Status of KM2A data analysis

Chen Songzhan， Wu Sha
IHEP
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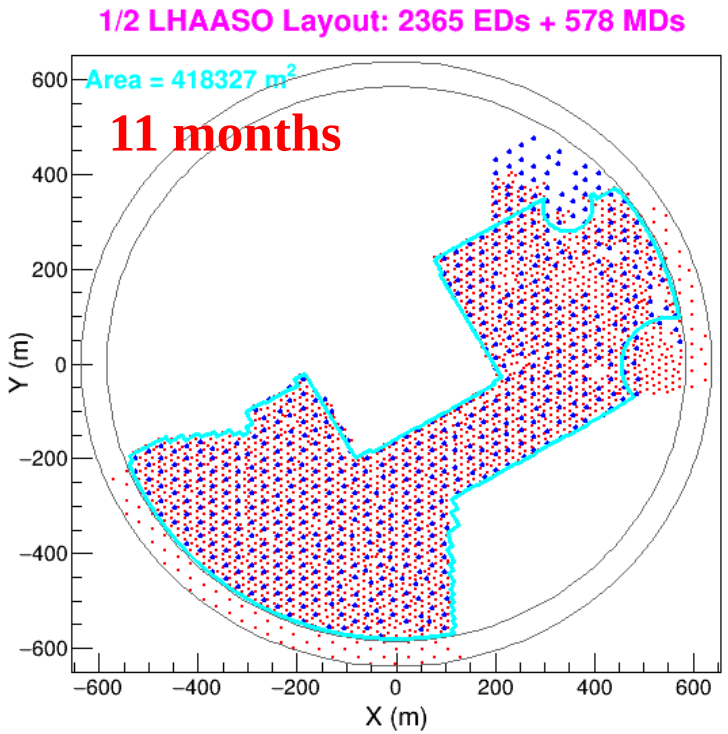
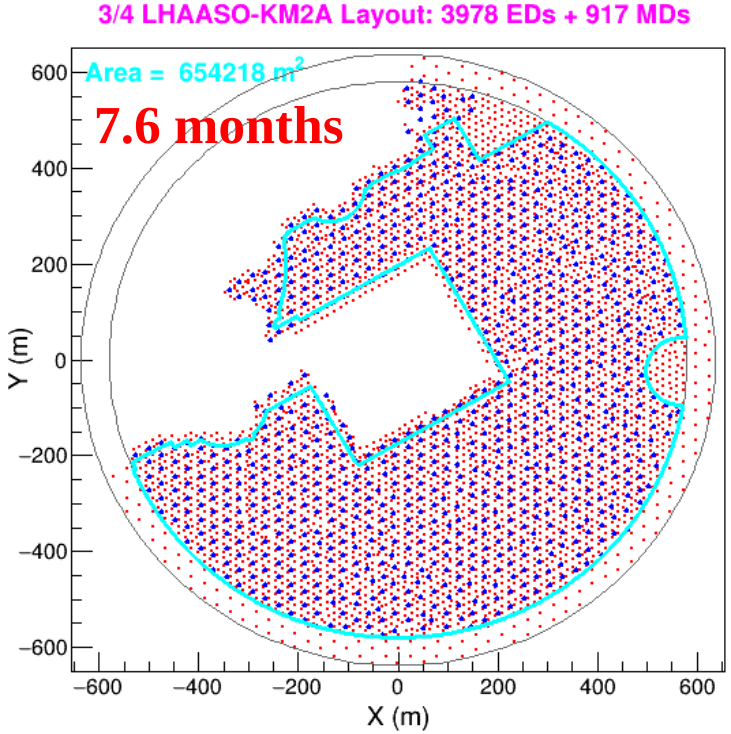
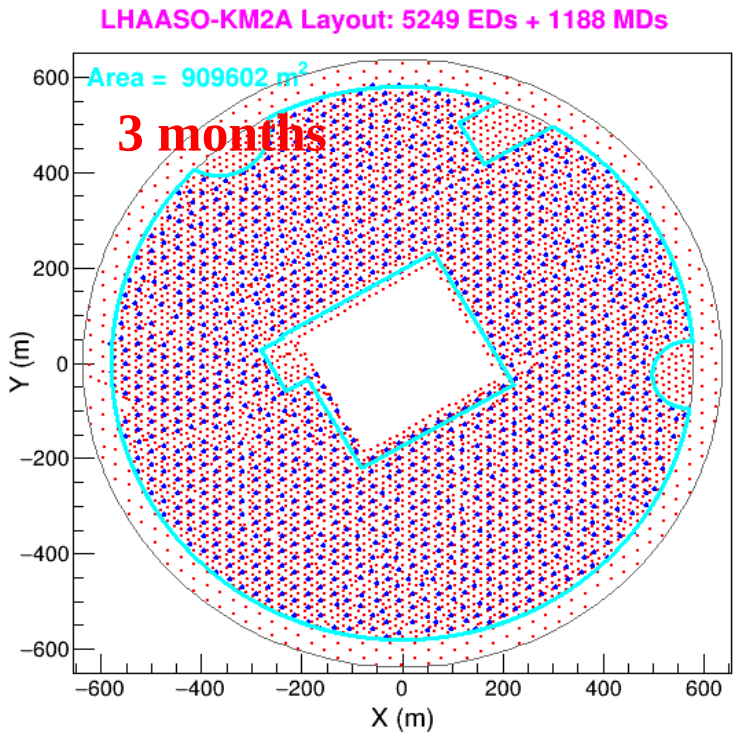
1. Status of KM2A data

½ KM2A ¾ KM2A Full-KM2A

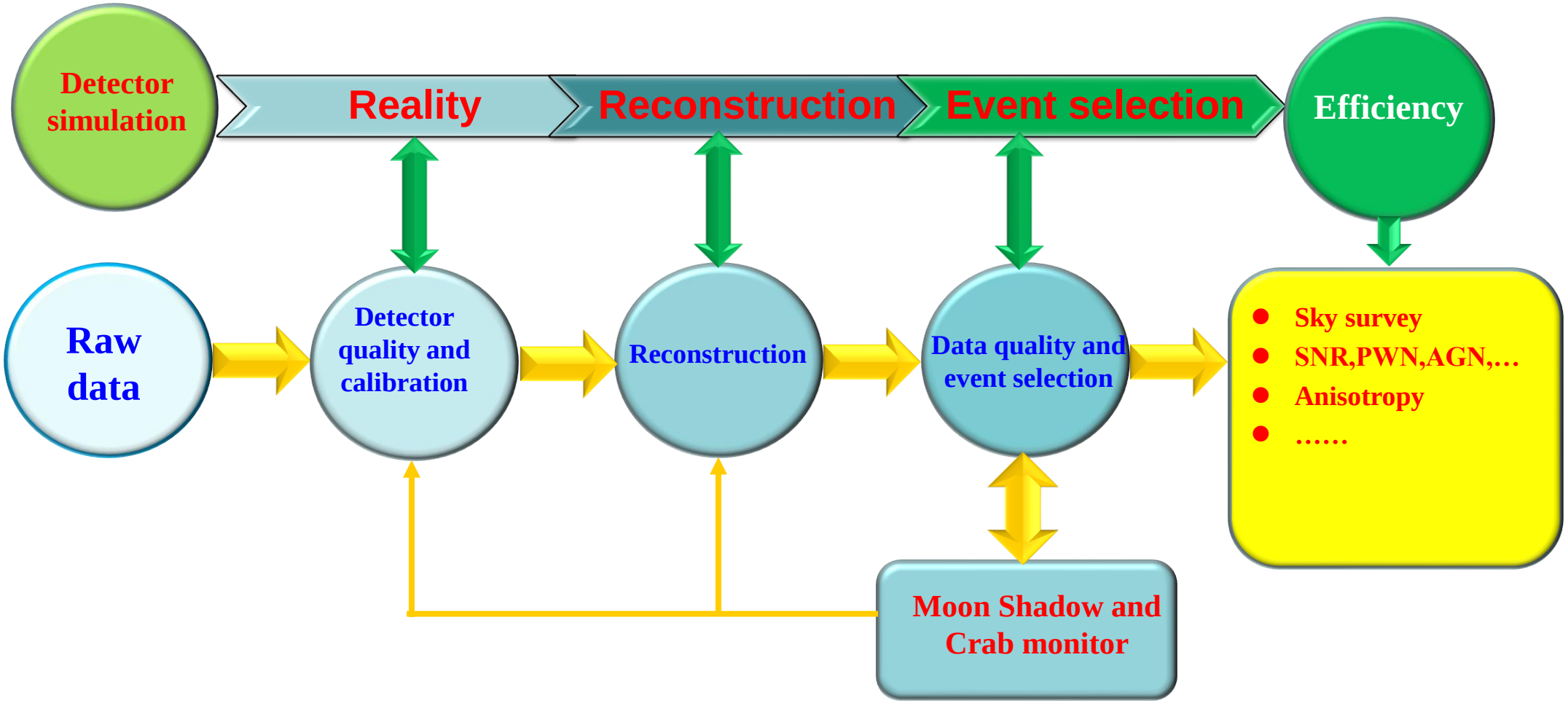






2019-12-27—2020-11-30 **2020-12-01—2021-07-19** **2021-07-20—>**

Pipeline of KM2A data processing



Quality monitor and selection of KM2A data

(Wu Sha)

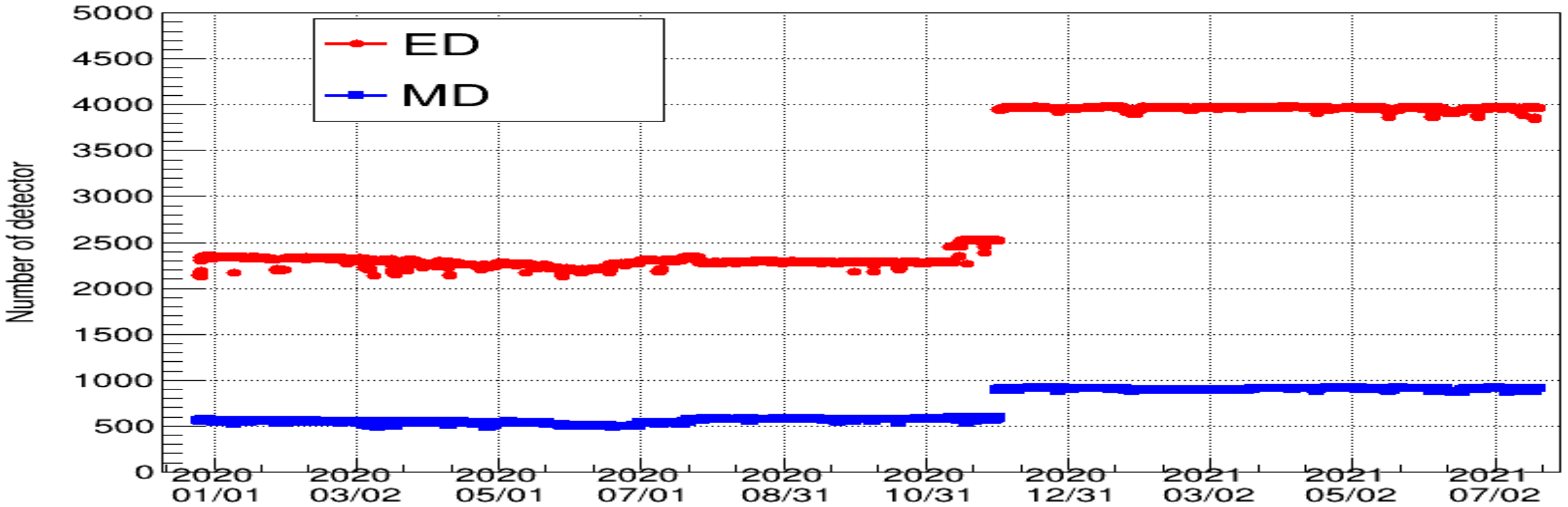
- **Detector quality monitor:**
  - Noise rate, Occupancy, Time residual of each ED and MD
- **Reconstruction file quality selection:**
  - Number of EDs and MDs, number of events, <Ne>,
    <Nu>,<Zenith>,<Azimuth>,<Chi>,<Rejection Ratio>, MD hit lost check
- **Production:** good file list for each day

½ KM2A, filter 0.7%files.

¾ KM2A, filter 0.3% files.

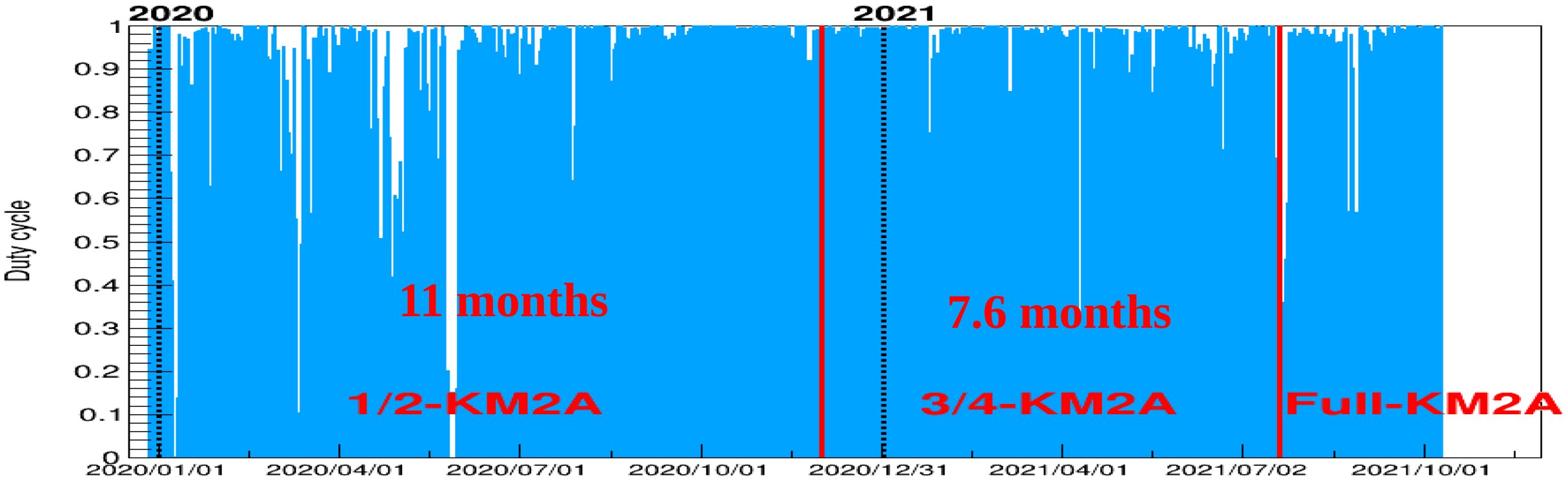
Number of KM2A detectors

- **The number of ¾ KM2A detectors is more stable than that of ½ KM2A.**



Duty cycle

- ½-KM2A: duty cycle ~ 90%, $7x10^7$ events/day, $2.3x10^{10}$
- ¾-KM2A: duty cycle ~ 95%, $1.4x10^8$ events/day, $3.1x10^{10}$
- Full-KM2A: duty cycle >95%, $1.7x10^8$ events/day.



Data and software availability

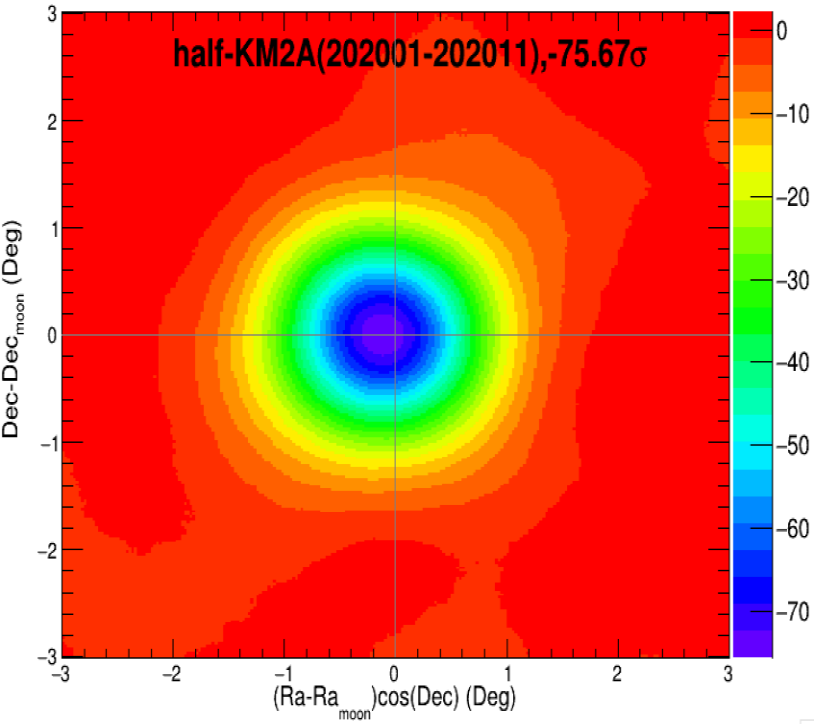
- The reconstruction software was updated to V2.
- The data of ½-KM2A and ¾-KM2A after data quality selection have been published.
- The data (include MC data) and software can be found in /lhaasofs/user/lhaasorec/publish/

or /home/lhaaso/lhaasorec/publish/

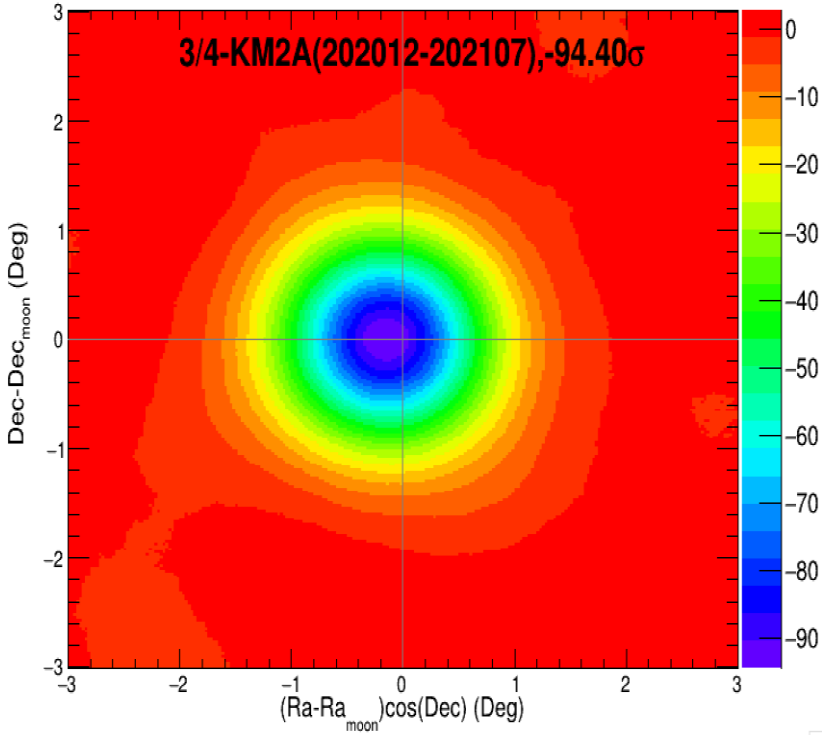
Moon shadow monitor

(Li Zhe)

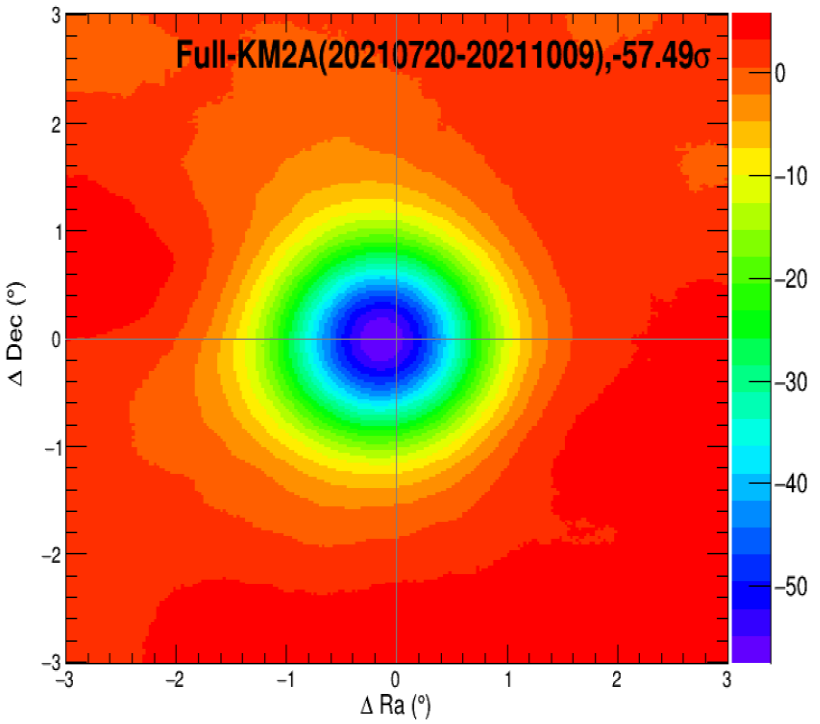
1/2-KM2A



3/4-KM2A

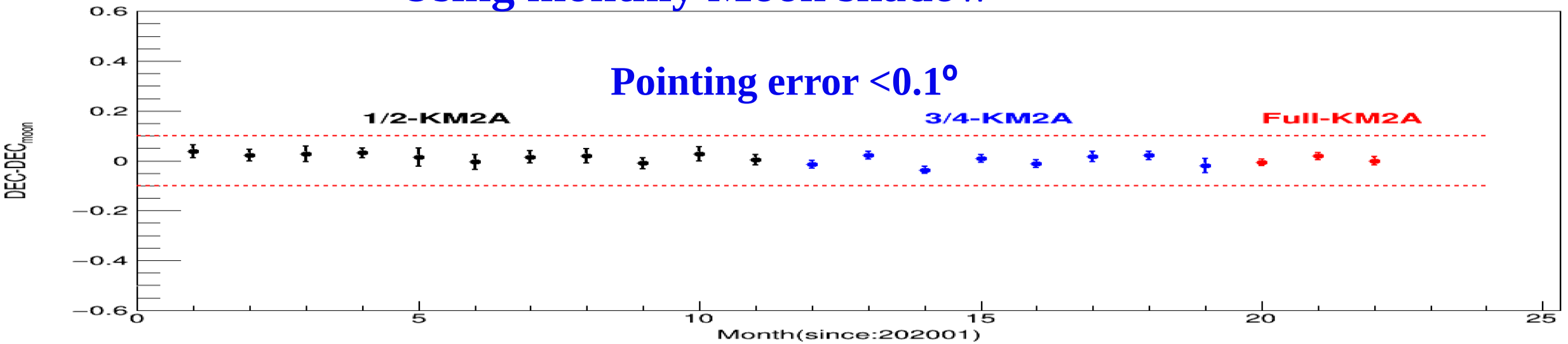


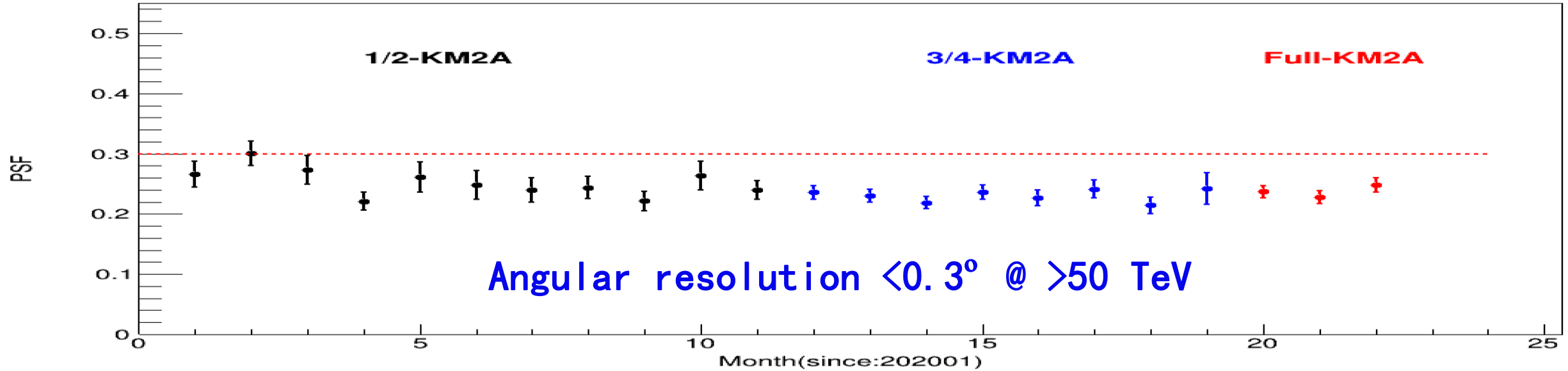
Full-KM2A



Long-term stability

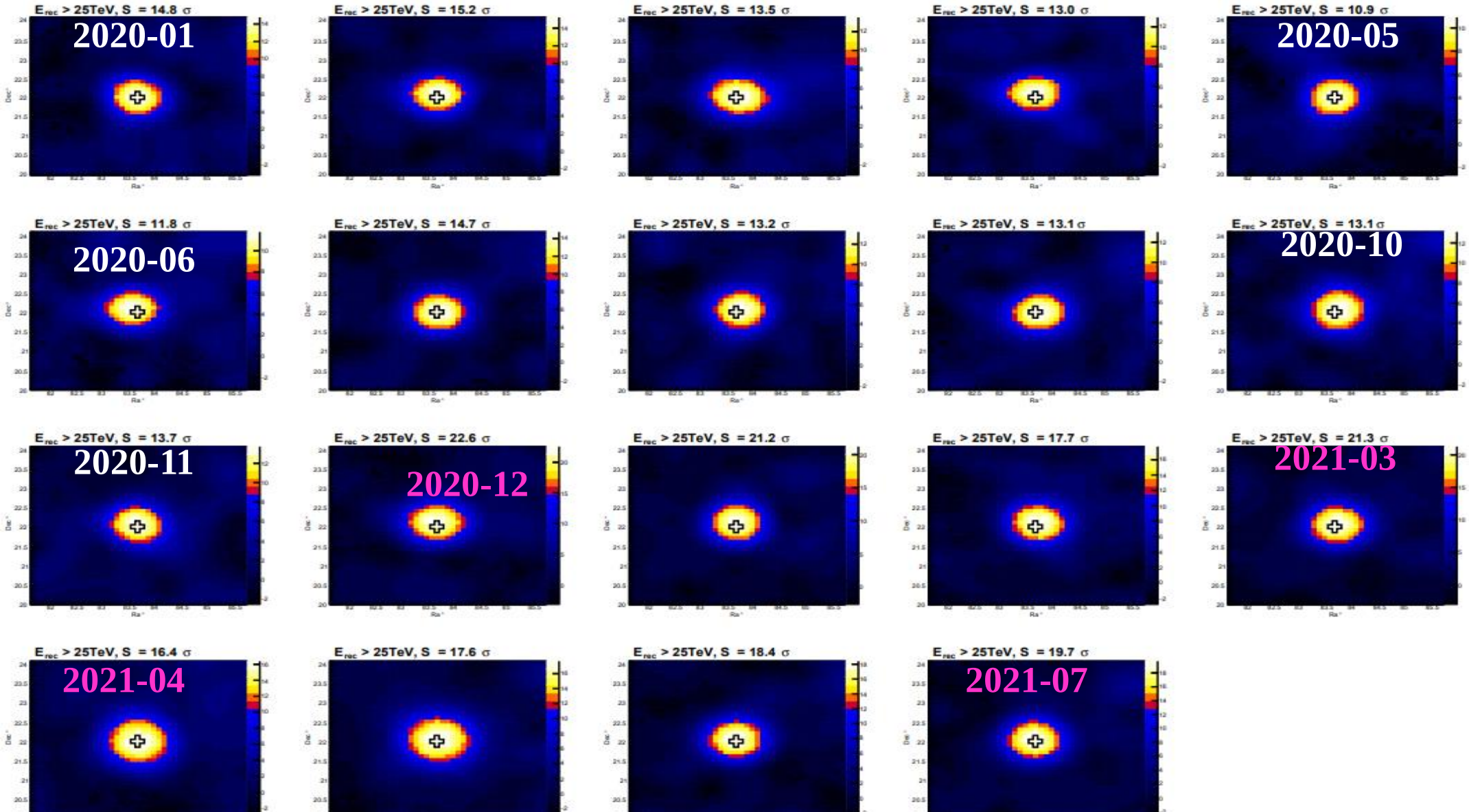
Using monthly Moon shadow





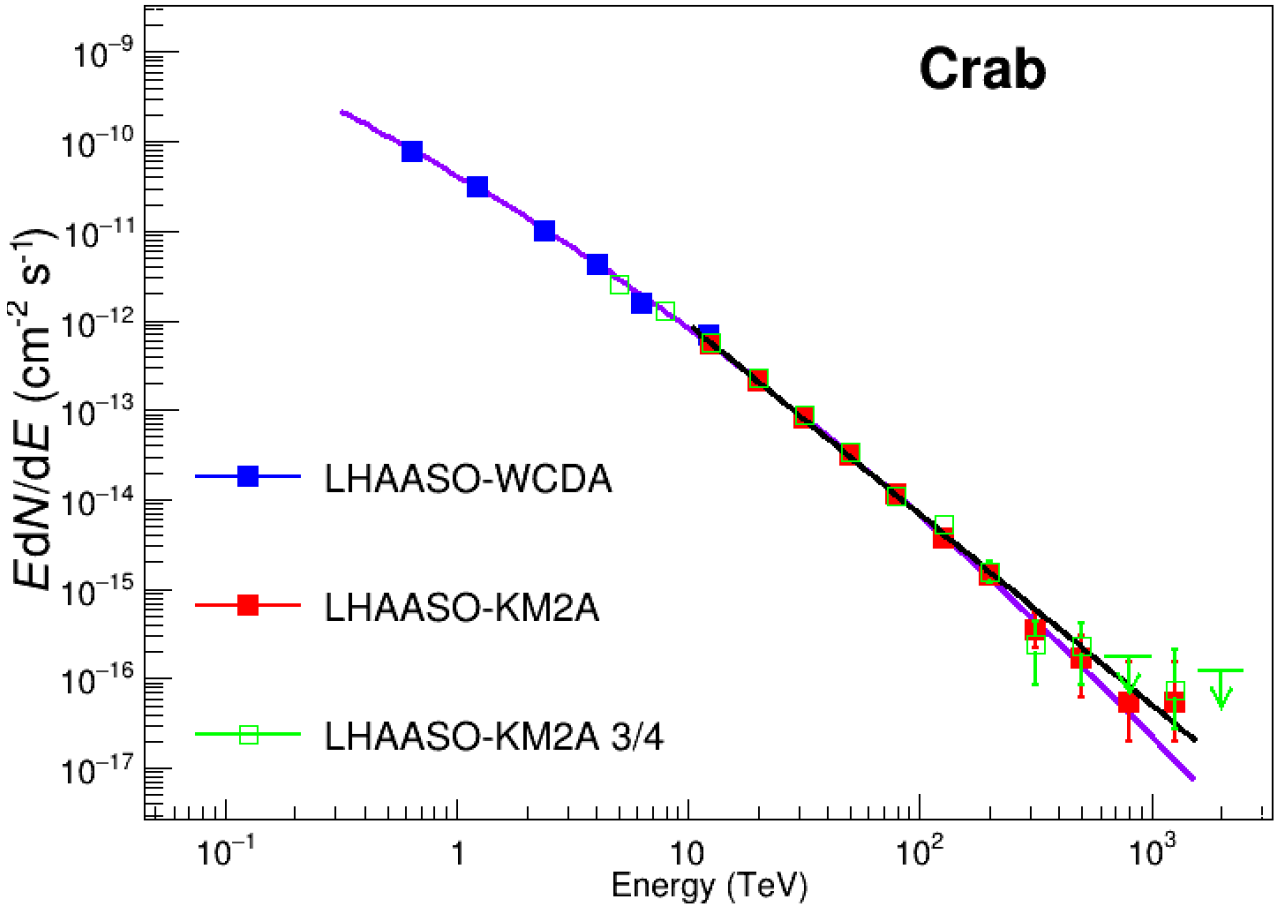
Crab monitor

(Yu Yanhong)



Crab SED

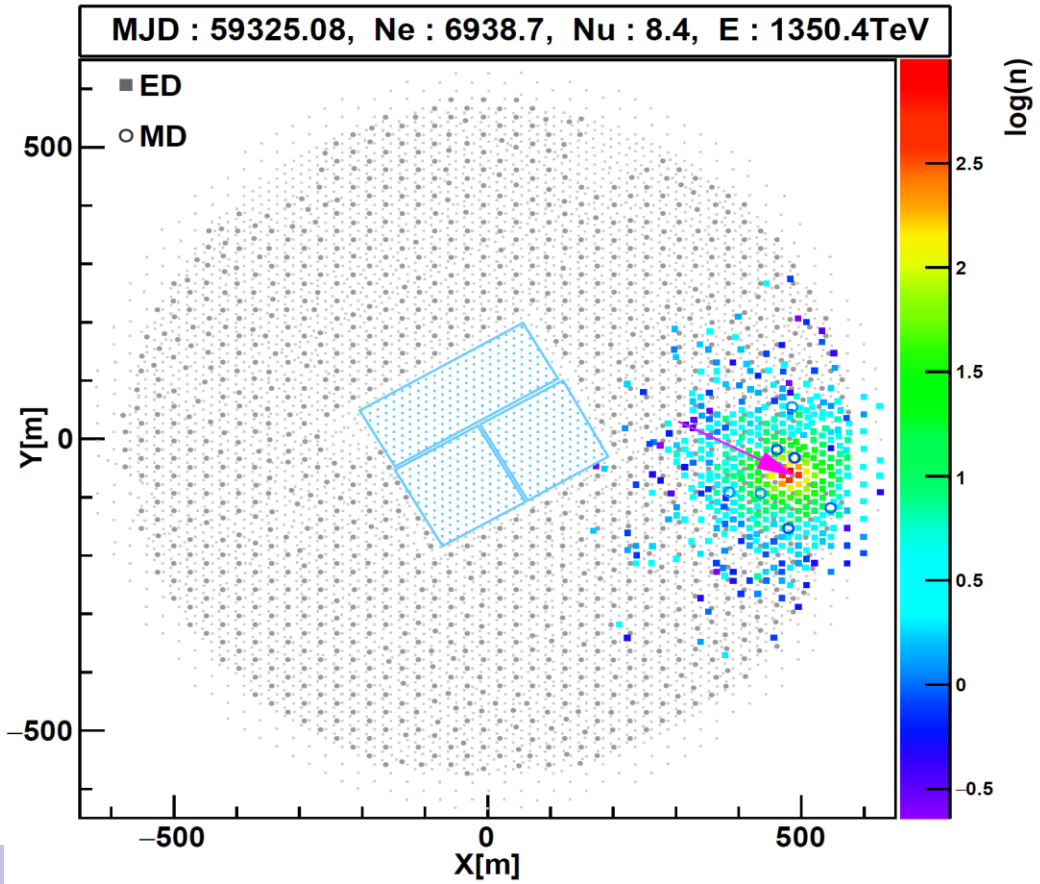
- The Crab SED using 3/4-KM2A data is consistent with the SED published in Science paper.

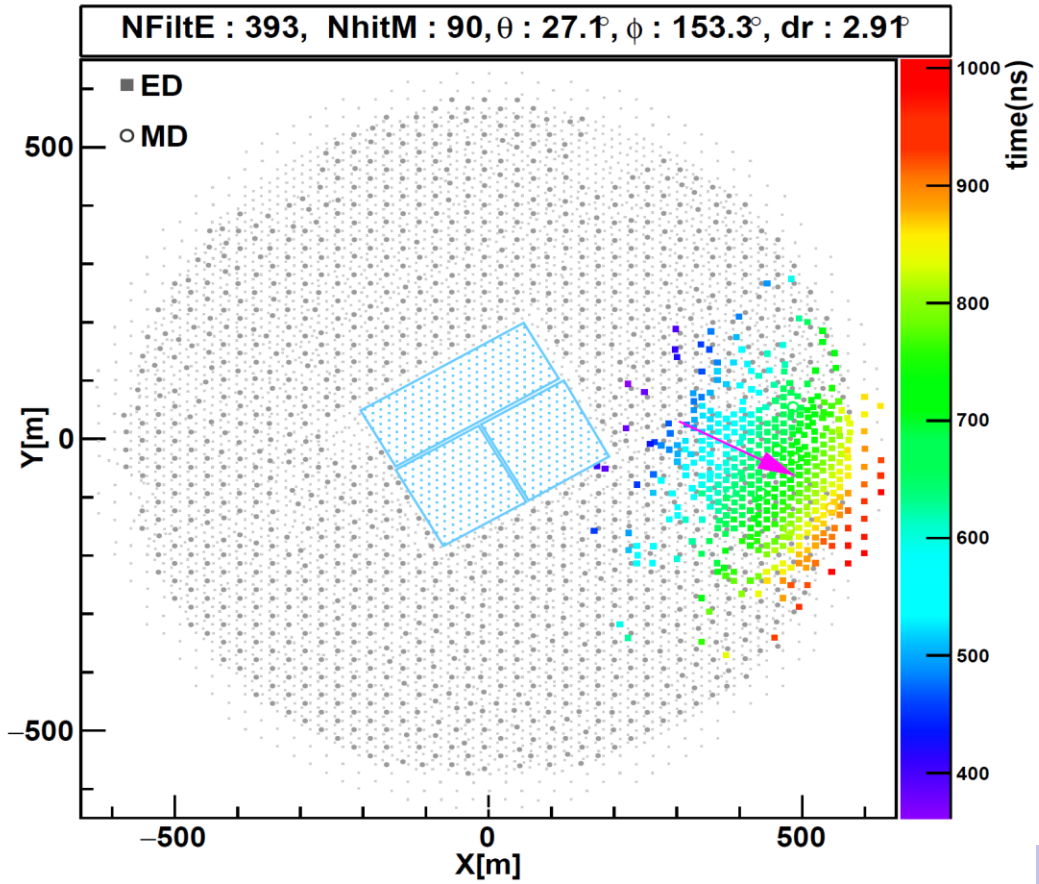


>100 TeV events monitor

(Wang Lingyu)

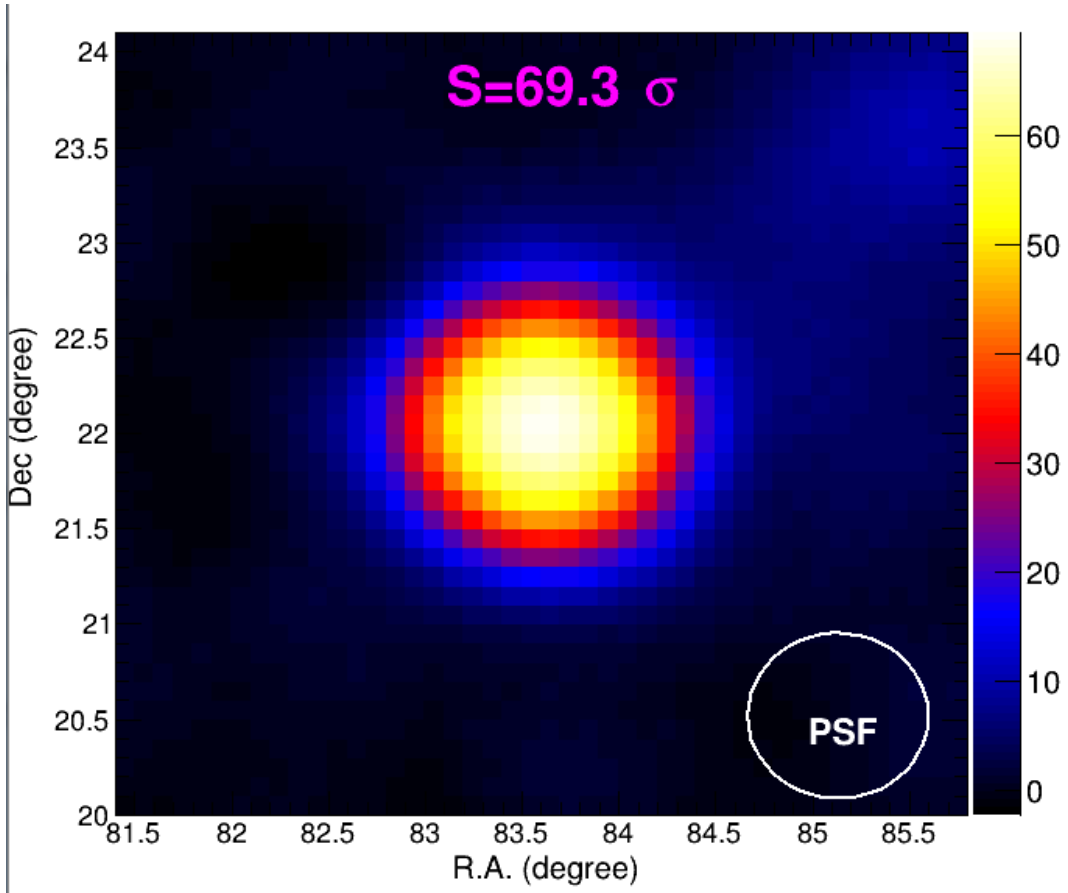
- 1400+ events>100TeV from UHE sources.
- 6 events >1 PeV from UHE sources.

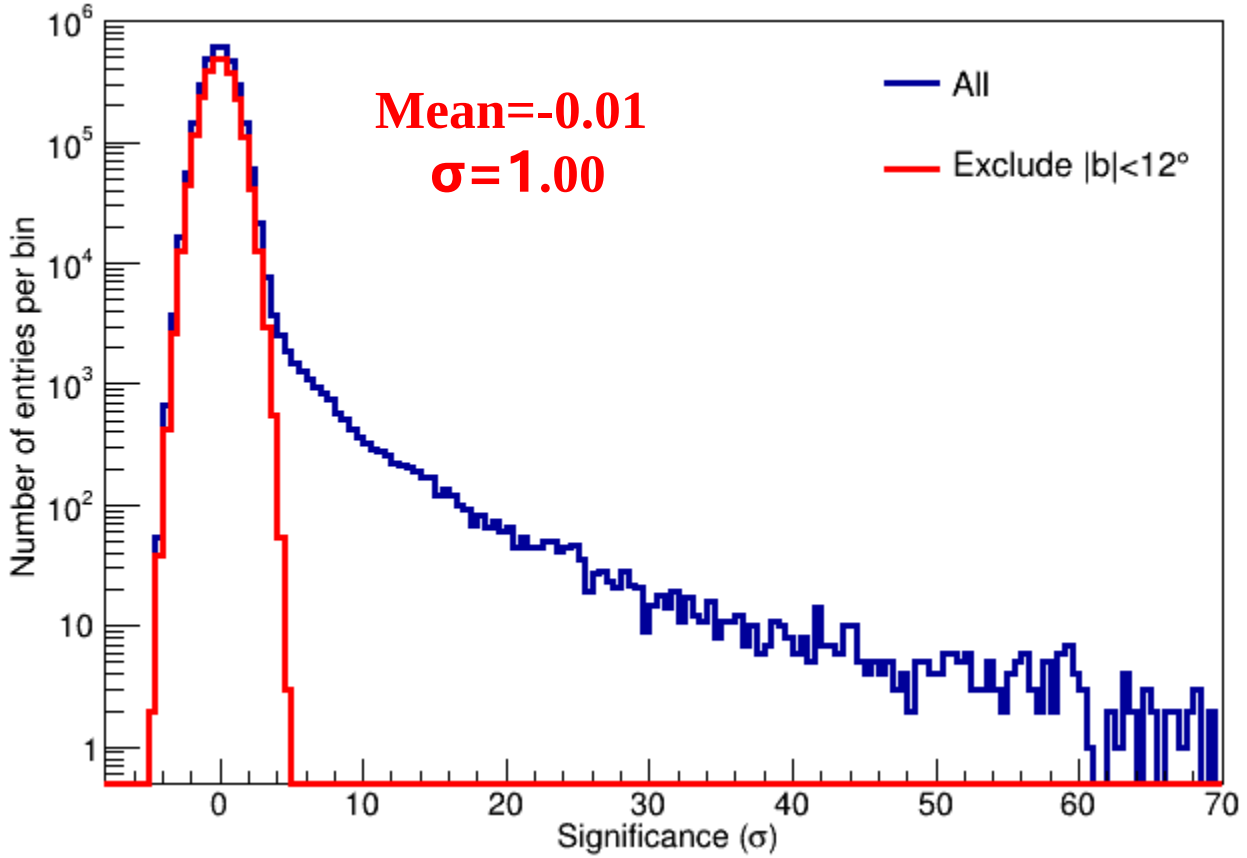




2. Sky survey result of KM2A data

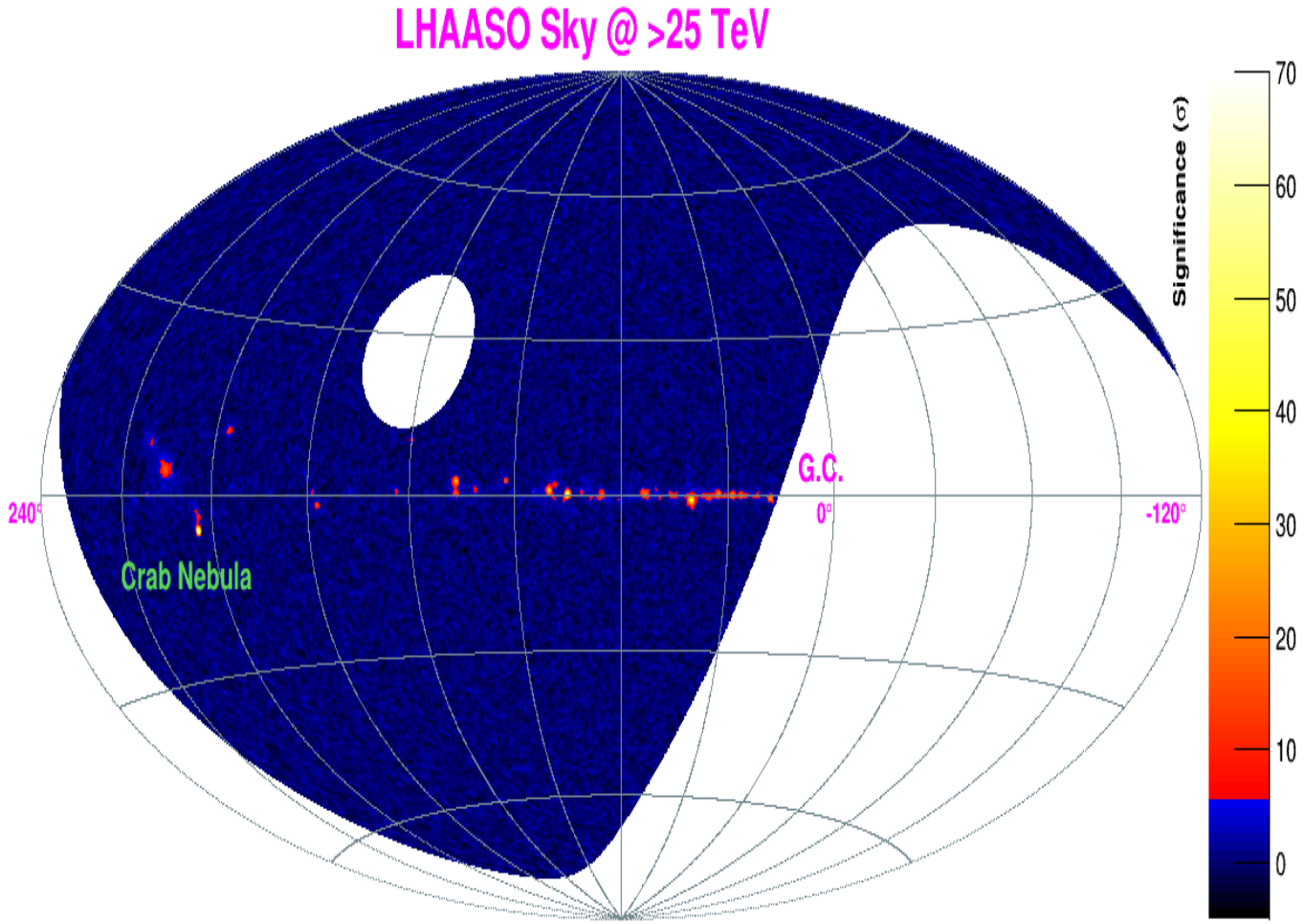
- Data up to 2021-07-20, E_{rec}>25 TeV





Sky survey (point source search)

- >25 TeV:
  - 44 sources S>5σ,
  - 35 sources S>6σ, (10new
  - 20 sources S>10σ
- >100 TeV
  - 23 sources S>5σ,
  - 18 sources S>6σ, (3 new)
  - 9 sources S>10σ



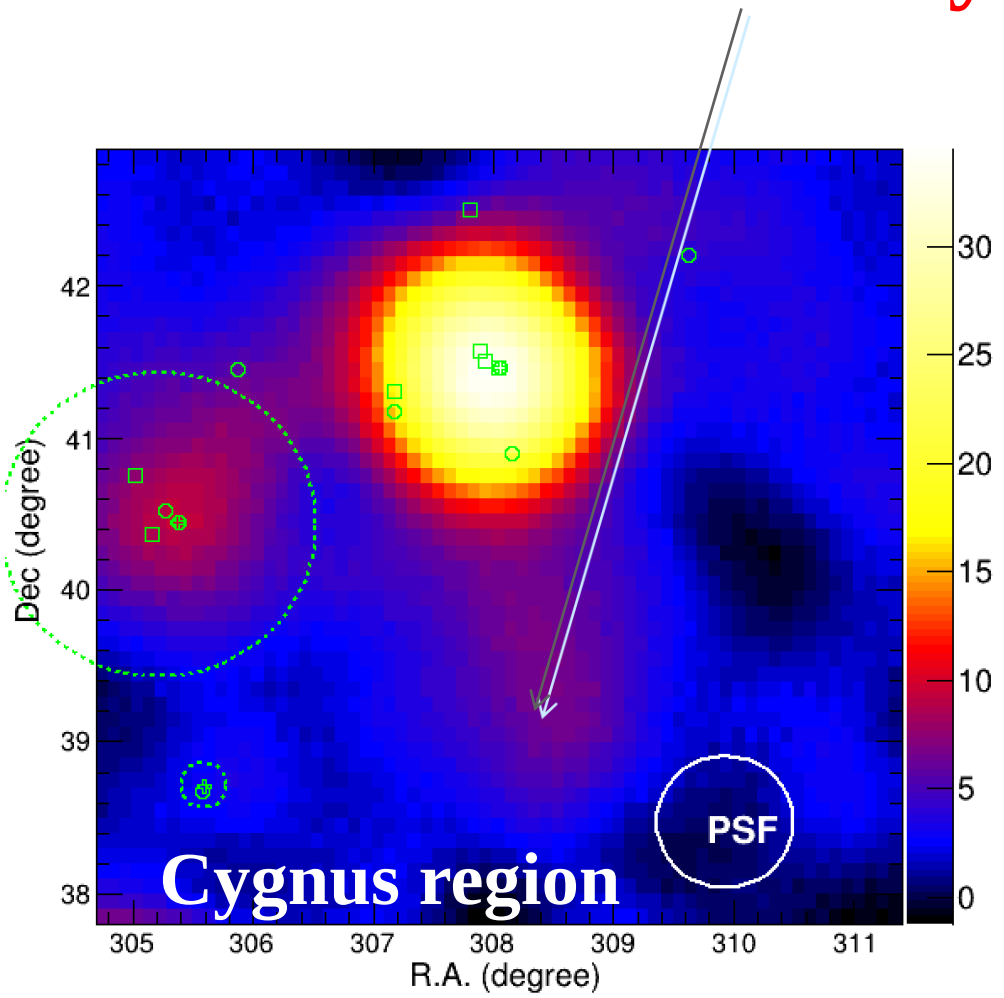
Multiwave-length counterpart within 0.5 degree

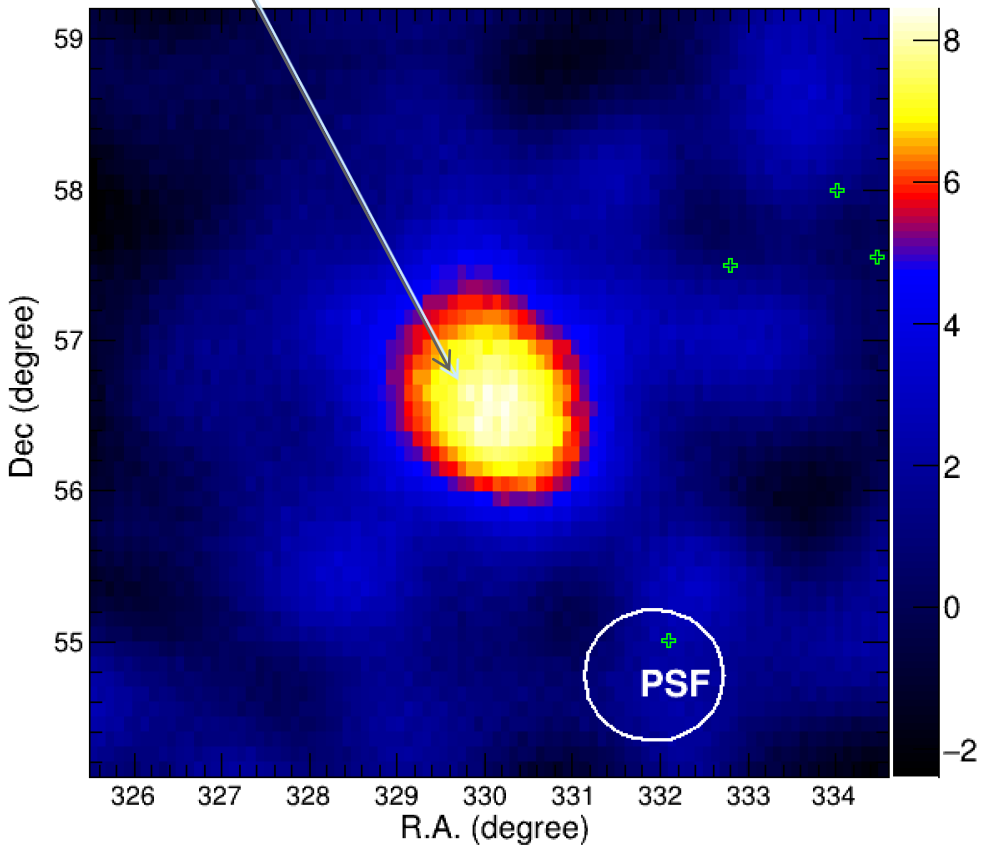
- 10 New TeV Gamma-ray sources
- 3 New Gamma-ray sources, where 2 without Plusar but near Molecular cloud.
- 4 sources maybe from SNR other than PWN.

E>25 TeV S>6σ	No.	with GeV source	with SNR	with Pulsar	with SNR & Pulsar	$R_{snr}<R_{pulsar}$	without GeV and Pulsar
All	35	29	13	30	13	4	2
New	10	7	0	6	0	0	2

Interesting new gamma-ray sources

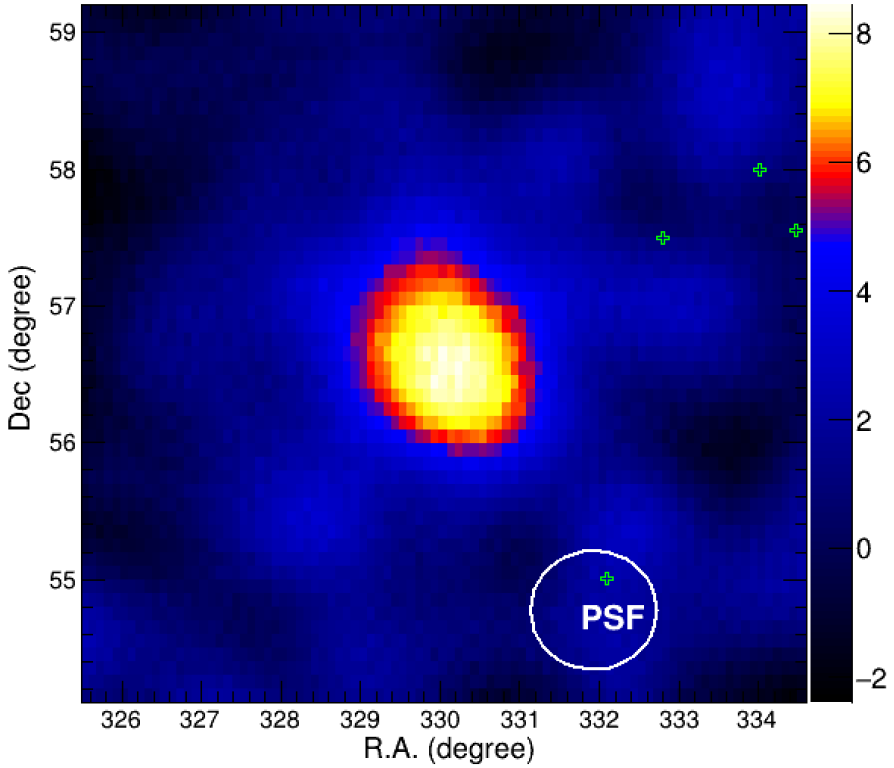
2 New Gamma-ray sources without Plusar.

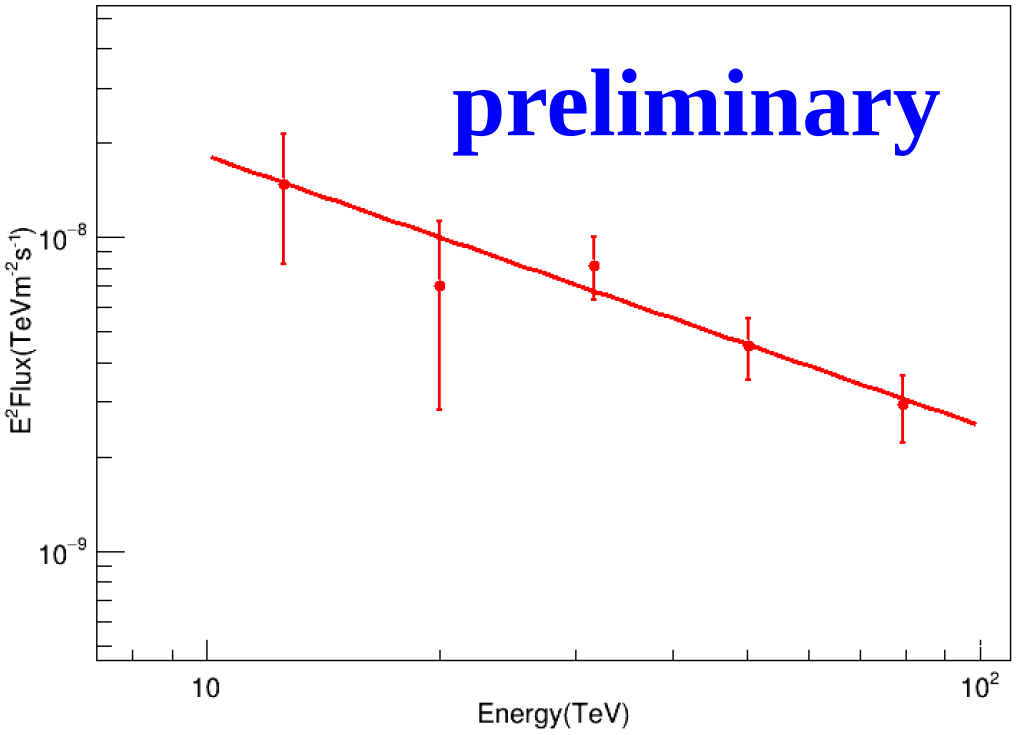




Further analysis about the isolated new gamma-ray source (Li Zhe)

- The extension is σ=0.55±0.14 degree (preliminary).





3. Summary

- **The data of 1/2-KM2A and 3/4-KM2A have been published. The Crab SED using different data is consistent with each other.**
- **Full-KM2A started since 2021-7-20. Data check have been done. The operation of detector is very stable now.**
- **Using 1/2-KM2A + 3/4-KM2A data, 35 gamma-ray sources @>25 TeV have been detected with >6σ and 10 are new VHE gamma-ray sources. 18 sources @>100 TeV. We will publish the LHAASO catalog in the next step.**

Thanks for your attention!