Atmospheric neutrino oscillation with KM3NeT/ORCA

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KM3NeT/ORCA is the next-generation underwater Cherenkov neutrino detector currently being built in the Mediterranean. The full ORCA array is a single KM3NeT building block of 115 strings or Detection Units (DUs). Each DU hosts 18 digital optical modules (DOMs) which contain 31 small (3") photomultipliers and the readout electronics. ORCA is designed to detect the Cherenkov light emitted from relativistic charged particles generated from the interaction between neutrinos and nuclei inside or around the detector. The geometry profile of the detector has also been chosen to optimize the performance in measuring atmospheric neutrinos in the energy range of 1-100 GeV.
Atmospheric neutrinos are produced in the decay of secondary particles (π, K,...) originating from the interaction of cosmic rays with the atmosphere. By studying the oscillation pattern of atmospheric neutrinos that cross the Earth with different path lengths (thus, zenith angles), the ORCA detector is primarily dedicated to resolving the question of the neutrino mass ordering and measuring neutrino oscillation parameters (Δm^2_{31} and θ_{23}). The expected sensitivity of full ORCA to the neutrino mass ordering is shown along with the potential of atmospheric neutrino oscillation parameter measurement with just the first sub-array of the detector during the construction phase.

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