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Simulation of the response of the URAN and PRISMA-32 facilities to the passage of the EAS

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A new method for studying the hadron component of EAS was recently developed. This method is based on registration of thermal neutrons that are generated as a result of interactions of shower hadrons with atomic nuclei in the atmosphere and the environment. The PRISMA-32 and URAN arrays were created at the Unique Scientific Facility NEVOD (MEPhI) to register the neutron component of EAS corresponding to E ˜ 10ˆ15 eV energy range of primary particles. The electron-neutron (en)-detectors are based on thin layers of inorganic scintillators which are sensitive to thermal neutrons. To correctly interpret array's experimental data, it was necessary to carry out model calculations. So, a mathematical model of the PRISMA-32 and URAN facilities has been developed. Simulation of the EAS was carried out using the CORSIKA7.6900 program. Geant4.10.5 software package was used to simulate the arrays' response. Installations' geometry is close to a real one. A detailed analysis of the response of the models of PRISMA-32 and URAN arrays to the neutron and charged components of EAS was carried out. The report includes the dependences of the average number of registered neutrons on the shower size and primary particle energy, the LDF of charged particles and the LDF of thermal neutrons. A comparison of the experimental data with model calculations is presented.

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