

Neutrino astronomy and oscillations: first KM3NeT results

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Abstract

KM3NeT is a multi-purpose neutrino observatory under construction in the Mediterranean Sea. It is composed of two Cherenkov detectors with different designs: ORCA, a compact and dense detector optimised for the high-statistic measurement of atmospheric neutrino physics, and ARCA, instrumenting a cubic kilometre to catch fluxes of extraterrestrial neutrinos. The two detectors have a final configuration comprising 115 and 230 detection lines, respectively. With its modular layout, partial configurations of KM3NeT take data promptly upon deployment. An overview of the first results will be discussed. ARCA has recently observed an ultra-high energy of likely extragalactic origin, with its 21-line configuration. No conclusive evidence of a correlation with astrophysical sources has been found. ORCA observes muon neutrino disappearance with more than 6 standard deviations and performs a precision measurement of atmospheric oscillation parameters. The KM3NeT science case also comprehends indirect search for physics beyond the Standard Model with effects altering the oscillation probabilities, such as non-standard interactions, neutrino decay and quantum decoherence.