ID de la contribución : **22** Tipo : **Talk**

KM3NeT/ARCA sensitivity to neutrino quantum decoherence

jueves, 6 de noviembre de 2025 17:00 (15)

In the framework of open quantum systems, neutrino may interact with their surrounding environment, introducing stochastic fluctuations to their quantum phase. This perturbation causes a gradual loss of coherence during neutrino propagation, a phenomenon known as decoherence, which alters the neutrino oscillation probabilities.
KM3NeT/ARCA is a water Cherenkov detector currently under construction in the Mediterranean Sea. Its design is optimized to detect neutrinos in the TeV to PeV energy range, covering both atmospheric and cosmic neutrino fluxes. This study explores the impact of decoherence effects on the expected neutrino flux composition within the energy range observable by ARCA. Furthermore, the detector's sensitivity to decoherence effects is evaluated across different models of energy dependence.

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Clasificación de la sesión : Neutrinos

Clasificación de temáticas : Neutrinos