

Executive Summary

The purpose of this report is to illustrate the latest calibration results of LHAASO-KM2A, including time and charge calibration. Offline calibration method has been used to calibrate thousands of electromagnetic particle detectors (EDs). Furthermore, we monitor the calibration parameters during the array operation and update the calibration results regularly to ensure the data quality of the detector.

Section A is a brief introduction for High Altitude Cosmic Ray Observers. The scientific target and performance of KM2A are introduced. In addition, the operation of KM2A is displayed.

In section B, Firstly, the factors causing the time offset are analyzed, then, the characteristic plane method is introduced for time calibration. To verify the applicability of this method and estimate its precision, hardware calibration is performed using a muon telescope system. Finally, the results of the time calibration of the 3/4 array are presented.

Section C introduces the charge calibration. The energy reconstruction depends on PMT signal integrated charge recorded by each fired EDs. The most probable value (MPV) of integrated charge spectrum is fitted to get the amplitude of charge corresponding to a single particle signal. The results show the peak value is almost unchanged.

In section D, we set up a monitoring program to monitor the calibration parameters in real time. Through the data analysis in recent months, it can be seen that the calibration results are very stable.

The report concludes with the opinion that the offline calibration has been successfully applied to 3/4 array. The relative time offsets can be periodically calibrated with a precision of better than 1 ns and charge calibration precision is sufficient within the KM2A performance requirements.