



Contribution ID: 272

Type: Poster

Monte Carlo study of the Water Cherenkov Muon Veto for the COSINUS Experiment

Monday, August 28, 2023 8:00 PM (1 minute)

For over twenty-five years, the DAMA/LIBRA experiment observes an annual modulation signal that is consistent with a dark matter explanation. Under the standard halo scenario, this signal is in tension with the null results observed by other searches that utilize different target detectors. The COSINUS experiment will perform a model-independent cross-check of the DAMA/LIBRA result by using the same target material, NaI crystals, operated as scintillating calorimeters. COSINUS is currently under construction at Laboratori Nazionali del Gran Sasso, Italy. In this low background underground facility, the detectors are placed at the centre of a 7×7 m cylindrical water tank, which acts as a passive shield against the ambient and cosmogenic background. However, muon-induced neutrons, created near the detector, can mimic a potential dark matter signal. Therefore, an active muon veto system is required to identify and remove these events. We report on the results of a design study for an active water Cherenkov muon veto. This study optimizes the design for tagging muons while mitigating the overall background trigger rate. To achieve this, comprehensive Monte Carlo simulations were conducted to investigate the impact of various factors including: trigger conditions, photomultiplier tube arrangements, foil reflectivity, and the size of the optically invisible region in the water tank.

Submitted on behalf of a Collaboration?

Yes

Author: Dr STUKEL, Matthew Jake (Gran Sasso Science Institute)

Presenter: Dr STUKEL, Matthew Jake (Gran Sasso Science Institute)

Session Classification: Poster session

Track Classification: Dark matter and its detection