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Galactic Bulge VHE tau-neutrino and gamma-ray Monitor with Ashra-1 and NTA detectors

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The Ashra-1 detector has been developed to efficiently take fine images of air-shower (AS) Cherenkov (CE) and fluorescence (FL) light induced by the Earth-skimming ν_τ and γ-ray ASs. Based on Ashra-1, we have planned a new extension, i.e. Neutrino Telescope Array (NTA), an AS imaging ν and γ-ray observation system for "Clear Discovery and Identification of Non-thermal Hadronic Processes in the Universe.", consisting of four NTA stations deployed at 3000-3500~m a.s.l. on Mauna Loa. NTA can watch the air volume surrounding Mauna Loa including the surface of Mauna Loa, the largest volcano, Hawaii Island and sea around it to efficiently detect CE and FL light from ν_τ ASs with both short and long decay lengths and γ-ray ASs. The NTA ν_τ sensitivity is sufficient to probe Pevatrons, an extension of the IceCube detected astrophysical neutrino flux and predictions of the cosmogenic neutrino flux.The point-back accuracy is evaluated to be within 0.2° with respect to the original direction of the PeV-scale ES ν_τ's. As the first step observation with the minimal systematic deployment, we propose to monitor 10 TeV-10PeV γ-rays from the Galactic bulge with Ashra-1 as well as Earth-skimming ν_τ's with NTA simultaneously to clearly identify the Pevatrons and comprehensively understand the emission process there. The effective detection area of Ashra-1 and NTA for the Galactic bulge γ-rays with the energies around 1~PeV is more than 10 and 100 times respectively larger than that of a ground array with 500m scale.

Keywords

VHE neutrino, tau neutrino, gamma-ray, galactic bulge, origin of cosmic ray, heavy dark matter

Collaboration

other (fill field below)

other Collaboration

Ashra NTA

Subcategory

Experimental Results

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