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Reconstruction of hadronic cascades in large-scale neutrino telescopes

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In order to achieve optimal angular resolution in searchers for neutrino point sources, neutrino telescopes are optimised for the detection and reconstruction of muon tracks, thus concentrating on muon-(anti)neutrino charged-current reactions. However, the efficiency for detecting neutrinos can be improved significantly by investigating also reaction channels containing a hadronic and/or electromagnetic particle cascade ("shower") in their final states, but no muon; these channels in particular comprise electron (anti)neutrino charged-current reactions and neutral-current reactions of all neutrino flavours.

Although the angular resolution for shower events cannot compete with that of muon events, an optimal reconstruction of showers will contribute valuable information, especially when it comes to measuring the neutrino energy. A strategy that allows for the reconstruction of direction and energy of hadronic cascades will be presented, as well as preliminary results from simulation studies of the ANTARES twelve-string detector. The analysis techniques are of very generic nature and can thus easily be applied for large-scale neutrino telescopes, such as KM3NeT.

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