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Uncertainty Quantification for DUNE ND Reconstruction

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As the role of machine learning methods in neutrino science expands, it is more and more important to have a reliable estimate of the uncertainty of the predictions of such models. Traditional uncertainty propagation does not capture the aleatoric and epistemic uncertainties intrinsic to these models and cannot characterize the models' robustness to out-of-distribution inputs. This talk describes a two-model system in which an upstream probabilistic neural network (PNN) will estimate the energy deposition of simulated events in the DUNE ND-LAr detector. Downstream reconstruction models will be trained with and without the uncertainty information provided by the upstream model in order to demonstrate the impact of uncertainty quantification.

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