



FIG. 8: The correlation coefficients of the unfolded mass spectra for three-prong decays. See Fig. 6 for the convention of the bin numbers. The pattern is the reflection of the detailed unfolding procedure.

measure the kaon and pion identification efficiencies and their uncertainties using the control sample of  $D^{*+} \rightarrow D^0 \pi_s^+$  and  $D^0 \rightarrow K^- \pi^+$  events. Since these efficiencies are applied to the efficiency matrix, we propagate the uncertainties in the kaon and pion identification efficiencies to the covariance matrix of branching fraction measurement. The kaon identification systematic uncertainties for  $\tau^- \rightarrow \pi^- \pi^+ \pi^- \nu_\tau$ ,  $\tau^- \rightarrow K^- \pi^+ \pi^- \nu_\tau$ ,  $\tau^- \rightarrow K^- K^+ \pi^- \nu_\tau$ , and  $\tau^- \rightarrow K^- K^+ K^- \nu_\tau$  decays are 1.3%, 3.9%, 1.9%, and 5.4%, respectively. For lepton identification efficiency uncertainties, we use  $\gamma\gamma \rightarrow e^+ e^- / \mu^+ \mu^-$  events.

In order to take into account the effects of the mass spectra on the branching fraction measurements, we have determined the mass spectra of the four dominant decay modes iteratively. The uncertainties in branching fractions due to the mass spectra are evaluated