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Observation of cosmic rays by Alborz -1 array

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Abstract
The first phase of the Alborz Observatory Array (Alborz-1) consists of 20 plastic scintillation detectors each one with surface area of 0.25 m^2 spread over an area of 40×40 m^2 realized to the study of Extensive Air Showers around the knee at the Sharif University of Technology campus. The first stage of the project including construction and operation of a prototype system has now been completed and the electronics that will be used in the array instrument has been tested under field conditions. In order to achieve a realistic estimate of the array performance, a large number of simulated CORSIKA showers have been used. In the present work, theoretical results obtained in the study of different array layouts and trigger conditions are described. Using Monte Carlo simulations of showers the rate of detected events per day and the trigger probability functions, i.e., the probability for an extensive air shower to trigger a ground based array as a function of the shower core distance to the center of array are presented for energies above 1 TeV and zenith angles up to 60°. Moreover, the angular resolution of the Alborz-1 array is obtained.
For experimental study of the array, Alborz-1 sub-array consists of 5 detectors on a pentagon configuration similar to the central cluster of the Alborz-1 array have been collecting data since 2014 February for 14 month in 4th floor of physics department at Sharif University of Technology. Alborz-I, made of 20 scintillation detectors is set up in a cluster layout to study the cosmic ray spectrum in the energy range of 1012 to 1016 eV. This paper reveals the zenith angle distribution function of detected air showers by this sub-array.

Keywords: extensive air shower, ground based detector array, trigger probability, angular resolution

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