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First neutrino oscillation measurement in KM3NeT/ORCA

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KM3NeT is a Cubic Kilometer Neutrino Telescope that is currently being constructed at the bottom of the Mediterranean Sea. The KM3NeT/ORCA detector will be used for oscillation physics with atmospheric neutrinos, with as main goal establishing the neutrino mass ordering.

In 2019, 4 out of the total of 115 vertical lines carrying the light sensors of the ORCA detector had been deployed, while 6 are operational from early 2020.

With this partial detector configuration, neutrino oscillations can already be observed. Neutrino flavor oscillations depend on the energy the neutrino carries and the distance it travelled. The distance the atmospheric neutrino travelled can be probed by using the incoming angle in the detector. By measuring the number of events as function of incoming angle and energy in the detector one has a proxy for finding the oscillation parameters.

Due to multiple background channels, of which atmospheric muons are the largest component, on average three in every one million triggered events comes from a neutrino interacting in the sea water. This contribution focuses on extracting the neutrino signal from the data, results from data/MC comparisons, and how to determine the oscillation parameters θ_{23} and Δm^2_{31} by fitting an oscillation model and estimating the associated systematic uncertainties that have to be taken into account.

Keywords

Neutrino oscillation physics; Atmospheric neutrinos; Atmospheric muons; VLVnT; Neutrino mass ordering;

Collaboration

KM3NeT

other Collaboration

Subcategory

Experimental Results

Primary authors: Mr NAUTA, Lodewijk (Nikhef); FOR THE KM3NET COLLABORATION

Co-authors: Ms ALY, Zineb (CPPM); Dr PESTEL, Valentin (Nikhef); Prof. DE JONG, Paul (Nikhef)

Presenter: Mr NAUTA, Lodewijk (Nikhef)

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