

Research Report

ICRR Inter-University Research Program 2020

Research Subject: Anisotropy of Ultra High Energy Cosmic Rays
Principal Investigator: Prof. Il H. Park
Participating Researchers: Hyomin Jeong, Kwangho Lee, Sangwoo Kim, Minhyom Kim

Summary of Research Result:
 Telescope Array times 4 (TAX4) Surface Detector (SD) and Fluorescence Detector (FD) had been built in early 2019, and keep operating until now. After trigger bug fix in Oct. 2019, we are stably accumulating data from TAX4 SD.

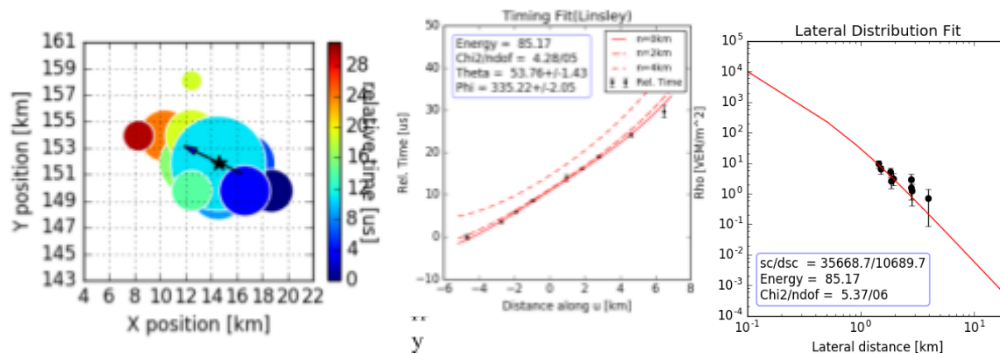


Fig. 1. Detected signal from SD array (left), timing fit result (middle) and lateral distribution function fit (right)

Since Apr. of 2019, TAX4 SDs have operated to detect the extensive air showers enhanced by UHECRs. From the timing and charge of detected signal from each SD, one can reconstruct the arrival direction of primary cosmic rays. Example of detected signals and reconstruction result are shown on Fig. 1.

Reconstructed arrival direction and energy distribution from 1-year detection period (from Oct. 2019 to Oct. 2020) is shown on Fig. 2. To pick out the events with good qualities, some event selection rules should be applied to remove bad reconstructed events. The number of detectors involved (≥ 4), zenith angle limit (< 55 degree) is applied already, and the effect of chi square cut is shown on Fig. 2.

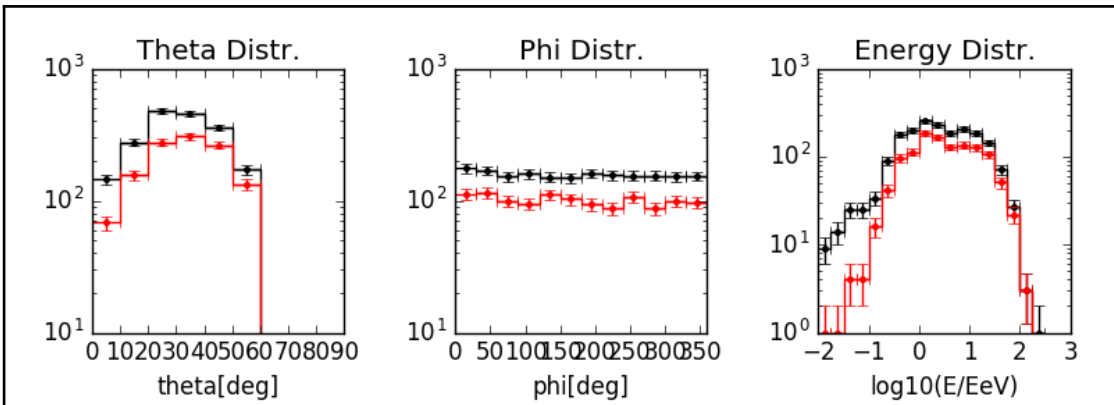


Fig. 2. Reconstructed event distribution before (black) and after chi square cut(red)

The angular resolution and energy resolution is check from the Monte Carlo simulation base on the extensive air shower simulation. For primary particles with energy > 57 EeV, which is the target energy of TAX4 SDs, angular resolution is 2.2 degrees and energy resolution is about 25%.

No.