Gamma-ray PSR J1356p0230

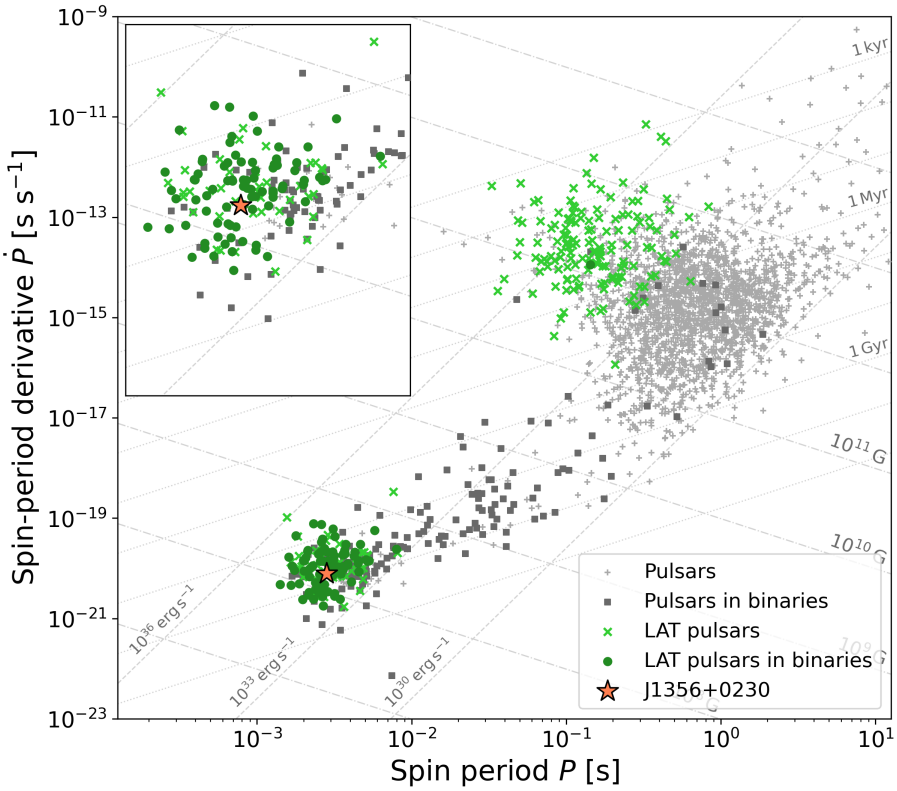
General Information

PSR	RA	DEC	P0	P1	F0	F1	Age	Dist	Edot	CODES (see below)
J1356+0230	209.155	2.508	0.0028	7.825e-21	353.74	-9.8e-16	5.8e9	1.8	1.37e34	RUP mbrw

Quick Info

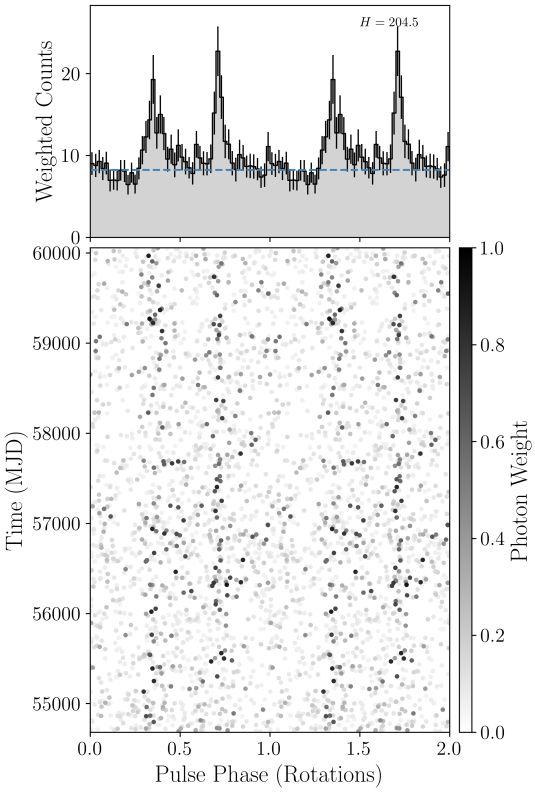
This pulsar was discovered by TRAPUM's Fermi Sources working group using MeerKAT, targeting the sky position of 4FGL J1356.6+0234. The pulsar was solved by Paulo Freire. For the gamma-ray follow-up, we used the orbital solution, the sky position (see plot below) and F0 from the radio timing analysis.

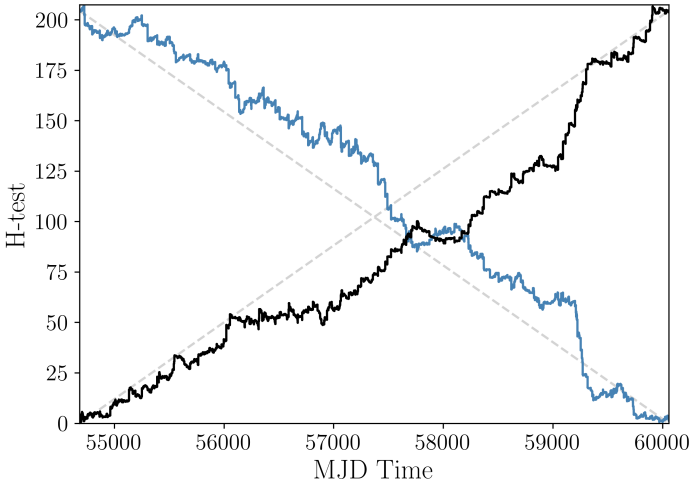
This binary pulsar was discovered and timed in gamma rays on 26 April 2023. More timing details can be found below.



Legend: Radio = gray, Gamma = green, isolated = cross or plus, binary = circle or square

Pulsations





Left: Gamma-ray pulse profile and photon phases versus time. Orange curve shows maximum-likelihood template pulse profile, faint black curves are from 100 randomly selected MCMC samples.

Right: H-test vs time

Derived Parameters

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4FGL source name     = 4FGL J1356.6+0234
Ang. sep. to pulsar  = 0.069
Energy flux (G100)   = 1.909e-12 erg/(cm^2*s)

Galactic longitude l = 338.07 deg
Galactic latitude  b = 60.85 deg
Dispersion measure   = 17.7866 pc/cm^3
YMW16 distance       = 1.82 kpc

Spin frequency F0    = 353.7 Hz
F1                   = -9.8e-16 Hz/s
Spin period P0       = 2.83 ms
P1                   = 7.8e-21 s/s

Spin-down power      = 1.37e34 erg/s
Surface B-field      = 1.5e8 G
B-field at LC        = 6.13e4 G
Characteristic age   = 5.72e9 yr

Corrections for acceleration (For YMW16 distance 1.82 kpc)
Intrinsic F1         = -6.81e-16 Hz/s
Intrinsic P1         = 5.45e-21 s/s

Spin-down power      = 9.52e33 erg/s
Surface B-field      = 1.26e8 G
B-field at LC        = 5.12e4 G
Characteristic age   = 8.23e9 yr
Gamma-ray luminosity = 7.552e32 erg/s
Gamma-ray efficiency = 0.08

Companion mass       = 0.01-0.02 solar masses (typical for Black Widows)
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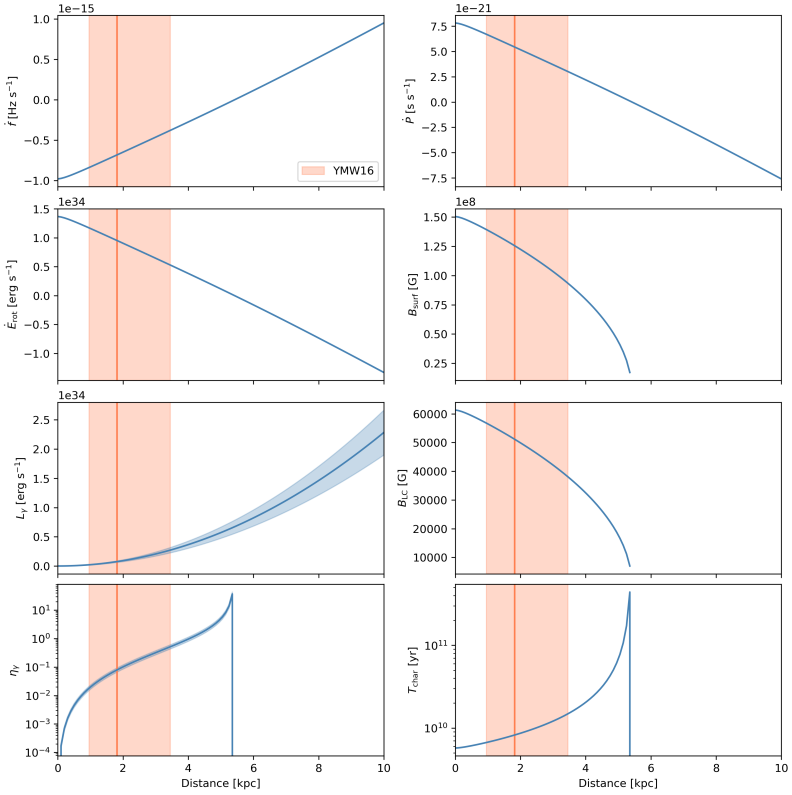

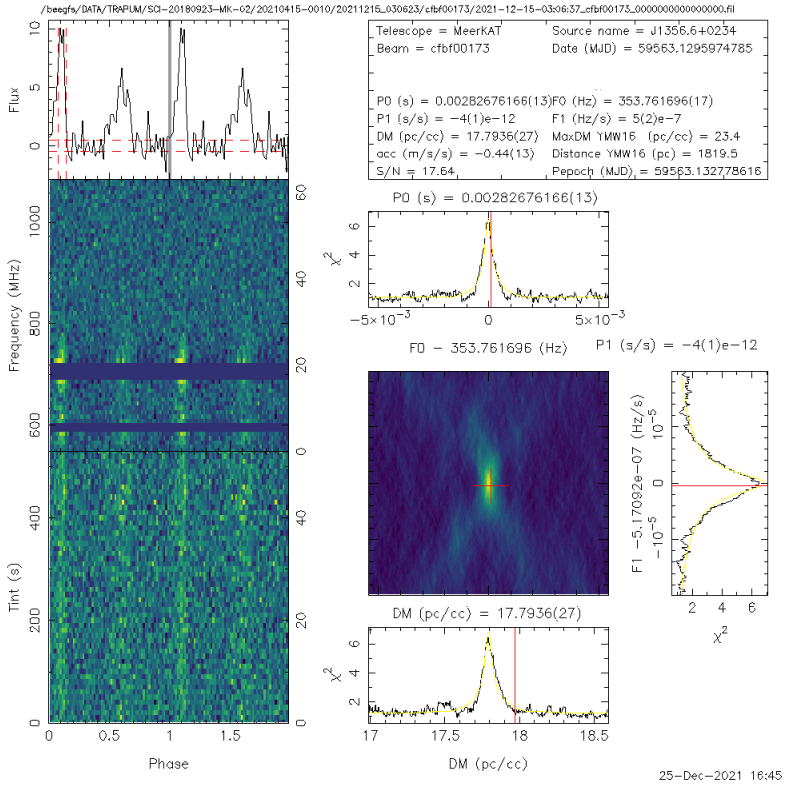

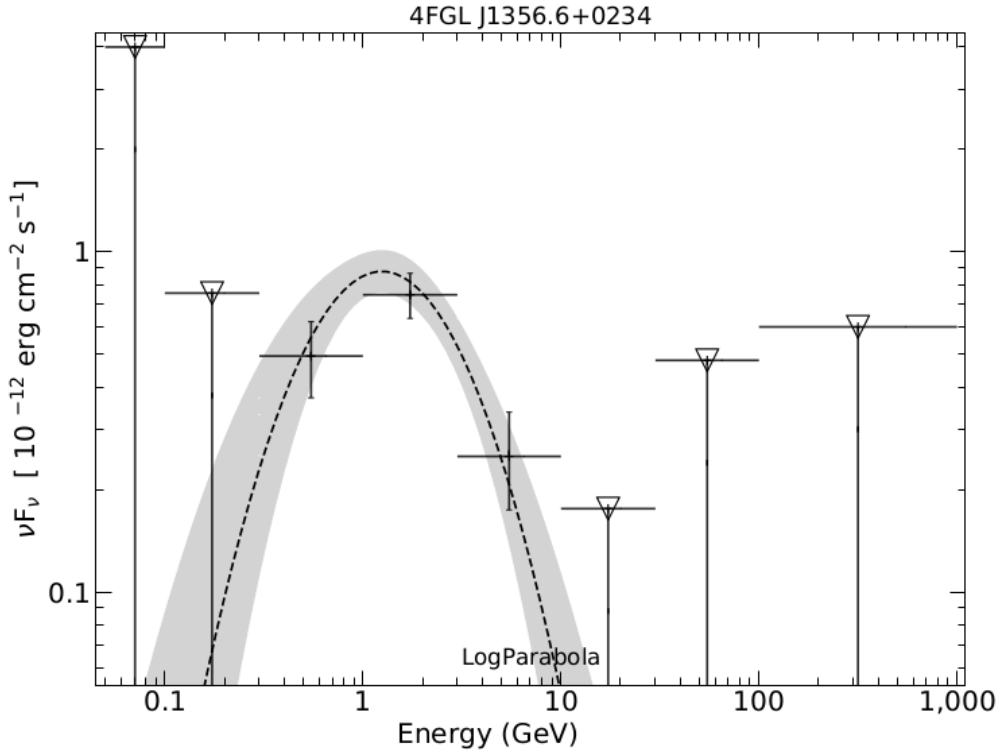

"4FGL" is the **Incremental Fermi Large Area Telescope Fourth Source Catalog** Abdollahi, S. et al. 2022, ApJS, 260, 53 doi: 10.3847/1538-4365/ac6751 arXiv: 2201.11184 ADS: 2022ApJS..260...53A

ATNF psrcat link.

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'