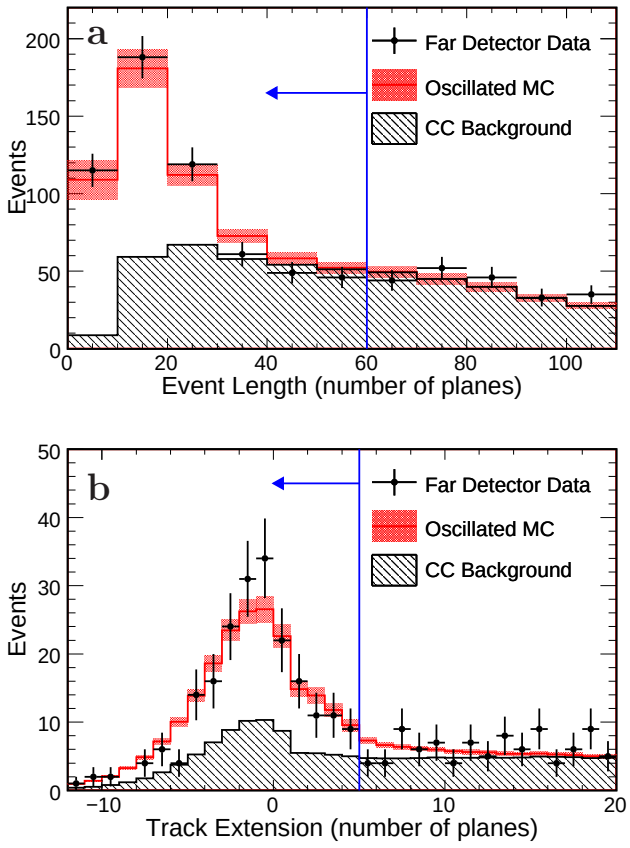

FIG. 4: Far-detector data versus predictions from the Monte Carlo (MC) simulation including $\nu_\mu \rightarrow \nu_\tau$ oscillations, for distributions of the classification variables (a) *event length* and (b) *track extension*. The data quality requirements of Sec. III are applied. The shaded bands show the systematic errors on the MC predictions. The arrows indicate events selected as neutral-current-like.

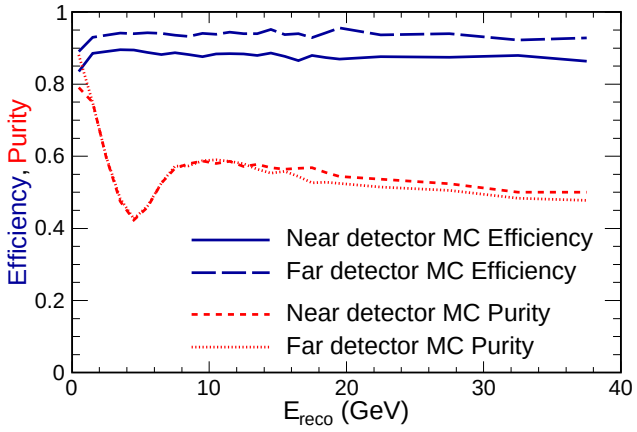

FIG. 5: Selection efficiency and sample purity for Monte Carlo (MC) events selected as neutral-current candidates in the near and far-detectors, as a function of reconstructed event energy. Detector selection, fiducial volume and neutral-current/charged-current separation requirements have been applied. The shapes of both efficiency and purity distributions are observed to be very similar for each of the two MINOS detectors.

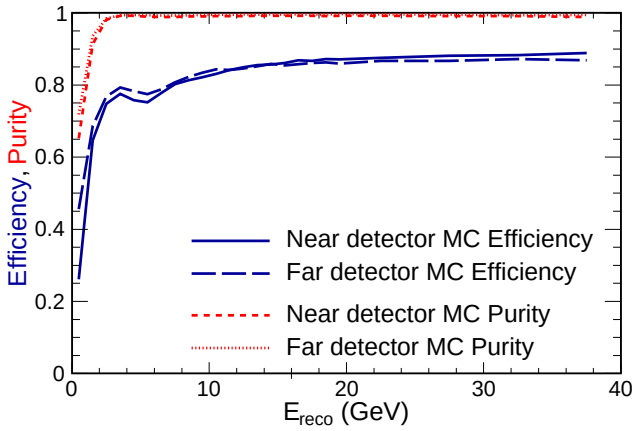

FIG. 6: Distributions of selection efficiency (lower curves) and sample purity (upper curves) versus reconstructed event energy, for Monte Carlo (MC) events selected as charged-current candidate events in the near-detector and in the far-detector.

lected charged-current sample which contains very little neutral-current background. For both samples, the data points are seen to fall within or near the 1 standard deviation range of the systematic uncertainty of the Monte Carlo simulation.

V. FAR-DETECTOR PREDICTION

The predictions of the energy spectra of the neutral-current and charged-current samples at the far-detector are based on the observed near-detector data and make use of the expected relationship between the neutrino fluxes at the two sites. The process of making the predictions is called "extrapolation" and may be viewed as making corrections to the simulation of interactions in the far-detector based on the energy spectrum measured in the near-detector.

This analysis uses an extrapolation technique called the "far over near" (F/N) method [4, 30]. This method makes the prediction of the far-detector spectrum by taking the product of two quantities. The first quantity is the ratio of the expected number of events from the Monte Carlo simulation for each energy bin in the far-detector and near-detector spectra. The expected number of events for each energy bin in the far-detector spectra depends on the composition of event types entering the samples and the corresponding oscillation probabilities for that energy. The second quantity is the number