Contribution ID: **1302** Type: **Talk**

Satellite-based Calibration of the TAIGA-HiSCORE Cerenkov Array by the LIDAR on-board CALIPSO

Friday 16 July 2021 19:18 (12 minutes)

The wide-angle Air-Cerenkov array HiSCORE is a major component of the TAIGA facility in the Tunka valley, built for Gamma Astronomy and Cosmic Ray research. HiSCORE will contain 120 stations distributed over a 1km2 area.

Here, we report a multi-year detection of light flashes in HiSCORE from the LIDAR on-board the Sun-synchronous CALIPSO satellite, obtained from 2015-2021. The 100mJ laser (532nm) is observed up to distances beyond 10km away from the ground light spot. This study complements first observations of a space-based LIDAR, performed in 2015/2017 with the 28-station HiSCORE prototype and the CATS LIDAR on-board the International Space Station. We present HiSCORE calibration methods developed for the LIDAR events to optimize the pointing resolution of the array; and additionally perform a detailed array performance analysis over 6 years.

The angular resolution for this special class of HiSCORE events - bright flashes, with a plane wave light front - is found to be <0.05°, which is much below the high-energy limit of ~0.1° for air-showers. The satellite event sample allows to optimize rare event search strategies, like for optical flashes of astrophysical origin. We will also report on scheduled joint LIDAR observation by HiSCORE and TAIGA-IACTs, as well as optical ground instruments - to independently calibrate the absolute array-pointing precision.

Keywords

timing array; LIDAR; time calibration; ground Cherenkov detection; gamma astronomy; satellite

Collaboration

TAIGA

other Collaboration

Subcategory

Experimental Results

Primary authors: PORELLI, Andrea (DESY); WISCHNEWSKI, Ralf (DESY Zeuthen); FOR THE TAIGA COLLABORATION

Presenter: PORELLI, Andrea (DESY)

Session Classification: Discussion

Track Classification: Scientific Field: GAI | Gamma Ray Indirect