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Neutrinos and nEXO: Alleviating Cosmogenic Backgrounds and Detecting Supernovae

Wednesday, May 29, 2024 11:30 AM (30 minutes)

The nEXO neutrinoless double beta decay experiment aims to detect a hypothetical decay mode in the isotope xenon-136.
A positive observation of this decay mode would serve as direct evidence for lepton number violation and confirm the Majorana nature of neutrinos, representing a breakthrough in physics beyond the Standard Model. Such an observation could also offer new pathways for understanding the mass generation mechanism of fermions, and potentially provide insights into the matter-antimatter asymmetry problem.
To increase the likelihood of observing neutrinoless double beta decay, nEXO requires stringent measures for background mitigation, such as placing the experiment deep underground to shield it from cosmic rays. Despite these measures, the residual cosmic muon flux remains a concern.

This talk will present an evaluation of the cosmogenic background rate in nEXO as well as the impact of these backgrounds on the experiment's sensitivity to neutrinoless double beta decay.
We introduce an initial design for an anti-coincident water-Cherenkov muon veto aimed at mitigating these cosmogenic backgrounds.
Additionally, the low background environment of nEXO enables the search for other rare interactions at the MeV scale, including those from astrophysical sources.
As such, a preliminary evaluation of nEXO's sensitivity to neutrinos originating from nearby galactic core-collapse supernovae is provided.

Keyword-1

nEXO

Keyword-2

Neutrinoless double beta decay

Keyword-3

Supernovae

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