

Supplementary materials

The mass distribution of the Ξ_{cc}^+ candidates with Selection A, together with fit results in mass region 3470–3770 MeV/c^2 , is shown in Fig. 7. The mass distribution of the Ξ_{cc}^+ candidates with Selection B is shown in Fig. 8. The mass and $\log_{10}(\chi_{\text{IP}}^2)$ fits of the Λ_c^+ normalisation mode for individual years are shown in Figs. 9. The mass fits of the Ξ_{cc}^{++} normalisation mode for individual years are shown in Figs. 10.

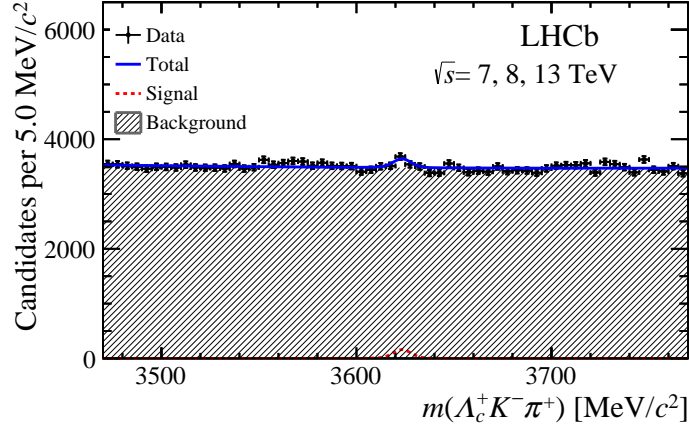


Figure 7: Mass distribution of Ξ_{cc}^+ candidates for the full data sample. Selection A is applied, including the Λ_c^+ mass requirement of $2270 \text{ MeV}/c^2 < M([pK^-\pi^+]_{\Lambda_c^+}) < 2306 \text{ MeV}/c^2$. The fit results with the nominal fit models are shown. In the fit, the mass resolution is fixed to $5.1 \text{ MeV}/c^2$, as obtained in simulation. The fit returns a mass of $3623.4 \pm 1.7 \text{ MeV}/c^2$, where the uncertainty is statistical only.

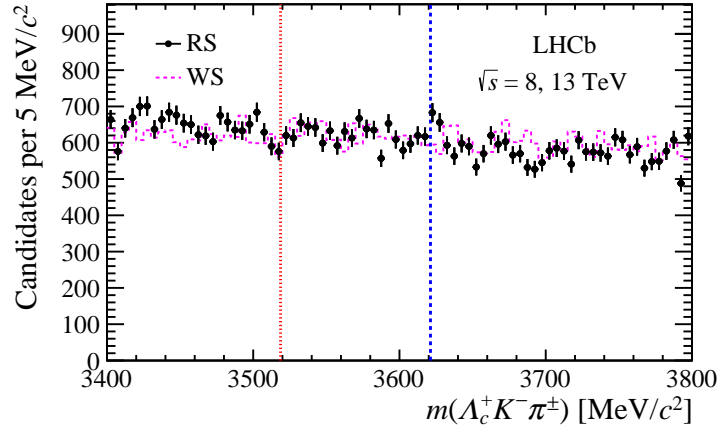


Figure 8: Mass distribution of the selected Ξ_{cc}^+ candidates from the data sets recorded at $\sqrt{s} = 8 \text{ TeV}$ and $\sqrt{s} = 13 \text{ TeV}$. Selection B is applied, including the Λ_c^+ mass requirement of $2270 \text{ MeV}/c^2 < M([pK^-\pi^+]_{\Lambda_c^+}) < 2306 \text{ MeV}/c^2$. The right-sign (RS) $m(\Lambda_c^+ K^- \pi^+)$ distribution is shown along with the wrong-sign (WS) $m(\Lambda_c^+ K^- \pi^-)$ distribution normalised to have the same area as the RS sample. The dotted red line of $3518.7 \text{ MeV}/c^2$ indicates the mass of the Ξ_{cc}^+ baryon reported by SELEX and the dashed blue line of $3621.2 \text{ MeV}/c^2$ indicates the mass of the Ξ_{cc}^{++} baryon.

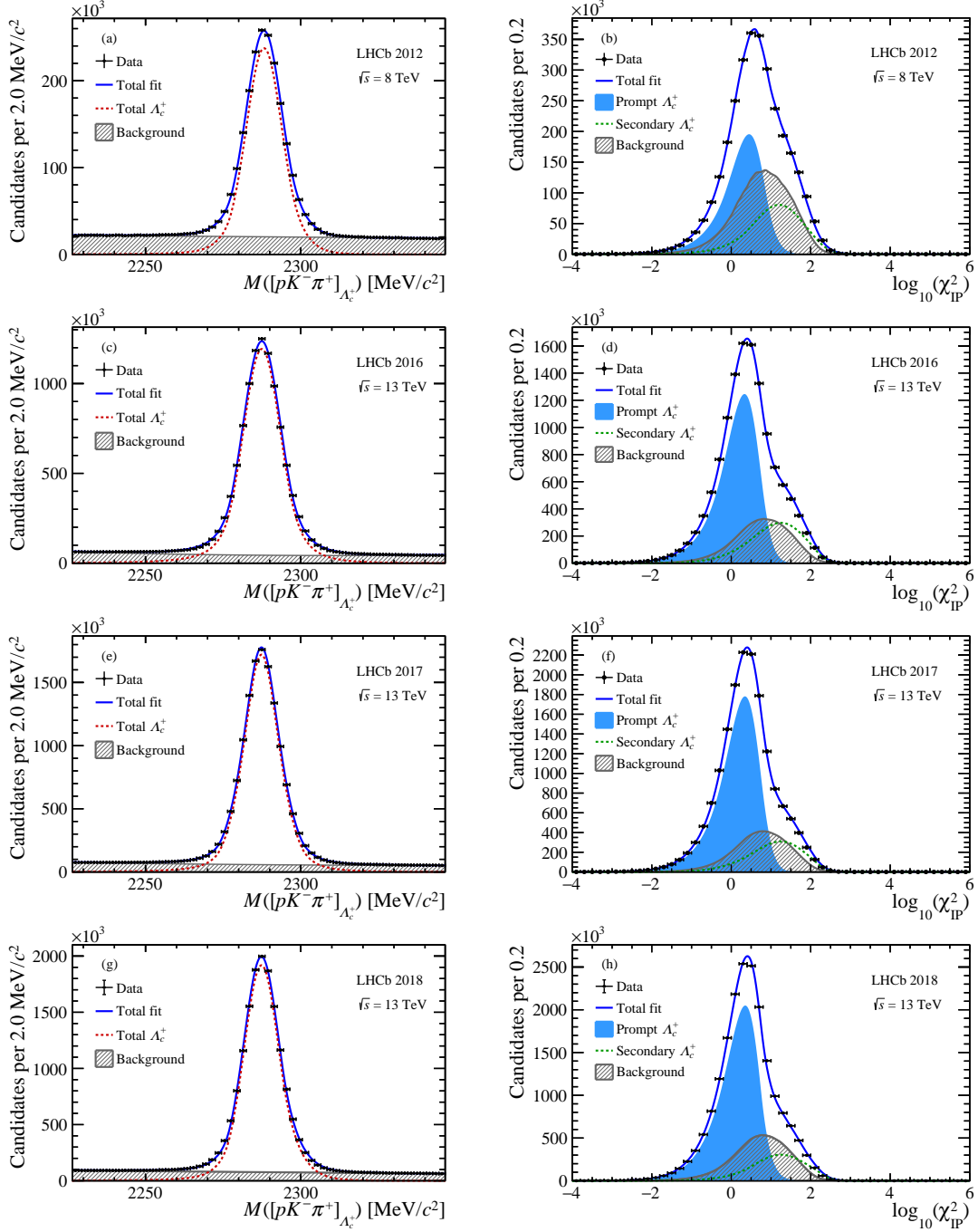


Figure 9: Mass distributions of selected Λ_c^+ normalisation mode candidates in the (a) 2012, (c) 2016, (e) 2017, and (g) 2018 data samples with their fit results overlaid. The $\log_{10}(\chi_{\text{IP}}^2)$ distributions of the candidates, together with their fit result, are also shown for (b) 2012, (d) 2016, (f) 2017, and (h) 2018 data samples.

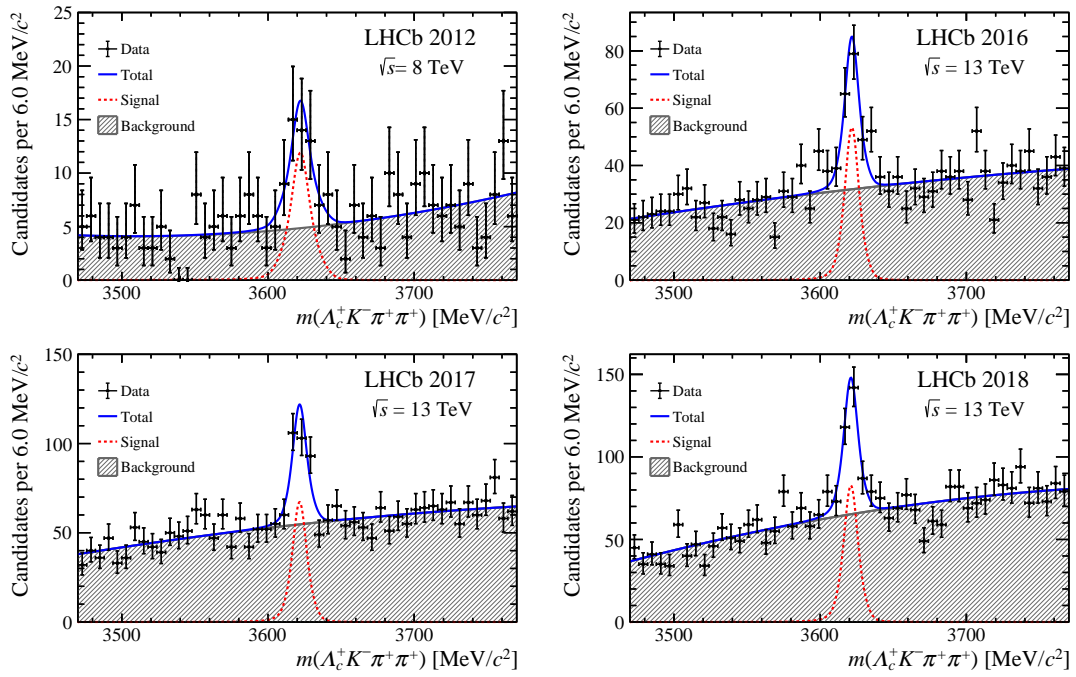


Figure 10: Mass distributions of Ξ_{cc}^{++} normalisation mode candidates, overlaid with the fit results, for the (top left) 2012, (top right) 2016, (bottom left) 2017, and (bottom right) 2018 data samples.