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Image from https://astro.phys.ntnu.no/SpiderCAT/

# Detection of Spider pulsars through stacking analysis

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# Spider pulsars

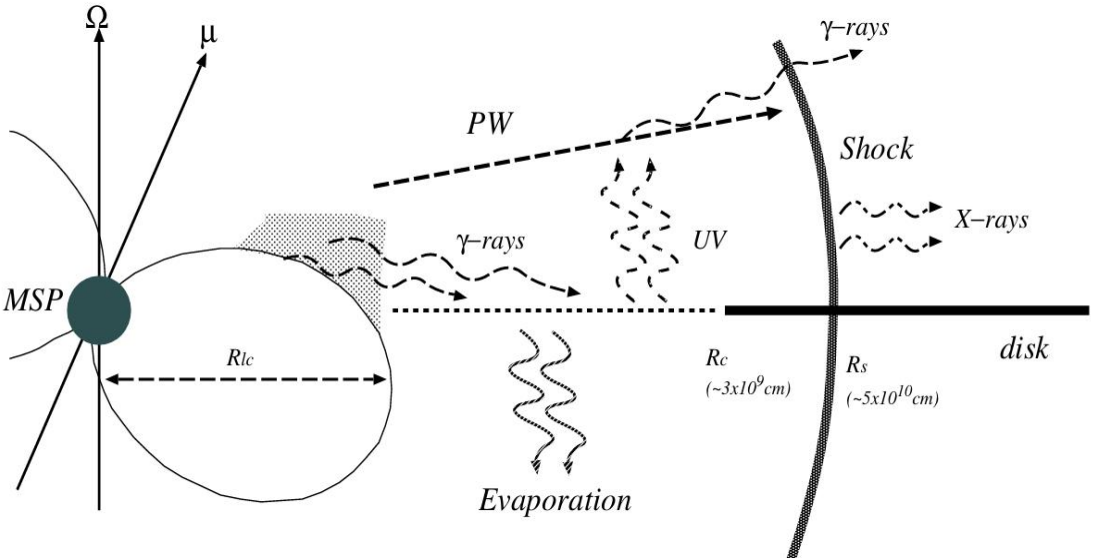
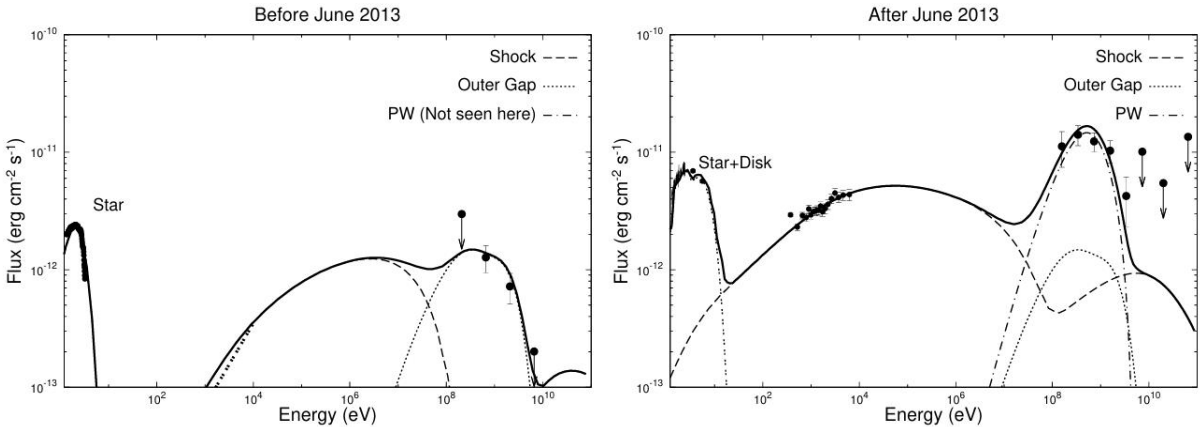



**Figure1**. Schematic illustration of the emission scenario for spider pulsar J1023+0038. Spider pulsars are a type of compact binary systems. A rapidly rotating millisecond pulsar is orbited by a very low- mass companion. Spider binaries commonly emit radio eclipses, X-ray, and, in some cases, gamma-ray emission.

(Hui, C. Y., & Li, K. L. High Energy Radiation from Spider Pulsars)

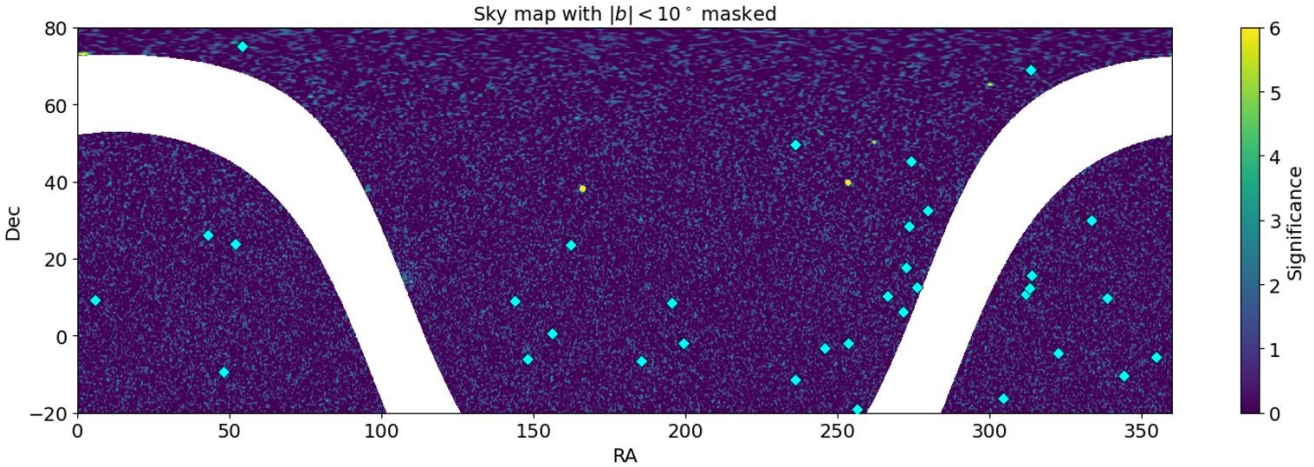
# Spider pulsars




LHASSO may detect the gamma ray emission from the spider pulsars.

(Hui, C. Y., & Li, K. L. High Energy Radiation from Spider Pulsars)

# Data selection




We selected targets from the SpiderCat ( a catalog of spider pulsars) , applying the following criteria:

1.Declination $\delta \leq 80^\circ$ and $\delta \geq -20^\circ$
2.To avoid contamination from galactic diffuse emission, we select a conservative galactic latitude range: $b \geq 10^\circ$ or $b \leq -10^\circ$
3.The availability of reported flux measurements in the gamma-ray band.

A total of 34 spider systems satisfy these selection criteria

# Check Significance map

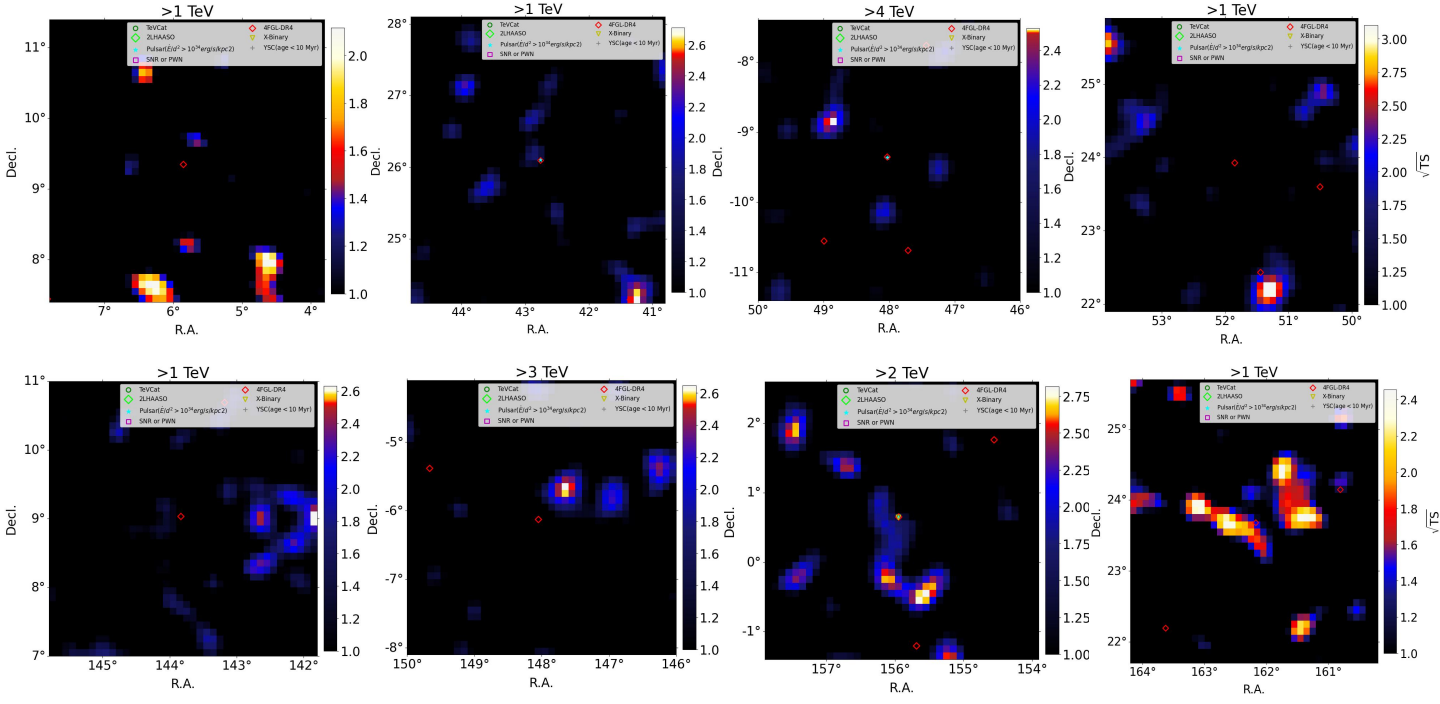



Figure 4 (partial). No source with a significance greater than 5 is found in the TS maps of the 34 sources.

# Stack analyse

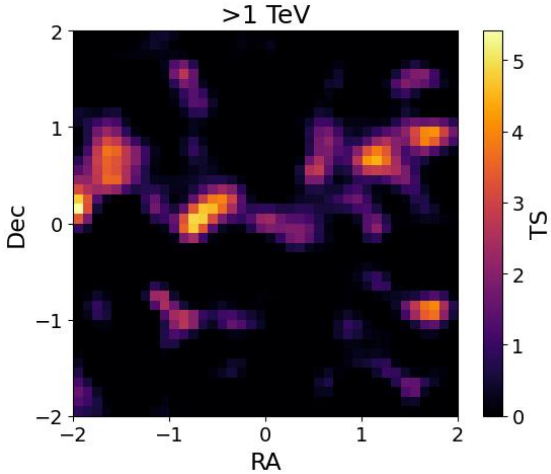



Figure 5. Joint data of selected spider pulsars, the stacked TS map is plotted.

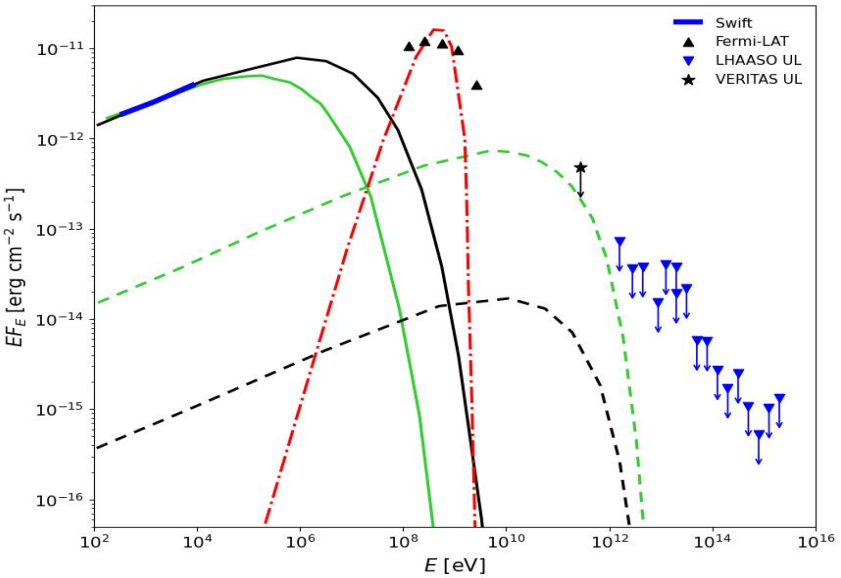



Figure 6. Broadband spectrum of PSR J1023+0038 compared with blue triangle LHAASO's upper limit is ploted.

## Conclusion

No significant signal is found in the LHAASO observations; therefore, an upper limit is derived from the stacked analysis, see Fig. 6.

(Fig 6's spectrum is from :Aliu, E., et al. A Search for Very High-Energy Gamma Rays from the Missing Link Binary Pulsar J1023+0038 with VERITAS)


Thank you!