

Convolutional Neural Network Reconstruction of Neutrino Event Interaction Vertex in IceCube

Wednesday, 14 July 2021 15:00 (15 minutes)

The IceCube Neutrino Observatory detects atmospheric and astrophysical neutrinos using a cubic kilometer of ice instrumented with optical sensors at the South Pole. Neutrinos are detected using these sensors which record the cone of light from Cherenkov radiation, emitted by charged particles moving faster than the speed of light in ice, allowing the event vertex of neutrino interactions to be reconstructed. Low energy events are difficult to detect in IceCube because the detector is sparse and there is less Cherenkov radiation emitted, so optimized reconstruction methods are required. Reconstructing the event vertex in particular is important to ensure that the events are contained in the detector, and to allow us to remove background atmospheric muons and other noise. Current and past reconstruction methods have been likelihood-based, however, these methods are computationally intensive. We utilized a Convolutional Neural Network, which has proven to be faster than the likelihood-based methods, and has comparable resolution for vertex reconstruction.

Are you are a member of the APS Division of Particles and Fields?

No

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