



Contribution ID: 1383

Type: Poster

Feasibility of the atmospheric antineutron detection using a calorimeter-like detector with liquid scintillator

The baryon asymmetry observed in our universe today, suggests that the baryon number (B) must be violated and theories Beyond the Standard Model are necessary to explain the early evolution of our universe [1]. The observation of a B -violating process has been elusive so far, however, the n - \bar{n} oscillation process has the potential to be measured in the next decade [2]. This would represent a fundamental discovery in physics. A significant source of background for the observation of an n - \bar{n} oscillation is antineutrons produced in cosmic ray interactions with the atmosphere. Motivated by the importance of measuring this background source along with the null reported measurements on it, in this work, the detection of atmospheric antineutrons through the signal produced after its annihilation in an active volume is explored. A simulation of antineutrons interacting with a tank full of liquid scintillator, filled with an array of WLS fibers coupled to a PMT, was performed. An acceptance system, based on 8 planes of plastic scintillator surrounding the tank, is included to select events with more than 3 coincidences. An analysis of the energy-loss distribution by atmospheric antineutrons compared to atmospheric muons and the detection efficiency of this system is presented.

[1] Phillips, D. et al. Neutron-antineutron oscillations: Theoretical status and experimental prospects. *Physics Reports* 612, 1–45 (2016). Neutron-Antineutron Oscillations: Theoretical Status and Experimental Prospects.

[2] Backman, F. et al. The development of the $n\bar{n}$ experiment. *Journal of Instrumentation* 17, P10046 (2022).

Collaboration(s)

Authors: GOMEZ CORAL, Diego Mauricio (Universidad Nacional Autonoma (MX)); MENCHACA-ROCHA, Arturo Alejandro (Universidad Nacional Autonoma (MX)); GONZALEZ TRUEBA, Laura Helena (Universidad Nacional Autonoma (MX)); GRABSKI, Varlen (Universidad Nacional Autonoma (MX)); AGUILAR SALAZAR, Saul (Universidad Nacional Autónoma de México)

Presenter: GOMEZ CORAL, Diego Mauricio (Universidad Nacional Autonoma (MX))

Session Classification: PO-1

Track Classification: Cosmic-Ray Indirect