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Possibility of investigations of primary cosmic rays by means of coordinate-tracking detector on the Earth's surface

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The study of primary cosmic rays is usually carried out by either direct measurements by means of satellite detectors or indirect measurements by ground-based detectors of secondary particles generated in extensive air showers (EAS). The main types of ground-based installations are scintillator or Cherenkov detectors that register light from all particles that give ionization in their working volume. Such detectors are distributed over large area and the amplitude and time of their response give a direction and a size of EAS. Such setup is implemented in experimental complex NEVOD in MEPHI. It is based on scintillator detectors and covers an area of 104 m². Classical EAS setup can be supplemented by coordinate-tracking detector that can separate particle tracks and measure their number and direction. The new coordinate-tracking detector ProtoTREK based on multiwire drift chambers is developed in MEPHI. It has an area of 13 m² and can measure up to 15 particles per m². Such setup can act like a valuable additional detector of primary cosmic rays. Monte-Carlo simulation shows that coordinate-tracking detector can give an independent information on EAS. The first comparison of ProtoTREK and NEVOD-EAS response shows a compliance. This new approach to EAS investigations is described.

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