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Zenithal dependence of muon intensity

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The zenithal dependence of muon intensity which reaches the earth's surface is well known as proportional to $\cos^n(\theta)$. Generally, for practical purposes and simplicity in calculations, n is taken as 2. However, compilations of measurements show dependence on the geographical location of the experiments as well as the muons energy range. Since analytical solutions appear to be increasingly less necessary because of the higher accessibility to low cost computational power, accurate and precise determination of the value of the exponent n , under different conditions, can be useful in the necessary calculations to estimate signals and backgrounds, either for terrestrial and underground experiments. In this work we discuss a method for measuring n using a simple muon telescope and the results obtained for measurements taken at Campinas (SP), Brazil ($22^\circ 54' W$, $-41^\circ 03'$, 854 m asl) and at Fermilab - Batavia (IL), United States ($41.8319^\circ N$, $88.2572^\circ W$, 220 m). After validation of the method, we intend to extend the measurements for more geographic locations due to the simplicity of the method, and thus collect more values of n that currently exist in compilations of general data on cosmic rays.

Collaboration

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