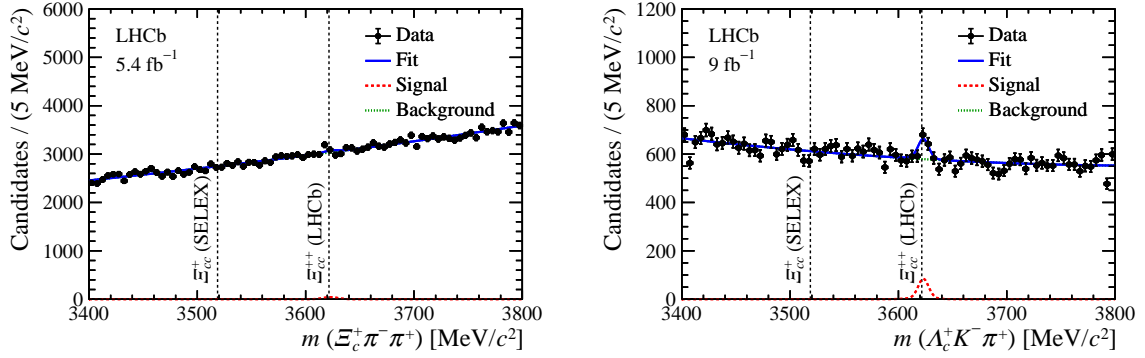


Figure 6: Invariant mass spectra for the (left) $\Xi_c^+ \pi^- \pi^+$ and (right) $\Lambda_c^+ K^- \pi^+$ final states. The blue solid curve represents the result of a simultaneous fit to the two spectra, with the red dashed (green dotted) curve showing the signal (background) component using $5 \text{ MeV}/c^2$ wide bins. The two black dashed vertical lines represent the Ξ_{cc}^+ and Ξ_{cc}^{++} states observed by the SELEX and the LHCb collaboration, respectively. The extended trigger set is used for the $\Xi_{cc}^+ \rightarrow \Xi_c^+ \pi^- \pi^+$ decay.