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Open-source, Cross-detector Comparisons for Machine Learning Reconstructions in Neutrino Telescopes

There are currently many Cherenkov neutrino telescopes being deployed and designed across the world. These detectors are exploring new optical sensors and geometric configurations to maximize their physics goals. Alongside detector R&D, machine learning (ML) has become established as a promising avenue for reconstructions in these detectors; however, there has not been a consistent comparison of the performance of these proposed detector geometries or existing ML-based reconstruction methods. This contribution presents a recent effort to simulate geometries comparable to existing and proposed telescopes using Prometheus, an open-source simulation library. On these datasets, we compare reconstruction performance for ML-based techniques using the open-source GraphNeT ML library. We will present the simulation sets and relative performance of each geometry across several reconstructed quantities, and summarize what this can teach us about detector design and ML-based reconstruction methods.

AI keywords

Open-source, reconstruction, design optimization

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