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P3.033 Charged-current coherent pion production on oxygen nuclei in the T2K near detector

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Neutrino-induced coherent pion production has already been measured by several experiments, at different energies and for different targets. For a neutrino energy around 1-2 GeV, it has been puzzling to observe that the K2K and the SciBooNE experiments results do not indicate evidence of such a process, while MINERvA and ArgoNEUT, that have a neutrino energy greater than 5 GeV, do. The mean energy of the T2K neutrinos is below 1 GeV. It is therefore an interesting range to search for coherent interactions and try to explain the ambiguity previously mentioned. Such an analysis has been performed on carbon nuclei where a small coherent excess has been found.

We report here the status of the current cross-section measurement for coherent π^+ production on oxygen nuclei induced by muon neutrinos from the T2K beamline. This analysis is performed using the tracker system of the off-axis near detector (ND280) which consists of three argon gas Time Projection Chambers (TPC) between which two Fine-Grained Detectors (FGD) are located. While the first FGD is made of plastic scintillator, the second one has alternate layers of scintillator and water. The signal is selected from events containing exactly one muon and one charged pion, where the neutrino vertex is in the water layers. Those events must then pass additional cuts related to a coherent selection. The main backgrounds coming from baryonic resonances and coherent interactions in the scintillator layers of FGD2 are taken into account in the cross-section extraction procedure. The systematic errors from flux, detector and cross-section parameters are accounted for as well.