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Neutrino Detection, Position Calibration and Marine Science with Acoustic Arrays in the Deep Sea

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Arrays of acoustic receivers are an integral part of present and potential future Cherenkov neutrino telescopes in the deep sea. They are required to monitor the positions of the optical detection modules whose positions vary with time as an effect of undersea currents. At the same time, the acoustic receivers can be employed for marine science purposes, in particular for monitoring the ambient noise environment and the signals emitted by the fauna of the sea. And last not least, they can be used for studies towards acoustic detection of ultra-high energy neutrinos. Measuring acoustic pressure pulses in huge underwater acoustic arrays, exceeding an instrumented volume of 10 km^3 , is a promising approach for the detection of cosmic neutrinos with energies exceeding 1 EeV . The pressure signals are produced by the particle cascades that evolve when neutrinos interact with nuclei in water and can be detected over large distances in the kilometre range. In this talk, the status of acoustic detection will be reviewed and plans for the future —most notably in the context of KM3NeT—will be discussed. The connection between neutrino detection, position calibration and marine science will be illustrated.

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