EXPERIMENTAL SIMULATION OF THE PROPERTIES OF BLUE JETS AND RED SPRITES OF ATMOSPHERIC DISCHARGES [[1]](#footnote-1)\*)

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A large number of scientific groups studies high-altitude discharges in the Earth’s atmosphere, see, for example, [1-6]. In recent years, obtaining new results has been facilitated by the improvement of instruments for registering various types of radiation, as well as filming from aircraft and the International Space Station [3, 6]. A large number of color photographs of high-altitude atmospheric discharges have appeared on the Internet, including red sprites, blue jets and analogs of blue jets (starters, giant jets), which are referred to as transient luminous events (TLE). In scientific laboratories, these phenomena are simulated, both experimental and theoretical. However, many questions remain unresolved now. These include the mechanisms of the appearance of various TLE and their influence on each other when they appear, as well as the nature of the color of the observed high-altitude discharges.

This report will present the results of experimental studies of the effect of vapors of various metals from electrodes on the color of pulsed and repetitively-pulsed discharges. In the experiments, we used gaps with an inhomogeneous distribution of the electric field. Colored mini jets were recorded in air, nitrogen, argon during diffuse and spark discharges, and were also accompanied by the generation of runaway electrons [7, 8]. It was found that the color of the mini jets that appear when bright spots appear on the electrodes is significantly influenced by the material of the electrodes, regardless of the polarity of the voltage pulse. It is shown that the color of the plasma in the mini jet region is more consistent with the color of atmospheric discharges (red sprites and blue jets) observed at high altitudes than the glow of diffuse discharges in air and nitrogen at the same pressure. It has been confirmed that the use of aluminum electrodes colors mini jets red, copper green and iron blue. A comparison of the properties of blue jets and red sprites with the formation of streamers in diffuse, corona, and apokampic [9] discharges has been carried out too.

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLIX/R/ru/JM-Tarasenko.docx) [↑](#footnote-ref-1)