

EAS observation conditions monitoring in the SPHERE-2 balloon experiment

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The SPHERE project studies primary cosmic rays by detection of the Cherenkov light of extensive air showers reflected from the snow covered surface of the earth. The SPHERE project is the first successful implementation of a new EAS detection method – detection of reflected Cherenkov light using an aerial-based detector – a method first proposed by A. Chudakov and first implemented by R. Antonov [1]. The SPHERE-2 experiment was designed for primary cosmic ray studies in the 10–1000 PeV energy range. The detector SPHERE-2 was lifted by a balloon to altitudes of up to 900 m above the snow covered surface of Lake Baikal, Russia. Measurements were performed in 2011–2013.

Here we present an overview of the SPHERE-2 [2] detector telemetry monitoring systems along with the analysis of the measurements conditions including atmosphere profile. The analysis of the detector state and environment atmosphere conditions monitoring provided various cross-checks of detector calibration, positioning, and performance.

1. Antonov, R., et al. Detection of reflected Cherenkov light from extensive air showers in the SPHERE experiment as a method of studying superhigh energy cosmic rays. *Physics of Particles and Nuclei* 2015, 46, 60–93. doi:10.1134/S1063779615010025
2. Antonov, R., et al. The SPHERE-2 detector for observation of extensive air showers in 1 PeV–1 EeV energy range. *Astroparticle Physics* 2020, 121, 102460. doi:10.1016/j.astropartphys.2020.102460

Primary author: BONVECH, Elena (SINP Moscow State University)

Co-authors: CHERNOV, Dmitry; PODGRUDKOV, Dmitry; ROGANOVA, Tatiana; GALKIN, Vladimir; VAIMAN, Igor; FINGER, Miroslav (Charles University); FINGER, Michael (Charles University)

Presenter: BONVECH, Elena (SINP Moscow State University)

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