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(POS-49) Detection of Cosmic Ray Muons with Teachspin and Cosmic Watch Muon Detectors

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Muons, fundamental particles within the Standard Model of Particle Physics, are produced as a result of cosmic rays colliding with the Earth's upper atmosphere. They only exist for 2.2 microseconds before they decay into other fundamental particles. However, they are moving at velocities near the speed of light, allowing them to reach the Earth's surface. Muons can be detected using scintillator-based detectors, which use photomultipliers to distinguish muons from other particles. The goal of this research is to investigate the muon flux in the Antigonish area, focusing on how altitude affects the flux. This data can be used to calculate other muon properties, like lifetime and energy.

Two different muon detectors were used for this experiment. The first of these is the Teachspin Muon Detector, which utilizes a photomultiplier tube to amplify signals generated by muons interacting with the scintillator. This detector was calibrated based on the well-established value for muon lifetime. The second detector, the Cosmic Watch Muon Detector, was constructed by the research student following the guidelines of MIT's Cosmic Watch outreach program, which guides students in building their own muon detectors. This inexpensive, portable detector excels at distinguishing muons from other particles, making it particularly well-suited for flux-related experiments.

This presentation will provide a theoretical background on muons, followed by an explanation of the detection process, including the design and operation of both detectors. The data collection process will be outlined, along with an analysis and presentation of the experimental results. Through this investigation, the goal is to contribute to a deeper understanding of muon behavior in this region.

Keyword-1

Muons

Keyword-2

Particle Detection

Keyword-3

Cosmic Rays

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