PANIC2021 Conference



Contribution ID: 384

Type: Poster

QED corrections to charged-current neutrino-nucleon elastic scattering

Tuesday 7 September 2021 19:05 (1 minute)

Charged-current quasielastic scattering is the signal process in modern neutrino oscillation experiments and the main tool for the reconstruction of the incoming neutrino energy. Exploiting effective field theory, we factorize neutrino-nucleon quasielastic cross sections into soft, collinear, and hard contributions. We evaluate soft and collinear functions from QED and provide a model for the hard contribution with expected infrared and collinear behavior. We account for logarithmically-enhanced higher-order corrections and evaluate cross sections and cross-section ratios quantifying the resulting uncertainty in detail. We present results for various conditions of modern and future accelerator-based neutrino experiments.

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Presenter: TOMALAK, Oleksandr

Session Classification: Poster Session II

Track Classification: Neutrino physics