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EM vs Weak Structure Functions in DIS processes

We shall present the results for nuclear correction factor for the electromagnetic and weak structure functions. The calculations have been performed in several nuclei like
^{9}Be, ^{12}C, ^{40}Ca, ^{56}Fe, and ^{208}Pb. These calculations are performed in a microscopic nuclear model using relativistic nuclear spectral functions which incorporate Fermi motion,
nuclear binding, and nucleon correlations. The pion and rho meson cloud contributions are calculated from a microscopic model of meson self-energies. The target mass correction has been made using prescription of Schienbein et al.~\cite{tmc} and shadowing effect has been taken into
account using Glauber-Gribov multiple scattering model following the prescription of Kulagin and Petti~\cite{kulagin2006}. We have obtained the ratios of the structure function in nuclei with the deuteron structure function and compared the results~\cite{sajjadnpa} with the available JLab data
with special attention to the slope of the x distributions. Using the same prescription we have obtained the results in weak structure functions~\cite{prc87,prc85,prc84}
and compared the results with the available data on the weak structure functions and differential scattering cross sections.
In this conference we shall explicitly present the results of the medium effects on $F_1^{\nu N}(x, Q^2)$, $F_1^{\bar{\nu} N}(x, Q^2)$, $F_2^{\nu N}(x, Q^2)$, $F_2^{\bar{\nu} N}(x, Q^2)$,
$xF_3^{\nu N}(x, Q^2)$, $xF_3^{\bar{\nu} N}(x, Q^2)$, the study of which may be quite useful as the future large samples and better beam-related systematics
will allow neutrino experiments to independently isolate all the structure functions.

Summary

For the next generation long baseline experiments which are aimed to precisely determine the parameters of the PMNS mixing matrix such as θ_{13} and the CP violating phase δ it has been realized that for these experiments a good knowledge of the anti(neutrino) DIS cross sections is very important. As these experiments are going to use nuclear targets, therefore a better understanding of medium effects in the DIS processes is required. The present understanding of nuclear correction is based mainly on charged current lepton nucleus DIS data, which may not be necessarily correct while applying it to anti(neutrino)-A DIS data.
In this work we have performed a model dependent analysis of nuclear corrections in the weak structure functions and observed that nuclear correction in F_3^A is different from F_2^A. We shall present the results for nuclear correction factor in the structure function F_i^A(i=1,2,3) and compare the results with the free nucleon structure function as well as with the available data on $\bar{\nu}(\nu)$-A scattering.

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