

The neutrino mass hierarchy in KM3NeT - ORCA, a feasibility study.

Wednesday, August 21, 2013 4:20 PM (20 minutes)

The talk will present the current status of a dedicated feasibility study “Oscillation Research with Cosmics in the Abyss” (ORCA) to evaluate the potential of a neutrino mass hierarchy measurement with “phase 1” of KM3NeT, the future multi-km³ water Cherenkov neutrino telescope in the Mediterranean.

Summary

After the successful measurement of the mixing angle θ_{13} , the determination of the neutrino mass hierarchy (MH) has become a priority for future neutrino experiments. It has been proposed to perform such a measurement with atmospheric neutrinos and a megaton-scale water or ice Cherenkov detector. The highest sensitivity to the MH is obtained for neutrinos of 5-10 GeV which traverse the Earth at zenith angles of 30-60 degrees. ANTARES, a neutrino telescope in the Mediterranean Sea, designed to search for high-energetic astronomical neutrino signals, has recently demonstrated its ability to reliably measure neutrinos with energies as low as 20 GeV, a range where neutrino oscillations start to play a dominant role. KM3NeT will be the next generation neutrino telescope in the Mediterranean Sea with an effective volume of several cubic kilometers. Funds for “phase 1” of the project, corresponding to about 20% of the total envisaged budget, are meanwhile available. A dedicated feasibility study “Oscillation Research with Cosmics in the Abyss” (ORCA), to evaluate the potential of a mass hierarchy measurement with “phase 1” of KM3NeT is currently underway. The talk will discuss the status and results of the current study into detector optimization and the feasibility of using KM3NeT technology to this end.

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