

Uniform beam simulation technique for beam scans and machine learning studies at Fermilab

Fermilab's neutrino facilities, including NuMI and the upcoming LBNF, use proton beams to produce positively and negatively charged pions and kaons. Detailed simulations are necessary to study particle interactions and beam propagation. To efficiently analyze beam scan effects, we propose a technique to generate multiple simulation samples with high statistics. These samples can be used to develop beamline simulation based machine learning applications. In this technique, we generate a uniformly distributed single simulation data sample. We calculate Gaussian weights for each beam configurations and apply them to post-processing measurements. In this poster, we demonstrate the proposed simulation technique. This technique reduces simulation time and computing resources significantly.

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