Gamma-ray PSR J2116p3701

General Information

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   PSRJ                    RAJD          DECJD         P0                     DIST   EDOT
                           (deg)         (deg)        (s)                    (kpc)  (erg/s)
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   J2116+3701    dcm+23    319.059600  37.025314    0.14588      dcm+23     2.903  6.7e+34

G100:  5.5e-12  +/- 9.7e-13   erg/cm2/s
LumG:  5.5e33   +/-  1.e32  +/-   (3.5e33, 5.3e33)      erg/s
EffG:  0.082    +/- 0.015   +/- (0.053, 0.079) (EffG = LumG/Edot)  (first uncertainty is statistical, second
includes the distance uncertainty)

Here is the closest 4FGL source:
  name               angSep    gglon     gglat   (maj,min95)  Sigma     nickname
  4FGL J2116.2+3701  0.000   82.3045   -8.3410  (0.077, 0.063) 14.4    P88Y5920

 Codes (see bottom of page): R r.
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ATNF psrcat v1.70 includes dcm+23 -- https://ui.adsabs.harvard.edu/abs/2022arXiv221009172D/abstract **The second set of pulsar discoveries by CHIME/FRB/Pulsar: 14 Rotating Radio Transients and 7 pulsars** Dong, Fengqiu Adam ; Crowter, Kathryn ; Meyers, Bradley W. ; Pleunis, Ziggy ; Stairs, Ingrid ; Tan, Chia Min ; Yu, Tinyau Timothy ; Boyle, Patrick J. ; Cook, Amanda M. ; Fonseca, Emmanuel ; Gaensler, Bryan M. ; Good, Deborah C. ; Kaspi, Victoria ; McKee, James W. ; Patel, Chitrang ; Pearlman, Aaron B.

We noticed that the position of PSR J2116+3701 closely matches that of the 4FGL source listed above and on the SED below, where 4FGL is the **Incremental Fermi Large Area Telescope Fourth Source Catalog** Abdollahi, S. et al. 2022ApJS..260...53A

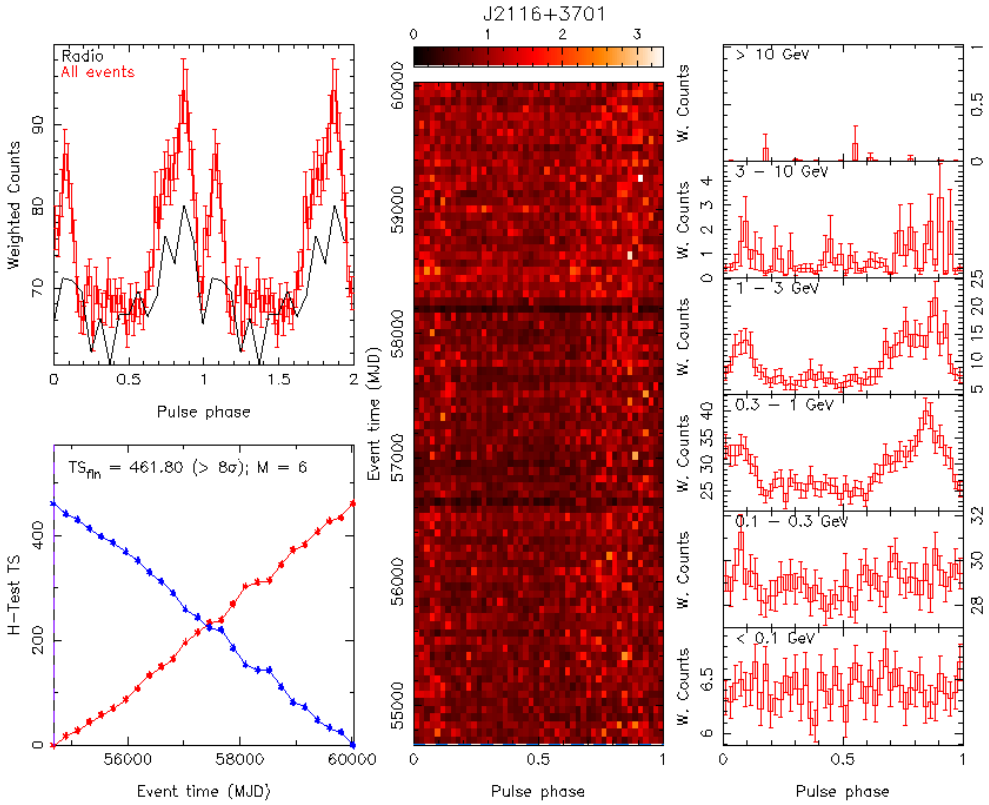
That source is non-variable (unlike most blazars) and has the pulsar-like SED shown below:

From the Table in dcm+23 we created J2116+3701.par and we gamma-ray phase-folded the *Fermi* LAT data using the methods described in **Searching a Thousand Radio Pulsars for Gamma-ray Emission** Smith, D. A. et al. 2019ApJ...871...78S . We thank dcm+23 lead author Fengqiu Adam Dong for having sent us the .par, the radio pulse profile to overlay on the gamma-ray phase histogram, and for other useful exchanges. This first folding gave an Htest of 66 for >14 years of LAT data, with a peak near 160 about 2000 days before the beginning of the radio ephemeris validity.

We then used the methods of **Precise -Ray Timing and Radio Observations of 17 Fermi -Ray Pulsars** Ray, P. S. et al. 2011ApJS..194...17R to create gamma-ray times-of-arrival, refit the ephemeris using the tempo2 "plk" plugin, to obtain an Htest of 375.

Applying the methods of **Timing gamma-ray pulsars with the Fermi Large Area Telescope: Timing Noise and Astrometry** Kerr, M. et al. 2015ApJ...814..128K and using Model Weights as per **Extending the event-weighted pulsation search to very faint gamma-ray sources** Bruel, P. 2019A&A...622A.108B finally gave Htest 461 for the full data set, as shown below.

Nota bene! We are currently (3 May 2023) verifying the radio-gamma phase alignment. What is shown below is quite possibly wrong, contact us if you need confirmation.



Pulsar History and Characteristics codes:

'G' 'Discovered in Fermi-LAT gamma-ray data.'

'R' 'Discovered in the radio and/or gamma-ray pulsations detected using the radio ephemeris.'

'X' 'Discovered in the X-ray and/or gamma-ray pulsations detected using the X-ray ephemeris.'

'E' 'Pulsar was detected in gamma rays by EGRET/COMPTEL.'

'P' 'Pulsar was discovered by the Pulsar Search Consortium.'

'U' 'Discovered using a Fermi-LAT seed position.'

'r' 'Pulsations detected in the radio band.'

'x' 'Pulsations detected in the X-ray band.'

'm' 'Millisecond pulsar.'

'b' 'Pulsar is in a binary system.'

'w' 'Pulsar is in a black-widow system.'

'k' 'Pulsar is in a redback system.'

'q' 'Gamma pulsar with no radio detection'