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A mechanical design for a detection unit for a deep-sea neutrino telescope

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The future KM3NeT neutrino telescope will be built on the seabed of the Mediterranean Sea at a depth between three and five kilometers. The high ambient pressure, but also the fact that the detector is hardly accessible, put severe constraints on the mechanical design of the detection units of the telescope. A detection unit is a vertical structure which supports the optical sensors of the telescope.

It has a height of almost one kilometer; two data cables run along the full length of the structure. Simple and therefore reliable rope and cable handling during installation of the unit at the seabed is important. During installation the stability of the unit depends mostly on the hydrodynamic behavior in the vertical direction, while when in operation, the horizontal behavior is of more importance. In order to reduce the estimated total transport volume of about 10000 m³ as, a compact design is essential.

We will present a mechanical design that has been developed during the KM3NeT Preparatory Phase following an analysis of the designs for Antares, NEMO and Nestor and that at the same time complies with the requirements for use in the KM3Net detector. The experience with this design has been used as input to the design of the KM3Net detection unit.

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