Supplementary material for LHCb-PAPER-2016-041

Figure 1: Top: distribution of $m(\pi^+\pi^-) (K^0_S)$ for $D^\pm \to K^0_S \pi^\pm$ candidates in (a) logarithmic and (b) linear scale. Bottom: distribution of $m(K^+K^-) (\phi)$ for $D_s^+ \to \phi \pi^\pm$ candidates in (c) logarithmic and (d) linear scale.
Figure 2: Distribution of (a) $m(\phi\pi^{\pm})$ and (b) $m(K_S^0\pi^{\pm})$ for $D_{(s)}^+ \to \phi\pi^{\pm}$ and $D_{(s)}^+ \to K_S^0\pi^{\pm}$ candidates, respectively.
Figure 3: Distribution of $\eta - p_T$ of the bachelor pion for $D_{(s)}^{\pm} \rightarrow \eta' \pi^{\pm}$ candidates in the (a) $T1$, (b) $T2$, and (c) $T3$ samples. The $\eta - p_T$ bin edges are marked by dashed lines.
Figure 4: Distribution of $p_T - \eta$ of the bachelor pion for $D_s^\pm \rightarrow \phi \pi^\pm$ candidates in the (a) $T1$, (b) $T2$, and (c) $T3$ samples. The $p_T - \eta$ bin edges are marked by dashed lines.
Figure 5: Distribution of $p_T - \eta$ of the bachelor pion for $D^\pm \to K^0_S \pi^\pm$ candidates in the (a) $T1$, (b) $T2$, and (c) $T3$ samples. The $p_T - \eta$ bin edges are marked by dashed lines.
Figure 6: Top: normalized distributions of (a) $\log_{10}(p_T \text{ [MeV/c]})$ and (b) $\eta$ of the bachelor pion in $D^+_s \rightarrow \eta' \pi^\pm$ (points with errors), $D^+_s \rightarrow \phi \pi^\pm$ (red, solid), and $D^\pm \rightarrow K_{S}^0 \pi^\pm$ (blue, dashed) decays. Bottom: normalized distributions of (c) $\log_{10}(p_T \text{ [MeV/c]})$ and (d) $\eta$ of the $D^+_s$ candidates in $D^+_s \rightarrow \eta' \pi^\pm$ (points with errors), $D^+_s \rightarrow \phi \pi^\pm$ (red, solid), and $D^\pm \rightarrow K_{S}^0 \pi^\pm$ (blue, dashed) decays.
Figure 7: Mass distribution of $\eta'\pi^\pm$ candidates, combined over all kinematic bins, pp centre-of-mass energies, and hardware trigger selections, for (a) positively and (b) negatively charged $D_{(s)}^\pm$ candidates. Points with errors represent data, while the curves represent the fitted model (solid), the $D_{(s)}^\pm \rightarrow \phi_3\pi^\pm$ (dashed) and $D^\pm \rightarrow \phi_3\pi^\pm$ (long-dashed) components, and the sum of all background contributions (dotted), including combinatorial background. Residuals divided by the corresponding uncertainty are shown under each plot.