



Contribution ID: 135

Type: **not specified**

Probing Neutrino Mass Hierarchy by Comparing the Charged-Current and Neutral-Current Interaction Rates of Supernova Neutrinos

Wednesday, 13 July 2016 11:20 (20 minutes)

The neutrino mass hierarchy is one of the neutrino fundamental properties yet to be determined. We introduce a method to determine neutrino mass hierarchy by comparing the interaction rate of neutral current (NC) interactions, $\nu(\bar{\nu}) + p \rightarrow \nu(\bar{\nu}) + p$, and inverse beta decays (IBD), $\bar{\nu}_e + p \rightarrow n + e^+$, of supernova neutrinos in scintillation detectors. Neutrino flavor conversions inside the supernova are sensitive to neutrino mass hierarchy. Due to Mikheyev-Smirnov-Wolfenstein effects, the full swapping of $\bar{\nu}_e$ flux with the $\bar{\nu}_x$ ($x = \mu, \tau$) one occurs in the inverted hierarchy, while such a swapping does not occur in the normal hierarchy. As a result, more high energy IBD events occur in the detector for the inverted hierarchy than the high energy IBD events in the normal hierarchy. By comparing IBD interaction rate with the mass hierarchy independent NC interaction rate, one can determine the neutrino mass hierarchy.

Summary

Primary author: LIN, Guey-Lin (National Chiao-Tung University)

Co-authors: Dr LEE, Fei-Fan (National Chiao-Tung University); Mr LEE, Feng-Shiuh (National Chiao-Tung University); LAI, KWANG-CHANG (CHANG GUNG UNIVERSITY); Dr LIU, Tsung-Che (National Taiwan University); Prof. YANG, Yi (National Chiao-Tung University)

Presenter: LIN, Guey-Lin (National Chiao-Tung University)

Session Classification: Parallel I

Track Classification: Neutrino Physics