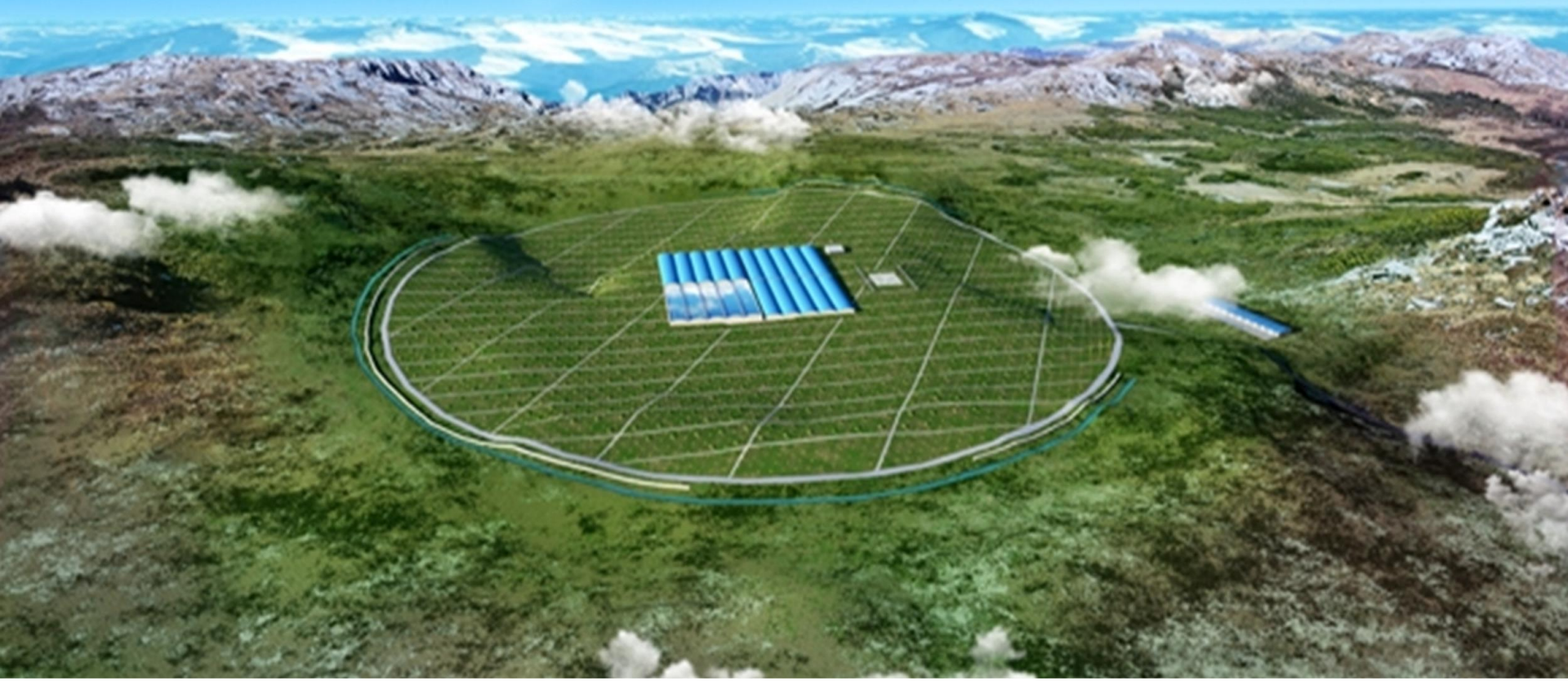
A 3D Likelihood Analysis Tool for LHAASO-KM2A data

Xiaoyuan Huang[a]* and Kaikai Duan[a] on behalf of the LHAASO Collaboration



[a]Key Laboratory of Dark Matter and Space Astronomy, Purple Mountain Observatory, CAS, China (xyhuang@pmo.ac.cn)

Introduction

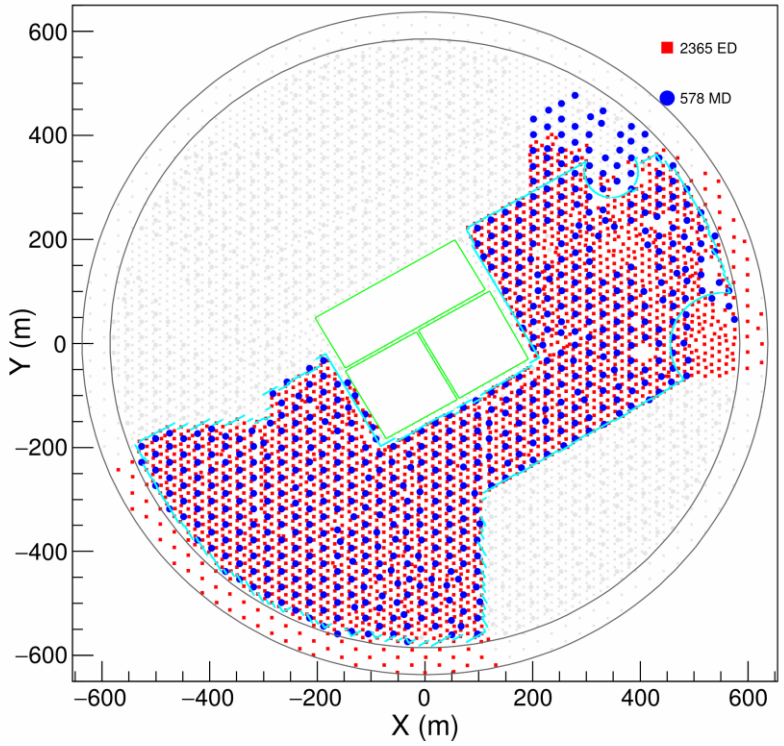


Figure 1:Planned layout of all LHAASO-KM2A detectors. The red squares and blue circles indicate the EDs and MDs in operation, respectively. The area enclosed by the cyan line outlines the fiducial area of the current KM2A half-array used in this analysis.

Large High Altitude Air Shower Observatory (LHAASO)

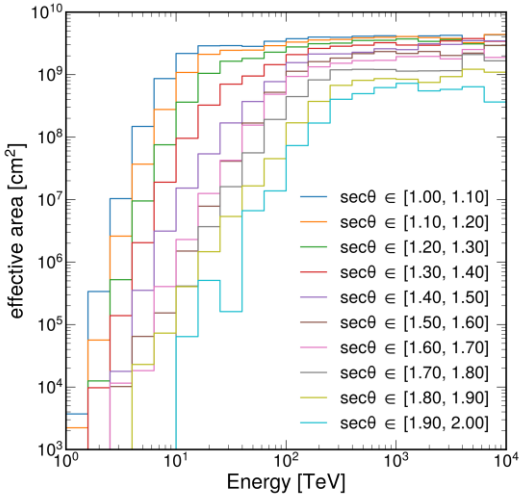
Scientific goal:

- the energy spectrum, the elemental composition and the anisotropy of cosmic rays in the energy range between 10^{12} and 10^{17}eV
- gamma ray astronomy in the energy range between10^{11} and 10^{15} eV

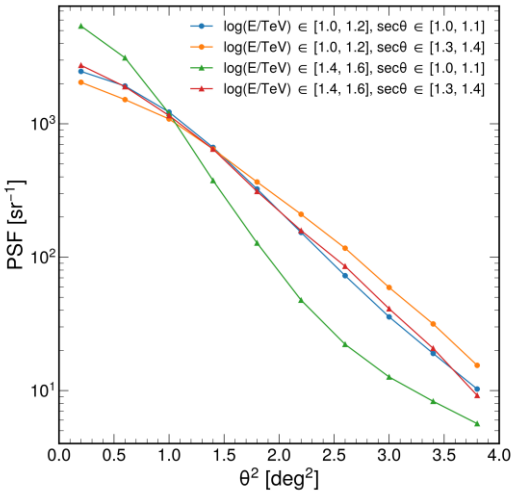
The square kilometer array (KM2A) Is the most sensitive gamma-ray detector for energies above a few tens of TeV.

KM2A IRFs from Simulation

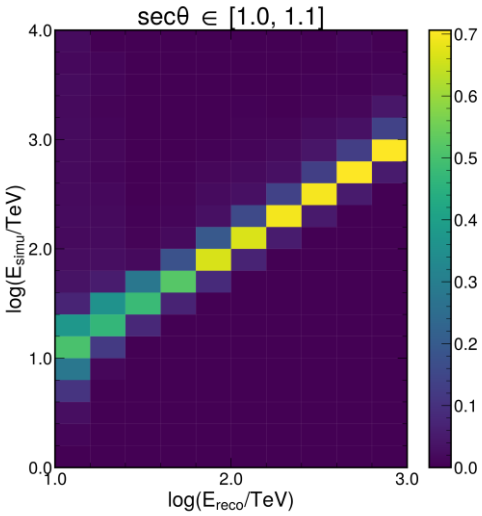
Instrument Response Functions (IRFs) including the effective area, point-spread function and energy dispersion represent the performance of the detections like sensitivity, angular and energy resolution.



Effective Area

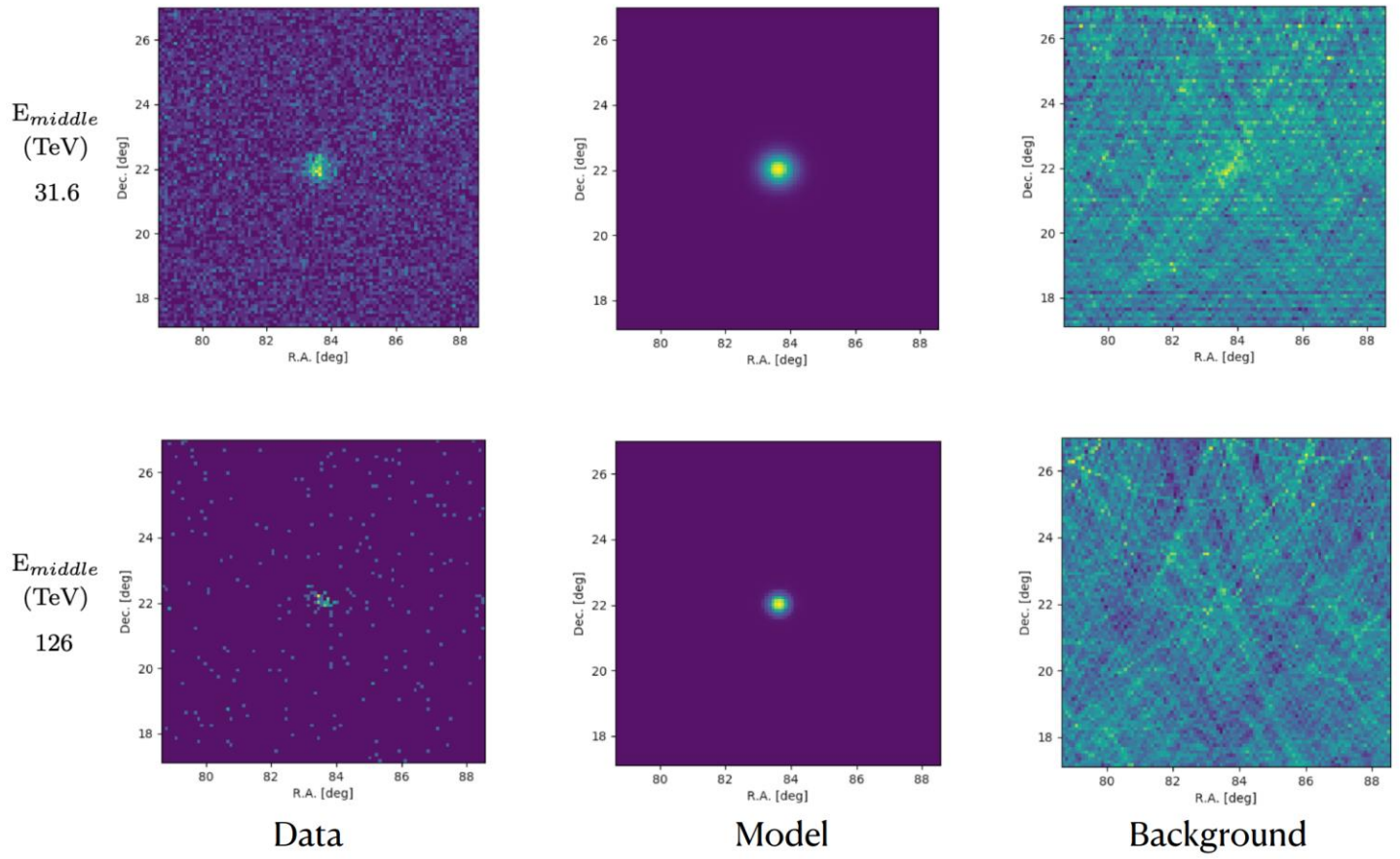


Point Spread Function

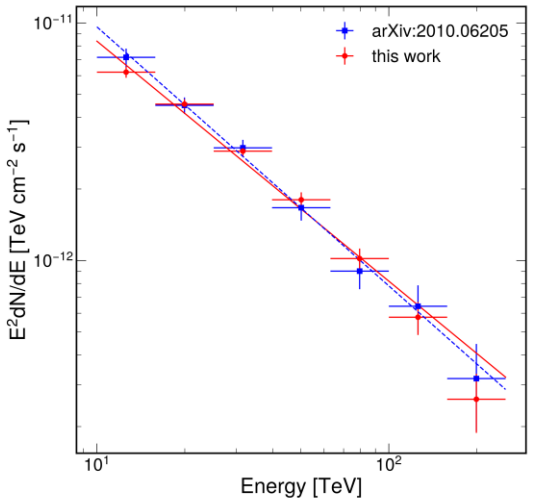


Energy Dispersion

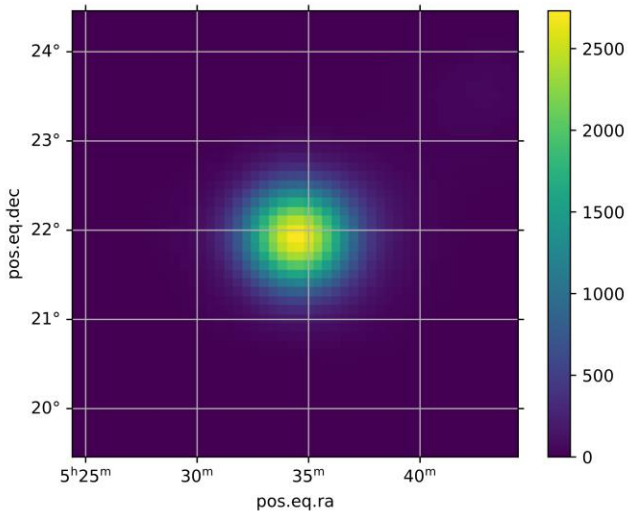
KM2A Data and Model Prediction



Analysis for Point Source



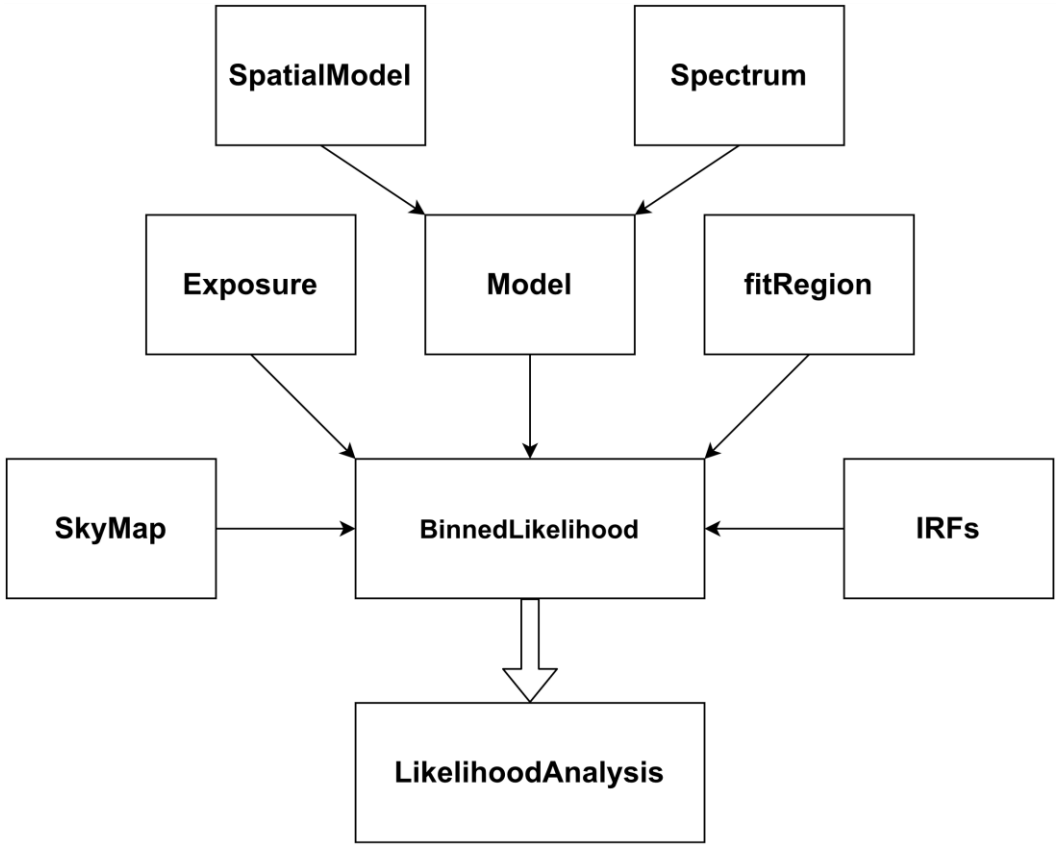
Spectral Energy Distribution (SED)

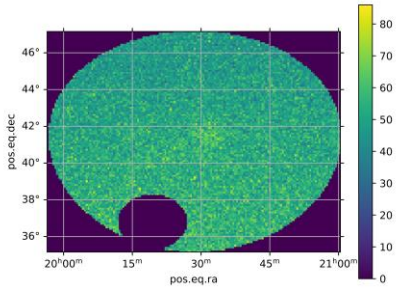


Test Statistic (TS) map

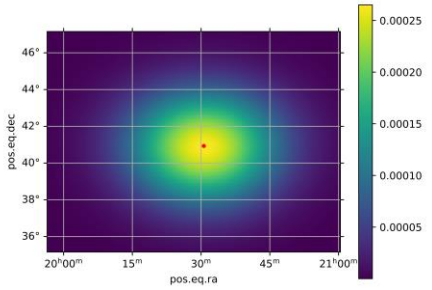
The analysis with this software could give consistent results with those using traditional method.

Implementation





Fit region around Cygnus Cocoon



Spatial model of Cygnus Cocoon with a Gaussian width 2.13 °

Thanks for your attention