PWNCAT2

Lots of people…

ABSTRACT

Abstract goes here

Subject headings: Catalogs; Fermi Gamma-ray Space Telescope; Gamma rays: observations; pulsar wind nebula

*Todo list

1. Introduction

The introduction goes here…

Primary motivations for improved analysis

- More data (3 years vs 18 months)
- Many new GeV pulsars
- Going to higher energies thanks to improved IRFs.
- Better spatial/morphological analysis due to new `pointlike` code.

2. LAT Description and Observations

Description goes here...

3. Timing Analysis

Timing analysis goes here...

4. Off-peak Phase Selection

Off-peak goes here...

Figure 1 shows the off peak selection for some pulsars...

THe off peak phase range is defined in Table 1.

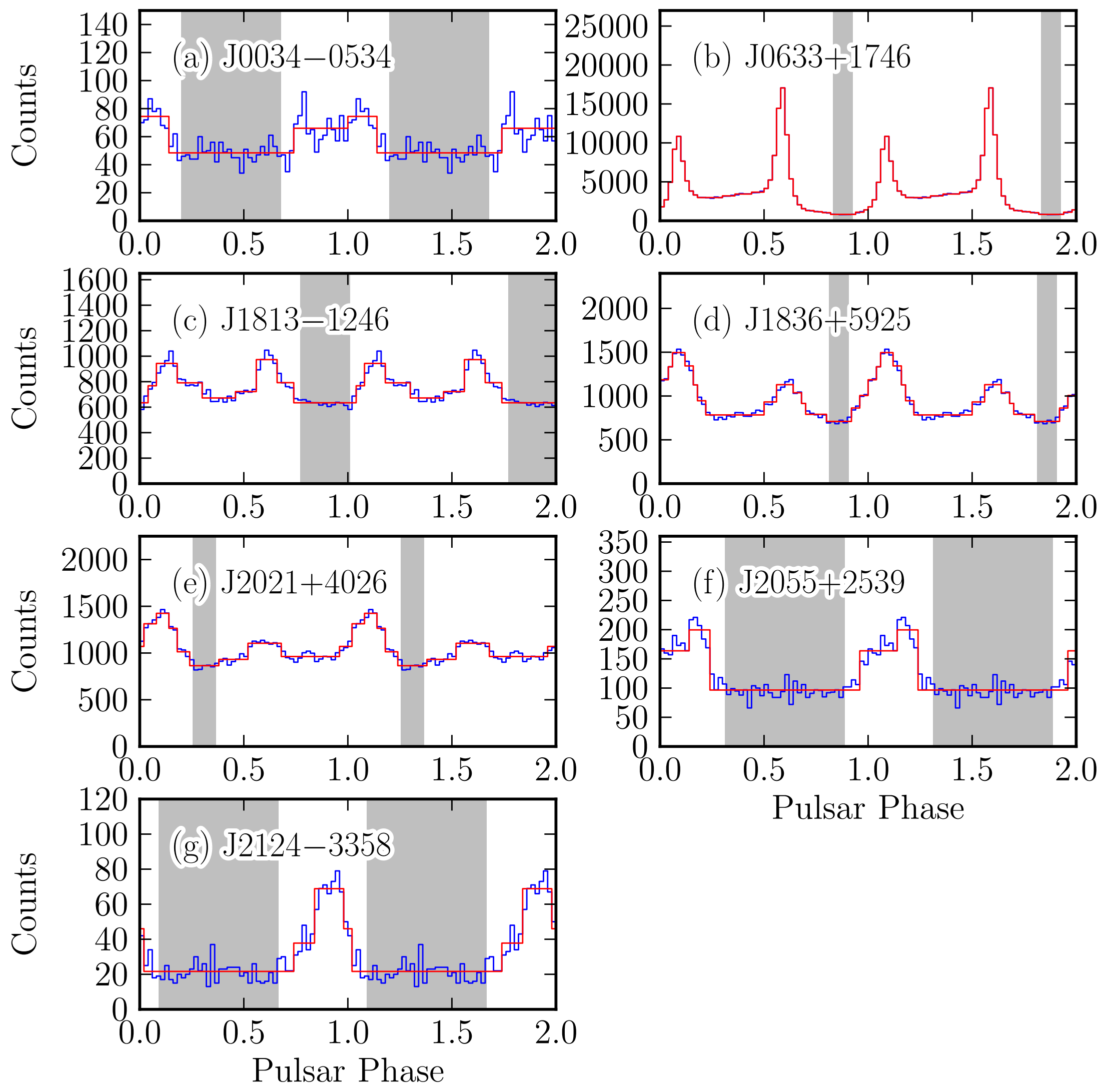

Fig. 1.— Off peak selection for some pulsars. . .

Table 1. Observatories, off-pulse definitions and distances of the

How many pulsars?

LAT-detected pulsars

PSR	ObsID	PHASE	Distance	Observation period rejected (MJD)
J0007+7303	···	0.53-0.91	···	···
J0030+0451	···	0.71-0.05	···	···
J0034−0534	···	0.21-0.68	···	···
J0106+4855	···	0.24-0.54	···	···
J0218+4232	···	0.83-0.17	···	···
J0248+6021	···	0.56-0.12	···	···
J0340+4130	···	0.17-0.64	···	···
J0357+3205	···	0.37-0.85	···	···
J0437−4715	···	0.60-0.16	···	···
J0534+2200	···	0.60-0.84	···	···
J0610−2100	···	0.29-0.51	···	···
J0613−0200	···	0.57-0.05	···	···
J0614−3329	···	0.36-0.50	···	···
J0622+3749	···	0.31-0.87	···	···
J0631+1036	···	0.64-0.19	···	···
J0633+0632	···	0.65-0.96	···	···
J0633+1746	···	0.84-0.92	···	···
J0659+1414	···	0.41-0.04	···	···
J0729−1448	···	0.70-0.42	···	···
J0734−1559	···	0.33-0.83	···	···
J0742−2822	···	0.73-0.37	···	···
J0751+1807	···	0.75-0.29	···	···
J0835−4510	···	0.85-0.03	···	···
J0908−4913	···	0.17-0.53	···	···
J0940−5428	···	0.56-0.14	···	···
J1016−5857	···	0.62-0.01	···	···
J1019−5749	···	0.66-0.37	···	···
J1023−5746	···	0.67-0.01	···	···
J1024−0719	···	0.88-0.34	···	···
J1028−5819	···	0.77-0.08	···	···
J1044−5737	···	0.56-0.96	···	···
J1048−5832	···	0.67-0.03	···	···
J1057−5226	···	0.16-0.56	···	···
J1105−6107	···	0.69-0.03	···	···
J1119−6127	···	0.60-0.18	···	···
J1135−6055	···	0.44-0.86	···	···
J1231−1411	···	0.86-0.10	···	···
J1357−6429	···	0.79-0.01	···	···
J1410−6132	···	0.51-0.89	···	···
J1413−6205	···	0.58-0.02	···	···
J1418−6058	···	0.66-0.92	···	···
J1420−6048	···	0.57-0.05	···	···
J1429−5911	···	0.32-0.42	···	···
J1459−6053	···	0.33-0.67	···	···
J1509−5850	···	0.65-0.13	···	···

Table 1—Continued

PSR	ObsID	PHASE	Distance	Observation period rejected (MJD)
J1513−5908	···	0.52-0.12	···	···
J1531−5610	···	0.55-0.19	···	···
J1600−3053	···	0.53-0.09	···	···
J1614−2230	···	0.83-0.17	···	···
J1620−4927	···	0.54-0.98	···	···
J1702−4128	···	0.58-0.16	···	···
J1709−4429	···	0.75-0.07	···	···
J1713+0747	···	0.67-0.19	···	···
J1718−3825	···	0.01-0.19	···	···
J1732−3131	···	0.79-0.95	···	···
J1741−2054	···	0.47-0.97	···	···
J1744−1134	···	0.16-0.72	···	···
J1746−3239	···	0.42-0.98	···	···
J1747−2958	···	0.66-0.10	···	···
J1803−2149	···	0.58-0.02	···	···
J1809−2332	···	0.53-0.91	···	···
J1813−1246	···	0.78-0.01	···	···
J1823−3021A	···	0.09-0.56	···	···
J1826−1256	···	0.26-0.52	···	···
J1836+5925	···	0.82-0.90	···	···
J1846+0919	···	0.42-0.88	···	···
J1907+0602	···	0.69-0.05	···	···
J1939+2134	···	0.09-0.47	···	···
J1952+3252	···	0.73-0.05	···	···
J1954+2836	···	0.67-0.98	···	···
J1957+5033	···	0.44-0.90	···	···
J1958+2846	···	0.64-0.92	···	···
J1959+2048	···	0.79-0.97	···	···
J2017+0603	···	0.76-0.20	···	···
J2021+3651	···	0.74-0.98	···	···
J2021+4026	···	0.26-0.36	···	···
J2028+3332	···	0.58-0.97	···	···
J2030+3641	···	0.71-0.21	···	···
J2030+4415	···	0.94-0.02	···	···
J2032+4127	···	0.68-0.92	···	···
J2043+2740	···	0.64-0.04	···	···
J2051−0827	···	0.77-0.24	···	···
J2055+2539	···	0.39-0.86	···	···
J2124−3358	···	0.14-0.58	···	···
J2139+4716	···	0.27-0.90	···	···
J2214+3000	···	0.64-0.74	···	···
J2238+5903	···	0.65-0.99	···	···
J2240+5832	···	0.70-0.46	···	···
J2302+4442	···	0.75-0.23	···	···

Note. —

Put table comments

5. Analysis of the *Fermi*-LAT data

Analysis goes here…

6. Results

Results goes here…

Table 2 shows the results of the all energy analysis of the off-peak emission for each pulsar.

Table 3 shows the results of the analysis in separate energy bins of each pulsar.

Table 4 shows the results of the cutoff test for pulsars with significant low-energy emission.

Table 2. All Energy spectral fit for the

How many pulsars?

LAT-detected Pulsars

PSR	TS	$F_{0.1-316}$ (10^{-9}ph cm^{-2} s^{-1})	Γ
J0007+7303	1.6	< 18.76	···
J0030+0451	14.0	< 8.19	···
J0034−0534	41.9	15.88 ± 4.74	2.41 ± 0.19
J0106+4855	0.0	< 6.80	···
J0218+4232	33.9	49.22 ± 20.43	2.79 ± 0.49
J0248+6021	18.5	< 13.59	···
J0340+4130	25.6	10.50 ± 3.68	2.13 ± 0.15
J0357+3205	0.0	< 2.97	···
J0437−4715	0.0	None	···
J0534+2200	4957.5	559.70 ± 19.47	2.24 ± 0.02
J0610−2100	0.0	< 3.23	···
J0613−0200	0.0	< 3.37	···
J0614−3329	15.6	< 15.81	···
J0622+3749	1.0	< 7.81	···
J0631+1036	15.1	< 14.03	···
J0633+0632	4.1	< 10.20	···
J0633+1746	2851.0	882.36 ± 30.61	2.28 ± 0.03
J0659+1414	0.0	< 1.77	···
J0729−1448	0.0	< 4.85	···
J0734−1559	24.5	< 12.39	···
J0742−2822	0.0	< 6.76	···
J0751+1807	8.1	< 5.70	···
J0835−4510	286.0	288.52 ± 22.98	2.54 ± 0.06
J0908−4913	21.7	< 29.39	···
J0940−5428	0.0	< 1.73	···
J1016−5857	0.0	< 12.99	···
J1019−5749	3.7	< 14.67	···
J1023−5746	68.5	96.55 ± 27.38	2.25 ± 0.11
J1024−0719	0.0	< 2.30	···
J1028−5819	9.7	< 29.20	···
J1044−5737	0.0	< 17.85	···
J1048−5832	7.8	< 19.16	···
J1057−5226	0.8	< 5.03	···
J1105−6107	10.9	< 32.30	···
J1119−6127	110.5	77.87 ± 15.89	2.28 ± 0.09
J1135−6055	4.2	< 6.81	···
J1231−1411	0.0	< 3.21	···
J1357−6429	2.9	< 5.94	···
J1410−6132	22.4	< 50.77	···
J1413−6205	2.8	< 12.42	···
J1418−6058	11.8	< 49.69	···
J1420−6048	0.0	< 26.02	···
J1429−5911	0.0	< 12.98	···
J1459−6053	0.3	< 9.28	···
J1509−5850	0.7	< 10.88	···

Table 2—Continued

PSR	TS	$F_{0.1-316}$ (10^{-9} ph cm^{-2} s^{-1})	Γ
J1513−5908	117.9	16.05 ± 6.39	1.74 ± 0.11
J1531−5610	0.0	< 3.49	···
J1600−3053	0.0	< 1.85	···
J1614−2230	0.0	< 5.77	···
J1620−4927	33.5	70.36 ± 19.70	2.20 ± 0.11
J1702−4128	0.0	< 6.30	···
J1709−4429	14.8	< 15.42	···
J1713+0747	2.1	< 4.93	···
J1718−3825	0.0	< 14.61	···
J1732−3131	0.0	< 8.69	···
J1741−2054	12.0	< 14.27	···
J1744−1134	74.3	47.28 ± 8.68	2.35 ± 0.08
J1746−3239	54.7	109.56 ± 22.82	2.54 ± 0.15
J1747−2958	32.6	124.33 ± 30.73	2.36 ± 0.11
J1803−2149	6.7	< 29.50	···
J1809−2332	24.8	< 38.61	···
J1813−1246	57.3	200.61 ± 41.33	2.59 ± 0.14
J1823−3021A	2.7	< 5.11	···
J1826−1256	20.0	< 68.93	···
J1836+5925	5020.0	561.42 ± 17.71	2.11 ± 0.02
J1846+0919	0.0	< 3.35	···
J1907+0602	0.0	< 7.55	···
J1939+2134	0.0	< 4.40	···
J1952+3252	0.2	< 7.71	···
J1954+2836	6.1	< 18.52	···
J1957+5033	0.0	< 2.52	···
J1958+2846	0.0	< 7.72	···
J1959+2048	0.0	< 4.89	···
J2017+0603	0.0	< 2.96	···
J2021+3651	0.0	< 7.59	···
J2021+4026	909.4	1206.23 ± 57.85	2.29 ± 0.02
J2028+3332	0.0	< 4.58	···
J2030+3641	0.0	< 2.96	···
J2030+4415	3.1	< 26.78	···
J2032+4127	11.7	< 31.08	···
J2043+2740	0.0	< 2.58	···
J2051−0827	0.0	< 1.89	···
J2055+2539	108.4	47.02 ± 6.41	2.53 ± 0.08
J2124−3358	103.4	19.86 ± 3.88	2.13 ± 0.10
J2139+4716	16.8	< 9.29	···
J2214+3000	0.0	< 5.02	···
J2238+5903	0.3	< 6.62	···
J2240+5832	0.0	< 6.21	···
J2302+4442	114.7	33.50 ± 5.34	2.38 ± 0.10

Note. —

Put table comments

Table 3. Energy bin spectral fit for the

How many pulsars?

LAT-detected Pulsars

PSR	$TS_{0.1-1}$	$F_{0.1-1}$ (10^{-9}ph cm^{-2} s^{-1})	TS_{1-10}	F_{1-10} (10^{-9}ph cm^{-2} s^{-1})	TS_{10-316}	F_{10-316} (10^{-9}ph cm^{-2} s^{-1})
J0007+7303	41.5	24.69 ± 4.11	23.4	< 1.41	1.2	< 0.15
J0030+0451	14.3	< 16.86	4.2	< 0.60	0.0	< 0.12
J0034−0534	20.1	< 15.78	25.5	0.64 ± 0.19	0.0	< 0.07
J0106+4855	1.5	< 11.34	2.8	< 0.80	0.0	< 0.11
J0218+4232	54.3	30.70 ± 4.56	7.6	< 1.13	0.0	< 0.10
J0248+6021	27.6	32.78 ± 6.38	4.2	< 0.96	2.5	< 0.13
J0340+4130	0.6	< 9.05	36.3	1.16 ± 0.26	0.0	< 0.07
J0357+3205	0.0	< 6.04	0.0	< 0.40	0.0	< 0.09
J0437−4715	0.7	< 5.11	0.0	< 0.21	0.0	< 0.05
J0534+2200	2065.0	432.14 ± 12.30	2101.7	28.41 ± 1.28	1227.0	5.35 ± 0.47
J0610−2100	0.0	< 6.16	0.0	< 0.52	0.0	< 0.15
J0613−0200	0.4	< 10.87	0.0	< 0.38	0.0	< 0.10
J0614−3329	16.8	< 28.41	1.8	< 1.09	0.0	< 0.22
J0622+3749	3.2	< 10.50	10.1	< 0.92	0.0	< 0.07
J0631+1036	14.2	< 30.84	4.0	< 1.12	2.3	< 0.15
J0633+0632	0.0	< 15.66	2.2	< 1.46	0.0	< 0.17
J0633+1746	2432.9	770.12 ± 23.09	865.5	40.45 ± 2.66	0.0	< 0.53
J0659+1414	0.0	< 4.00	0.0	< 0.27	0.0	< 0.06
J0729−1448	5.7	< 18.70	0.1	< 0.48	0.0	< 0.06
J0734−1559	36.7	33.00 ± 5.75	0.0	< 0.65	0.0	< 0.08
J0742−2822	6.8	< 20.10	0.0	< 0.49	2.4	< 0.12
J0751+1807	1.8	< 7.59	9.6	< 0.71	0.0	< 0.06
J0835−4510	326.1	227.40 ± 14.24	42.2	5.62 ± 1.10	0.0	< 0.39
J0908−4913	34.2	55.16 ± 9.73	2.0	< 1.78	3.5	< 0.26
J0940−5428	0.0	< 2.40	0.0	< 0.32	0.8	< 0.12
J1016−5857	0.0	< 21.99	0.6	< 1.54	1.3	< 0.23
J1019−5749	15.1	< 49.63	3.0	< 1.44	0.0	< 0.10
J1023−5746	49.1	84.11 ± 12.34	31.9	3.98 ± 0.82	23.1	< 0.73
J1024−0719	0.0	< 5.49	0.0	< 0.30	0.0	< 0.08
J1028−5819	7.6	< 54.10	8.6	< 2.91	0.0	< 0.26
J1044−5737	13.7	< 45.84	3.6	< 1.65	0.0	< 0.12
J1048−5832	5.7	< 38.88	8.7	< 2.14	0.0	< 0.14
J1057−5226	0.1	< 10.22	0.9	< 0.58	0.0	< 0.12
J1105−6107	17.2	< 62.57	10.4	< 3.18	0.2	< 0.19
J1119−6127	82.3	69.07 ± 7.91	63.0	3.38 ± 0.52	15.2	< 0.29
J1135−6055	2.2	< 24.14	0.0	< 0.66	1.5	< 0.12
J1231−1411	0.3	< 10.39	0.0	< 0.36	0.0	< 0.14
J1357−6429	0.0	< 13.11	0.0	< 0.65	1.2	< 0.27
J1410−6132	7.6	< 65.87	14.5	< 4.94	7.4	< 0.60
J1413−6205	0.0	< 14.31	1.8	< 1.87	1.4	< 0.22
J1418−6058	1.6	< 51.21	11.4	< 5.69	5.8	< 0.64
J1420−6048	0.4	< 32.17	0.4	< 2.28	10.0	< 0.45
J1429−5911	0.0	< 23.55	0.0	< 1.90	0.4	< 0.43
J1459−6053	2.6	< 32.19	0.0	< 0.81	0.0	< 0.22
J1509−5850	1.2	< 30.14	0.0	< 1.20	0.0	< 0.18

Table 3—Continued

PSR	$TS_{0.1-1}$	$F_{0.1-1}$ ($10^{-9}\,\mathrm{ph\,cm^{-2}\,s^{-1}}$)	TS_{1-10}	F_{1-10} ($10^{-9}\,\mathrm{ph\,cm^{-2}\,s^{-1}}$)	TS_{10-316}	F_{10-316} ($10^{-9}\,\mathrm{ph\,cm^{-2}\,s^{-1}}$)
J1513−5908	5.1	< 35.07	32.8	2.42 ± 0.51	83.7	0.54 ± 0.11
J1531−5610	0.0	< 5.05	0.0	< 0.66	0.3	< 0.15
J1600−3053	0.0	< 3.47	0.0	< 0.35	0.0	< 0.06
J1614−2230	0.0	< 9.78	1.9	< 0.84	0.0	< 0.11
J1620−4927	20.4	< 90.79	20.4	< 5.64	6.1	< 0.41
J1702−4128	0.0	< 11.77	0.0	< 0.96	0.1	< 0.21
J1709−4429	16.5	< 65.45	0.1	< 1.16	0.0	< 0.16
J1713+0747	4.6	< 13.46	0.5	< 0.50	0.0	< 0.07
J1718−3825	0.3	< 51.76	0.0	< 1.61	0.1	< 0.33
J1732−3131	0.0	< 23.77	0.0	< 1.20	0.0	< 0.39
J1741−2054	7.9	< 33.06	2.3	< 1.16	3.3	< 0.20
J1744−1134	32.0	33.58 ± 6.21	48.8	2.25 ± 0.41	0.4	< 0.10
J1746−3239	74.1	85.14 ± 10.28	22.9	< 3.49	0.0	< 0.08
J1747−2958	54.2	122.66 ± 16.98	28.7	4.86 ± 1.04	0.0	< 0.15
J1803−2149	3.0	< 55.66	2.4	< 2.77	2.5	< 0.41
J1809−2332	47.2	87.15 ± 13.16	7.1	< 2.81	0.0	< 0.16
J1813−1246	71.6	140.50 ± 17.54	21.0	< 5.45	0.8	< 0.33
J1823−3021A	0.3	< 12.08	0.0	< 0.40	3.3	< 0.18
J1826−1256	32.2	123.26 ± 22.17	4.9	< 5.06	0.3	< 0.47
J1836+5925	3491.7	497.90 ± 14.02	2421.1	44.07 ± 2.19	0.0	< 0.28
J1846+0919	0.0	< 8.72	0.0	< 0.46	0.0	< 0.11
J1907+0602	0.8	< 40.61	0.0	< 1.06	0.0	< 0.14
J1939+2134	0.0	< 11.60	0.0	< 0.85	0.0	< 0.12
J1952+3252	2.1	< 24.53	0.0	< 0.88	0.0	< 0.13
J1954+2836	2.9	< 36.33	5.5	< 2.12	0.1	< 0.18
J1957+5033	0.0	< 5.54	0.0	< 0.29	0.1	< 0.09
J1958+2846	0.0	< 13.30	0.4	< 1.30	0.0	< 0.16
J1959+2048	0.6	< 21.38	0.0	< 0.53	0.0	< 0.18
J2017+0603	0.8	< 10.00	0.0	< 0.31	0.0	< 0.10
J2021+3651	0.9	< 37.70	0.0	< 1.07	0.0	< 0.14
J2021+4026	1747.0	1008.54 ± 29.42	923.5	60.15 ± 3.16	7.6	< 1.25
J2028+3332	0.0	< 12.66	0.0	< 0.76	0.0	< 0.09
J2030+3641	0.0	< 13.03	0.0	< 0.42	0.0	< 0.09
J2030+4415	0.1	< 45.39	1.1	< 2.94	2.0	< 0.62
J2032+4127	0.1	< 35.03	3.5	< 2.88	8.7	< 0.71
J2043+2740	0.0	< 5.44	0.3	< 0.34	0.0	< 0.10
J2051−0827	0.0	< 3.77	0.0	< 0.29	0.0	< 0.09
J2055+2539	106.3	36.24 ± 4.00	23.0	< 1.50	0.0	< 0.07
J2124−3358	16.6	< 16.97	107.2	2.01 ± 0.30	0.0	< 0.07
J2139+4716	10.0	< 18.78	8.0	< 1.02	0.0	< 0.05
J2214+3000	1.1	< 18.13	0.0	< 0.48	0.0	< 0.28
J2238+5903	0.8	< 18.92	0.2	< 0.88	0.0	< 0.10
J2240+5832	0.0	< 8.66	5.6	< 1.05	0.0	< 0.06
J2302+4442	61.9	24.28 ± 3.41	61.1	1.47 ± 0.26	0.0	< 0.08

Note. —

Put table comments

Add table on PWN Variability

Figure 2 shows the cutoff test…

7. Discussion

The discussion goes here...

The *Fermi* LAT Collaboration acknowledges generous ongoing support from a number of agencies and institutes that have supported both the development and the operation of the LAT as well as scientific data analysis. These include the National Aeronautics and Space Administration and the Department of Energy in the United States, the Commissariat à l'Energie Atomique and the Centre National de la Recherche Scientifique / Institut National de Physique Nucléaire et de Physique des Particules in France, the Agenzia Spaziale Italiana and the Istituto Nazionale di Fisica Nucleare in Italy, the Ministry of Education, Culture, Sports, Science and Technology (MEXT), High Energy Accelerator Research Organization (KEK) and Japan Aerospace Exploration Agency (JAXA) in Japan, and the K. A. Wallenberg Foundation, the Swedish Research Council and the Swedish National Space Board in Sweden.

Additional support for science analysis during the operations phase is gratefully acknowledged from the Istituto Nazionale di Astrofisica in Italy and the Centre National d'Études Spatiales in France.

The authors acknowledge the use of HEALPix[1] (Górski et al. 2005).

REFERENCES

Górski, K. M., Hivon, E., Banday, A. J., Wandelt, B. D., Hansen, F. K., Reinecke, M., & Bartelmann, M. 2005, ApJ, 622, 759

A. Validation of Extension Upper Limits

[1] http://healpix.jpl.nasa.gov/

This preprint was prepared with the AAS LaTeX macros v5.2.

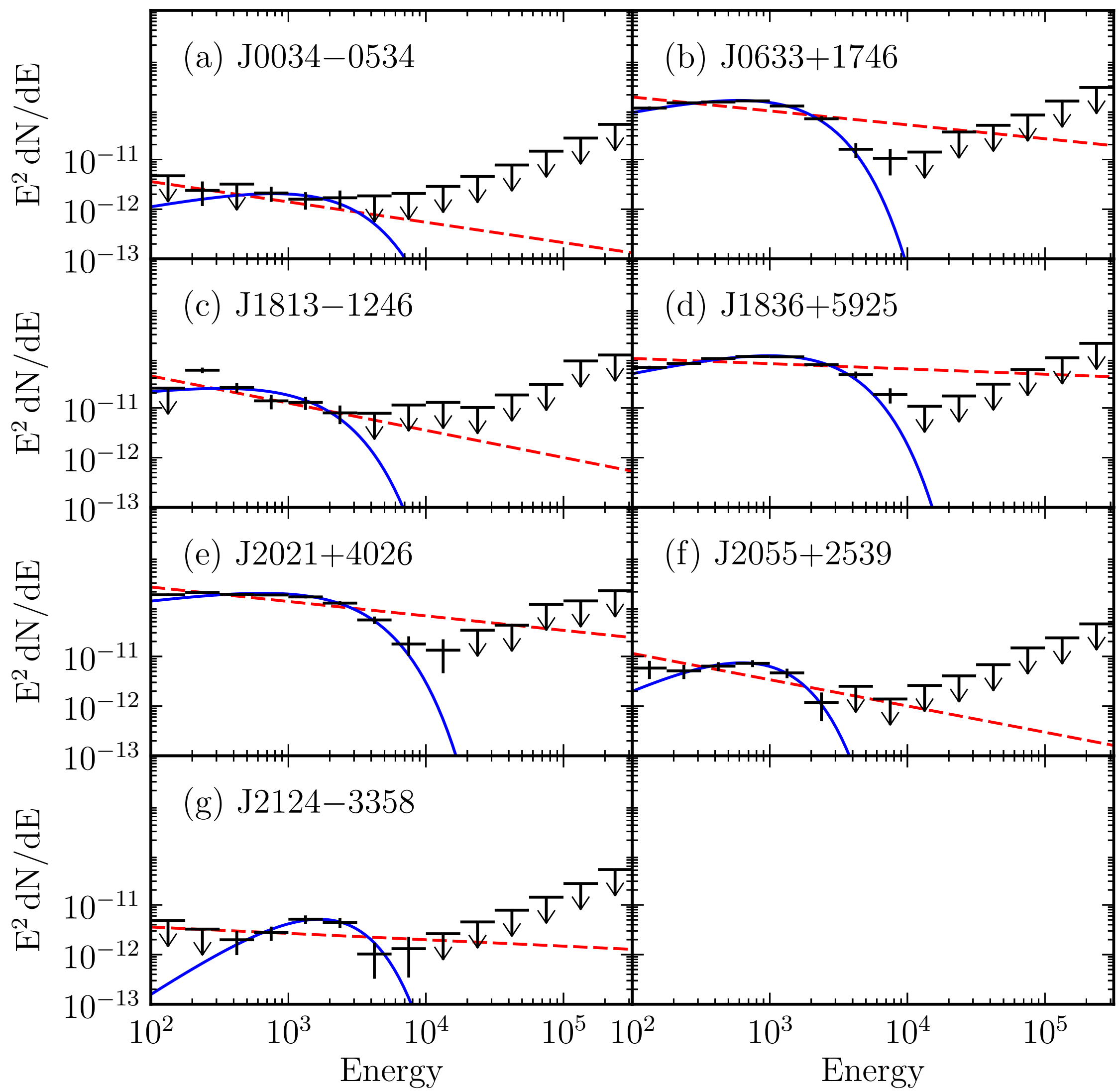

Fig. 2.— Cutoff test for some pulsars…

Table 4. Spectral fitting of pulsar wind nebula candidates with low energy component

PSR	$G_{0.1-316}$ ($10^{-12}\,\mathrm{erg\,cm^{-2}\,s^{-1}}$)	Γ	E_{cutoff} (GeV)	$\mathrm{TS}_{\mathrm{cutoff}}$
J0034−0534	6.06 ± 1.59	1.49 ± 0.67	1.52 ± 1.17	5.3
J0633+1746	415.30 ± 12.92	1.41 ± 0.10	1.00 ± 0.13	177.0
J1813−1246	65.41 ± 3.93	1.68 ± 0.03	1.00 ± 0.05	2.5
J1836+5925	330.12 ± 8.76	1.40 ± 0.03	1.64 ± 0.07	203.4
J2021+4026	585.23 ± 16.60	1.64 ± 0.03	1.83 ± 0.07	124.2
J2055+2539	15.57 ± 2.25	0.67 ± 0.71	0.47 ± 0.20	29.1
J2124−3358	9.80 ± 1.57	0.15 ± 0.84	0.91 ± 0.42	27.6

Note. —

Put table comments