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KM3NeT/ORCA: Measuring the neutrino mass hierarchy in the Mediterranean sea

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Since the measurement of the mixing angle theta_13, the determination of the neutrino mass hierarchy (normal vs. inverted) has become one of the central challenges of neutrino physics, together with the search for CP violation in the leptonic sector. Recent studies have pointed out that the neutrino mass hierarchy can be investigated in the atmospheric neutrino sector, in the energy range 1-20 GeV, where oscillations are affected by Earth matter effects, exploiting the appearance/disappearance patterns of different neutrino types as a function of energy and path through the Earth. ORCA - Oscillations Research with Cosmics in the Abyss - will be a detector made of a dense configuration of KM3NeT detection units, optimised for studying the interactions of neutrinos in seawater at low energies. To be deployed at the French KM3NeT site, ORCA's multi-PMT optical modules will take advantage of the excellent optical properties of deep seawater to accurately reconstruct both cascade and track events with a few GeV of energy. This contribution reviews these methods and technology and presents the ORCA sensitivity for the neutrino mass hierarchy.

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