

Fermi-LAT Search for Pulsar Wind Nebulae Associated With High- \dot{E} γ -Quiet Pulsars

1. Introduction

The Large Area Telescope (LAT) on board the *Fermi* Gamma-ray Space Telescope has vastly improved the field of γ -ray pulsars.

How many pulsars detected by the LAT.

Most prominently, the LAT Collaborators receive

- Pulsar Physics
- Pulsars causing a pulsar wind.
- PWNe (high energy IC emission)
- PWNe detected at GeV energies
 - 2PC Off-peak PWNe search
 - TeVCat PWNe search
 - Why we see high \dot{E} pulsars.
- Pulsars not seen by the LAT (γ -quiet pulsars)
- Search for new pulsars. Put some kind of note about how LAT has uniform coverage of all sources, which is a benefit.
- Also put note about how we discovered a source HESS J1616 & HESS J1825 at GeV energies using this method.
- Put note about how there are 17 pulsars with $\dot{E} < 10^{37}$ (table 3 in 2PC). Of those, 8 has no gamma-ray pulsations. There are 46 with $10^{36} < \dot{E} < 10^{37}$. 19 pulsars with no gamma-ray pulsations (table 4 in 2PC). In total, there are 27 pulsars with $\dot{E} > 10^{36}$ with no pulsations (despite thorough search). We search the LAT data for these 27 high \dot{E} pulsars to find new PWNe.

2FGL is (Nolan et al. 2012).

2. Analysis Method

2.1. Pulsar Selection Criteria

Our selection criteria for our PWN search was that to selected high \dot{E} pulsars with no γ -ray pulsations.

We took Table 10 from 2PC [CITATION NEEDED],

We excluded PSR J0537–6910 and PSR J0540–6919. They are in the LMC region which has been detected.

Exclude 3 regions with dedicated publications:

1. PSR J1617–5055 (HESS J1616-508)
2. PSR J1838–0655 (HESS J1837-069)
3. PSR J1826–1334 (HESS J1825-137)

Don’t include pulsars which have LAT-detected pulsars since publication of 2FGL. Presumably, need to redo analysis in off-peak

1. PSR J1824–2452A
2. PSR J1055–6028

Don’t include sources in Romain’s PWNe search:

1. PSR J1301-6305 -j HESS J1303-631
2. PSR J1813-1749 -j HESS J1813-178

2.2. LAT Data Preparation

Analysis results

3. Discussion

REFERENCES

Nolan, P. L., et al. 2012, ApJS, 199, 31

A. notes

Benefits:

1. Improved time range (XXX months vs XXX months in 2PC)
2. Improved upper limit from likelihood test.
3. Better analysis method (search for extended sources, could be more sensitive?) Look for hard-index sources (unlike 2PC).
4. For example, Lande et al 2012 discovered Gamma-ray emission from HESS J1616-508 which is associated with PSR J1617-5055.
5. Note: Table 3 and 4 get upper limits assuming cutoff spectrum, not suitable for PWNe searches. For describing of 2PC flux upper limits, see <https://confluence.slac.stanford.edu/x/U>

Notes/questions:

1. Should we used reprocessed data?