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Hadronic interactions and EAS muon multiplicity investigated with the new Tibet hybrid experimental muon data

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We have built a new hybrid detector system in Tibet, China, in 2014, it consists of the Tibet air-shower array (Tibet-AS), the air-shower core-detector array (YAC) and the underground water-Cherenkov muon-detector array (Tibet-MD). In this paper, the muon multiplicity will be discussed in detail by analyzing the muon components of the secondary particles of extensive air showers (EAS) in the primary energy range of 10^{14} to 10^{16} eV recorded by Tibet-MD array. We have carried out detailed Monte Carlo simulation by using CORSIKA (ver.7.35), which includes QGSJET01c, EPOS-LHC and SIBYLL2.1 hadronic interaction models. The simulated air-shower events are reconstructed with the real detector configuration as the (Tibet-AS+MD) hybrid experiment, and all detector responses are calculated using Geant4 (ver. 9.5). The data observed by the Tibet-AS+MD has been used to study the correlation between the air-shower size (Ne) and the number of muons (Nmuon). Here, we will also report their primary mass sensitivity and the interaction model dependence using our new hybrid experimental result.

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