

The KM3NeT Digital Optical Module

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KM3NeT is a European deep-sea multidisciplinary research infrastructure in the Mediterranean Sea. It will host a km³-scale neutrino telescope and dedicated instrumentation for long-term and continuous measurements for Earth and Sea sciences.

The KM3NeT neutrino telescope is a 3-dimensional array of Digital Optical Modules (DOMs), suspended in the sea by means of vertical string structures, called Detection Units, supported by two Dyneema ropes, anchored to the seabed and kept taut with a system of buoys.

The Digital Optical Module represents the active part of the neutrino telescope and therefore the real heart of KM3NeT. It consists in a pressure-resistant borosilicate glass spherical vessel housing 31 photomultiplier tubes and the associated front-end and readout electronics.

The aim is to provide nanosecond precision on the arrival time of single Cherenkov photons and directional information with a high sensitive surface (1260 cm²) and an almost isotropic field of view.

Temperature and humidity sensors are used to monitor the environmental conditions, while a system of compasses and calibration components provide precision about the position and orientation of the photo-sensors up to a few centimetres and few degrees, respectively.

In this contribution the design and the performances of the KM3NeT Digital Optical Modules are discussed, with a particular focus on enabling technologies and integration procedure.

Primary author: VIVOLO, daniele (I)

Presenter: VIVOLO, daniele (I)

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