Contribution ID: **20** Type: **Contributed talk**

A new method of determination of the mass of primary cosmic ray particles

Wednesday 26 July 2017 15:31 (15 minutes)

This paper studies the influence of the Earth's magnetic field on the extensive air shower particles generated by CORSIKA code. The effect causes an azimuthal asymmetry especially on positive and negative muons in highly inclined showers. This asymmetry is quantified by introducing a new observable in terms of a transverse distance (TD) between the positive and negative muon barycenters across shower core in the shower front. It is found that the TD and its maximum value clearly show primary mass sensitivity. An experimental feasibility of the new method in a sea level experiment is also discussed.

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Session Classification: Cosmology, Gravitational Waves, & Cosmic Rays

Track Classification: Cosmic Rays