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Searching for Transient Gamma-ray Sources with LHAASO-KM2A

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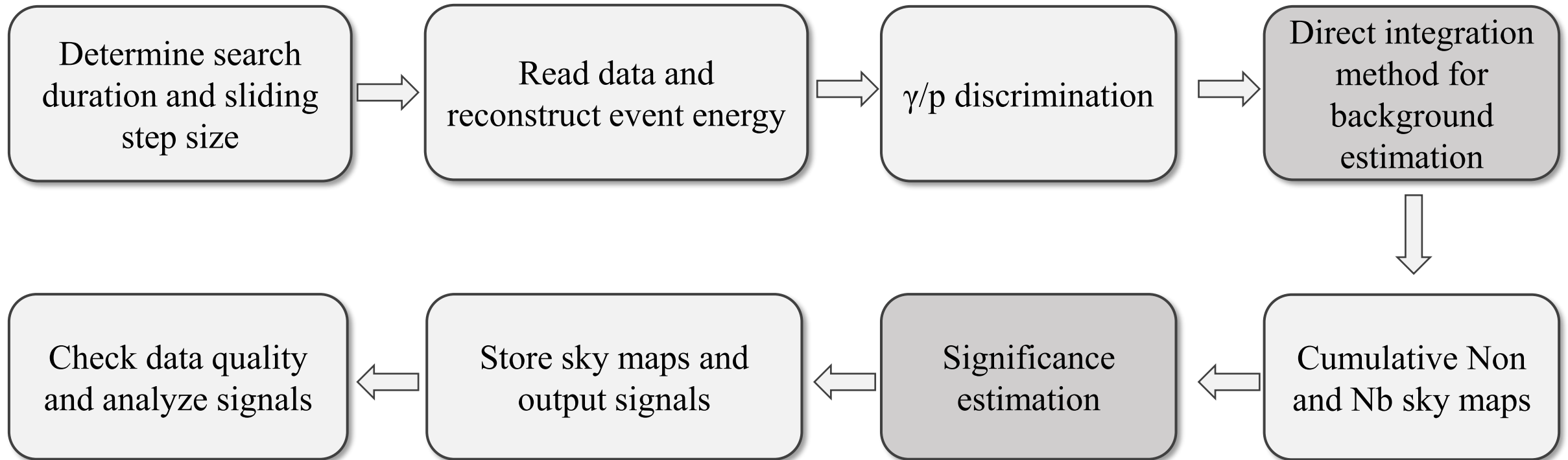
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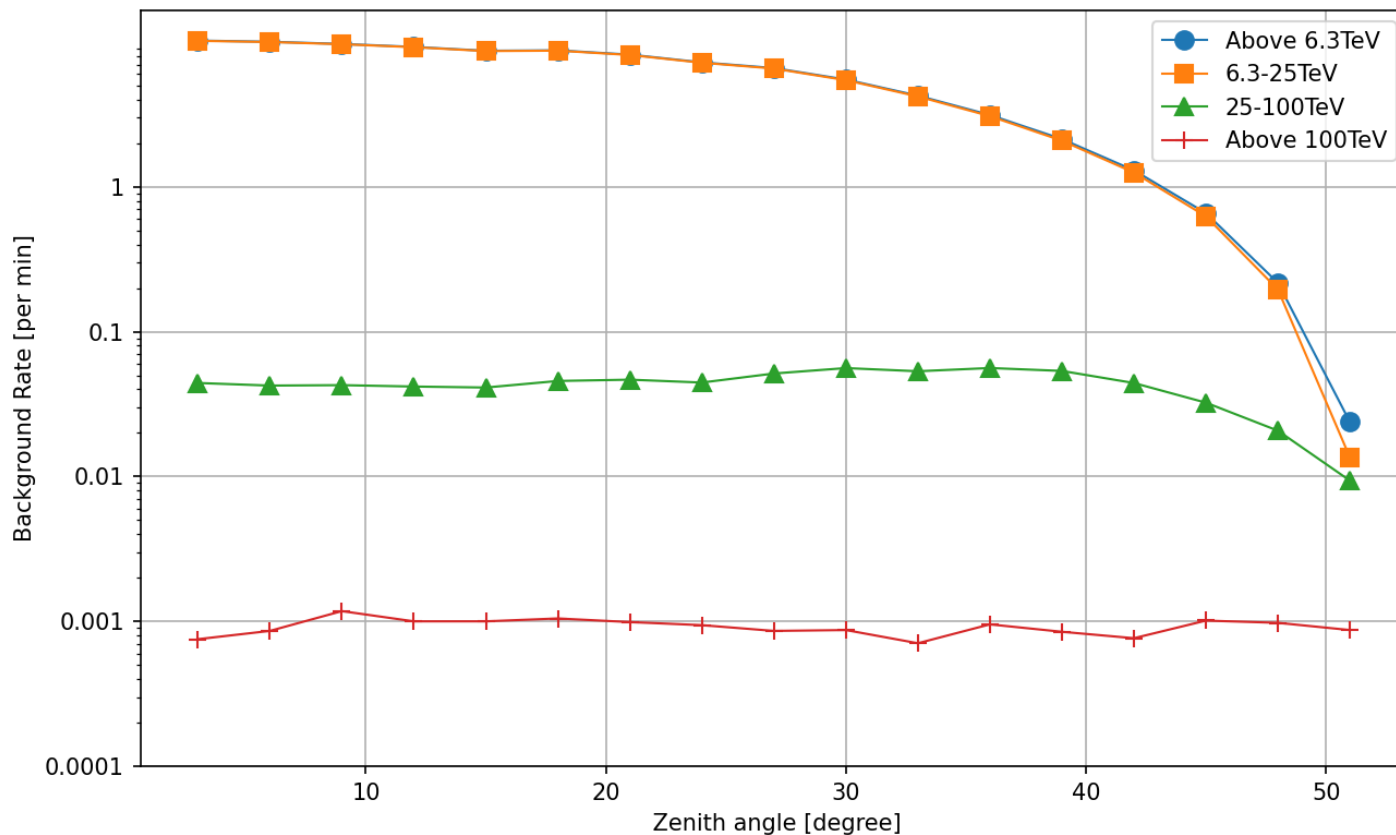
Research Method

Basic Workflow Diagram of Sky Survey Scanning



Aimer: Searching and alerting for new gamma-ray source signals

Searching Range



Search energy range and targets :

6.3–25TeV: Extragalactic transients / Galactic transients

25–100TeV: Galactic transients

>100TeV: UHE Galactic transients

Search duration :

30 day、7 day、1 day、4h、1h、3min

sliding step size :

15 day、3 day、12 day、2h、30min、1.5 min

Result

Search Results Under Short Time Duration

Search Window	P < 1	P < 0.1	P < 3 σ	P < 5 σ
3 minutes	2	2	1	1
1 hour	4	3	1	1
4 hours (6.3–25 TeV)	11	5	0	0
4 hours (> 25 TeV)	29	11	2	2

old

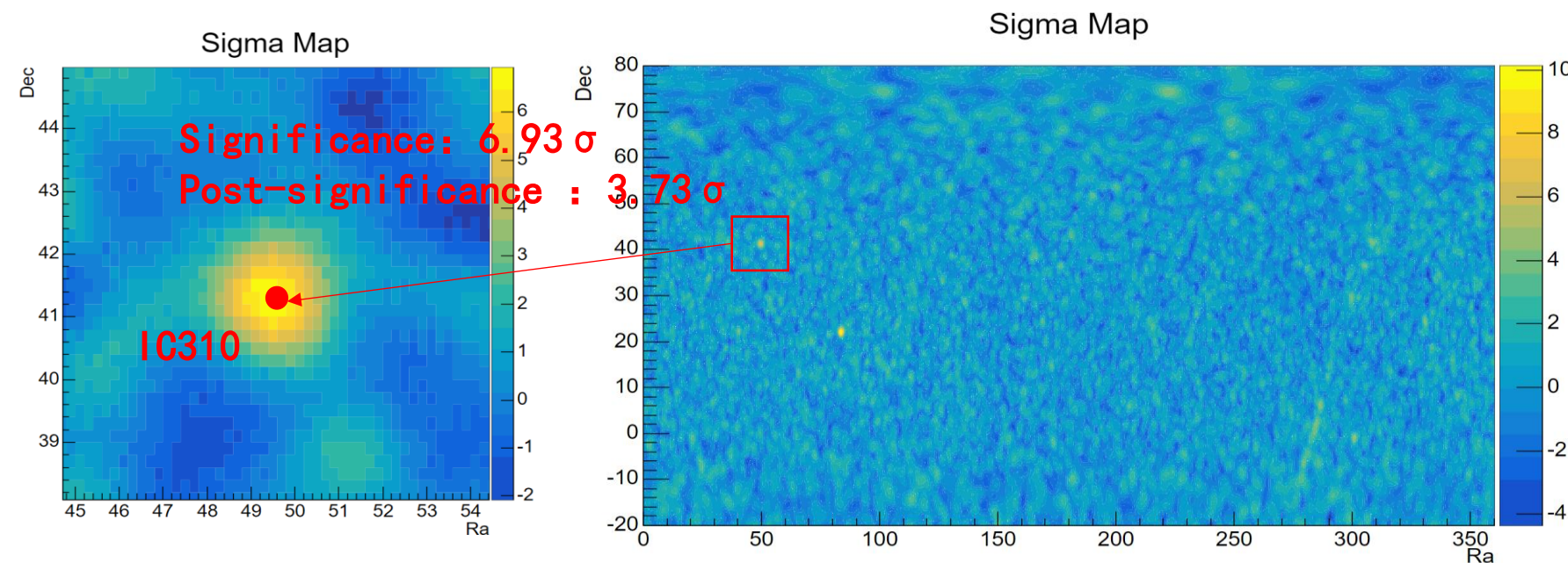
Search Window	P < 1	P < 0.1	P < 3 σ	P < 5 σ
3 minutes	2	2	1	1
1 hour	5	3	1	1
4 hours (6.3–25 TeV)	14	7	0	0
4 hours (> 25 TeV)	33	13	2	2

new

The search period starts from January 2020, and the results have been updated from July 2024 (old scan) to December 2025 (new scan)

Result

Search Results Under Long Time Duration



Week Result

Start Date	RA (°)	Dec (°)	Pre-trial Significance	Post-trial Significance	Known Source
2020-06-17	166.1	38.3	6.48 σ	2.85 σ	Mrk 421
2020-07-20	166.1	38.3	7.58 σ	4.79 σ	Mrk 421
2020-08-01	166.3	38.3	13.14 σ	11.73 σ	Mrk 421
2020-08-04	166.3	38.1	9.38 σ	7.29 σ	Mrk 421
2020-09-06	166.1	38.3	7.08 σ	3.98 σ	Mrk 421
2020-10-18	166.3	38.1	6.66 σ	3.22 σ	Mrk 421
2020-10-24	165.9	38.1	7.89 σ	5.27 σ	Mrk 421
2023-10-30	165.7	38.3	7.75 σ	5.05 σ	Mrk 421
2023-11-02	166.1	38.5	10.94 σ	9.20 σ	Mrk 421
2024-03-25	49.5	41.3	6.93 σ	3.73 σ	IC 310
2024-04-21	49.1	41.1	5.7 σ	0.58 σ	IC 310

Searches for long-duration burst signals are mainly focused on the flaring activity of **Mrk 421** and **IC 310** in 2020 and 2023–2024.

Summary and outlook

- The transient-source search results were updated from June 2024 to December 2025, with no evidence for new transient outbursts found so far.
- The real-time search and monitoring system is close to completion and is expected to be deployed in the coming months.

Thank you!