



Contribution ID: 52

Type: Long talk (25min. + 10min. Q/A)

Determining a TPC Electric Field using Physics-Informed Continuous Normalizing Flows

Thursday 30 October 2025 13:00 (25 minutes)

Noble element time projection chambers (TPCs) have enabled searches for neutrino physics both within and beyond the Standard Model, but these rare event searches are limited by electric field distortions on event position reconstruction. Traditional data-driven field distortion corrections lack smoothness and differentiability, require extensive calibration data, and often do not follow Maxwell's equations. We present a physics-informed continuous normalizing flow approach that models the electric field lines by learning an invertible, differentiable, curl-free transformation from reconstructed positions to true interaction vertices. We evaluate this machine learning method's performance against traditional field distortion correction methods. By improving event position reconstruction, future rare event searches can increase the number of correctly reconstructed interaction events and achieve greater wall background rejection.

Presenter: LI, Ivy

Session Classification: AI//ML for Detector Physics Modeling