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## **Study of charged current interactions on carbon with a single positively charged pion in the final state at the T2K off-axis near detector with $4\pi$ solid angle acceptance**

The long-baseline neutrino experiment Tokai-to-Kamiokande (T2K) is located in Japan and is measuring neutrino oscillation parameters. An accelerator at J-PARC (Tokai) produces a beam of neutrinos or antineutrinos, that are then detected in a near detector complex (ND280) and at the far detector (Super-Kamiokande). The muon neutrino charged current interactions in ND280 are used to predict the event rate at the far detector, in particular constraining the neutrino flux and neutrino-nucleus interaction cross-sections, which are the dominant systematic uncertainties in the oscillation analysis. In the talk, we will focus on neutrino CC1 $\pi$  interactions, where a muon and a single positively charged pion are produced in the final state. Those interactions constitute the main background for the muon neutrino disappearance measurement when the charged pion is not observed in the SuperKamiokande water Cherenkov detector, and a precise understanding of them is relevant for all current and planned neutrino oscillation experiments. Single pion production is primarily sensitive to resonant processes but also non-resonant contributions as well as coherent pion production. Additionally, final-state interactions in the nuclear target have to be taken into account.

We will present a study of CC1 $\pi$  interactions on carbon as selected at the T2K off-axis near detector with a  $4\pi$  solid angle acceptance. In particular, we will show an interesting characterization of those interactions through the measurement of Adler Angles. Adler Angles carry information about the polarization of the Delta resonance and the interference with the non-resonant single pion production. We will show sensitivity studies with improved statistics and solid angle acceptance with regard to the previous T2K measurements.

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