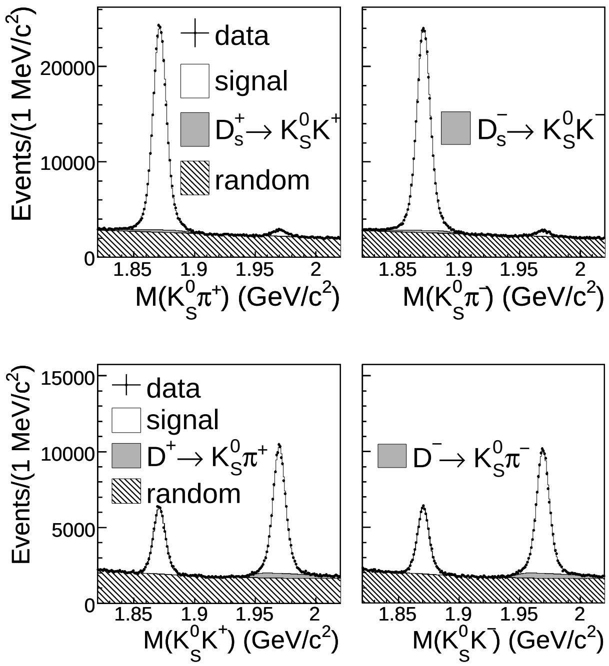

FIG. 1: Invariant mass distributions for the $K_S^0\pi^\pm$ and $K_S^0K^\pm$ final states. Points with error bars (note the small size of them due to the large sample) show the data and the histograms show the results of the parameterizations of the data. Signal, peaking background, and random combinatorial background components are also shown.

metry other than $A_\epsilon^{h^+}$. Eq. (2) can therefore be expressed as

$$A_{\rm rec}^{X^+\to K_S^0h^+} \;=\; A_{CP}^{X^+\to K_S^0h^+} \;+\; A_{FB}^{X^+} \;+\; A_\epsilon^{h^+}. \qquad (3)$$

To correct for the asymmetries other than A_{CP}, we use reconstructed samples of $D_s^+ \to \phi\pi^+$ and $D^0 \to K^-\pi^+$ decays and assume that A_{CP} in CF decays is negligibly small at the current experimental sensitivity and that A_{FB} is the same for all charmed mesons. We reconstruct ϕ mesons via their K^+K^- decay channel for $D_s^+ \to \phi\pi^+$, requiring the K^+K^- invariant mass to be between 1.01 and 1.03 GeV/c^2.

The measured asymmetry for $D_s^+ \to \phi\pi^+$ is the sum of $A_{FB}^{D_s^+}$ and $A_\epsilon^{\pi^+}$. Hence one can extract the A_{CP} value for the $K_S^0\pi^+$ final states by subtracting the measured asymmetry for $D_s^+ \to \phi\pi^+$ from that for $D_{(s)}^+ \to K_S^0\pi^+$. The subtraction is performed in bins of π^+ momentum, $p_\pi^{\rm lab}$, and polar angle in the laboratory system, $\cos\theta_\pi^{\rm lab}$ (because $A_\epsilon^{h^+}$ depends on these two variables while it is uniform in azimuthal angle), and the charmed meson's polar angle in the center-of-mass system, $\cos\theta_{D_{(s)}^+}^{\rm CMS}$ (since $\cos\theta_{D_{(s)}^+}^{\rm CMS}$ is correlated with $\cos\theta_\pi^{\rm lab}$ and $A_{FB}^{D_{(s)}^+}$ depends on it). The choice of the three-dimensional (3-D) binning is selected in order to avoid large statistical fluctuations in each bin. Figure 2 shows the A_{CP} map of $D^+ \to K_S^0\pi^+$ in bins of ($p_\pi^{\rm lab}$, $\cos\theta_\pi^{\rm lab}$, $\cos\theta_{D_{(s)}^+}^{\rm CMS}$). Calculating a weighted average of the A_{CP} values over the 3-D bins, we obtain $A_{CP}^{D^+\to K_S^0\pi^+} = (-0.71 \pm 0.26)\%$ where the uncertainty originates from the finite size of the $D^+ \to K_S^0\pi^+$ (0.19%) and $D_s^+ \to \phi\pi^+$ (0.18%) samples. The χ^2/d.o.f over the 3-D bins is found to be 31.4/24 which corresponds to 14% probability.

The statistical precision of the $D_s^+ \to K_S^0\pi^+$ sample is too low to allow for a 3-D correction to $A_{\rm rec}^{D_s^+\to K_S^0\pi^+}$. For this mode we correct for asymmetries other than A_{CP} with an inclusive correction obtained by subtracting $A_{\rm rec}^{D^+\to K_S^0\pi^+}$ from $A_{CP}^{D^+\to K_S^0\pi^+}$ after integrating over the entire ($p_\pi^{\rm lab}$, $\cos\theta_\pi^{\rm lab}$, $\cos\theta_{D^+}^{\rm CMS}$) space. The inclusive correction is $(-0.34\pm0.18)\%$ where the uncertainty is entirely due to the statistical uncertainty of the $D_s^+ \to \phi\pi^+$ sample. The value of $A_{CP}^{D_s^+\to K_S^0\pi^+}$ is measured to be $(+5.45\pm2.50)\%$, where the uncertainty is statistical only.

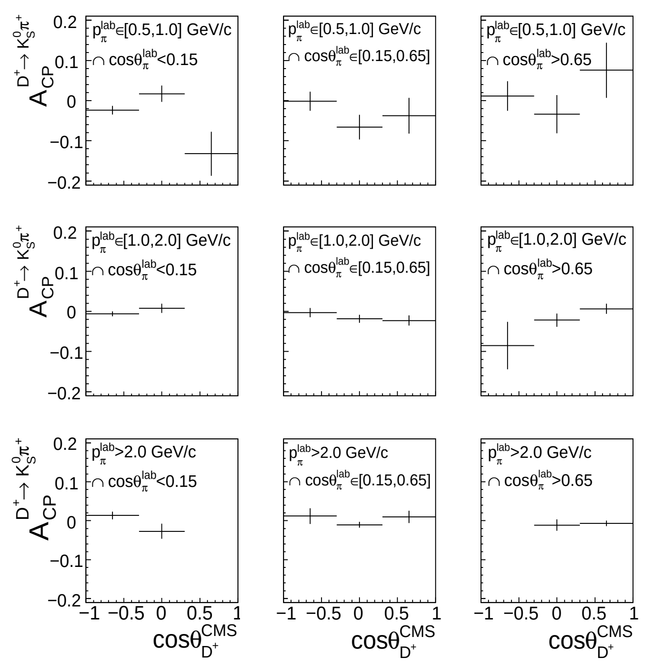

FIG. 2: Measured A_{CP} values for $D^+ \to K_S^0\pi^+$ in bins of ($p_\pi^{\rm lab}$, $\cos\theta_\pi^{\rm lab}$, $\cos\theta_{D^+}^{\rm CMS}$). Empty bins where no entries are plotted have no statistics.

The dominant source of systematic uncertainty in the $A_{CP}^{D_{(s)}^+\to K_S^0\pi^+}$ measurement is the uncertainty in the $A_{\rm rec}^{D_s^+\to\phi\pi^+}$ determination, which originates from the following sources: the statistical uncertainty of the selected $D_s^+ \to \phi\pi^+$ sample (0.18%); the choice of the $M(K^+K^-)$ interval (0.03%); and the choice of binning for the 3-D map of $A_{\rm rec}^{D_s^+\to\phi\pi^+}$ (0.03%). Another source is the choice of fitting parameters for the invariant mass dis-