

TAIGA-Observatory: First 5 years of operation of the HiSCORE Air-Cerenkov Array

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TAIGA-HiSCORE is a wide-aperture Air-Cherenkov array, and is a major component of the TAIGA-Observatory (Tunka Instrument for high-energy gamma-ray astronomy and cosmic ray physics), located in the Tunka valley, 50km from Lake Baikal, Russia. A main science target of TAIGA is gamma ray astronomy above ten's of TeV, in particular the search for sources of few 100 TeV gamma rays (candidate "PeVatrons"), the possible sites of Galactic cosmic ray acceleration. The HiSCORE array will consist of 120 optical Cerenkov stations, deployed on an area of 1km². Its construction will be finished in 2021.

This report presents the performance of HiSCORE during the first 5 years of operation, in various configurations, from 28 to 88 stations. A key for high sensitivity to gamma point sources is precision timing of the whole array down to sub-nsec level, required to be stable for the observation period. We apply different methods to reach this goal. The pointing resolution of the array for extended air-showers is obtained as 0.1° for highest energies, and is experimentally verified, based on independent approaches. We present results of a 5-year-search for gamma-like point sources with HiSCORE, and compare to MC-predictions.

Keywords

EAS; gamma astronomy; cosmic rays, timing array, angular resolution; time calibration; ground Cherenkov detection

Collaboration

TAIGA

other Collaboration

Subcategory

Experimental Results

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