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Machine Learning based reconstruction for Hyper Kamiokande

Friday, 24 July 2020 10:00 (40 minutes)

We present initial developments of ML based event reconstruction for water Cherenkov detectors in the context of Hyper Kamiokande. Using ML, we aim to exploit additional spatial and directional information from higher granularity PMTs developed for HyperK to improve on existing reconstruction performance and to enable new measurements that are very challenging in conventional maximum-likelihood fitters. Here, we present several ongoing works, using standard CNN, a new CNN architecture, and other types of networks to efficiently handle topology and geometry of cylindrical detectors. Applications of these networks to particle identification are presented, including electron / gamma separation at higher energies and neutron capture / radioactive decay separation at lower energies. We also present our future plans for additional applications, including generative networks with unsupervised and semi-supervised approaches.

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