



Iranian Journal of Physics Research, Vol. 24, No. 4, 2025
DOI: 10.47176/ijpr.24.4.31865

Reconstruction of extensive air showers core location using cosmic ray radio signals

F Latifian and G Rastegarzadeh*

Physics Faculty, Semnan University, Semnan, Iran

E-mail: grastegar@semnan.ac.ir

(Received 10 March 2024 ; in final form 23 April 2024)

Abstract

In the present study, we have demonstrated that the core location of cosmic ray air showers can be determined by utilizing a virtual dense array and comparing the intensity of experimental signals received by antennas within a cosmic ray radio array with those received by their corresponding antennas in a dense array. Specifically, this method is applied to the coordinates of the SURA radio array. Additionally, to reduce the simulation time the number of antennas in the dense array is optimized. Moreover, we investigate the influence of the primary energy and the zenith angle of the dense array on the accuracy of the method. We have shown that within a limited range, a dense array with a specified primary energy and zenith angle can effectively determine the core location of cosmic rays with various energies and zenith angles while maintaining acceptable accuracy of the method.

Keywords: cosmic ray, core location of extensive air showers, radio detection, SURA

For full article, refer to the Persian section