

# 1 Supplementary material for LHCb-PAPER-2015-057

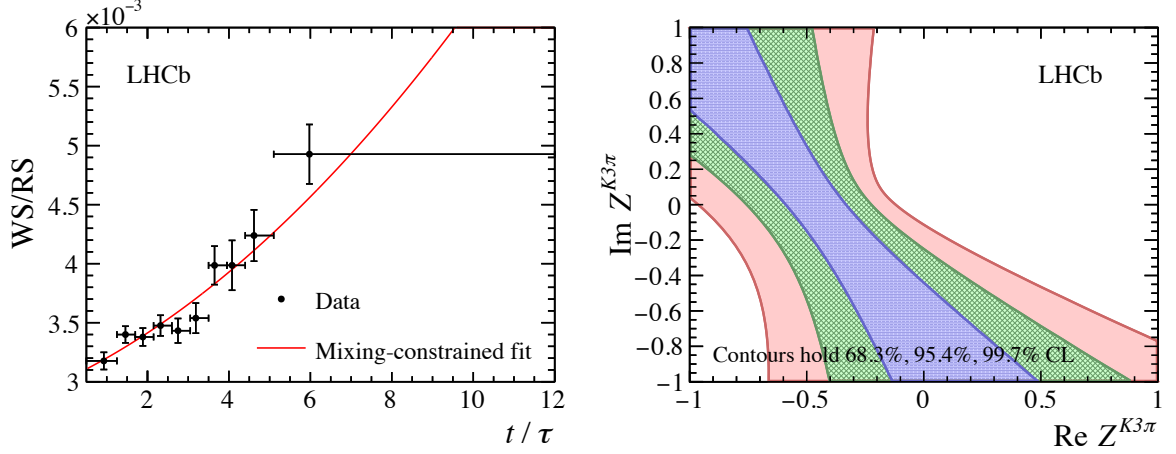


Figure 4: (left) Decay-time evolution of the background-subtracted and efficiency corrected WS/RS ratio (points) with the results of the mixing-constrained fit superimposed (solid line). The bin centres are set to the decay-time where  $R(t)$  is equal to the bin integrated ratio  $\tilde{R}$ , (right) confidence-level (CL) regions in the  $Z^{K3\pi}$  Argand plane taken from the mixing-constrained fit. Here  $Z^{K3\pi} \equiv R_D^{K3\pi} e^{-i\delta_D^{K3\pi}}$  is the complex interference parameter, as defined in Ref. [15].

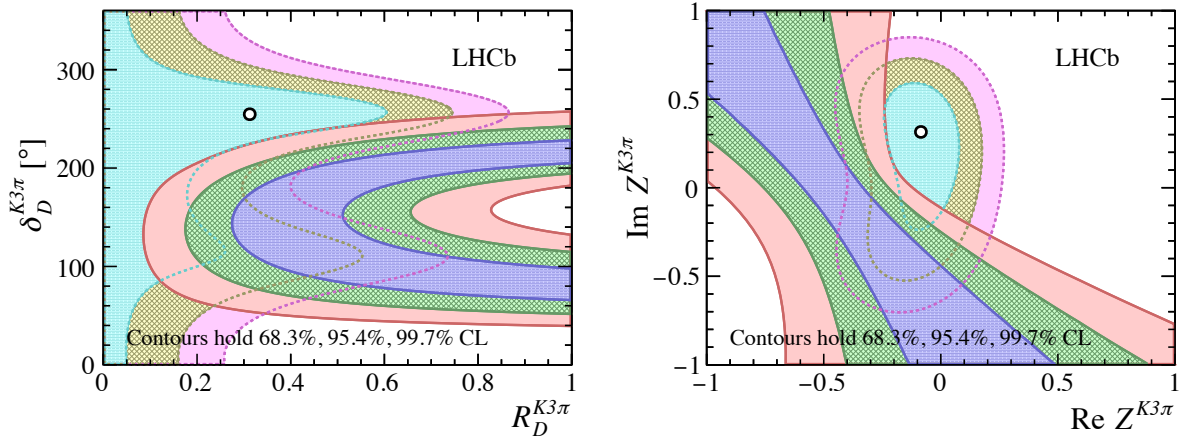


Figure 5: Confidence-level (CL) regions in the (left)  $(R_D^{K3\pi}, \delta_D^{K3\pi})$  plane, (right)  $Z^{K3\pi}$  Argand plane, taken from the mixing-constrained fit. Here  $Z^{K3\pi} \equiv R_D^{K3\pi} e^{-i\delta_D^{K3\pi}}$  is the complex interference parameter, as defined in Ref. [15]. The contours from LHCb (solid lines) are overlaid on the contours from CLEO [30] (dashed lines).

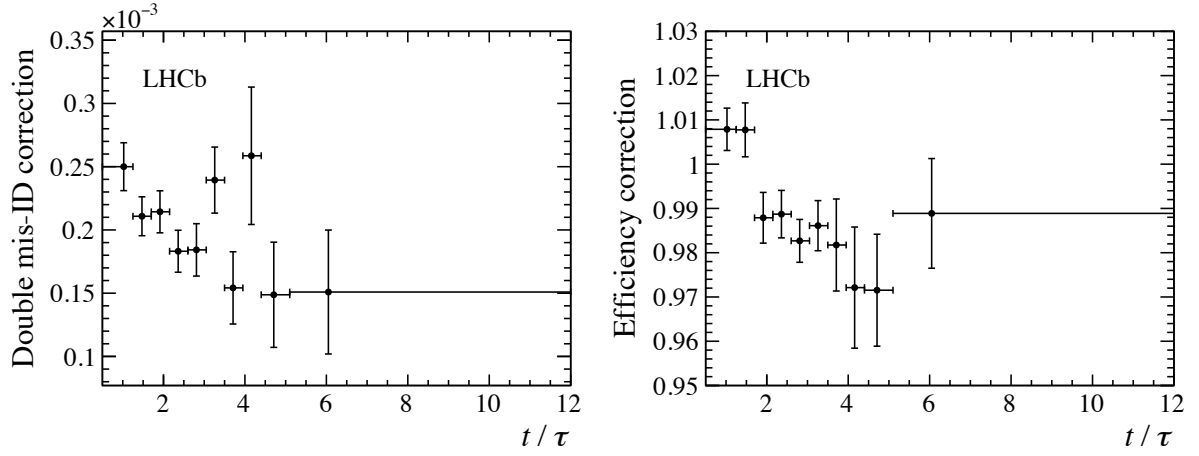


Figure 6: (left) Decay-time evolution of the additive correction used to correct the WS/RS ratio for the presence of misidentified backgrounds. (right) The decay-time evolution of the multiplicative correction used to correct the WS/RS ratio for efficiency differences between WS and RS decays.

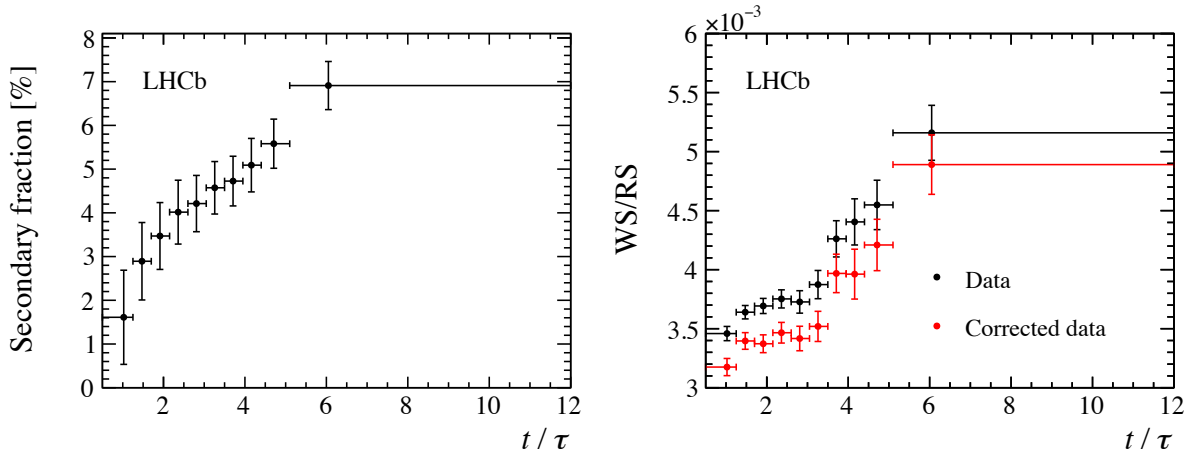


Figure 7: (left) Estimated secondary fraction as a function of decay-time. (right) The decay-time evolution of the measured WS/RS ratio both before (black points) and after (red points) background-subtractions and efficiency corrections are applied.

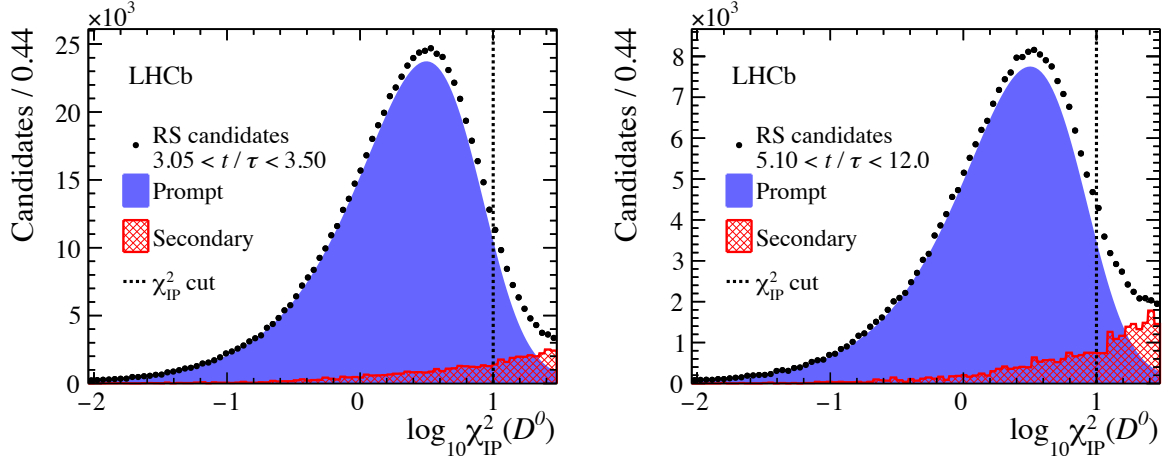


Figure 8: The background-subtracted  $\chi_{\text{IP}}^2(D^0)$  distribution of RS candidates (points). A fit is performed to this distribution with a prompt (blue shaded area) and secondary (red hashed area) component: the PDF describing the former is determined from signal candidates with decay-times smaller than  $0.8\tau$ ; the PDF describing the latter is found from a subsample of candidates that are also compatible with the decay chain  $B \rightarrow D^* \mu X$ . The vertical dotted line indicates the selection requirement used in the analysis.

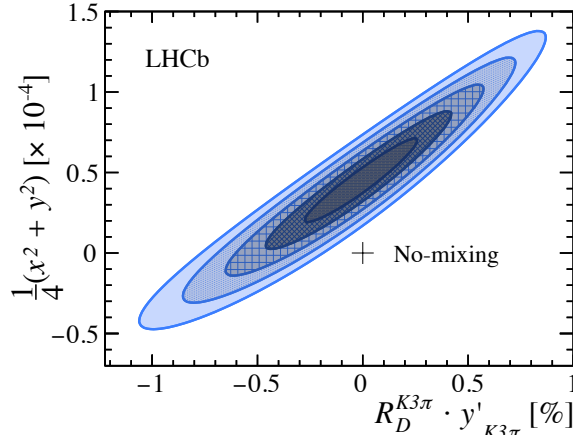


Figure 9: Confidence-level (CL) regions in the  $(\frac{1}{4}(x^2 + y^2), R_D^{K3\pi} \cdot y'_{K3\pi})$  plane taken from the mixing-allowed fit. The contours contain 68.3% ( $1\sigma$ ), 95.4% ( $2\sigma$ ), 99.7% ( $3\sigma$ ),  $1 - 6.33 \times 10^{-5}$  ( $4\sigma$ ) and  $1 - 5.73 \times 10^{-7}$  ( $5\sigma$ ) CLs. The no-mixing hypothesis is indicated with a black cross, and is excluded at a significance level of 8.2 standard deviations.