Detector Design Studies for a Cubic Kilometre Deep Sea Neutrino Telescope – KM3NeT

J. Carr¹, F. Cohen², D. Dornic¹, F. Jouvenot³, G. Maurin⁴ and C. Naumann⁴ for the KM3NeT consortium

¹ CPPM – Centre de Physique des Particules de Marseille, CNRS/IN2P3, France
² IReS - Institut de Recherches Subatomiques, Strasbourg, France
³ formerly University of Liverpool, Oliver Lodge Laboratory, United Kingdom
⁴ CEA Saclay – DSM/IRFU – Service de Physique des Particules, France

The KM3NeT consortium is currently preparing the construction of a cubic-kilometre sized neutrino telescope in the Mediterranean Sea as a continuation of the previous efforts by the three Mediterranean projects ANTARES, NEMO and NESTOR and as a counterpart to the South-Pole based IceCube detector. The main physics goals of KM3NeT include the detection of neutrinos from astrophysical sources such as active galactic nuclei, supernova remnants and gamma-ray bursts as well as the search for new physics, such as neutrino signals from neutralino annihilation.

A key point during the early phases of this experiment is the determination of the ideal detector layout as well as of important design criteria such as required spatial and temporal resolution of the sensor elements, to optimise the sensitivity in the energy range of interest. For this purpose, several independent Monte-Carlo studies using a range of possible detector configurations are being performed. In this presentation, one of these studies, using the fast and flexible Mathematica-based simulation and reconstruction package NESSY, is described in more detail together with expected results for some exemplary detector configurations.

E-Mail: christopher.naumann@cea.fr, gilles.maurin@cea.fr

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