

CC-Inclusive Cross Section Measured With The T2K Near Detector

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Abstract. T2K has performed the first measurement of muon neutrino inclusive charged current interactions on carbon at neutrino energies of ~ 1 GeV where the measurement is reported as a flux-averaged double differential cross section in muon momentum and angle. The flux is predicted by the beam Monte Carlo and external data, including the results from the NA61/SHINE experiment. The data used for this measurement were taken in 2010 and 2011, with a total of $1.08 \cdot 10^{20}$ protons-on-target. The analysis is performed on 4485 inclusive charged current interaction candidates selected in the most upstream fine-grained scintillator detector of the near detector. The flux-averaged total cross section is $\langle \sigma_{CC} \rangle = (6.91 \pm 0.13(\text{stat}) \pm 0.84(\text{syst})) 10^{-39} \text{ cm}^2/\text{nucleon}$ for a mean neutrino energy of 0.85 GeV.

Keywords: charge current, neutrino interaction cross section, T2K experiment

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SUMMARY

The flux integrated charge current inclusive cross section measurement as measured by the T2K near detector has just been submitted to PRD[1]. The main results are summarized in Figure 1 and 2.

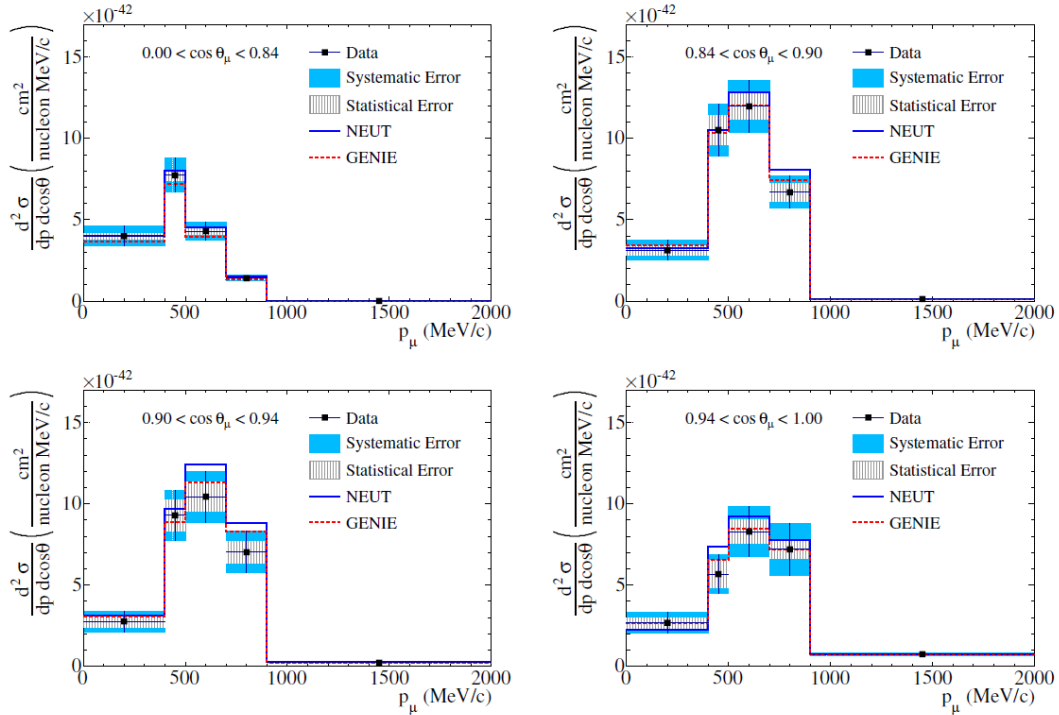


FIGURE 1. The 4 plots show the CC-inclusive differential cross section in $\text{cm}^2/\text{nucleon}/\text{MeV}$, with statistical and systematics errors. Each graph corresponds to a different range of muon angle.

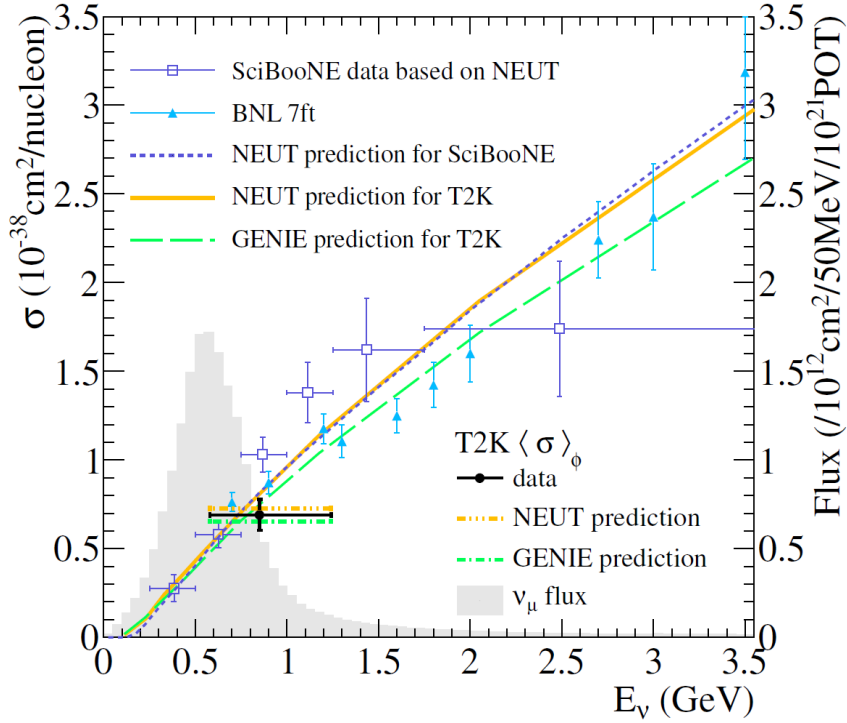


FIGURE 2. The figure shows the T2K total flux-averaged cross section with the NEUT and GENIE predictions for T2K and SciBooNE. The T2K data point is placed at the flux mean energy. The vertical error bars represent the total (statistical and systematic) uncertainty and the horizontal bar represents 68% of the flux of each side of the mean energy. The T2K flux distribution is shown in grey.

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REFERENCES

1. K. Abe et al. (T2K collaboration), “Measurement of the Inclusive NuMu Charged Current Cross Section on Carbon in the Near Detector of the T2K Experiment”, arXiv:1302.4908, submitted to PRD.