



Contribution ID : 225

Type : Oral talk

Reconstruction of neutrino-induced muon energy in Baikal-GVD with transformer neural networks

Thursday, 29 October 2026 16:35 (15)

Baikal-GVD is a deep underwater Cherenkov telescope at the bottom of Lake Baikal, built to detect high-energy astrophysical neutrinos. The energy of the neutrino is one of the key parameters of a recorded event, which makes its accurate measurement an important task of the experiment.

We apply transformer neural networks to the reconstruction of the energy of a muon produced by a muon neutrino, in events confined to a single cluster of the telescope. The energy is reconstructed at the point of the muon track where it enters the sensitive volume of that cluster. The input of the network is the sequence of optical module hits recorded in the event, and the network is trained on Monte Carlo simulation.

Training uses unsupervised domain adaptation of the DANN type, which prevents the network from distinguishing simulation from experimental data. The loss function includes a negative log-likelihood term (beta-NLL), so that the network predicts not only the energy but also its own uncertainty for each event. Extension to the joint reconstruction of energy and muon track is planned.

Primary author(s) : MATSEIKO, Albert (MIPT, INR RAS)

Presenter(s) : MATSEIKO, Albert (MIPT, INR RAS)

Session Classification : Artificial Intelligence in particle physics and astrophysics

Track Classification : Artificial Intelligence in particle physics and astrophysics