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TAIGA - a hybrid detector for the high energy gamma-ray astro-physics and the cosmic ray physics in the Tunka valley

The TAIGA (Tunka Advanced Instrument for cosmic ray physics and Gamma Astronomy) facility aims to study the very high energy gamma-rays at energies from a few TeV to several PeV, as well as cosmic rays from 100 TeV to several EeV. Combination of the wide-angle Cherenkov timing detector TAIGA-HiSCORE with the 4-m class Imaging Atmospheric Cherenkov Telescopes (TAIGA-IACT) of FoV of 9,6 degrees offers a cost-effective way to construct a large array for very high energy gamma astrophysics. At present the one square km installation TAIGA-1 is in operating in Tunka valley, ~50 km West from the southernmost tip of the lake Baikal. It consists of 120 TAIGA-HiSCORE wide-angle (0.6 ster) stations distributed over an area of 1,1 km², three 4-m class Imaging Atmospheric Cherenkov Telescopes (IACT) with FoV of 9.6 degrees and 250 m² of particle detectors. The effective area of the system of 3 IACTs completely covers the area of TAIGA-HiSCORE wide-angle installation of the TAIGA-1 complex for gamma-ray energy above 80 TeV. The next plans for the development of the TAIGA-1 installation include the deployment of 2 more IACTs. We expect a sensitivity of the TAIGA-IACT installation with 5 IACTs in the novel, hybrid stereo mode for detecting gamma-rays with energies greater than 10 TeV for 100 hours of observation of 10^{-12} TeV cm⁻² s⁻¹ and an angular resolution of 0.2 degrees. The future development plan of the TAIGA array up to 10 km² is presented.

Primary experiment

TAIGA

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