

## **Studying the relationship between cosmic rays and atmospheric electricity at the Tunka-Grande scintillation array: status and prospects**

Research on thunderstorm phenomena has been conducted for centuries, however, some fundamental questions remain unresolved. One of these is the mechanism of occurrence and propagation of lightning discharges. Initiated by high-energy ( $E > 10^{15}$  eV) cosmic rays (CR) extensive air showers (EAS) can be one of the factors influencing the mechanism of lightning development. At the same time, the thunderstorm cloud itself probably plays the role of an active medium that modifies the processes of EAS propagation.

In 2016, the Tunka-Grande array was commissioned and included in the TAIGA astrophysical complex (Tunka Advanced Instrument for cosmic rays and Gamma Astronomy). It consists of an array of scintillation detectors grouped into 19 stations on an area of 0.5 km<sup>2</sup>. The main objectives of the experiment are to study the energy spectrum and mass composition of CR, as well as to search for diffuse gamma radiation in the energy range of 10-1000 PeV by detecting the electron-photon and muon components of EAS. In the summer of 2024, in order to study the relationship between CR and atmospheric electricity, the hardware and software of three stations was upgraded, and the EFM-100 surface electric field strength sensor was included in the dataset.

The report provides a description of the Tunka-Grande array, the results of joint measurements of the flow of single atmospheric particles (electrons and muons) and the electric field strength for the 2024 season. It is shown that lightning discharges with a range of more than 15 kilometers have no effect on the flow of charged particles. Additionally, plans for further modernization of the facility and research prospects are being discussed.

**Primary authors:** MALAKHOV, Stanislav (API ISU); MONKHOEV, Roman (API ISU)

**Presenter:** MALAKHOV, Stanislav (API ISU)

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