ICRC2021(Indico-ID1421)

A northern sky survey for ultra-high-energy gamma-ray source using the Tibet air-shower array and muon-detector array.

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The Tibet ASγ Collaboration

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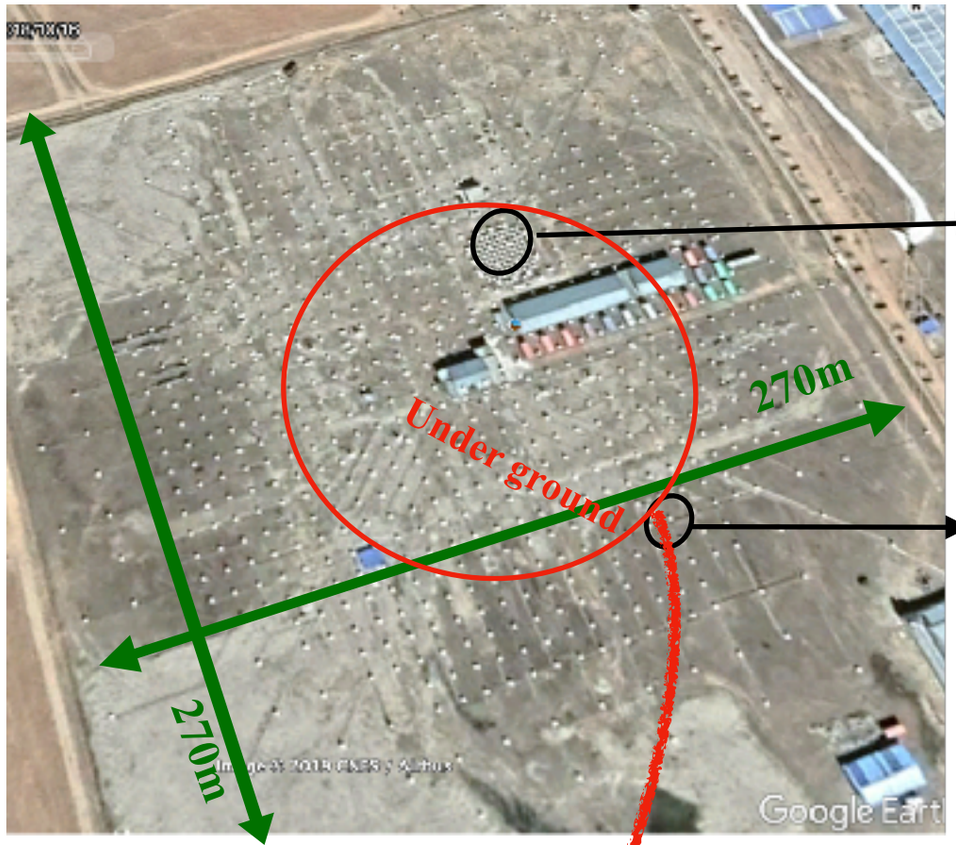
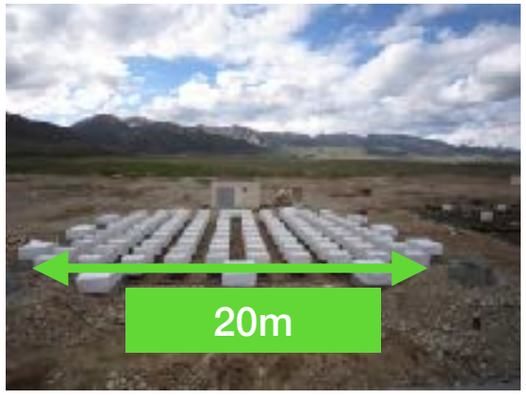
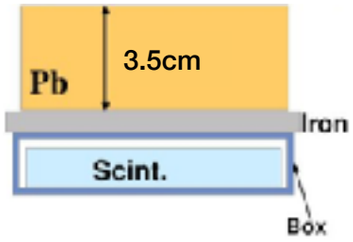
The Tibet ASγ experiment

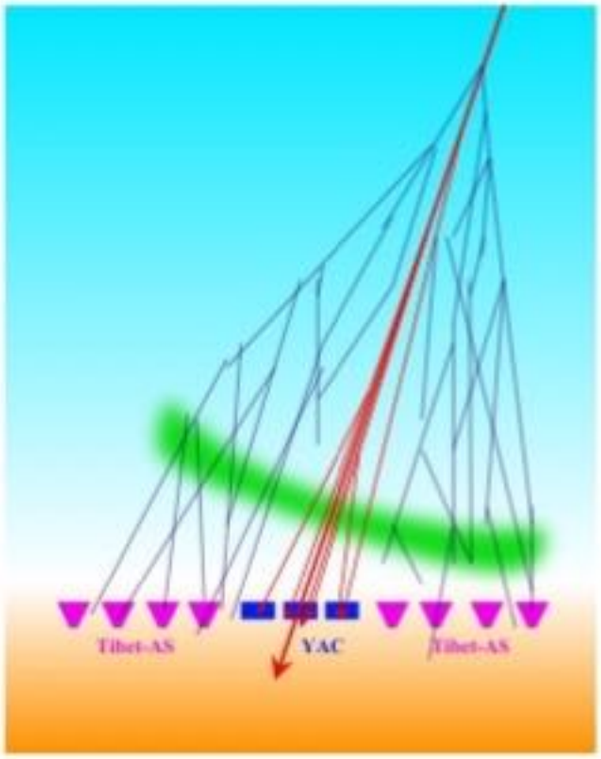
At Yangbajing, Tibet, China(90.522°E, 30.102°N, 4300m a.s.l)

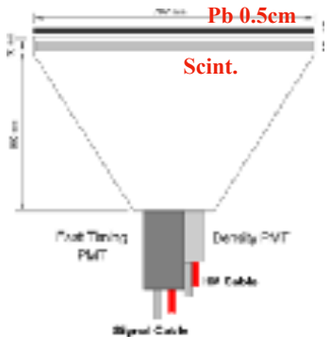




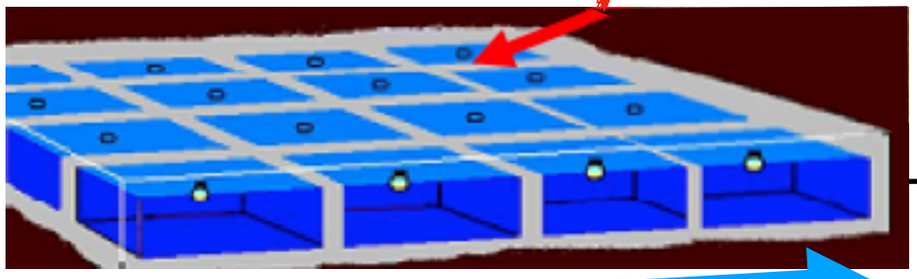


YAC-II

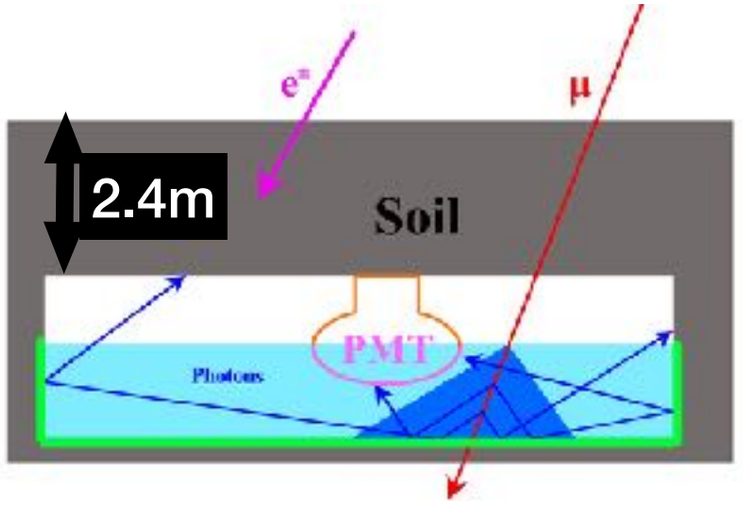




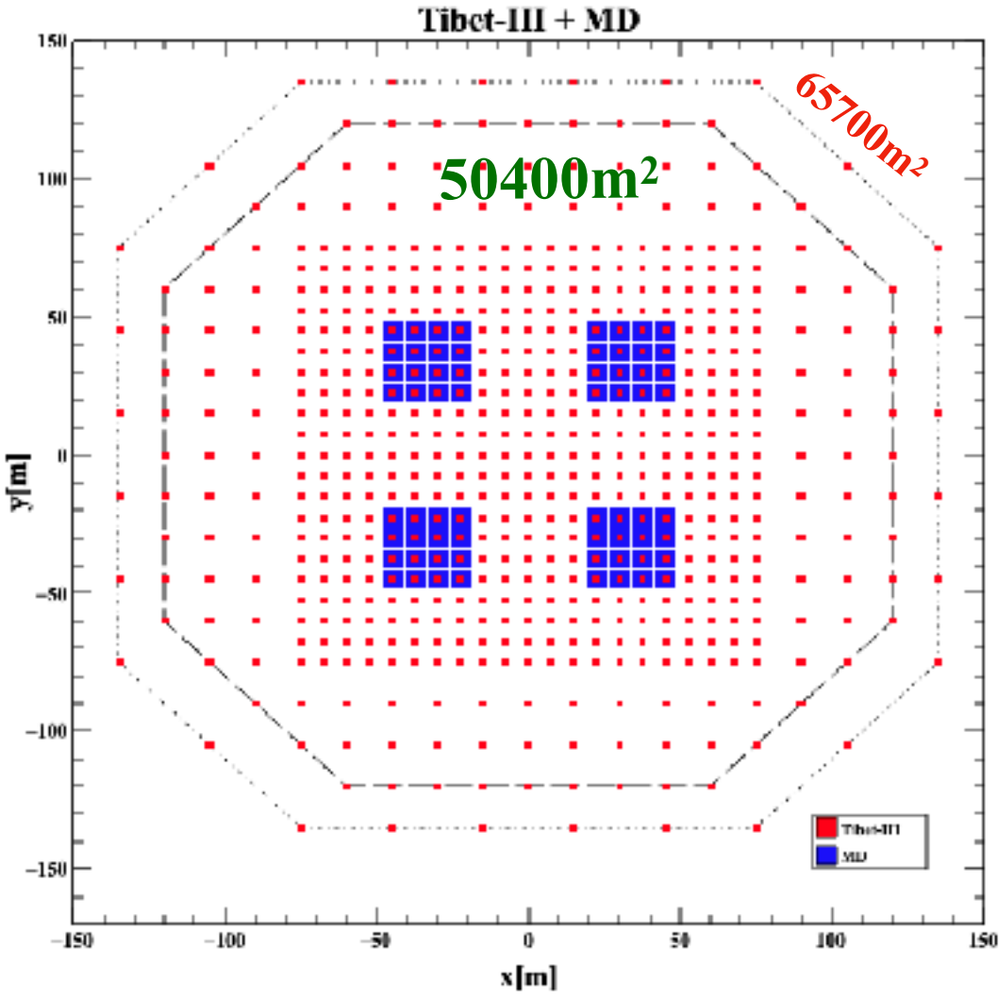
Tibet-III



MD



Tibet-III+MD



- Num of Hit >=16
- Zenith<60°
- inout=(5,6)
- 0.3<shower age<1.3
- Point source mode
- Equiz-zenith method

Live time 719 days

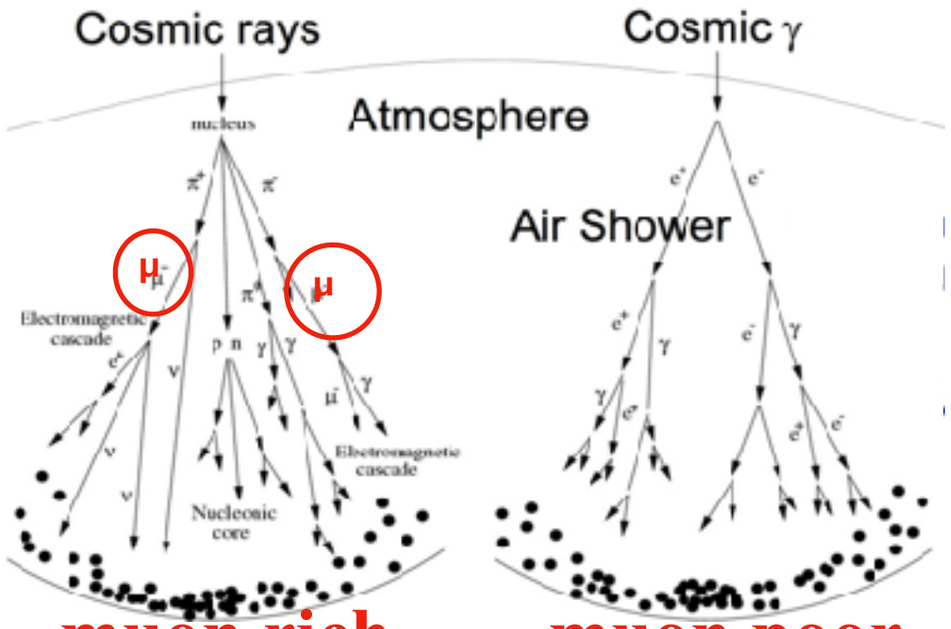
Tibet-III

- Area: 65700 m²
- Each detector: 0.5 m²
- Energy: TeV-PeV
- Energy resolution:
  - 40%~10TeV
  - 20%~100TeV
- Angular resolution:
  - 0.4°~10 TeV
  - 0.2°~100 TeV
- Field of View ~2 Sr

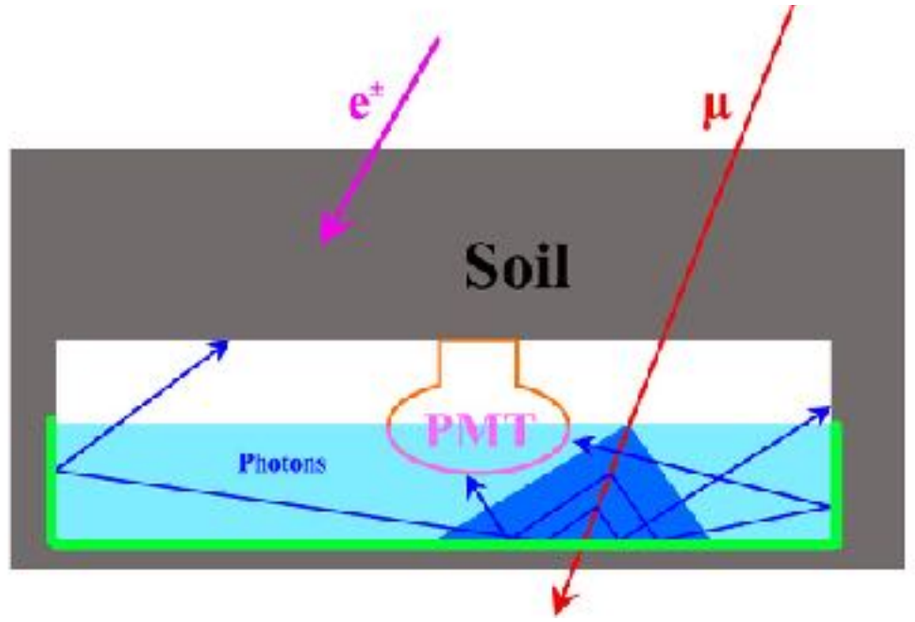
MD(P/γ)

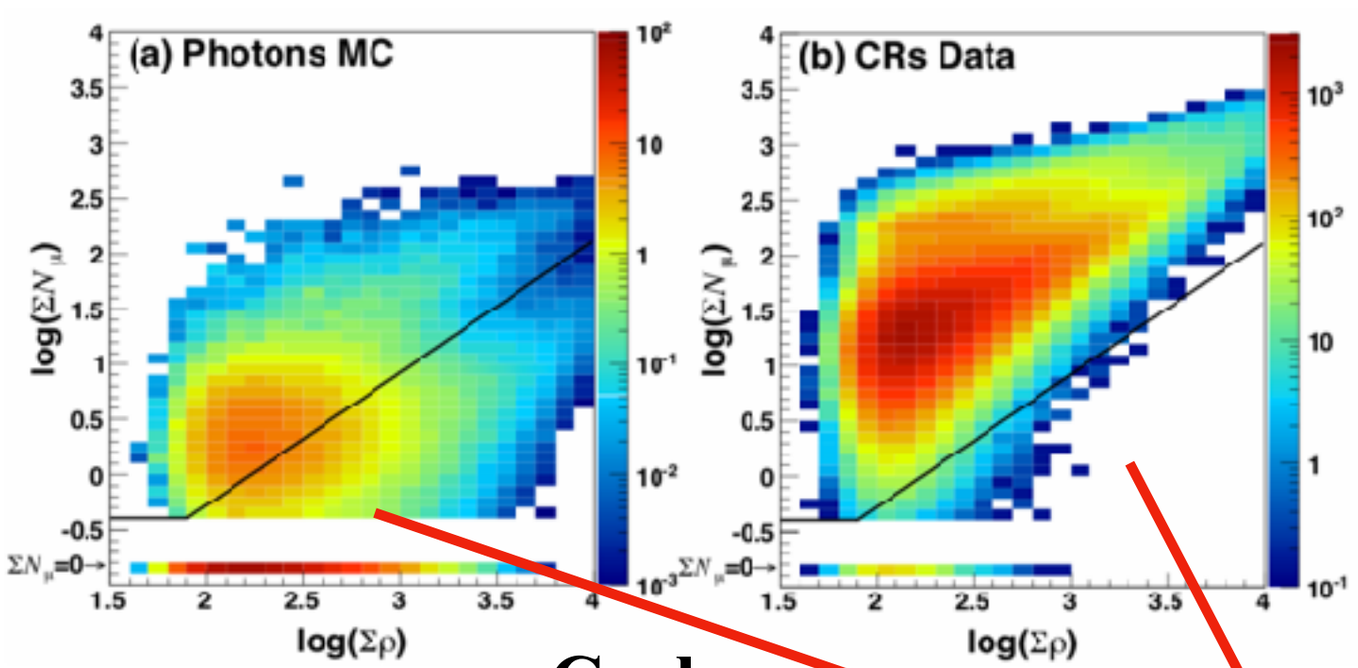
- Effective area: 3400 m²
- Each detector: 54 m²
- Underground 2.4m

Muon detector(MD)(P/γ)



muon rich muon poor





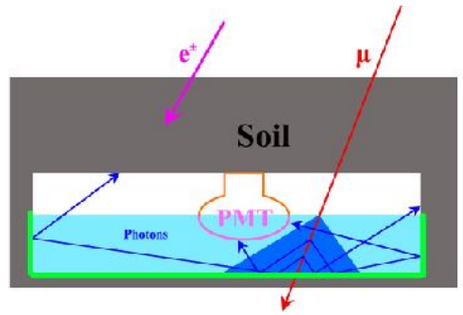
Crab

(M. Amenomori et al., PRL,, 2019)

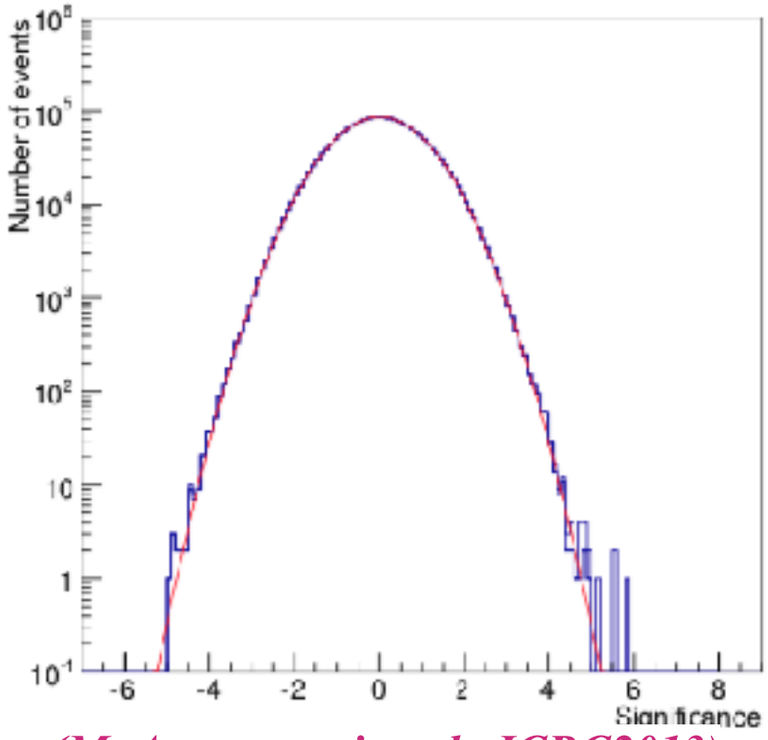
At Energy >100 TeV, The CRs background rejection is 99.9%, while 90% of the photons remaining.

muon poor events, γ-like

Northern sky survey

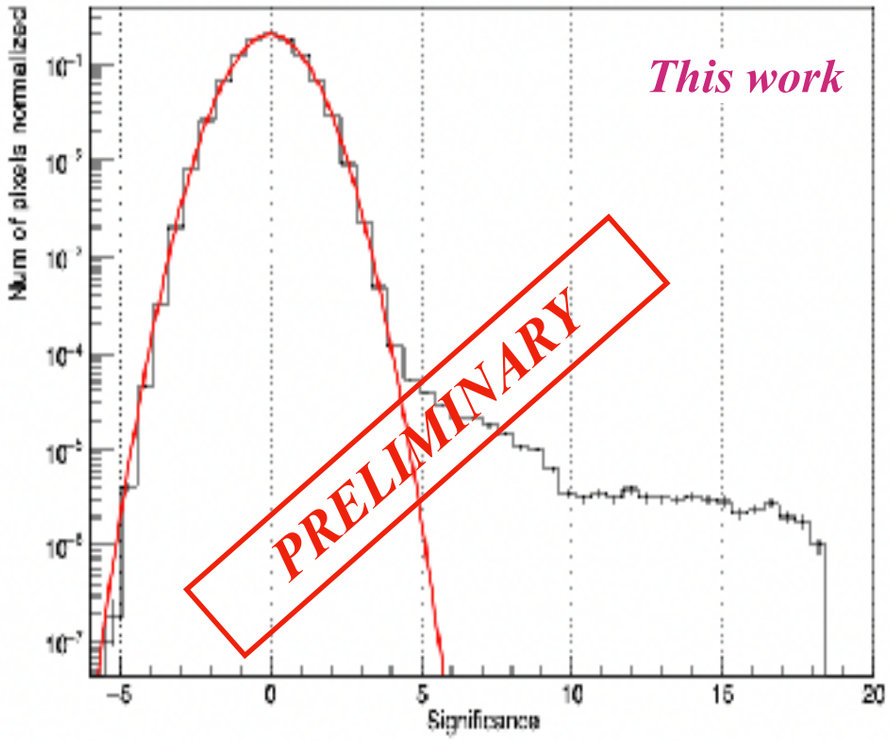


E >10 TeV



(M. Amenomori et al., ICRC2013)

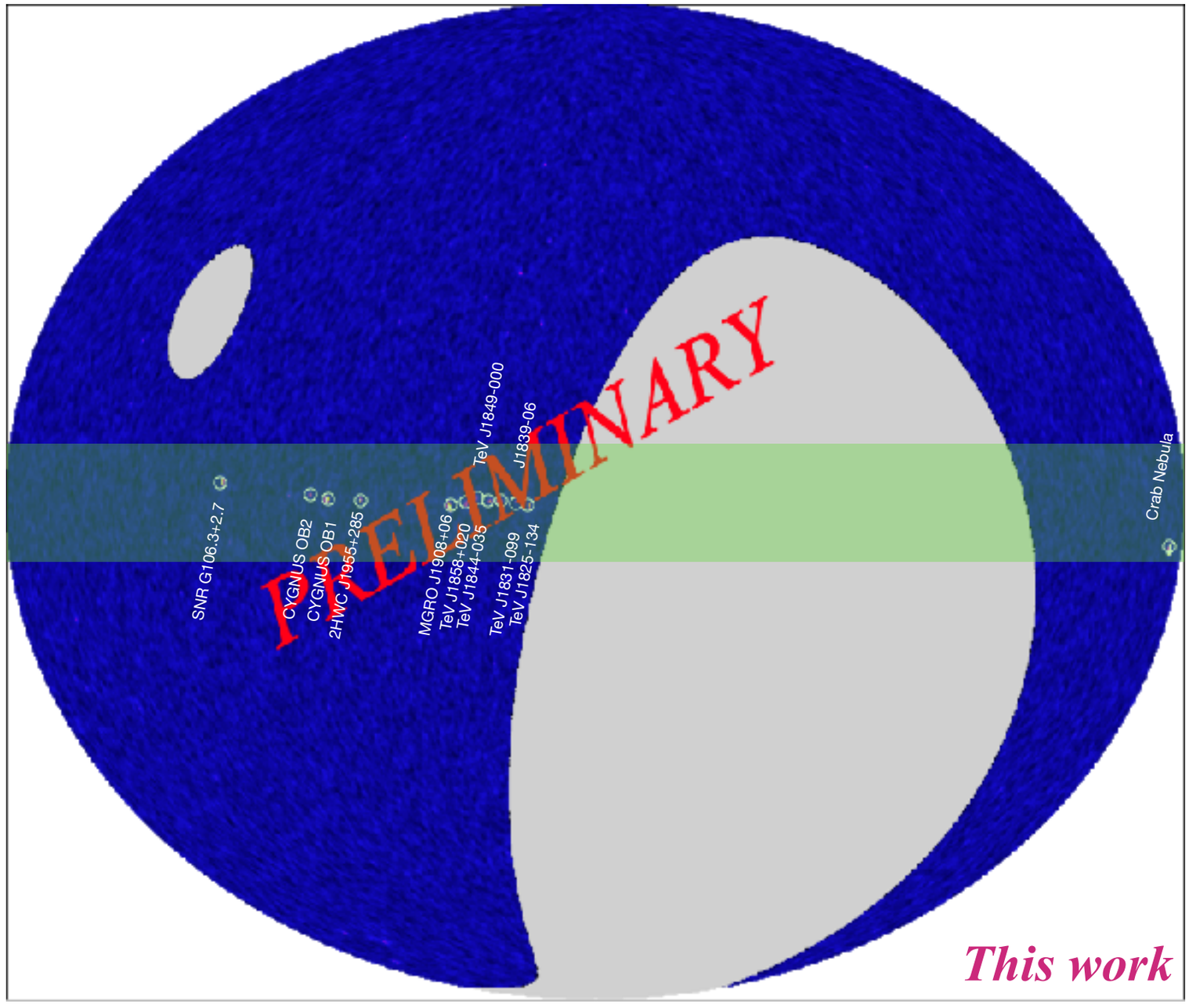
Tibet-III
1915days



Tibet-III + MD
719days

The Tibet-MD array significantly improves its gamma-ray sensitivity in the 10-1000 TeV energy region.

Allsky survey σ > 5

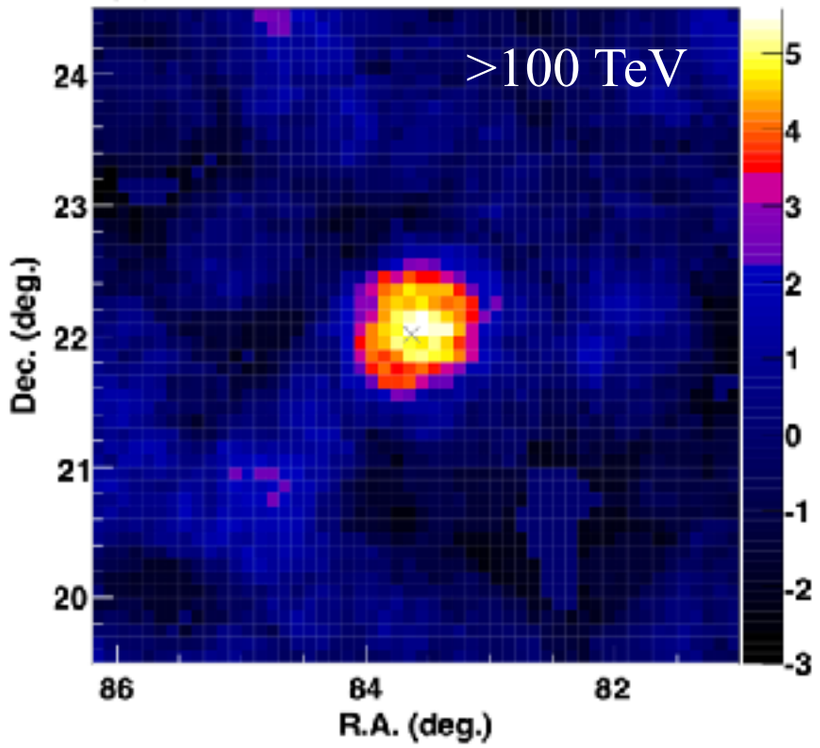


Associated Source	RA[deg]	Dec[Deg]
Crab	83.65	22.02
TeV J1825-134	276.52	-13.4
TeV J1831-099	277.58	-9.84
TeV J1840-055 TeV J1837-065	279.91	-6.03
TeV J1844-035	280.92	-3.58
TeV J1849-000	282.84	0.03
TeV J1857+026	284.70	2.66
MGRO J1908+06	287.01	6.20
2HWC J1955+285	298.87	28.63
Cygnus OB1	305.02	36.77
Cygnus OB2	308.01	41.19
SNR G106.3+2.7	336.77	60.88

This work

Standard Candle

Crab Nebula



(M. Amenomori et al., PRL,, 2019)

Physics ABOUT BROWSE PRESS COLLECTIONS

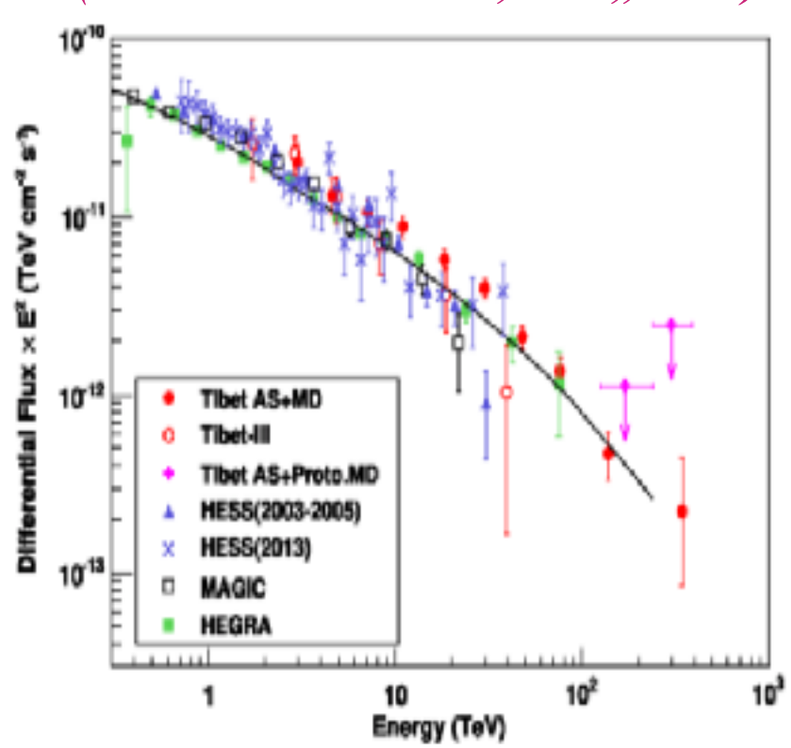
VIEWPOINT

Highest Energy Astrophysical Photons Detected

Rene A. Ong

Department of Physics and Astronomy, University of California, Los Angeles, CA, USA

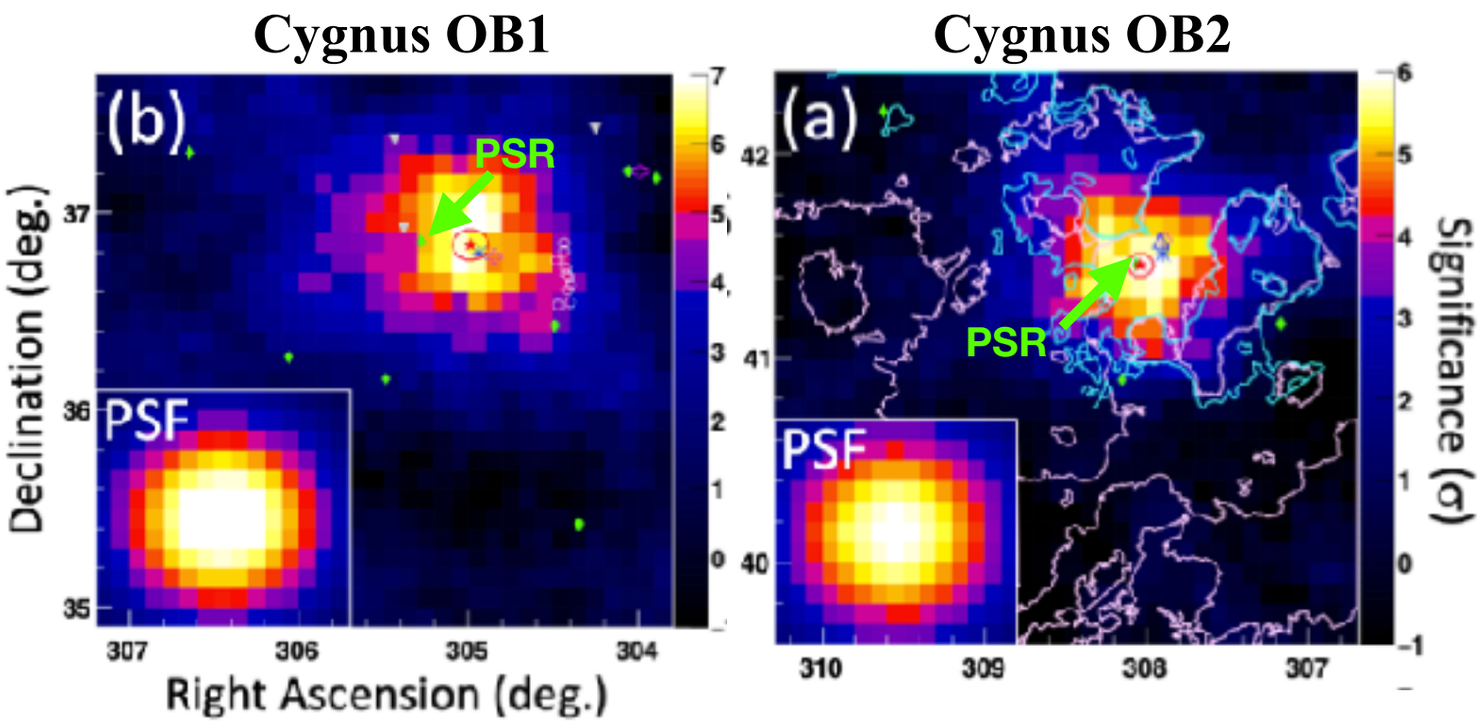
- >100TeV, we observed 5.6σ gamma ray emission.
- First Detection of Photons with Energy beyond 100 TeV from an Astrophysical Source
- Spectra can be explained by leptonic origin via IC process



(M. Amenomori et al., PRL,, 2019)

Potential associated with PSR

Cygnus region

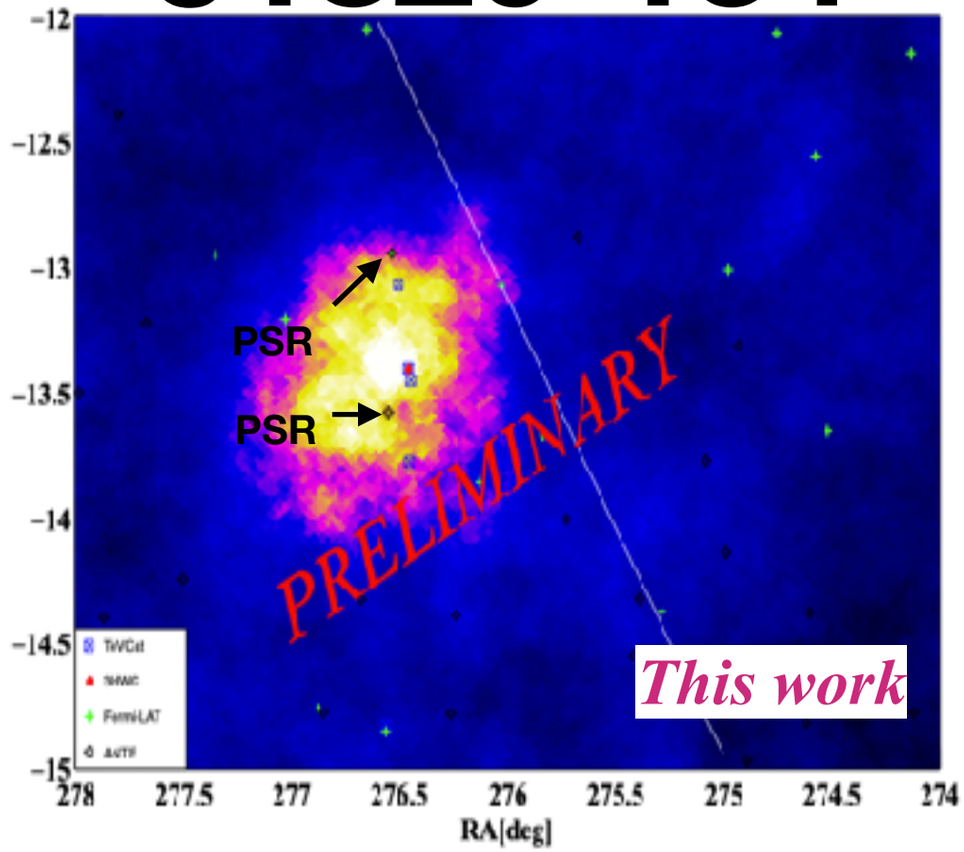


Paper accepted by PRL(2021), arxiv:2107.01064

Please refer to talks by Y.Katayose（indico-ID334）

- **PSR J2021+3651**
- **PSR J2032+4127**

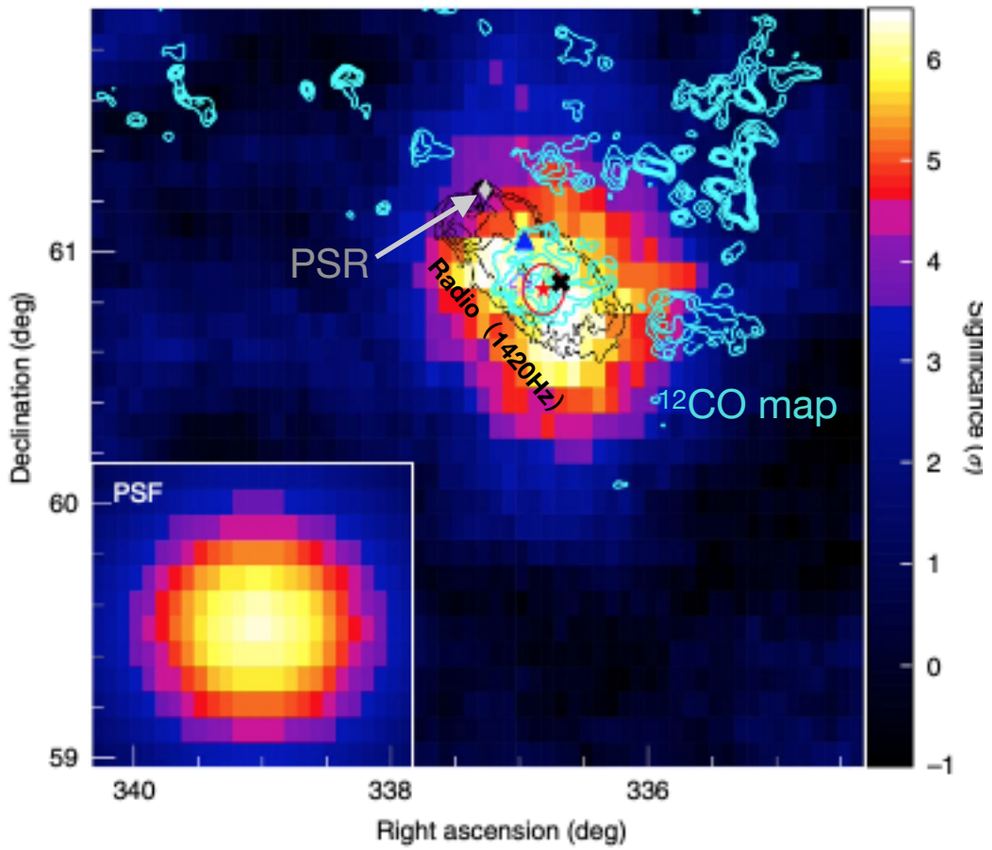
J1826-134



- **PSR J1826-1334**
- **PSR J1826-1256**

Potential associated with SNR

SNR G106.3+2.7

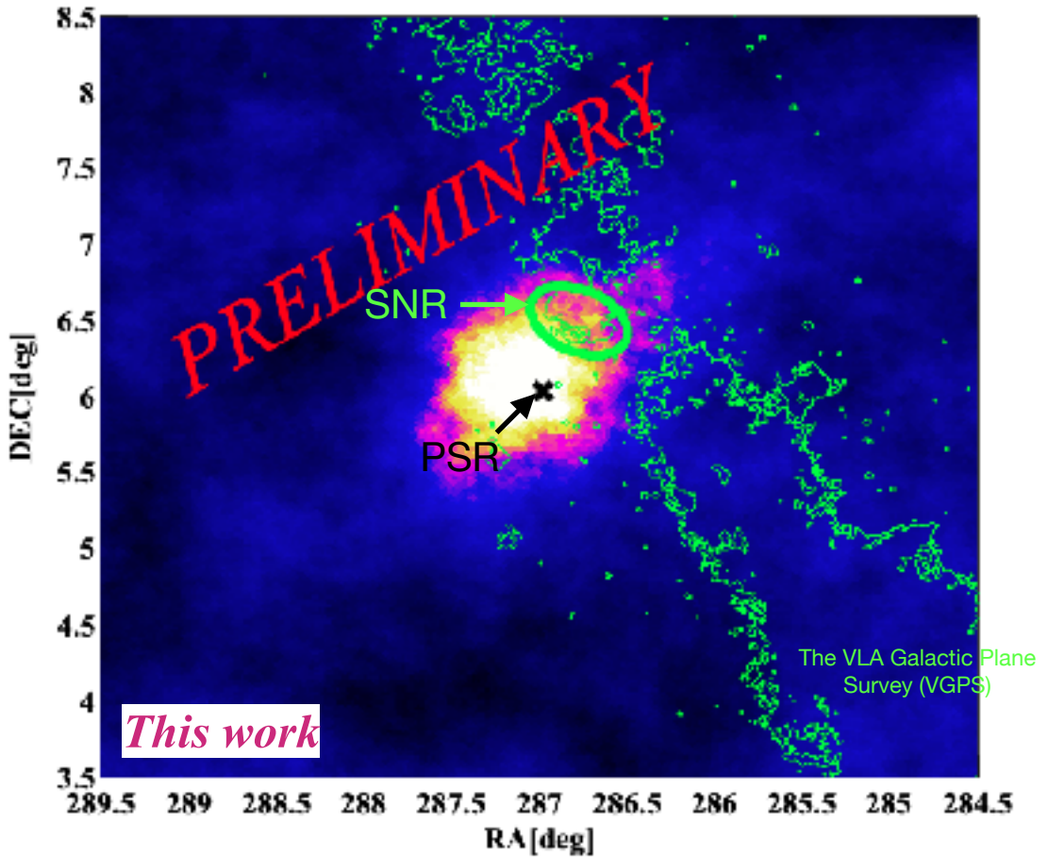


(M. Amenomori et al., Nature Astronomy , 2021)

Please refer to talks by Dr M.Ohnishi（Indico-ID1430）

- **PSR J2229+6114**
- **SNR G106.3+2.7**
- **Coincident with CO emmision**

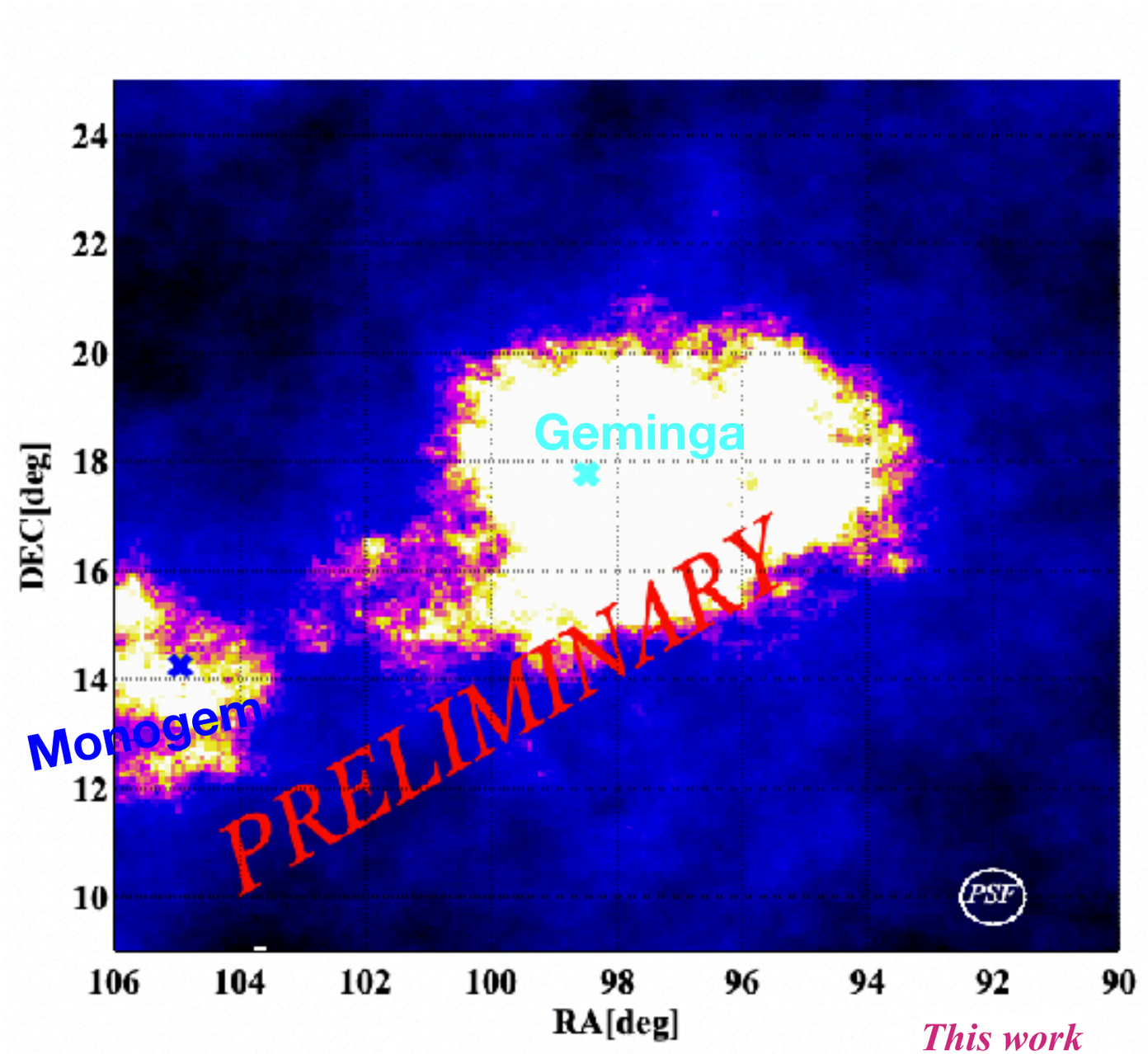
MGRO J1908+06



- **PSR J1907+0602**
- **SNR G40.5-0.5**

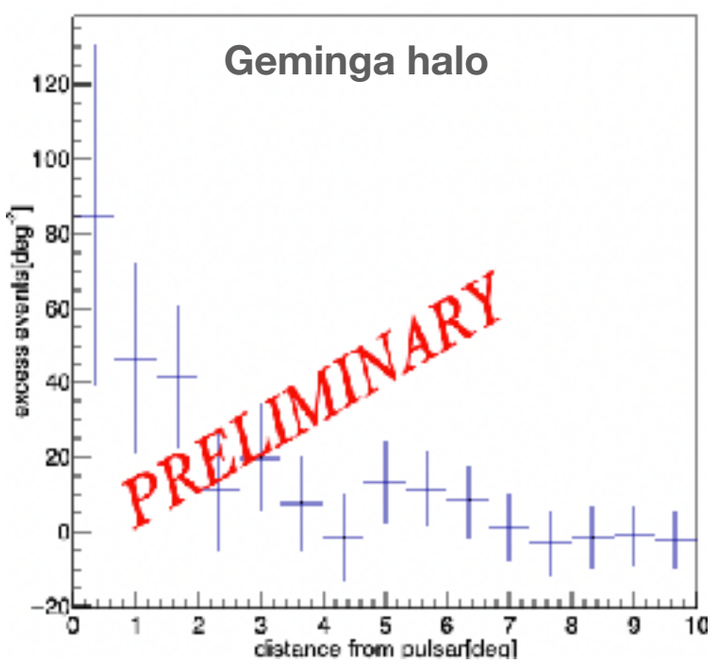
Extend gamma ray halo

Geminga



This work

- >10 TeV
- diffuse searching mode
- Equi-Dec method
- Geminga Pulasr
- Gamma ray Halo



This work

Summary

- **The Tibet ASγ experiment has a wide field of view and large effective area.**
- **The Tibet-MD array significantly improves its gamma-ray sensitivity in the 10-1000 TeV energy region.**
- **13 Very-High-Energy gamma-ray sources including large extended gamma ray halos had been seen by the Tibet ASγ experiment**

Thanks!!