Observation of HESS J0632+057 Region with LHAASO-KM2A

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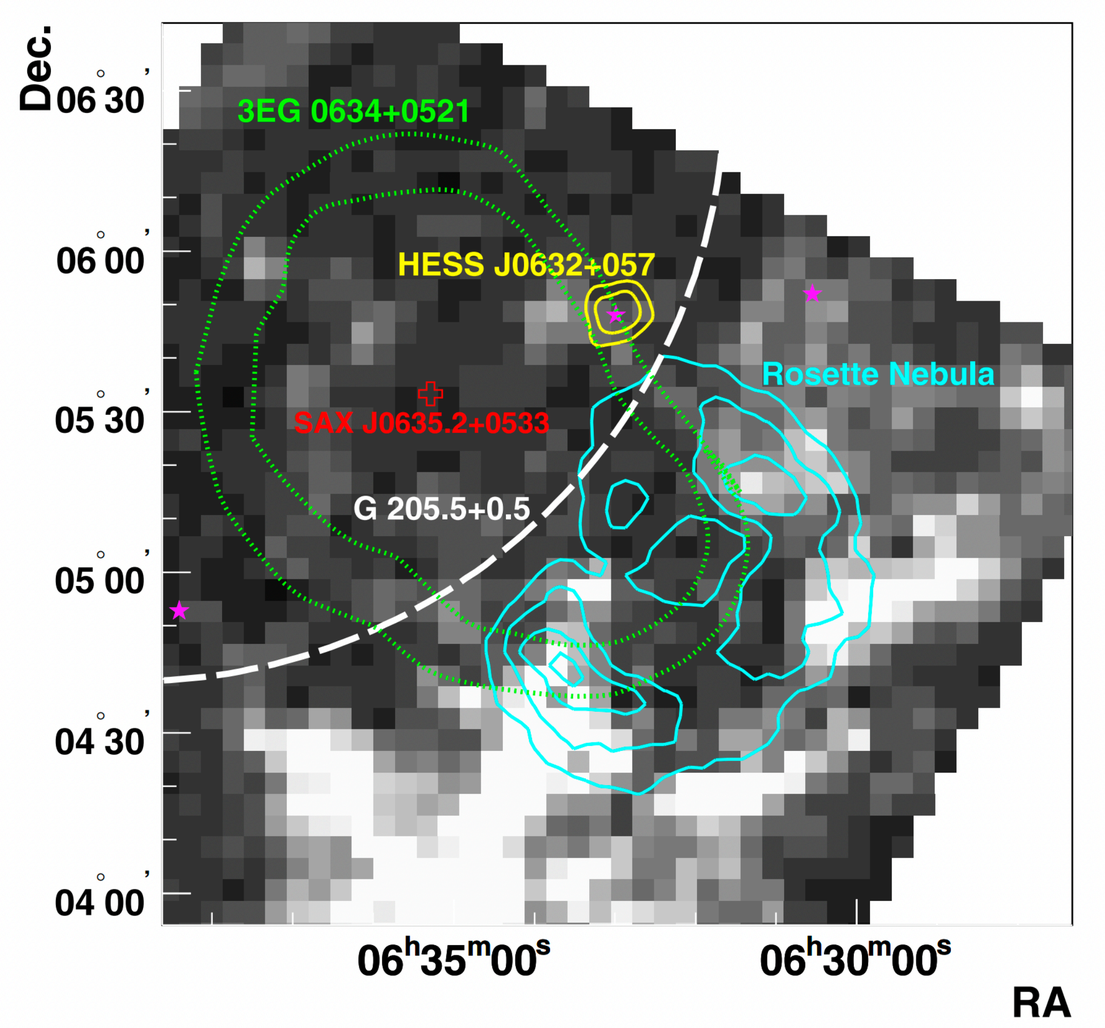
Outlines

- Introduction
- TeV data of J0632+057 with KM2A
- Plans and summary

HESS observation (0.4-10TeV)



Position:(Aharonian 2007)
- R.A. (J2000): 06h 32m 58.3s
- Dec. (J2000): +05d 48' 20''

(Aliu 2014)
- R.A. (J2000): 06h 32m 59.4s +/- 1.1s (stat)
- Dec. (J2000): +05d 47' 20'' +/- 16.1'' (stat)

Possible associations:
- The Monoceros Loop SNR
- 3EG J0634+0521
- 1RXS J063258.3+054857
- MWC 148 (HD 259440)

AIMS: Several potential sources to probe acceleration processes in this region.

Fermi observation (0.1-300GeV)

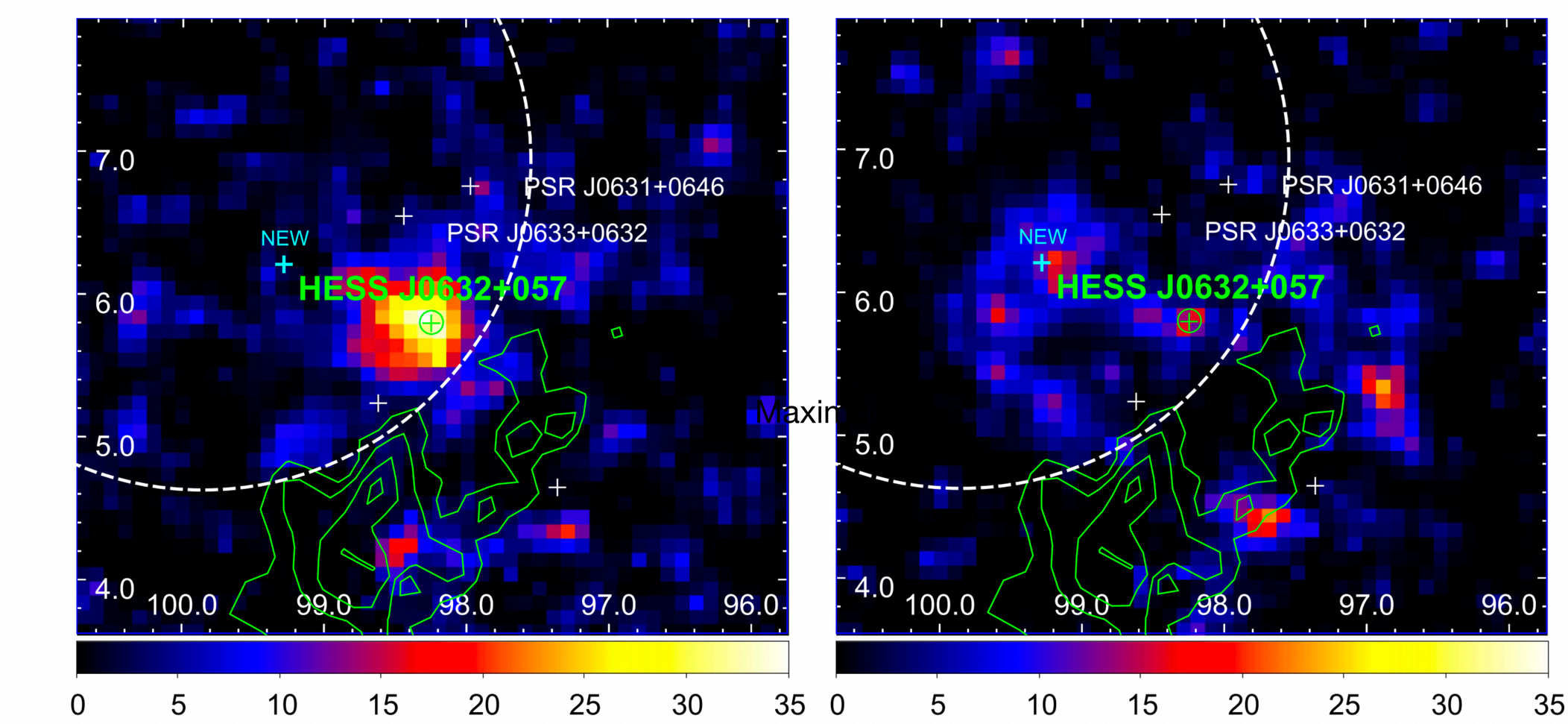


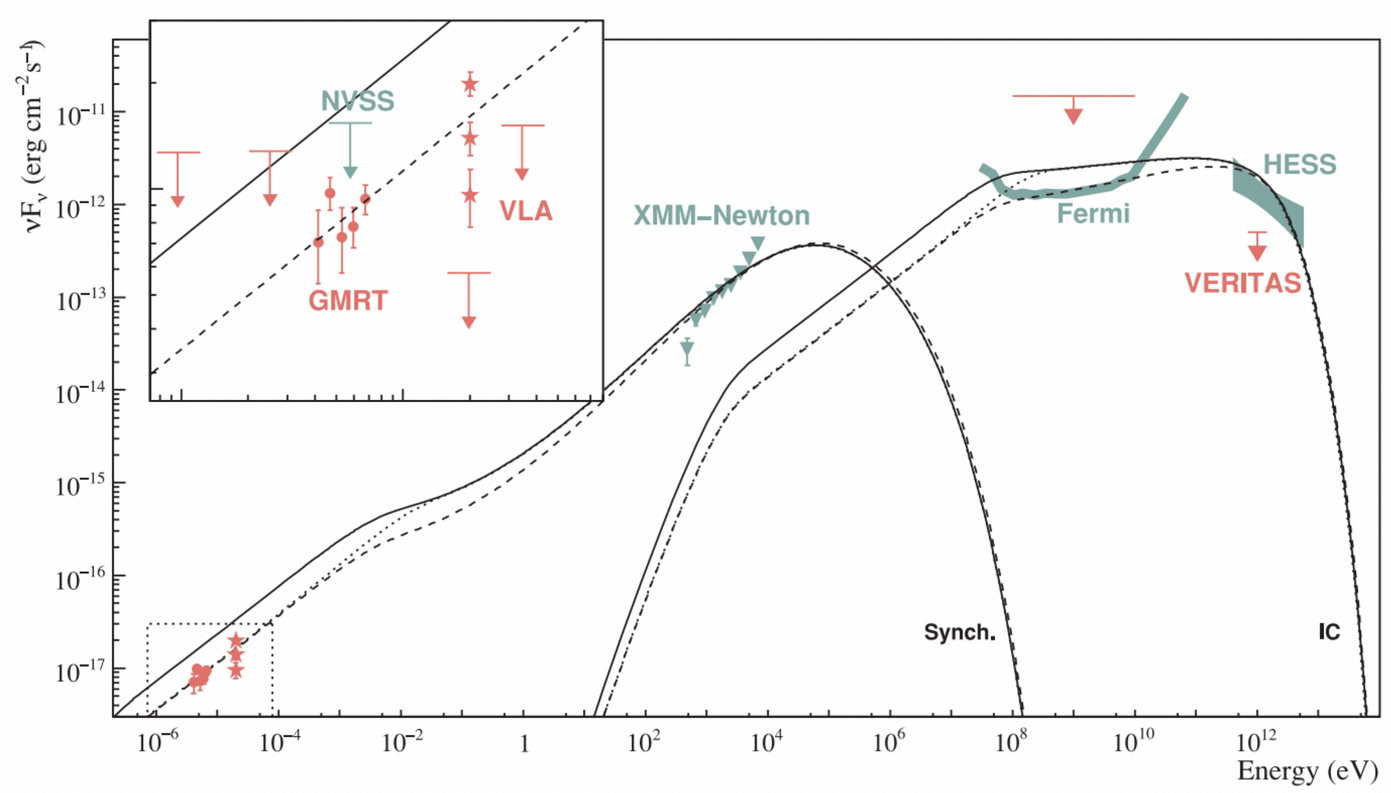
Figure 4. 0.1–300 GeV, TS maps of the *Fermi*-LAT field surrounding HESS J0632+057 in two broad ranges of orbital phases, 0.0–0.5 (left panel) and 0.5–1.0 (right panel). All markings are the same as in Figure 2.

(Li 2017)

Radio counterpart(1280 MHz & 5GHz)
Optical counterpart

Suggested as HMXB system

Optical counterpart: (Aragona 2010)
a Be star MWC 443
Mass: 13.2–19.0 M_sun
Radius: 6.0–9.6 R_sun
Distance: 1.4kpc.

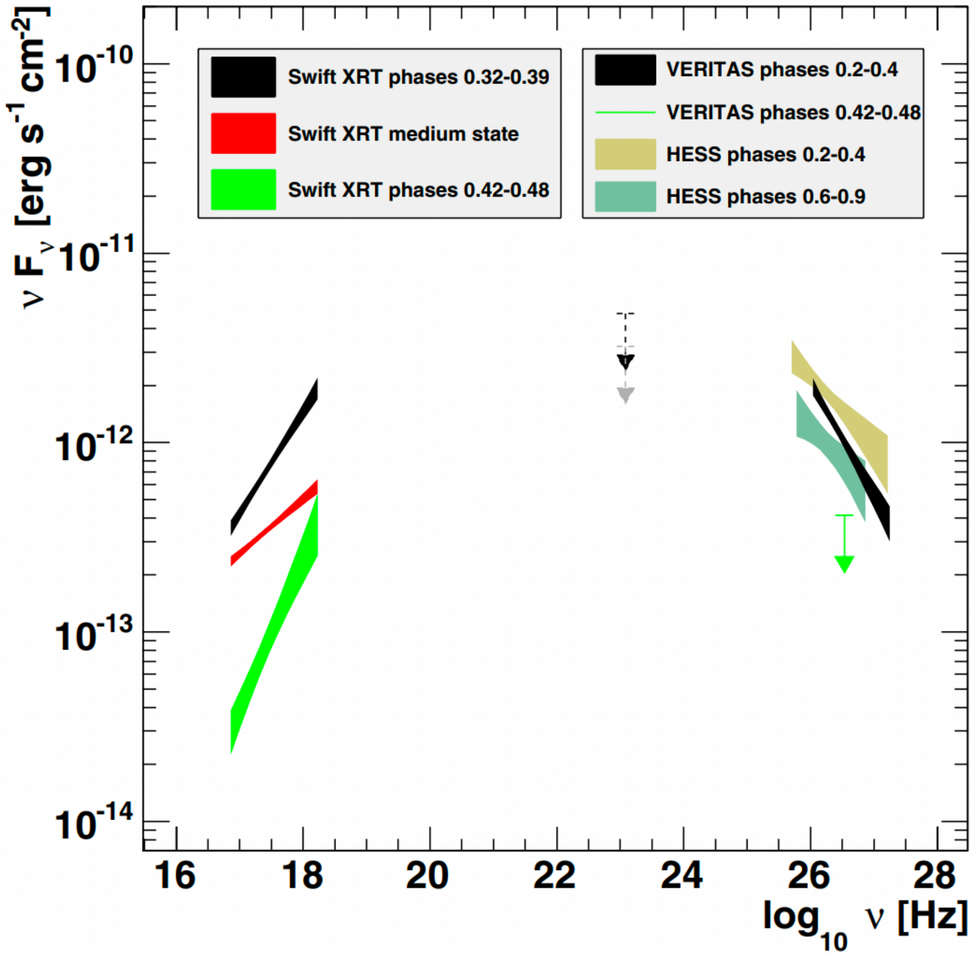


Swift-XRT(0.3-10keV)

Orbital Period: (Maier 2019)

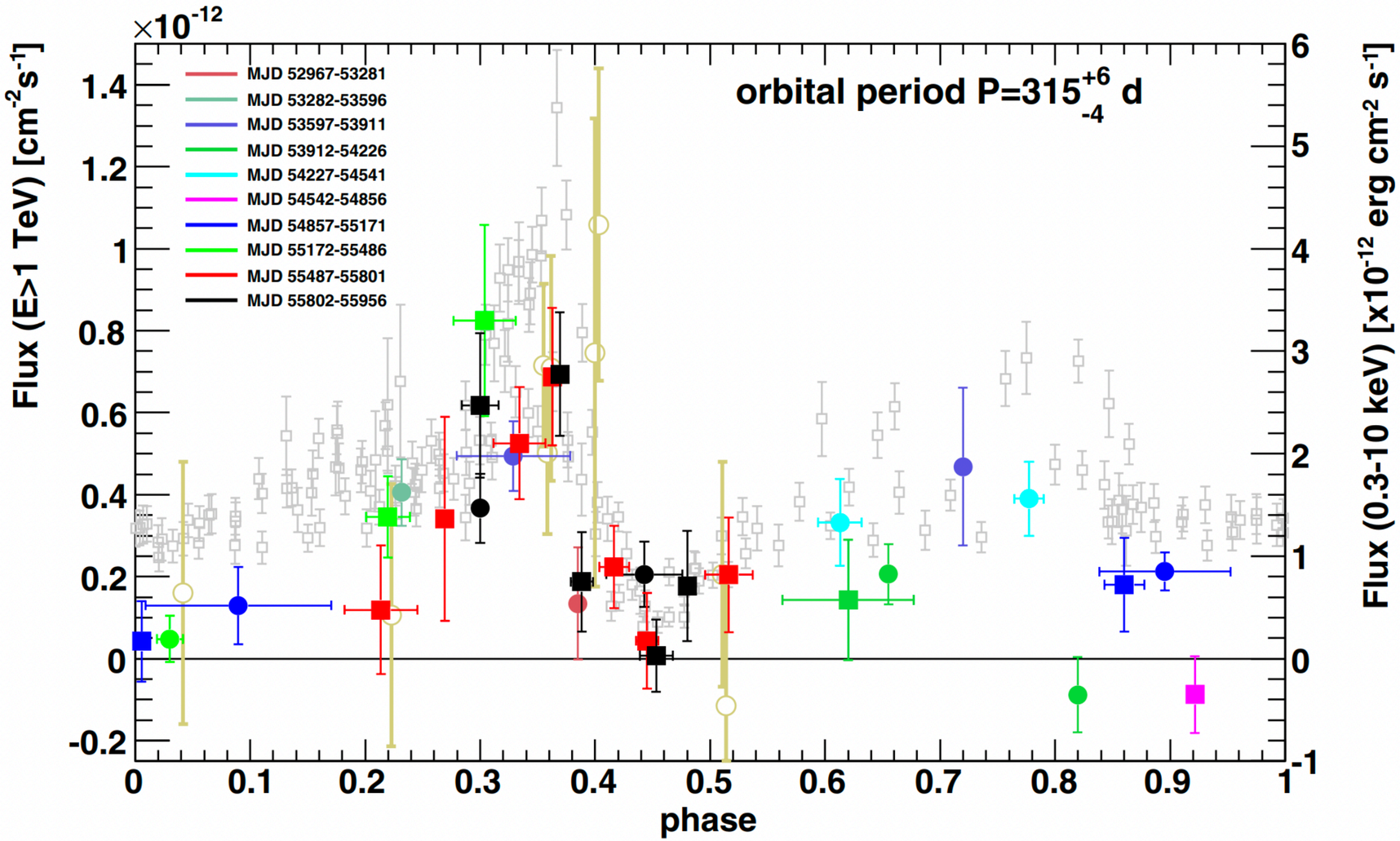
gamma-ray
318.7 +/- 3.4 days
(phase dispersion method)
316.3 +/- 4.3 days
(Pearson correlation coefficient method)

X-ray
317.3 +/- 0.7 days



(Aliu 2014)

X-ray/TeV light curve



(Aliu 2014)

LHAASO-KM2A data

1/2 array: /lhaasofs/user/chensz/public/data
from 2019-12-27 to 2020-11-24 (2020329)
Livetime: 308 live days

3/4 array: /home/lhaaso/chensz/public/sky34V2
from 2020-12-01 to 2021-07-19 (2021200)
Livetime: 218.316 days

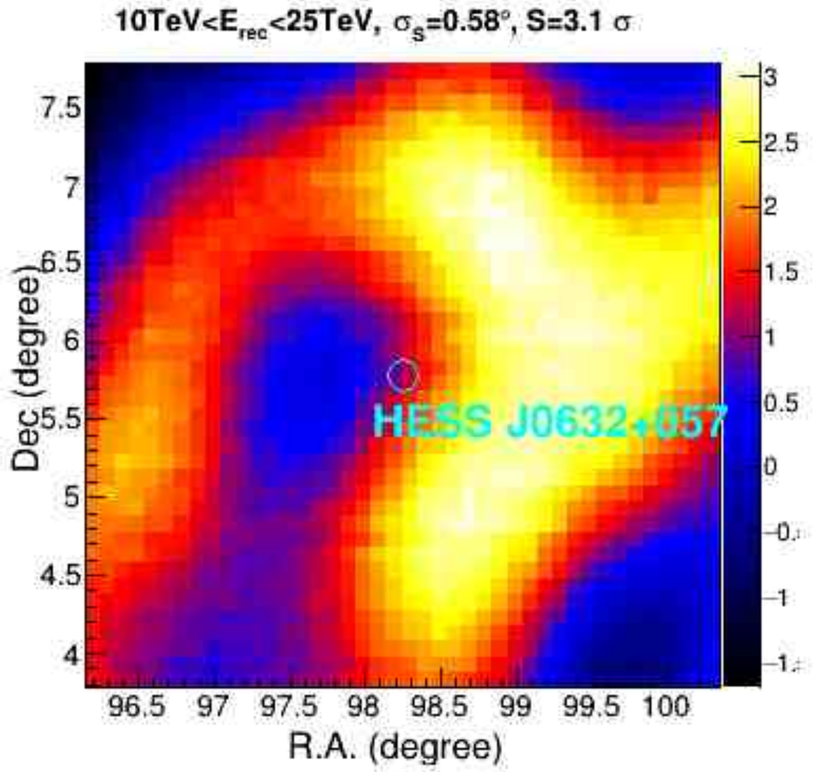
RA: 98.25
DEC: 5.78

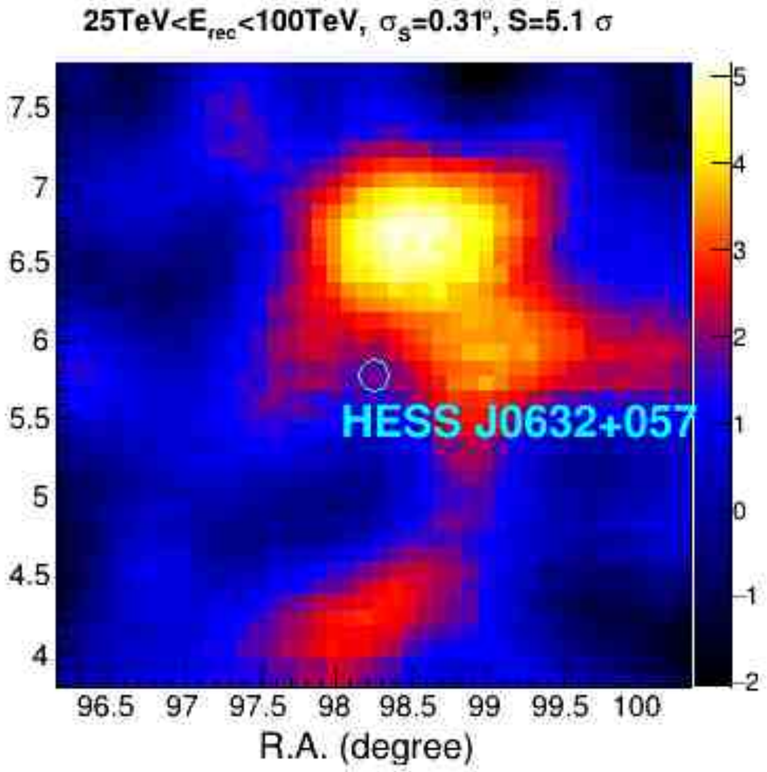
Angular resolution

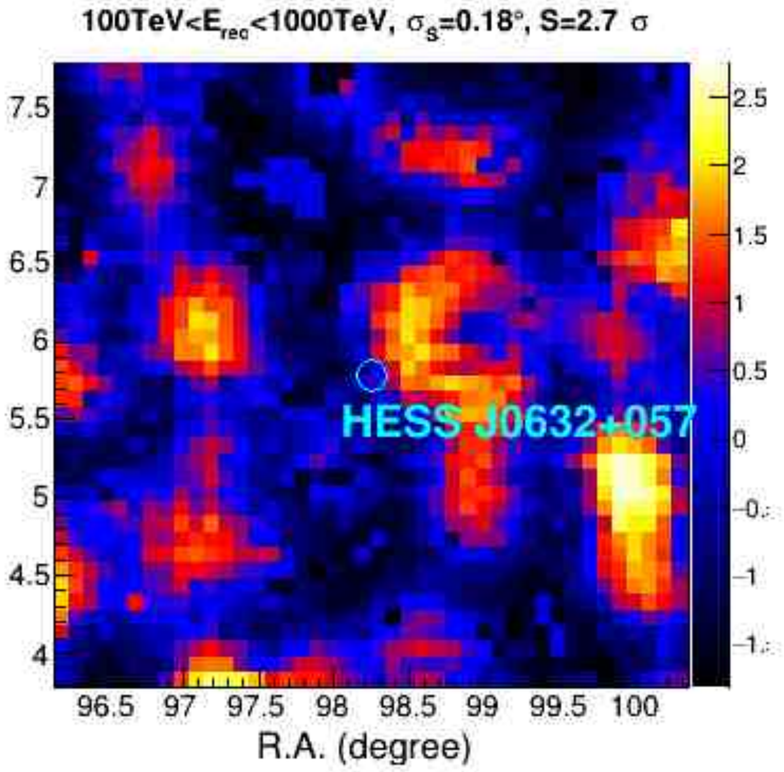
Sequence	0	1	2	3	4	5	6	7	8	9	10	11
Energy(TeV)	10-16	16-25	25-40	40-63	63-100	100-158	158-251	251-398	398-631	1000	1585	2512
Phi(deg)	0.578	0.459	0.307	0.251	0.216	0.175	0.141	0.130	0.118	0.101	0.091	0.086

Significance map

1/2 & 3/4 combined

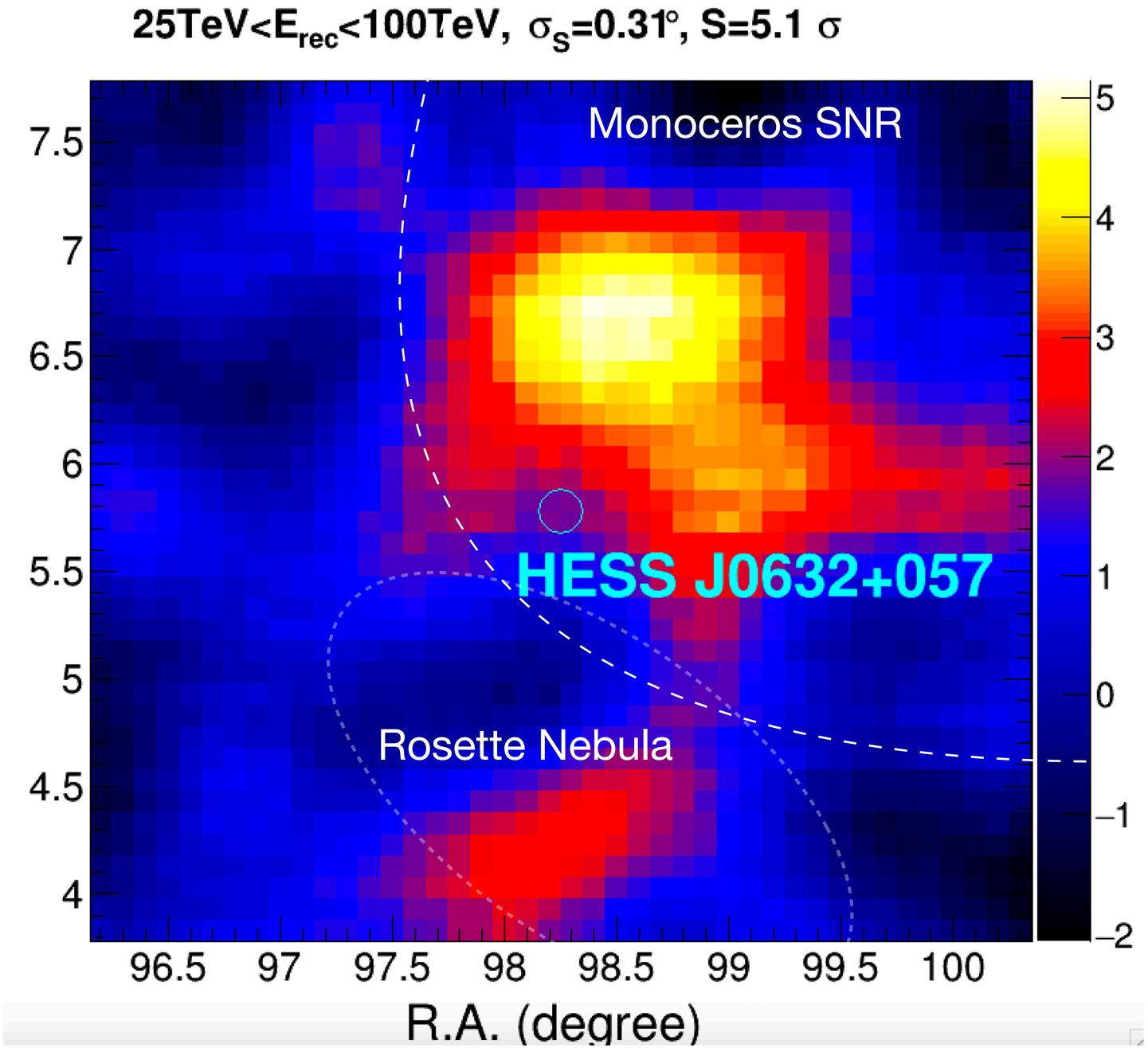






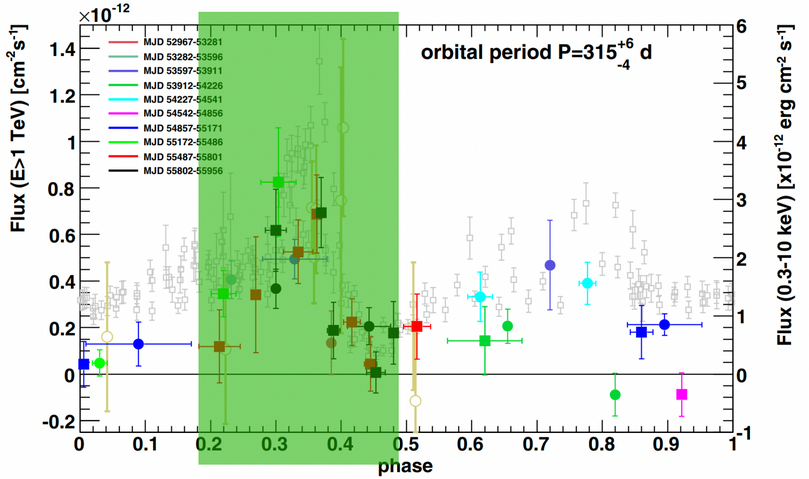
Maximum: 99.03, 6.60

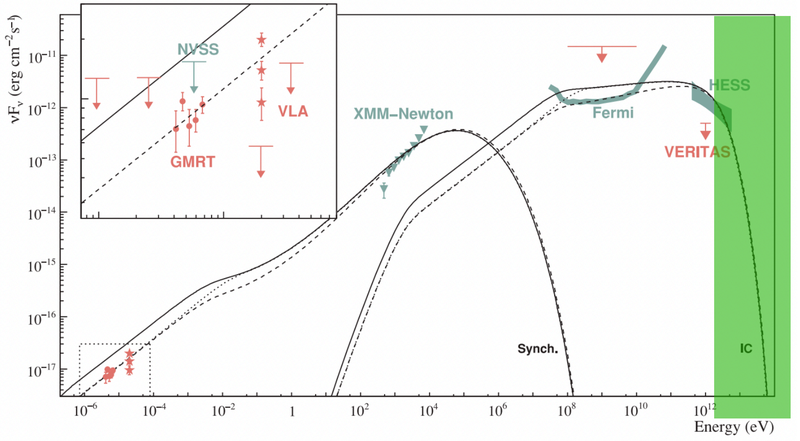
Maximum: 98.39, 6.72
PSF=0.643+/-0.221


25TeV<E_rec<100TeV, σ_S=0.31°, S=5.1 σ
Monoceros SNR
HESS J0632+057
Rosette Nebula
7.5
7
6.5
6
5.5
5
4.5
4
96.5
97
97.5
98
98.5
99
99.5
100
R.A. (degree)
5
4
3
2
1
0
−1
−2

Plans and summary

- The most significant emission is in energy 25-100 TeV with σ=5.1
- Long-term observation in time analysis are needed to obtain orbital period and confirm the association of the UHE source and HESS J0632+057.
- Further data in >10TeV would help to complete the broadband spectrum and probe acceleration processes.



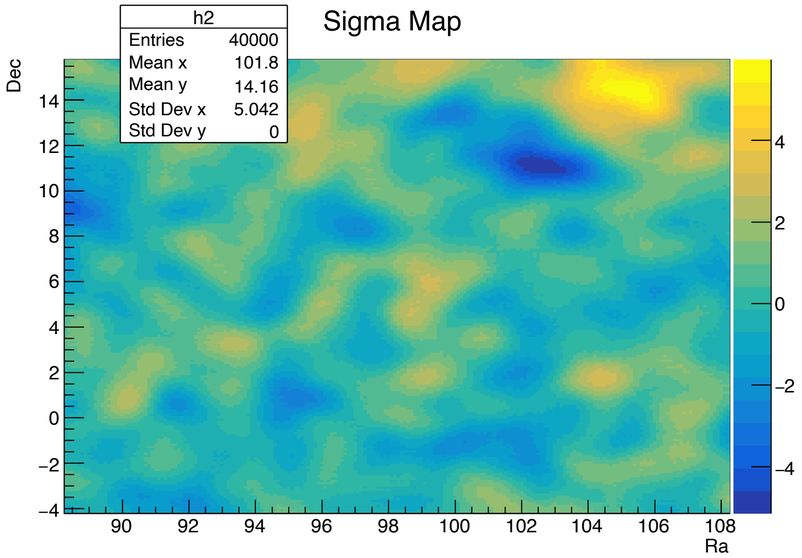


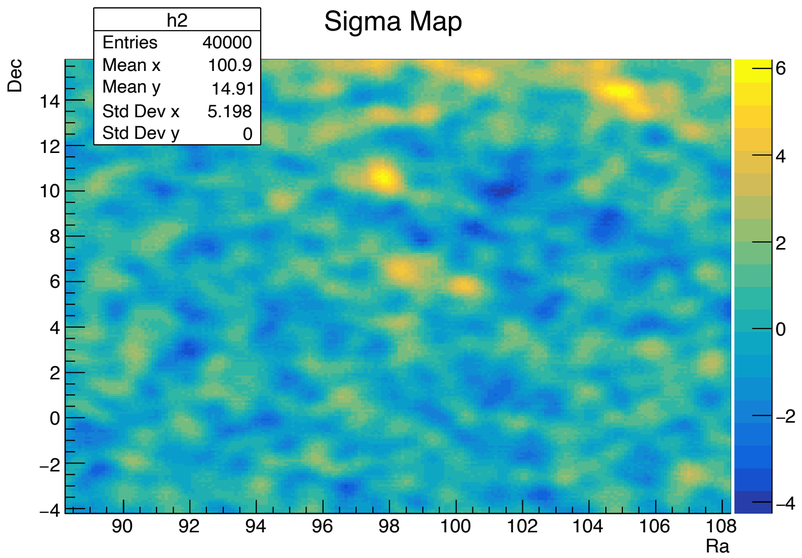
Thank you for your attention!

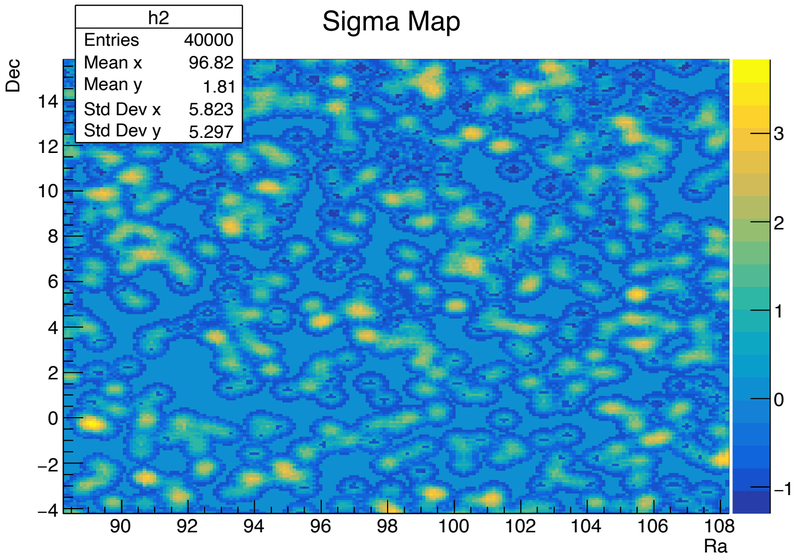
Appendix

Significance map

3/4 array







10-25TeV

σ=2.83

99.33, 5.81

25-100TeV

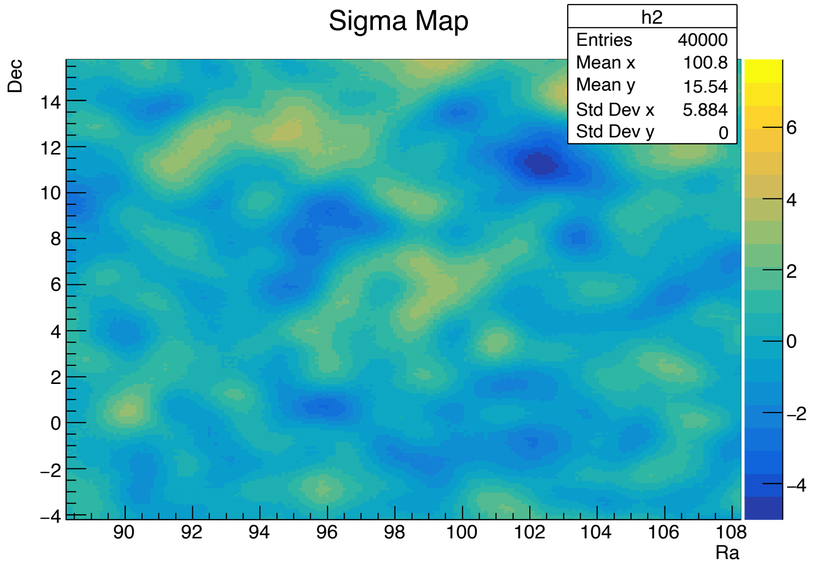
σ=4.45

98.39, 6.51

100-1000TeV

Significance map

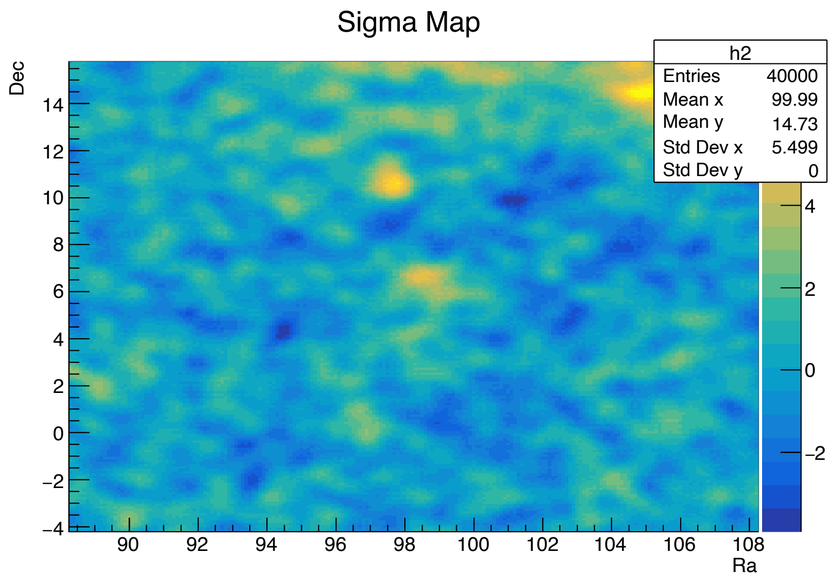
1/2 & 3/4 combined



10-25TeV

σ=3.08

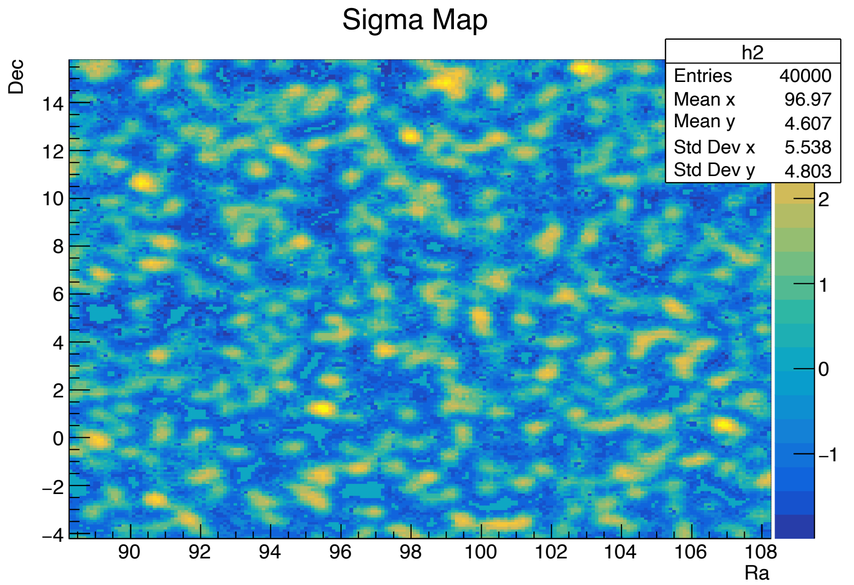
99.03, 6.60



25-100TeV

σ=5.14

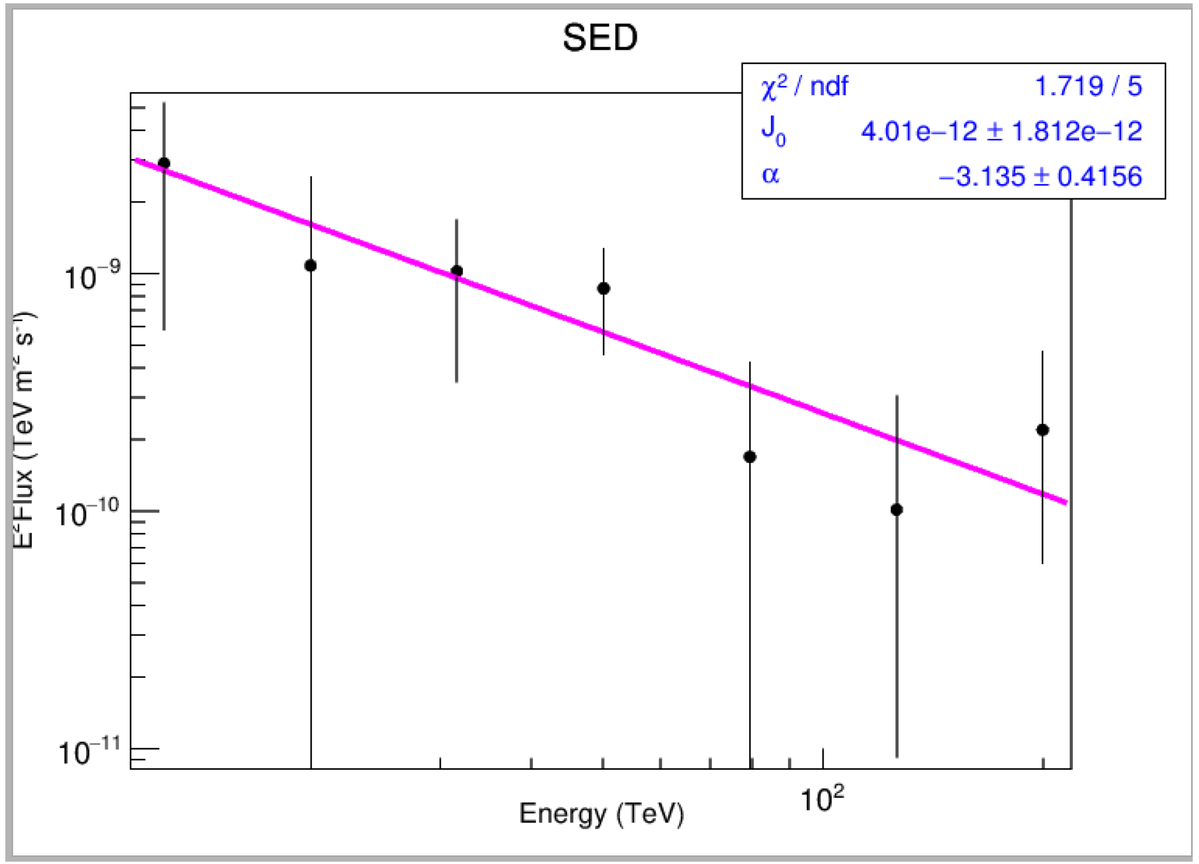
98.39, 6.72



100-1000TeV

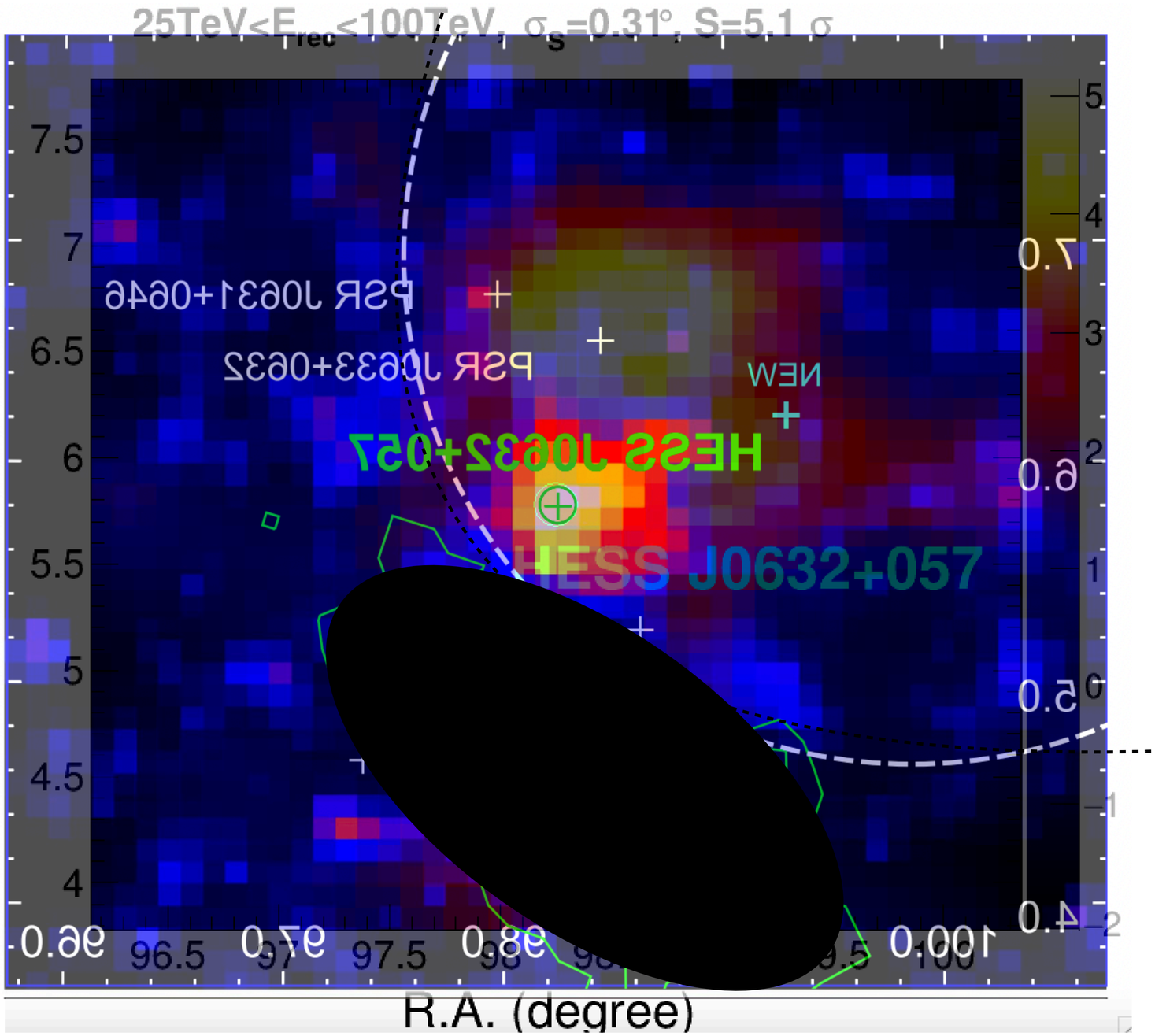
σ=2.18

SED



TeV spectrum of J0632+057

Radius: 1.431 1.216 0.968 0.892 0.848 0.803 0.772 0.763 0.754 0.742 0.736 0.733 (Phi90+0.33)


25TeV<E_rec<100TeV, σ_s=0.31°, S=5.1 σ
PSR J0631+0646
PSR J0633+0632
NEW
HESS J0632+057
HESS J0632+057
7.5
7
6.5
6
5.5
5
4.5
4
96.5
97
97.5
98
100
7.0
6.0
5.0
4.0
R.A. (degree)