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The importance of characterizing charged pions in neutrino interactions

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Recent results from neutrino experiments studying neutrino interactions show that final state interactions are not fully explained by current theoretical models. In this regard, pion production in final state interactions is at the center of the discrepancies between theoretical models and experimental data. Hence, a characterization based on data of pion production and interactions in long-baseline neutrino experiments would contribute significantly to hadron identification, and therefore, to better tune the theoretical models embedded in the Monte Carlo simulations used by neutrino experiments to carry on their analyses. Currently, neutrino experiments such as MINERvA, T2K, and NOvA, published various improvements in the tuning of the nuclear theoretical models coded in their simulations based on their data. However, there are standing difficulties in hadron identification, which could be sorted if constraints from pion classification become available. This talk portraits the importance of developing better pion identification algorithms, and summarizes the ideas that could contribute to the improvement in pion identification.

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