



Single Pion Production in Neutrino-Nucleon Reactions

Monday, 8 August 2016 18:30 (2 hours)

This work represents an extension of the single pion production model proposed by D. Rein. The model consists of resonant pion production (Rein-Sehgal model and based on helicity amplitudes) and non-resonant background contributions coming from three born diagrams in the helicity basis.

The new work includes **lepton mass effects**, and non-resonance interaction is described by **five diagrams** as it is proposed in HNV paper. The main challenge of this work has been to calculate them in the helicity basis in order to evaluate the **interference effect** of resonant and non-resonant interactions.

The present model can describe single pion production in neutrino and anti-neutrino induced charged current interactions, i.e.

$$\begin{equation} \nu_{\mu} + p \longrightarrow \mu^{-} p \pi^{+}, \bar{\nu}_{\mu} + p \longrightarrow \mu^{+} p \pi^{-} \end{equation}$$

$$\begin{equation} \nu_{\mu} + n \longrightarrow \mu^{-} n \pi^{+}, \bar{\nu}_{\mu} + n \longrightarrow \mu^{+} n \pi^{-} \end{equation}$$

$$\begin{equation} \nu_{\mu} + n \longrightarrow \mu^{-} p \pi^{0}, \bar{\nu}_{\mu} + p \longrightarrow \mu^{+} n \pi^{0} \end{equation}$$

The model prediction is in good agreement with all existing bubble chamber neutrino and anti-neutrino data with $W < 2 \text{ GeV}$ cut. The comparisons are performed for angular and W distributions, Q^2 -differential cross-section and integrated cross-section for different channels.

A model that has better agreements with data can reduce the uncertainties in neutrino oscillation measurements which is the main goal of neutrino experiments.

Primary author: KABIRNEZHAD, Monireh

Presenter: KABIRNEZHAD, Monireh

Session Classification: Poster Session

Track Classification: Neutrino Physics