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Investigation of Geomagnetic field effect on azimuth distribution of EAS events.

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Abstract content

EAS events are developing in the last few 10 kilometers of their path. But geomagnetic field has been extended until a few thousand kilometers from the ground. This field deflects charged particles. The deflection is different for different directions and observers. These differences is due to amount and direction of the geomagnetic field (a dipole at the centre of the earth) and the direction of the primary particle. It was accurately investigated for 100TeV particles from 20,000 kilometers from the center of the earth ($B = 0.03B_0$) to the ground and it was observed that the deflection is less than 10^{-6} degrees in ϕ . So for the investigation, we need to investigate secondary particles of the EAS events. In the recent few months we accumulated about 400,000 EAS events by a 4-fold array of charged particle detectors with a configuration of 6m6m square. Distribution of the events shows a slight anisotropy ($\sim 4\%$). We fitted two first harmonics on the distribution, it is seen that the first harmonic is more important and the excess is in the west direction. Also we separated these data in 12, 5 degree intervals from 0 to 60 degrees. It is seen that: 1- In all of them the peak is in the west direction. 2- The zeroth harmonic (Constant number) accurately obey the $dN = \sin(z) \cos^n(z) dz$. 3- The amplitude of the first harmonic is increasing until 35-40 interval and then it decreases. (The most Important point) For the investigation of the geomagnetic field on the EAS events we simulated 70,000 events with the magnetic field at Tehran ($B_x=28.1$, $B_z=38.4$) and 40,000 events without magnetic field ($B_x=B_z=0$), from 50 TeV to 5 PeV by CORSIKA code. Investigation of secondary particle distribution of the simulated events in ϕ (0, 360) shows a good coincidence with our experimental results. Now we are investigating the simulated events by the approach that there is an anisotropy in North-South direction due to angle between secondary charged particles and geomagnetic field direction ($\vec{B} = B_x i + B_z k$).

If this papers is presented for a collaboration, please specify the collaboration

Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Olivo, Gustavo Medina-Tanco, Lukas Nellen, Federico A. Sánchez, José F. Valdés-Galicia (eds.); Universidad Nacional Autónoma de México, Mexico City, Mexico, 2008; Vol. 4 (HE part 1), pages 11-14

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