Contribution ID: **67** Type: **not specified**

Search for UHE neutrinos in the background of cosmic rays

Thursday, 27 June 2024 16:00 (15 minutes)

The main challenge in detecting ultra-high energy (UHE) neutrinos is discriminating a neutrino-induced shower in the background of showers initiated by ultra-high energy nuclei. The resulting shower development from neutrinos exhibits different characteristics from hadron-induced showers because neutrinos penetrate the atmosphere more deeply than hadrons. This study focuses on simulations of highly inclined neutrino-induced showers, exploring an extensive energy range from 1EeV to 120EeV. These simulated showers have different ranges of interaction depths corresponding to each zenith angle, presenting diverse detection challenges. Our methodology utilises timing data from radio antennas for the shower front calculation for extensive air showers induced by neutrinos and nuclei. Furthermore, we incorporate signals obtained from the Water Cherenkov detectors and the spatial distribution of stations registering signals in both Water Cherenkov detectors and radio antennas. We aim to classify neutrino-induced showers and background events stemming from nuclei by harnessing a decision tree classifier employing the Gini impurity method. Our framework yields excellent accuracy for separating the neutrinos from the background. The findings of this study offer significant advancements in the domain of UHE neutrino detection, shedding light on astrophysical phenomena associated with these elusive particles amidst the complex background of UHE nuclei.

Presenter: KHAKURDIKAR, Abha (Radboud University)

Session Classification: Contributed talks