

Towards a km³ scale neutrino telescope in the Mediterranean Sea: KM3NeT

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The KM3NeT consortium, formed by 40 European astroparticle and Earth & Sea science institutes from 10 European countries, aims at developing a deep-sea research infrastructure in the Mediterranean Sea hosting a multi-cubic-kilometre Cherenkov telescope for neutrinos with energies above 100 GeV and scientific nodes for long-term, continuous measurements in earth and marine scientific research. In the past decade, the three founding collaborations of KM3NeT, ANTARES, NESTOR and NEMO, have developed the basic technology and have explored three candidate sites in the Mediterranean sea ranging from 2500m to 4500m in depth. The EU-funded KM3NeT Design Study (2006-2009) has explored the technologies, which were presented in a Technical Design Report (TDR) together with the expected physics performance of the future detector. A further EU project, the Preparatory Phase (2008-2012) is meant to pave the path towards the telescope construction by defining the financial, legal and governance issues and by preparing the construction plans of the infrastructure.

The location in the Mediterranean Sea will allow for surveying a large part of the Galactic Plane, including the Galactic Centre, complementing the sky coverage of IceCube telescope and even improving the discovery potential in the same field of view.

In neutrino telescopes, high-energy neutrinos are detected using the Cherenkov light from the secondary particles produced in neutrino interactions with the matter in and surrounding the detector. Due to the low neutrino cross sections, the detection of the fluxes expected from galactic and extragalactic sources requires instrumenting large volumes of water or ice with photo-detectors (photomultipliers). In the KM3NeT telescope, hundreds of instrumented Detection Units, each hosting tens of photomultipliers and their related electronics and calibration systems, will be deployed several kilometres below sea level. The status of the project will be presented.