

Research Result Report
ICRR Inter-University Research Program 2022

Research Subject: Neutrino Telescope Array (NTA) Prototype Test and Technical Design	
Principal Investigator: Sadakazu Haino	
Participating Researchers: Makoto Sasaki, Satoru Ogawa	
<p>Summary of Research Result :</p> <p>The origin of cosmic rays above PeV remains a mystery, but protons accelerated there collide with surrounding nuclei and photons to produce π, and after decay ν and γ rays are emitted. In this study, for the first time, we will make high-precision composite imaging observations of ν, γ-rays and nuclei in the PeV region through atmospheric Cherenkov light and atmospheric fluorescence (atmospheric luminescence) from air showers (AS), and elucidate the mystery of the origin of cosmic rays.</p> <p>When the cosmic tau neutrino ($\nu\tau$) collides with the crust or mountains, it is converted to τ, appears on the slopes of mountains or on the ground surface, collapses, generates AS, and emits atmospheric light.</p> <p>The parent particle of AS coming from the direction of the ground or mountain is clearly identified as $\nu\tau$. Most of the parent particles of AS coming from the sky are nucleons, but γ-rays that are uncharged and cannot be bent by a magnetic field can be concentrated at point sources or can be distinguished from the morphology of AS development.</p> <p>At an altitude of 3000 m to 3500 m above Mauna Loa, Hawaii Island, the largest mountain on Earth, a wide-field high-precision atmospheric luminescence imaging detector is installed so that the atmosphere above the Mauna Loa slope is included in the double field of view. and observe the atmospheric Cherenkov light and atmospheric fluorescence from the AS generated there with high-accuracy binocular imaging.</p>	

No.

C1
