Statistical study of muons counts rates in differents directions, observed at the Brazilian Southern Space Observatory

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Cosmic ray are charged particles, at the most time protons, that reach the earth's magne-tosphere from interplanetary space with velocities greater than the solar wind. When these impinge the atmosphere, they interact with atmosphere constituents and decay into sub-particles forming an atmospheric shower. The muons are the sub-particles which normally maintain the originated direction of the primary cosmic ray. A multi-directional muon detec-tor (MMD) was installed in 2001 and upgraded in 2005, through an international cooperation between Brazil, Japan and USA, and operated since then at the Southern Space Observatory -SSO/CRS/CCR/INPE -MCT, (29,4° S, 53,8° W, 480m a.s.l.), São Martinho da Serra, RS, a Brazil. The main objetive of this work is to present a statistical analysis of the intensity of muons, with energy between 50 and 170 GeV, in differents directions, measured by the SSO's multi-directional muon detector. The analysis was performed with data from 2006 and 2007 collected by the SSO's MMD. The MMD consists of two layers of 4x7 detectors with a total observation area of 28 m2 . The counting of muons in each directional channel is made by a coincidence of pulses pair, one from a detector in the upper layer and the other from a detector in the lower layer. The SSO's MMD is equipped with 119 directional channels for muon count rate measurement and is capable of detecting muons incident with zenithal angle between 0° and 75,53° . A statistical analysis was made with the MMD muon count rate for all the di-rectional channels. The average and the standard deviation of the muon count rate in each directional component were calculated. The results show lower cont rate for the channels with larger zenith, and higher cont rate with smaller zenith, as expected from the production and propagation of muons in the atmosphere. It is also possible to identify the Stormer cone. The SSO's MMD is also a detector component of the Global Muon Detector Network (GMDN), which has been developed in an international collaboration lead by Shinshu University, Japan.

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