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Nuclear Dependence of Antineutrino Deep Inelastic Scattering in two dimensions at MINERvA

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MINERvA (Main Injector Neutrino ExpeRiment to study ν-A interactions) is a dedicated (anti)neutrino-nucleus experiment in the few GeV energy region which has used the high-intensity NuMI beamline facility at the Fermi National Accelerator Laboratory.

The experiment was performed using several nuclear targets, Iron, Carbon, Lead, Water and Hydrocarbon to study the nuclear medium effects in the low ($< E_{\bar{\nu}_\mu} > \sim 3 GeV$) and intermediate ($< E_{\bar{\nu}_\mu} > \sim 6 GeV$) energy region. The idea is to understand the nuclear medium effects by taking the ratio of cross section like $\frac{\sigma_i}{\sigma_{CH}}$ and $\frac{d\sigma_i}{d\sigma_{CH}}$ where i = C, Fe, Pb, etc. We shall present the current progress on the two dimensional (2D) charge current antineutrino Deep Inelastic Scattering (DIS) analysis using medium energy $\bar{\nu}_\mu$ beam. The event selection is based on a set of different selection cuts and the DIS signal is defined as the events which contribute in the kinematical region defined by $Q^2 > 1 GeV^2$ and W $> 2GeV$. We will discuss the different steps involved in the analysis. This study will give insight to both weak hadron physics and in the understanding of the nuclear medium effects in antineutrino nucleus interaction.

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