

Measurement of the atmospheric muon neutrino flux with KM3NeT/ORCA6

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The KM3NeT/ORCA detector (Oscillation Research with Cosmics in the Abyss), currently under construction, is deployed at 2450m depth in the Mediterranean Sea, near Toulon, France. Its primary scientific goal is to determine the Neutrino Mass Ordering. ORCA is an array of Digital Optical Modules, spheres that host 31 photomultiplier tubes, tied together in vertical structures (the Detection Units -DUs), which are anchored on the seabed. Such an array configuration can detect neutrino events from the Cherenkov radiation emitted by the secondary particles of neutrino interactions in the abyssal depths of the Mediterranean Sea.

A measurement of the atmospheric muon neutrino flux in the energy range between 1 GeV and 100 GeV is presented in this work, using data collected with the 6-DU configuration of KM3NeT/ORCA (KM3NeT/ORCA6). The data analyzed corresponds to a period of almost one and a half years. The selection of a high-purity sample of atmospheric neutrino events, using a Machine Learning classifier (Boosted Decision Tree), is presented. An unfolding scheme, used to obtain an estimation of the atmospheric muon neutrino flux in bins of energy is shown. Finally, a detailed study of the impact of the systematic uncertainty sources in the measurement is also presented. This measurement illustrates the ability of the KM3NeT/ORCA detector to provide experimental information at an energy region in which only few measurements exist by other experiments, even with an early-stage detector configuration.

Poster prize

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