

A New Method for Event Reconstruction in Large Water Cherenkov Detectors

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In the Hyper-K detector, all information about a given set of final state particles is encoded in a charge and a time for each photomultiplier tube. This new reconstruction algorithm, based on the method used by Mini-BooNE (NIM A608, 206 (2009)), calculates time and charge probability distribution functions for every tube at each stage of a likelihood fit minimization. The particle light emission profiles, tank and water properties, and the response of the electronics are all treated separately, which makes it straightforward to incorporate any Cherenkov-emitting particle hypothesis, extend the algorithm to many different detector geometries, and reconstruct multi-particle final states within a common likelihood fit framework. A first version of the algorithm has been implemented for the Super-K detector, and preliminary performance comparisons to previously existing Super-K reconstruction algorithms will be presented. In addition, possible applications to future CP violation and proton decay measurements at Hyper-K will be discussed.

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