

Simulation Study on Scaler Mode in LHAASO-KM2A

Friday 16 July 2021 19:18 (12 minutes)

LHAASO, located at Daocheng in Sichuan province of China with an altitude up to 4410 m above the sea level, takes the function of hybrid technology to detect cosmic rays. As the major array of LHAASO, KM2A is composed of 5195 electromagnetic particle detectors (EDs) and 1188 muon detectors (MDs). In the ground-based experiments, there are two common independent data acquisition systems, corresponding to the scaler and shower operation modes. In order to learn more about the scaler mode in LHAASO-KM2A, we adopt the CORSIKA to study the shower development and employ the G4KM2A (based on Geant4) to simulate the detector responses. For one cluster (composed of 64 EDs) in the array of KM2A-ED, the event rates of showers having a number of fired EDs ≥ 1 , 2, 3 and 4 (in a time coincidence of 100 ns) are recorded. The average rates of the four multiplicities are ~ 88 kHz, ~ 1.4 kHz, ~ 210 Hz, ~ 110 Hz, respectively. For the array of KM2A-MD, there are 16 MDs in one cluster. The average rates with multiplicities ≥ 1 and ≥ 2 are ~ 84 kHz and ~ 890 Hz, respectively. The corresponding primary energies are also given. According to our simulations, the energy threshold of the scaler mode can be lowered to ~ 100 GeV. At the same time, the energy threshold of LHAASO-KM2A in shower mode is presented for comparison. The simulation results in this work are beneficial for the online trigger with scaler mode, and also be useful in understanding the experiment results in LHAASO-KM2A.

Keywords

Scaler mode; Shower mode; LHAASO-KM2A; Monte Carlo simulations; Cosmic rays

Collaboration

Lhaaso

other Collaboration

Subcategory

Experimental Results

Primary authors: Mr HUANG, Zhicheng (Southwest Jiaotong University); HUANG, Daihui; ZHOU, Xunxiu; Ms ZHAO, Jing (Institute of High Energy Physics, Chinese Academy of Sciences); HE, Huihai (Institute of High Energy Physics, Chinese Academy of Sciences); CHEN, songzhan (Institute of High Energy Physics(IHEP),CAS); MA, Xinhua (Institute of High Energy Physics, Chinese Academy of Sciences); LIU, Dong (Shandong University); AXI, Kegou (Southwest Jiaotong University); ZHAO, Bing (Southwest Jiaotong University)

Presenter: HUANG, Daihui

Session Classification: Discussion

Track Classification: Scientific Field: CRI | Cosmic Ray Indirect