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Taiwan Astroparticle Radiowave Observatory for Geo-synchrotron Emissions (TAROGE)

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TAROGE is an antenna array on the high mountains of Taiwan's east coast for the detection of ultra-high energy cosmic ray (UHECR) in energy above 10^19 eV. The antennas will point toward the ocean to detect radiowave signals emitted by the UHECR-induced air-shower as a result of its interaction with the geomagnetic field. Looking down from the coastal mountain, the effective area is enhanced by collecting both direct-emission as well as the ocean-reflected signals. This instrument also provides the capability of detecting Earth-skimming tau-neutrino through its subsequent tau-decay induced shower. A prototype station with 12 log-periodic dipole array antennas for 110-300MHz was successfully built at 1000 m elevation near Heping township, Taiwan in July 2014 to prove the detection concept. It has been operating smoothly for radio survey and optimization of instrumental parameters. We plan to install another station on a higher mountain in summer 2015. In this report, we discuss the design of TAROGE, performance of the prototype station, expected sensitivity, and future prospect.

Collaboration

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