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Professor Based ReWeight for GENIE Generator

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Interaction generators for neutrinos are essential tools to predict the final states of neutrino interactions from atmospheric and accelerator sources. Those final states would be important input to quantify the relation between the visible energy in our detector and the neutrino energy, whose distribution is affected by oscillation. This understanding is crucial for experiments such as JUNO, DUNE, and Hyper-Kamiokande. GENIE is one of the neutrino generators that specialise in the GeV region. Much work is being done to tune GENIE models' parameters to obtain for the best description of experimental datasets. In addition, the parameters extracted from the tuning have very well motivated statistical uncertainties that will make the analyses more robust as based on better motivated inputs. Once the initial inputs are defined, it will be crucial to understand the how the uncertainties would affect the predictions. Reweighting is a powerful approach to propagate those model uncertainties through GENIE. There are many restrictions in the current reweight approaches, the main being that only a subset of parameters can be reweightable. This work aims to utilize the Professor tool to model GENIE as respondence functions. This approach unifies the workflow of tunning and reweight, allowing us to propage the uncertainty obtained from the tuning using a reweight infrastructure. This will enable us to do reweight all parameters, including previously unweightable parameters, e.g. hadronization parameters.

Poster prize

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GENIE collaboration

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