

Study of the Electron-Neutron Detector Array (ENDA) in Yangbajing, Tibet

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To research the “knee” region of cosmic ray energy spectrum, we should clearly discriminate components of cosmic rays at the knee. EN-detectors (Electron-Neutron Detector) can detect both electrons and thermal neutrons generated in ground by EAS hadrons, so that the electron-neutron detector array (ENDA) can improve capability of primary components separation and energy measurement of LHAASO in the near future. At present, a cluster (of 16 EN-detectors) is running at the Yangbajing Cosmic Ray Observatory in Tibet to test performance at high altitude (4300 m above sea level).

With a period of stably operating at Yangbajing, we demonstrated the efficiency of thermal neutron detection is affected by environmental water—drier the weather, higher the efficiency. The difference between rain season and dry season could be about 10 percent. Therefore, in order to minimize seasonal effect, we designed a construction of so called “sand cube”, i.e., 1 cubic meter plastic tank filled with sand, on which one detector is mounted. The sand cube can apart detector from ground and reduce the seasonal effect. Moreover, because ingredient of sand is uniform and tested clearly, simulation of sand cube and detector can be more accurate so that the final systematic uncertainties can be reduced definitely. This report describes seasonal effect and the comparison of the performances between using sand cube and not.

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