



Study of  $\Lambda_b^0$  and  $\Xi_b^0$  decays to  
 $\Lambda h^+ h'^-$  and evidence for  $CP$   
violation in  $\Lambda_b^0 \rightarrow \Lambda K^+ K^-$  decays  
Supplementary material

# 1 Supplemental material

## 2 1 Summaries of the fit results for $\mathcal{A}^{CP}$ measurements

3 Figure S1 shows the mass spectrum of the control channel  $\Lambda_b^0 \rightarrow \Lambda_c^+(\rightarrow \Lambda\pi^+)\pi^-$ , separately  
 4 for baryon and antibaryon samples. Figure S2 shows the mass spectra of the  $\Lambda_b^0 \rightarrow \Lambda K^+\pi^-$ ,  
 5  $\Lambda_b^0 \rightarrow \Lambda\pi^+\pi^-$  and  $\Xi_b^0 \rightarrow \Lambda K^-\pi^+$  decays, separately for baryon and antibaryon samples.  
 6 The same BDT classifier is used in selecting candidates for the  $\Lambda_b^0$  and  $\Xi_b^0$  modes, but  
 7 with a different FoM. Due to the relatively smaller number of  $\Xi_b^0$  signal yields, when  
 8 determining its selection criteria the  $N_S/(\sqrt{N_B} + 2.5)$  FoM method is applied, as shown in  
 9 Fig. S1 (bottom), whereas when studying the  $\Lambda_b^0$  modes, the  $N_S/\sqrt{N_S + N_B}$  FoM method  
 is applied, as shown in Fig. S2 (top) (middle) and Fig. S1.

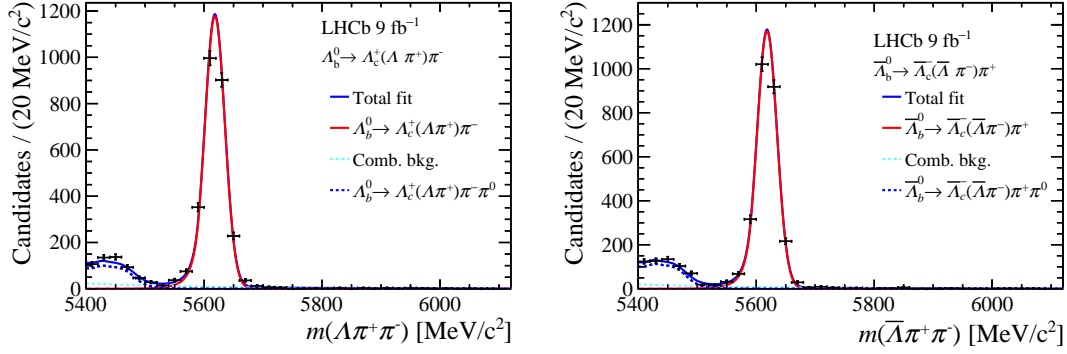


Figure S1: Mass distribution for the (left)  $\Lambda_b^0 \rightarrow \Lambda_c^+(\rightarrow \Lambda\pi^+)\pi^-$  and (right)  $\bar{\Lambda}_b^0 \rightarrow \bar{\Lambda}_c^-(\rightarrow \bar{\Lambda}\pi^-)\pi^+$  control mode.

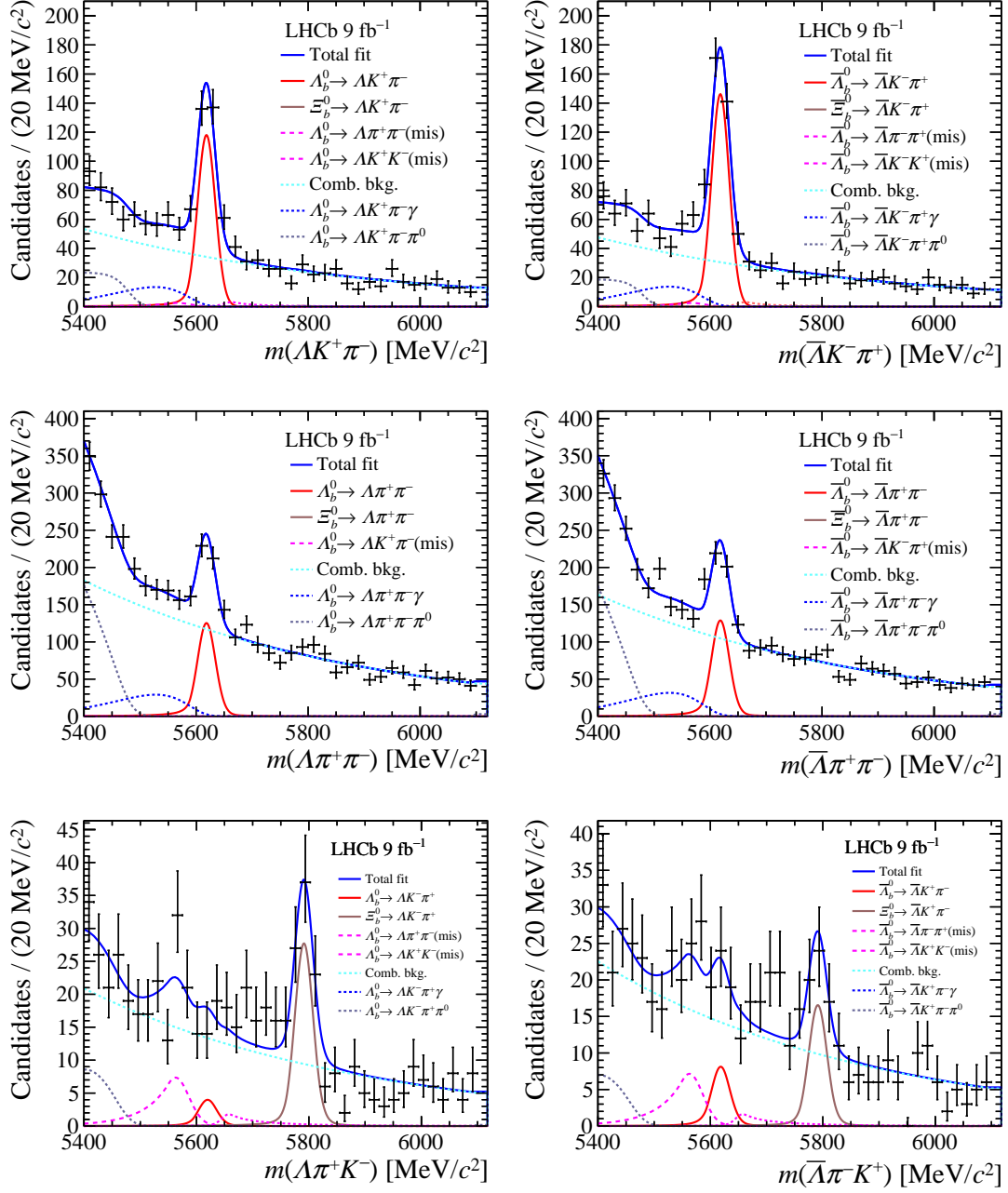


Figure S2: Distributions of  $m(\Lambda h^+ h^-)$  for (top left)  $\Lambda_b^0 \rightarrow \Lambda K^+ \pi^-$ , (top right)  $\bar{\Lambda}_b^0 \rightarrow \bar{\Lambda} K^- \pi^+$ , (middle left)  $\Lambda_b^0 \rightarrow \Lambda \pi^+ \pi^-$ , (middle right)  $\bar{\Lambda}_b^0 \rightarrow \bar{\Lambda} \pi^+ \pi^-$ , (bottom left)  $\Xi_b^0 \rightarrow \Lambda K^- \pi^+$ , and (bottom right)  $\Xi_b^- \rightarrow \bar{\Lambda} K^+ \pi^-$  decays in data, together with the fit results. The selection criteria are optimized with the  $N_S/\sqrt{N_S + N_B}$  FoM for  $\Lambda_b^0$  distributions and  $N_S/(\sqrt{N_B} + 2.5)$  FoM for  $\Xi_b^0$  distributions.