

Introducing a Simultaneous Track+Shower Reconstruction Algorithm, dedicated for KM3NeT/ORCA

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Underwater or in-ice neutrino oscillation experiments, which detect the products of neutrino interactions via Cherenkov radiation, have traditionally reconstructed events using a 'track' or 'shower' event classification scheme. At the neutrino energies of interest to these experiments, deep inelastic scattering is the dominant interaction mechanism. As a result, a hadronic shower is always created at the vertex of charged-current interactions, alongside the out-going lepton. This work presents a dedicated 'track+shower' reconstruction algorithm, which aims to more completely describe neutrino interactions in the KM3NeT research infrastructure.

The potential of this algorithm in performing particle identification for simulated neutrino events in the ORCA-6 sub-detector is presented. In turn, the improved neutrino energy resolution and directly-reconstructed Bjorken- η for neutrino events in the envisaged ORCA detector is shown. Such an algorithm paves the way for future neutrino oscillation analyses in KM3NeT, with improved energy resolution and reconstructed Bjorken- η being essential tools for a determination of the neutrino oscillation parameters and the yet-unknown Neutrino Mass Ordering.

Poster prize

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