HIGH ENERGY NEUTRINO ASTRONOMY WITH THE TELESCOPE ARRAY DETECTOR

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We present the potential of the Telescope Array (TA) detector for deeply penetrating air-showers initiated by high energy neutrino (HE-ν) from the most interesting source classes such as active galactic nuclei (AGN) jets and gamma ray bursts (GRB). The observation of neutrino fluxes to correlate with these sources would be direct evidence for these objects to be the dominant sources of extremely high energy cosmic rays (EHECR). The exploration of the energy range between 10^7GeV and 10^9GeV, where the connection between EHECR and HE-ν is most rigid, will thereby play a crucial role. The TA detector consists of 10 observational stations installed on the grid of 30-40km distance in the Utah south, which ensure the gigantic target mass for neutrinos. The 3m-diameter F/1 mirrors and 1.2°-FOV PMTs are served as fluorescence light collectors and sensor pixels respectively. Adding to the highly-sensitive optical devices, the advanced frontend and trigger electronics fully utilizing high technology such as digital signal processor (DSP) will greatly contribute to maximizing the detection sensitivity irrelevant of air-shower kinematics. It also provides excellent particle identification as well as accurate directional determination of primary cosmic rays to test the source models at a high confidence level. The TA detector, therefore, will probe astrophysical accelerators using good statistics of clearly identified neutrino-induced air-showers of the primary energy above 10^7 GeV with essentially no contaminations from protons and atmospheric neutrinos to lead opening the window of the HE-ν astronomy.