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The Cosmic-ray Anisotropy Observed by YBJ-HA Experiment

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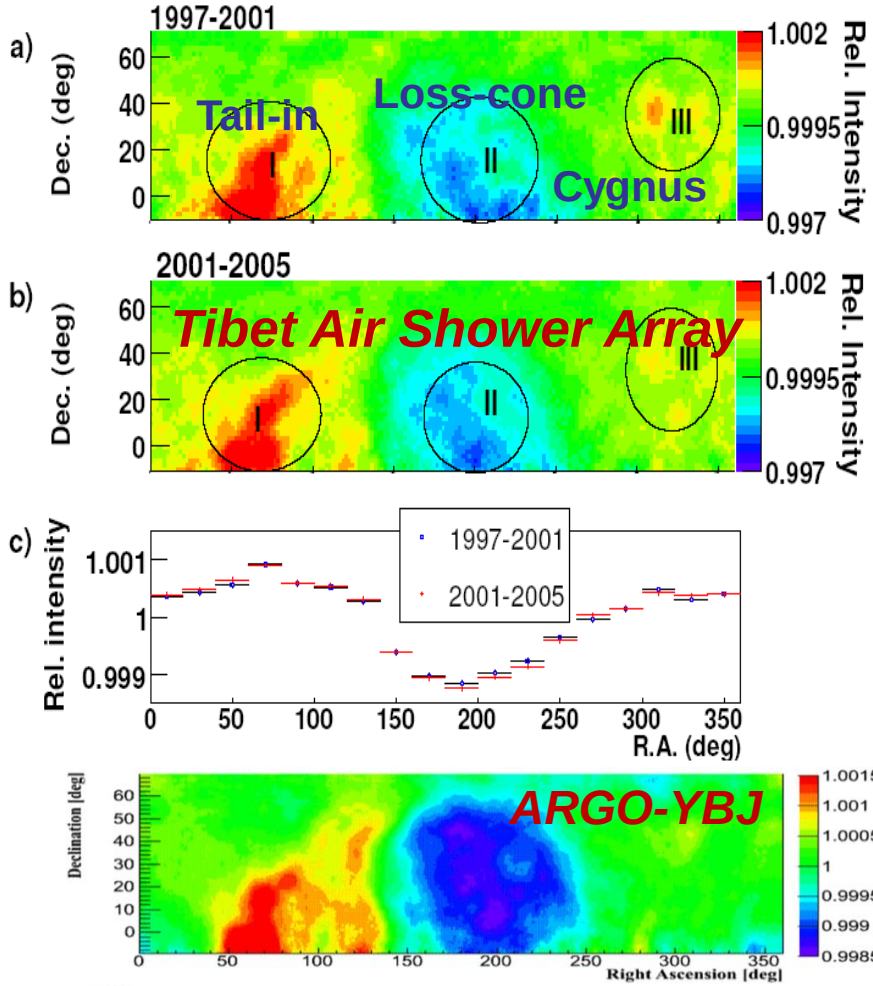
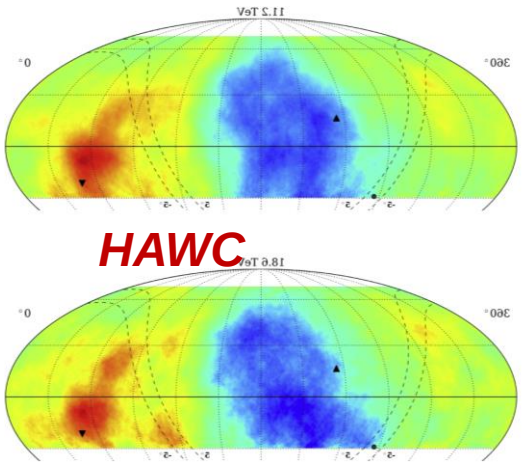
For 2019 ICRC

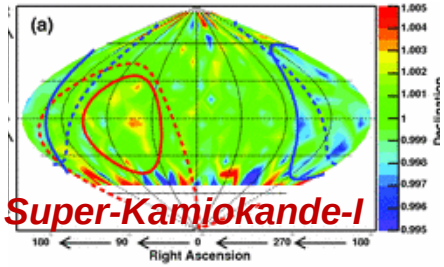
Outline

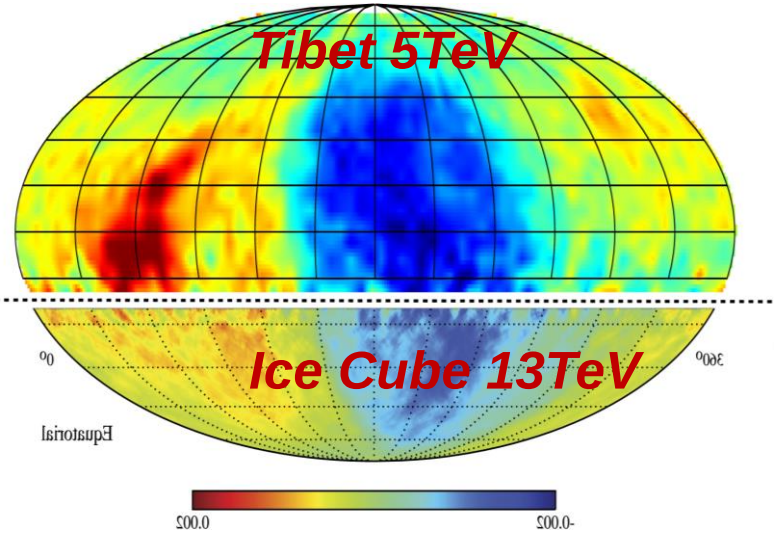
- *Some observations of anisotropy*
- *YBJ-HA(YangBaJing Hybrid Array)*
- *Data selection && Background estimation*
- *Summary*

Experiment Observation



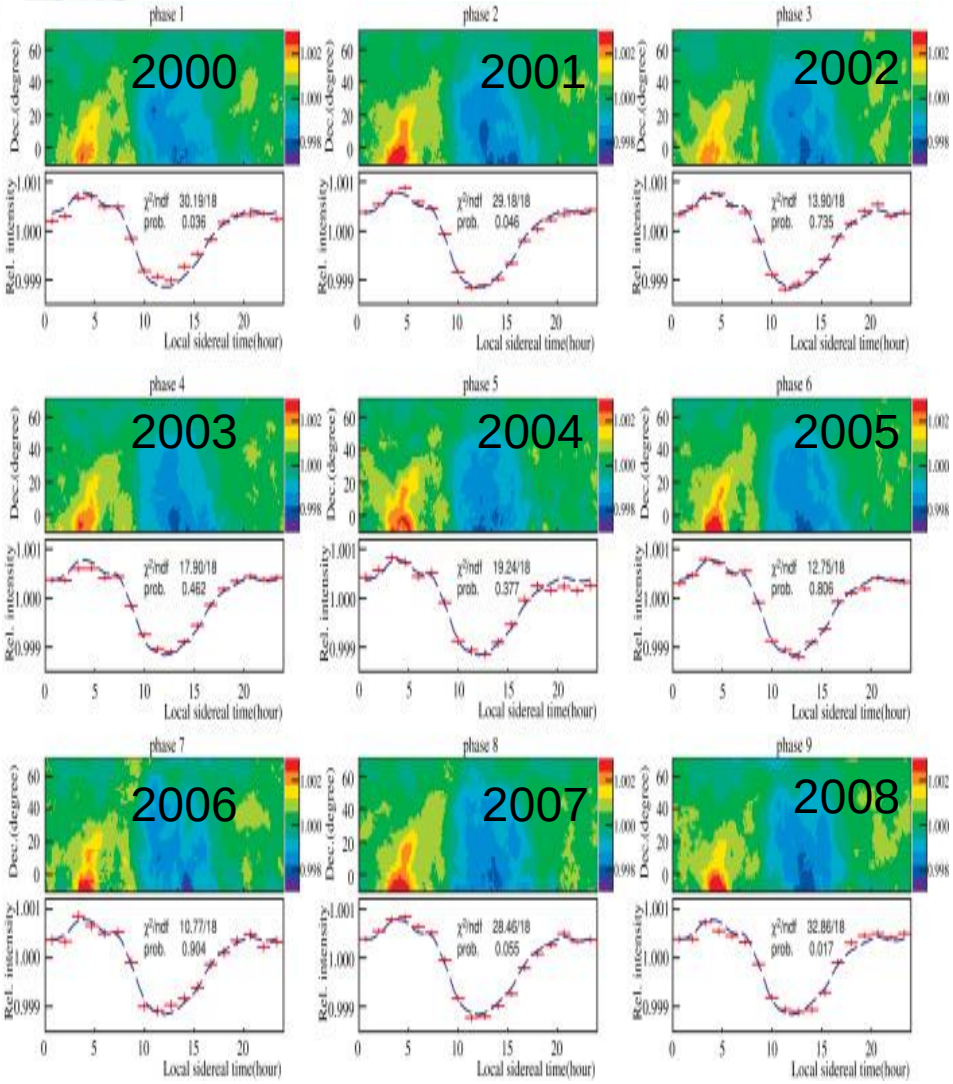


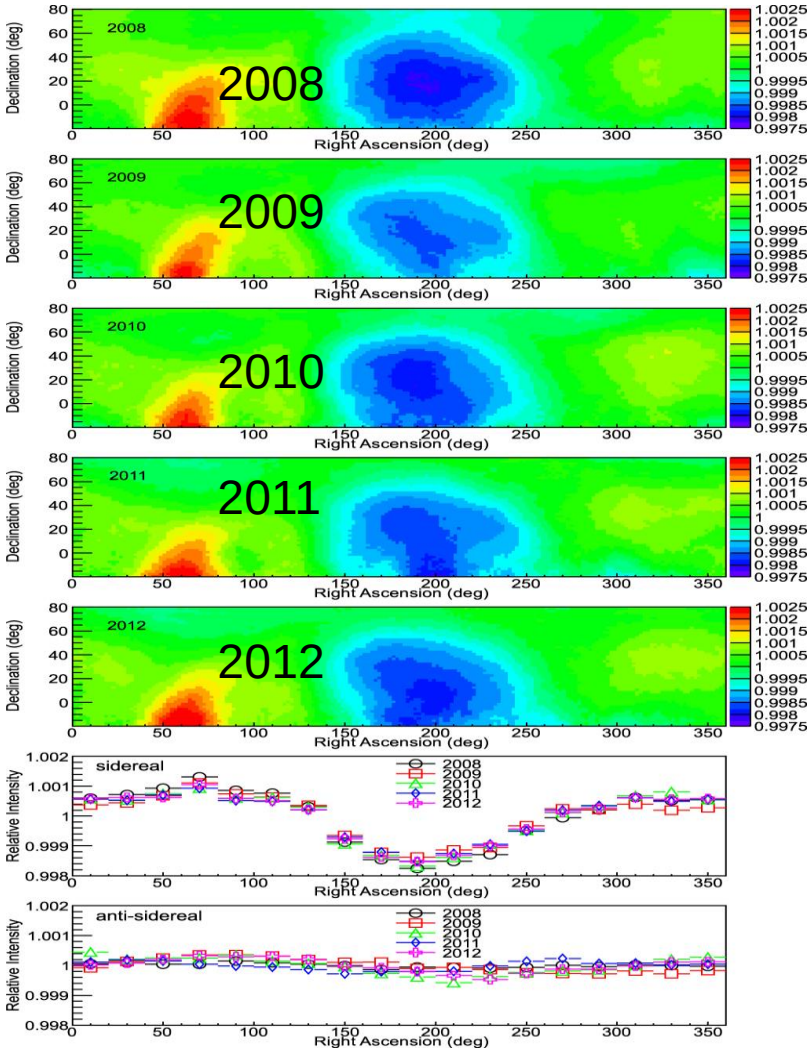




https://doi.org/10.1126/SCIENCE.1131702 https://doi.org/10.3847/1538-4357/aad90c
https://doi.org/10.1016/j.ppnp.2017.01.004 https://doi.org/10.1103/PhysRevD.75.062003

No time dependence of Sidereal anisotropy



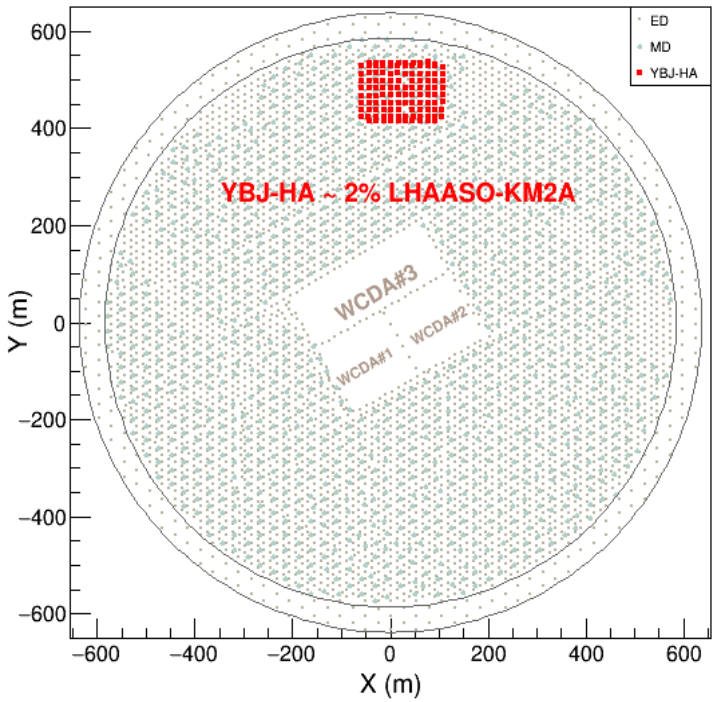


THE TIBET III AIR SHOWER ARRAY

ARGO-YBJ

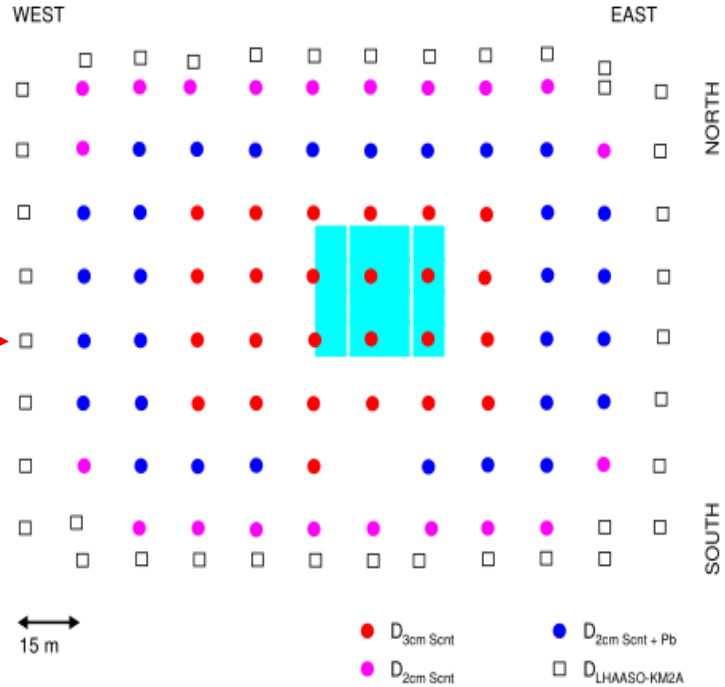
https://doi.org/10.3847/1538-4357/aac6cc https://doi.org/10.1088/0004-637X/711/1/119

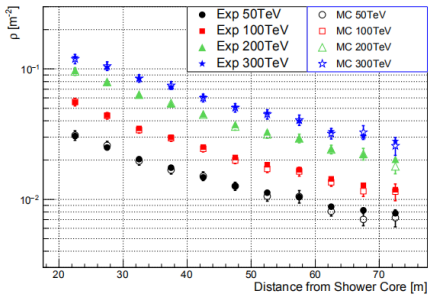
YBJ-HA Array / testing Array of LHAASO-KM2A



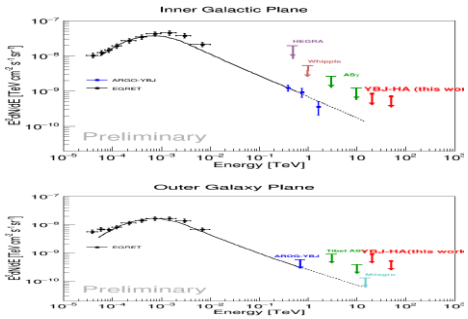
	YBJ-HA	LHAASO-KM2A
Altitude	4300m	4400m
Detector type	ED && MD	same
Separation	15m	same
time synchronization system	white rabbit clock 	same
electronics	ED  MD 	same

YangBaJing Hybrid Array(YBJ-HA)





Muons lateral density distribution



Diffuse γ rays upper limits on flux

Data phase and the their respective number of events for analysis

Phase	Time(days)	Number of Events
1	68	1.081×10^8
2	74	1.361×10^8
3	135	2.701×10^8
4	119	2.886×10^8

Detector types:(115EDs+16MDs)

- **115 Electromagnetic particle Detectors(EDs)**
- **16 Muon Detectos(MDs)**

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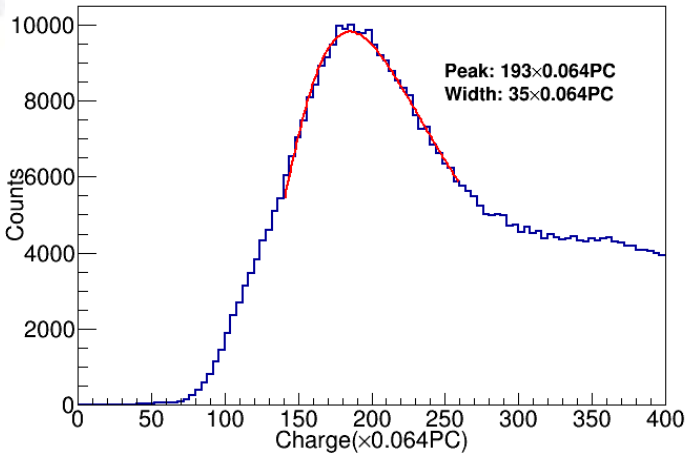
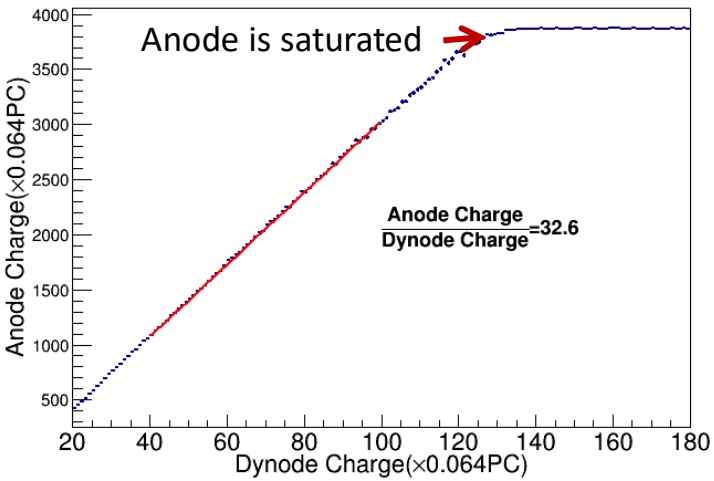
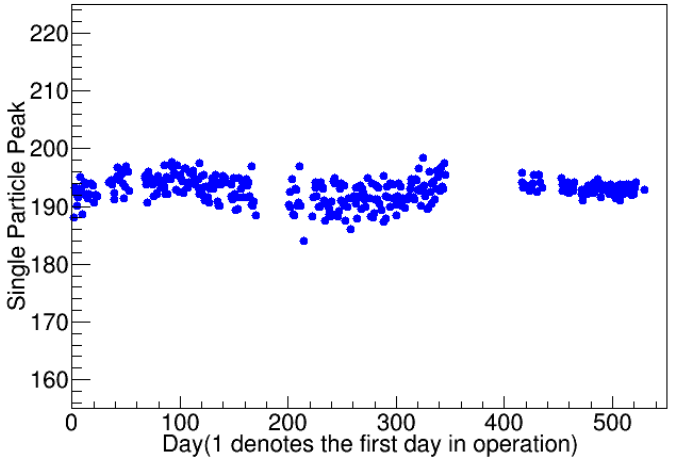
ED charge calibration && electronics stability



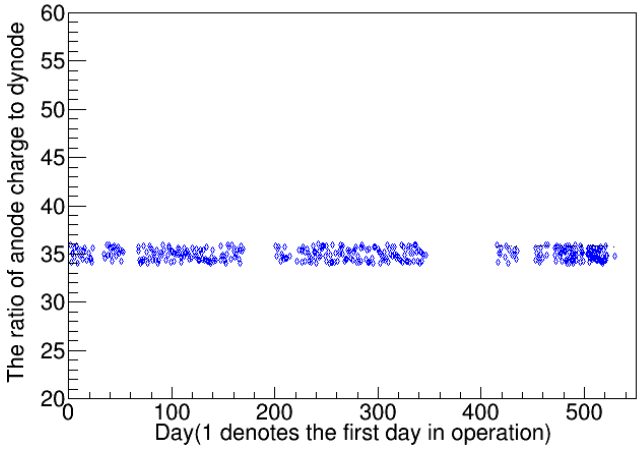
Single particle peak



The ratio of anode charge to dynode

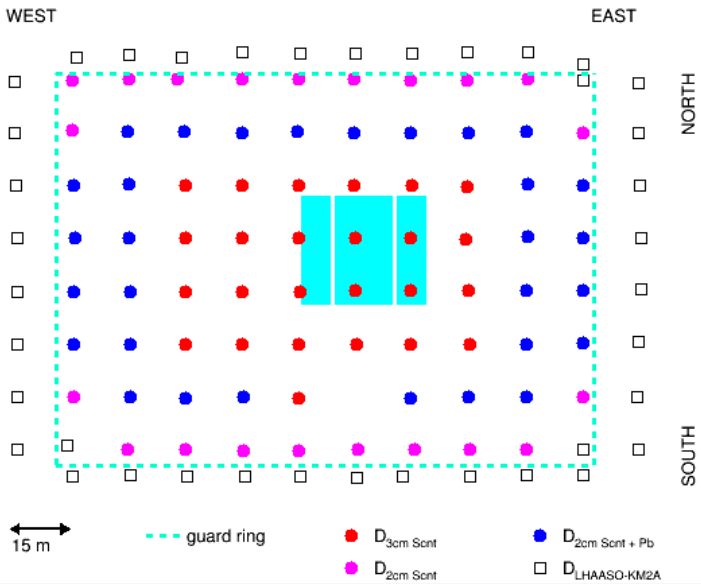


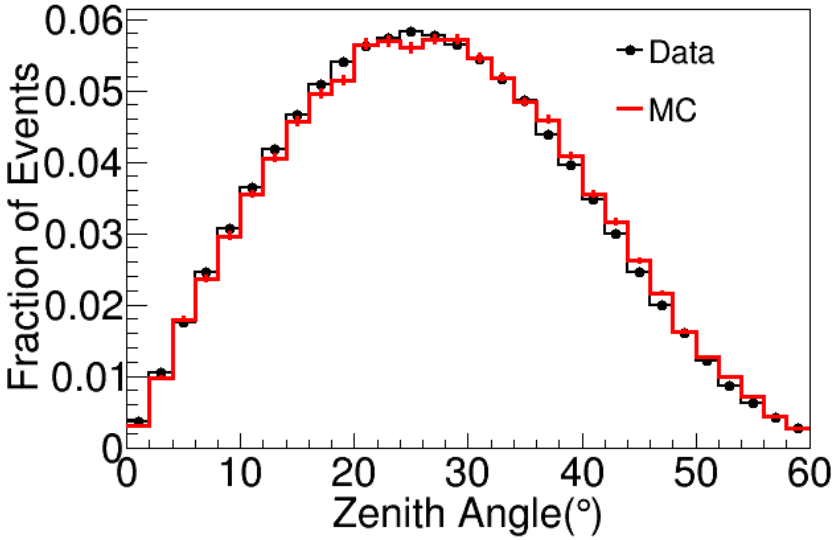
The stability single particle peak

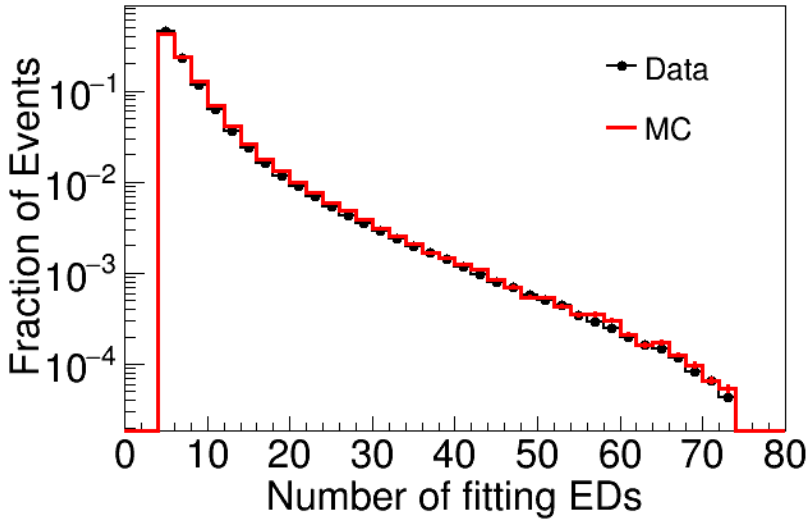


The stability of the ratio

Data selection







- **Criteria:**

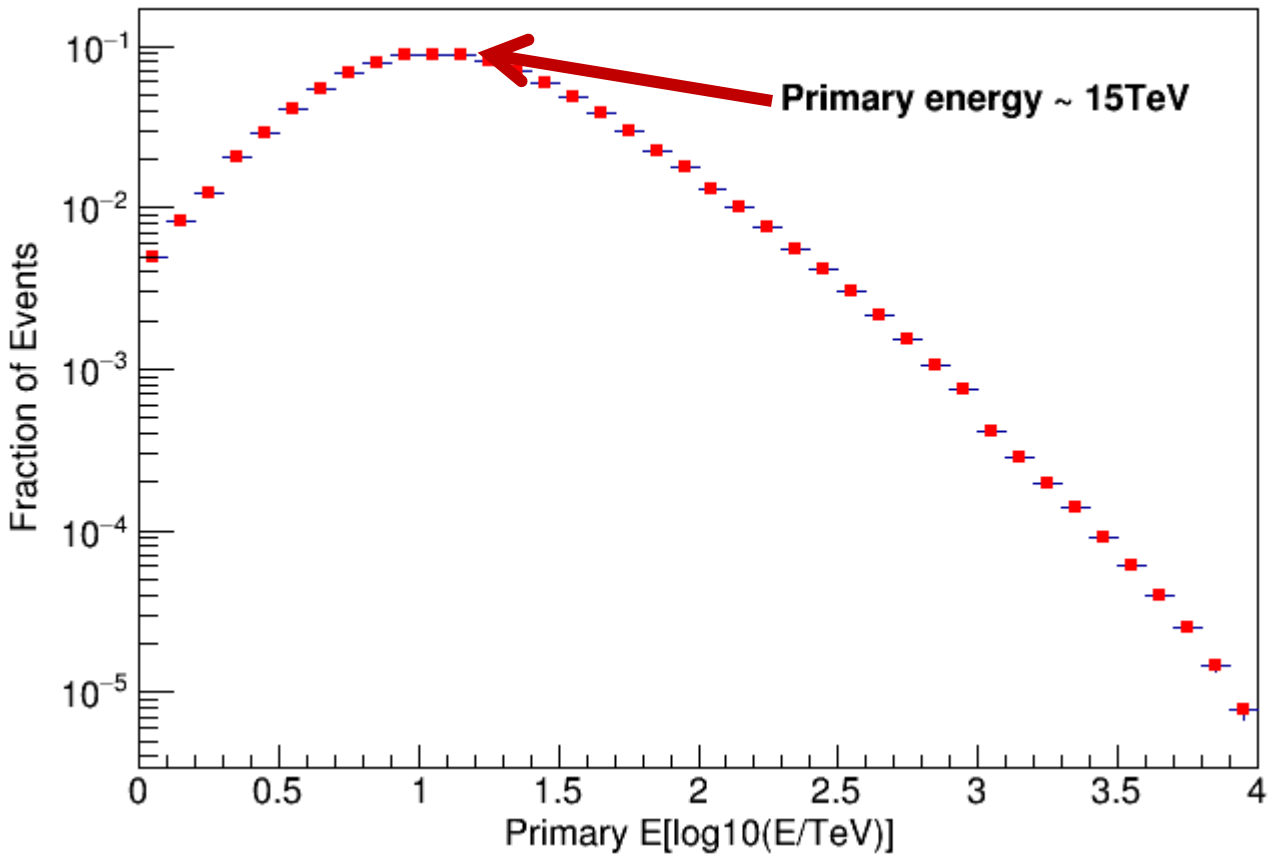
on array

The number of EDs > 4

the zenith angle <60^0

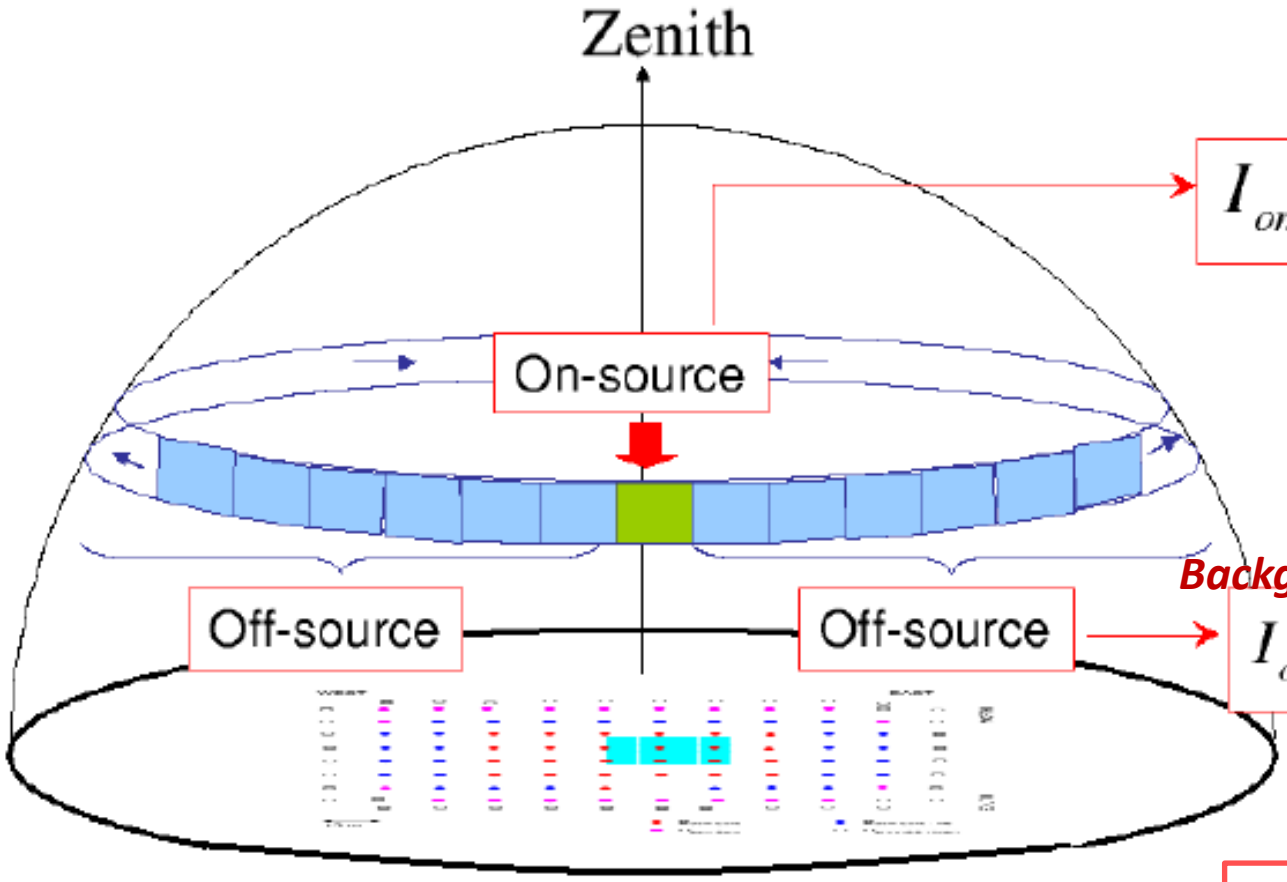
- ***Monte Carlo agrees with data***

Energy Distribution



The simulated primary energy distribution

Background estimation



I_{on}, N_{on} → $\frac{N_{on}}{I_{on}}$

Background

I_{off}, N_{off} → $\left\langle \frac{N_{off}}{I_{off}} \right\rangle$

$$Signi_{ij} = \frac{I_{ij} - 1}{\Delta I_{ij}}$$

All-Distance Equi–Zenith Angle Method

I indicates the relative intensity in some direction

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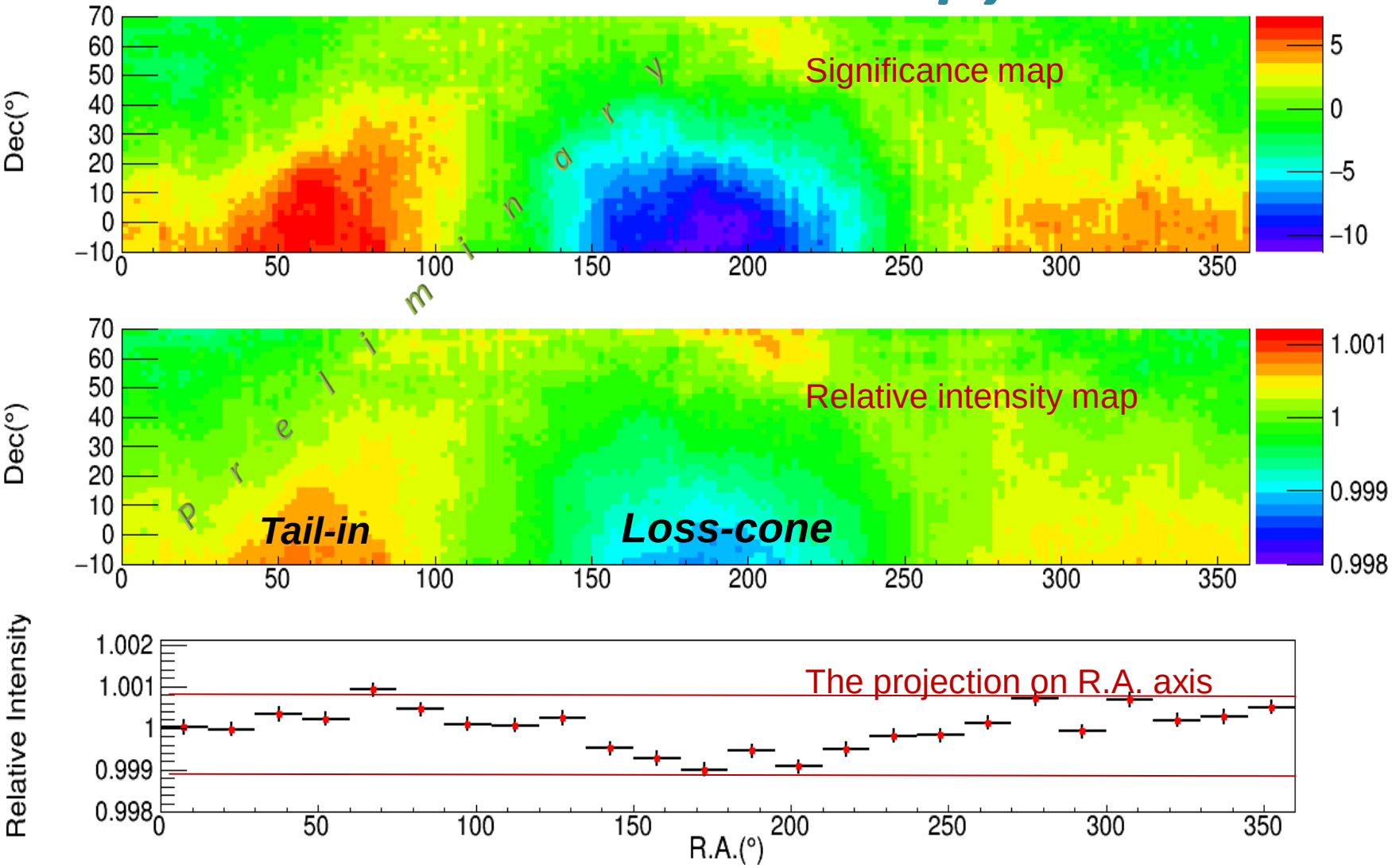
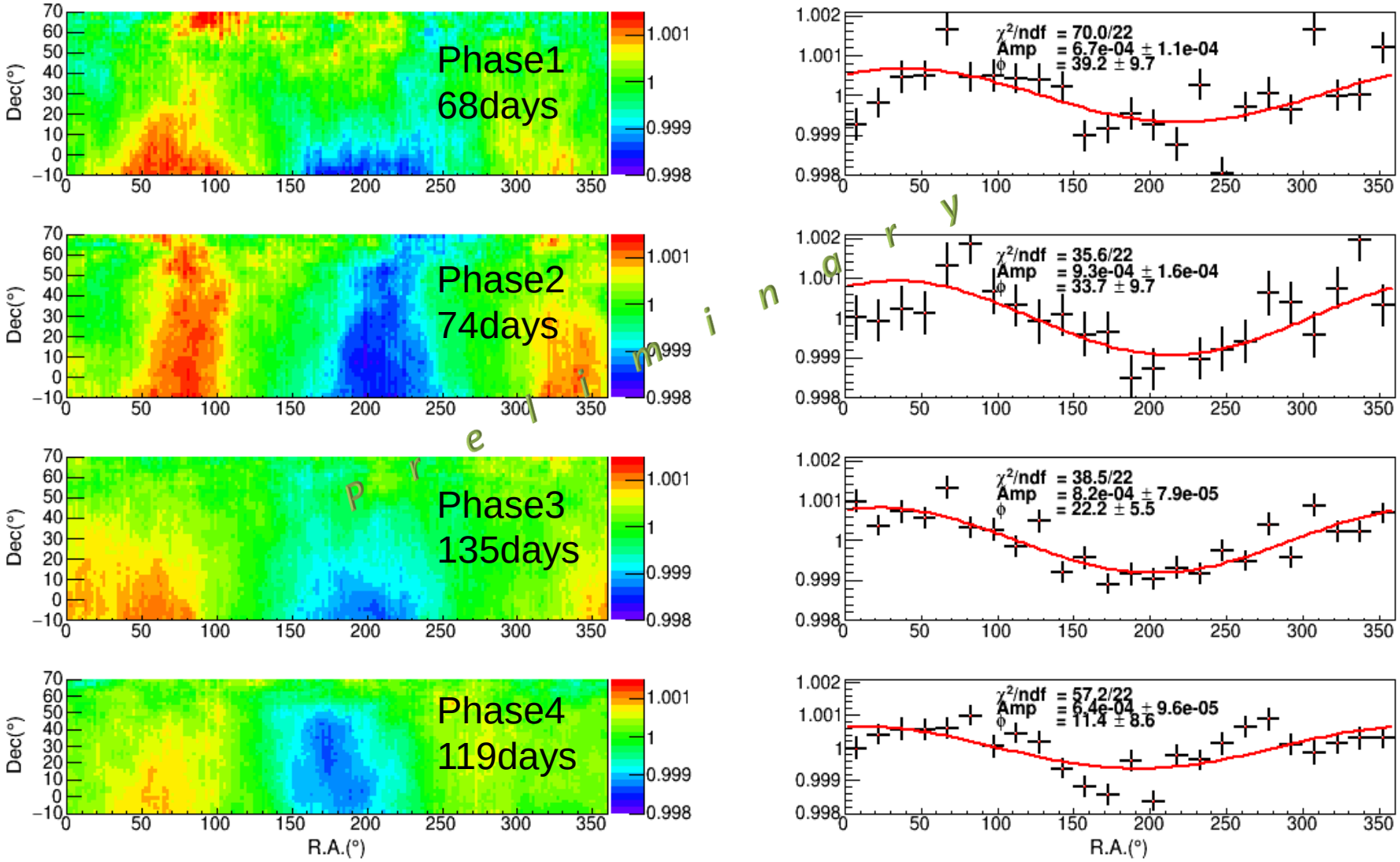
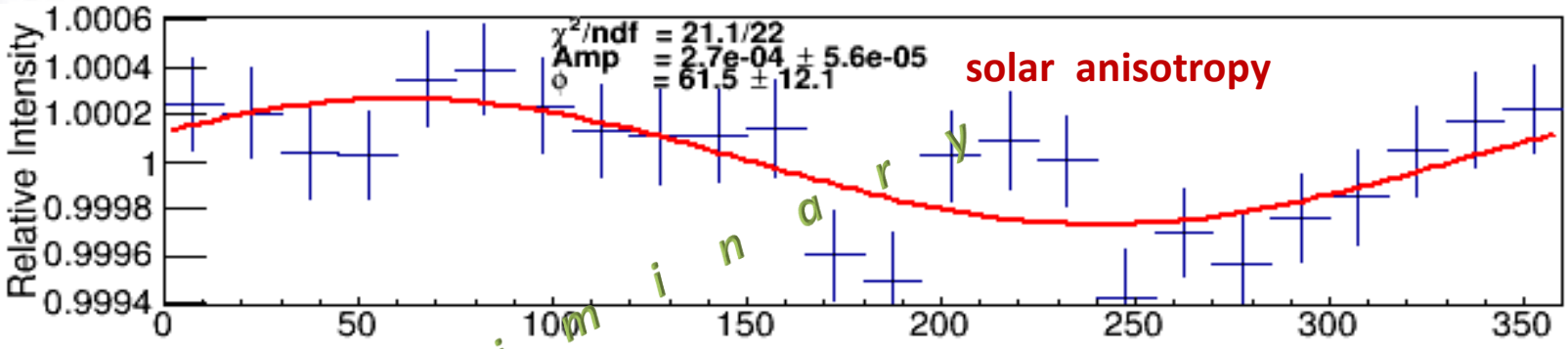
Sidereal Anisotropy

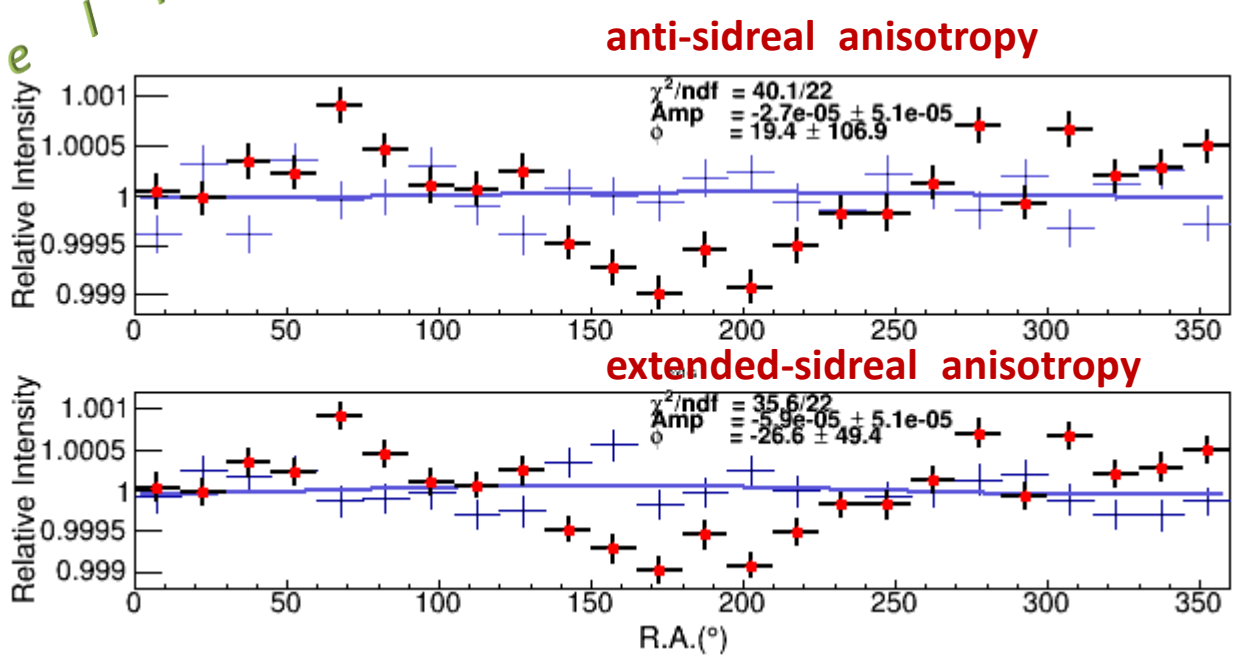


No time dependence of sidereal anisotropy



Systematic checks





systematic error

summary

- ***We observed the sidereal anisotropy of cosmicray at the median energy of 15 TeV.***
- ***No time-dependence of the Large-structure anisotropy.***
- ***The anti/extended-sidereal anisotropy is ~10^{-5}, which ensured the reliability of sidereal anisotropy .***
- ***The YBJ-HA is running, LHAASO-KM2A is under construction***