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Tuning the pion production on free nuclei with GENIEv3

GENIE (http://www.genie-mc.org/) is one of the most used event generator for neutrino experiments. The collaboration has a continuous effort to improve its prediction by adding new models and tune them against data. For the future experiments, the description of single and double pion production is fundamental and yet there is not a single model that describes simultaneously resonant, non-resonant and DIS interactions. The modelling of this transition region is left to the generators and a number empirical models are used to achieve this goal. GENIE has addressed the modelling of pion production at the free nucleon level with a new tune using deuterium data from ANL-12ft, BNL-7ft, BEBC and FNAL 15-ft bubble chamber experiments. The shallow inelastic scattering region has been tuned against ν_μ and $\bar{\nu}_\mu$ CC inclusive, one pion and two pion integrated cross sections. The global fit describes both inclusive and exclusive cross sections simultaneously, improving the agreement for ν_μCC pπ^+, nπ^+, pπ^0 and p$\pi^+\pi^-$ cross sections on free nucleon.

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