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The Electron-Neutron Detector Array (ENDA), Status and Coincidence with LHAASO

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Hadrons are the "skeleton"of extensive air shower (EAS). They possess favorable information concerning the cosmic ray components and energy. The electron-neutron detector (EN-detector) can detect both electrons and thermal neutrons generated by EAS hadrons in surrounding matter. The electron-neutron detector array (ENDA) was proposed to add into the LHAASO project to improve its capability of EAS hybrid detection. Up to present 64 EN-detectors have been produced and are running in China. In 2018, a cluster (of 16 EN-detectors) was installed at Yangbajing (YBJ), Tibet. In 2019, another cluster so called ENDA-16-HZS was installed in LHAASO at Haizishan (HZS), Daocheng, Sichuan. Besides, 2 clusters are tested at Hebei Normal University (HNU), Shijiazhuang, Hebei. ENDA-16-HZS is running normally and get amount of EAS events at energy above 100 TeV. Moreover, a number of coincident events between ENDA and the LHAASO electron detector (ED) and muon detector (MD) arrays composed the KM2A, as well as Cherenkov detectors WFCTA and WCDA are obtained. The events with cores falling into ENDA were selected. The ED array and ENDA accurately offers the EAS directions and the core positions respectively. Both the lateral distributions of neutrons, electrons and muons and the longitudinal development of atmospheric Cherenkov lights are effectively sampled. A hybrid detection of EAS including thermal neutrons, electrons, muons and Cherenkov lights can provide a strong capability of cosmic nuclei discrimination as well as energy measurement with high resolution. In this report, the status of the clusters at the different places are summarized, and the preliminary results of coincident events between ENDA and the LHAASO array are presented.

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