

Cosmic-Ray Muons Detection by a Spark Chamber

Tuesday 22 May 2018 15:00 (1 hour)

Cosmic ray, originating from several galactic sources, bombards the Earth's atmosphere and produces lots of secondary particles. One of them is an unstable charged particle known as "muon (\pm)" with speed close to the speed of light and lifetime about 2.2 microseconds before decaying into others. In this study, a spark chamber detector with 10 stacks of parallel electrode plates is constructed to detect the cosmic-ray muons which will lose their energies via ionization in the helium filled chamber. When muons passing through the chamber, they left their traces as the ionization paths. Sparks will occur immediately between each stack of parallel electrodes which are connected to a high voltage supply. The muon's trajectory then can be visualized by connecting the sparks in each stack. To reconstruct this muon's path, two cameras are set to record the events from the two perpendicular planes on two sides of the chamber. The photos are analyzed using MATLAB to obtain the coordinates of the sparking tracks which then are used to determine the zenith angular distribution. The results show that a large number of muons arrived at our laboratory (Chulalongkorn University, Bangkok, Thailand 13°44'09.5"N 100°31'49.6"E) with a zenith angle about 30°.

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Session Classification: A012: High Energy Physics (Poster)

Track Classification: High Energy and Particle Physics