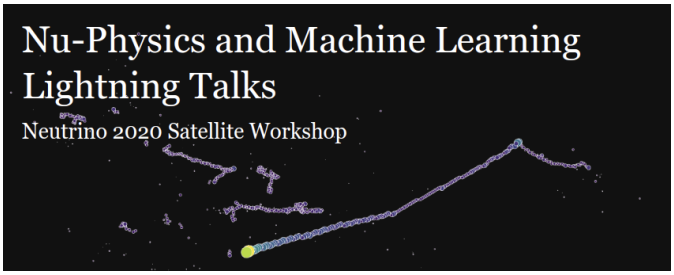

Contribution ID: **17** Type: **not specified**

Reconstructing 10 GeV-Scale Neutrino Events in IceCube using CNNs

Wednesday, 17 June 2020 13:45 (15 minutes)

The IceCube Neutrino Observatory, which instruments a cubic kilometer of Antarctic ice, aims to detect astrophysical and atmospheric neutrinos. The detector contains 5160 photomultiplier tubes arranged in a 3D hexagonal array, which capture Cherenkov radiation emitted from the daughter particles of neutrino interactions. While IceCube detects astrophysical neutrinos in the TeV-PeV energy range, the more densely instrumented center, called DeepCore, is optimized to measure atmospheric neutrinos in the 10s of GeV energy scale. These energy ranges are important for measuring fundamental properties of neutrinos such as the oscillation parameters and searching for non-standard interactions, but current reconstruction methods for these events take seconds to minutes. A convolutional neural network has been implemented and optimized for 10s of GeV-scale events in DeepCore, to reconstruct neutrino energy and direction. This method takes milliseconds per event, which is orders of magnitude faster than previous methods, with the ultimate goal to additionally improve the resolution for low energy event reconstruction in IceCube.

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