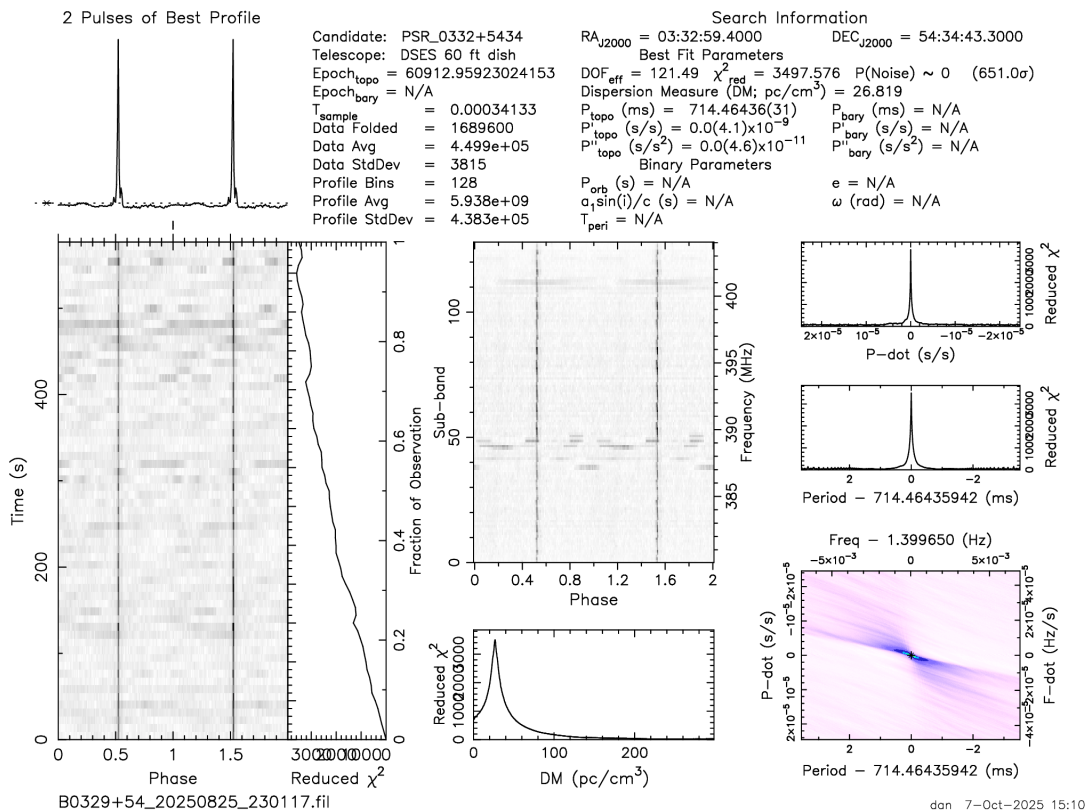


Observation Report: PSR B0329+54

Pulsar B0329+54 is the brightest pulsar in the Northern hemisphere. Since it is circumpolar we use it as a "reference" pulsar. We generally track this pulsar for 10 minutes at the beginning of an observing session to verify that all equipment is operating properly. This report contains sample observations at 408, 1,296 and 1,420 MHz.

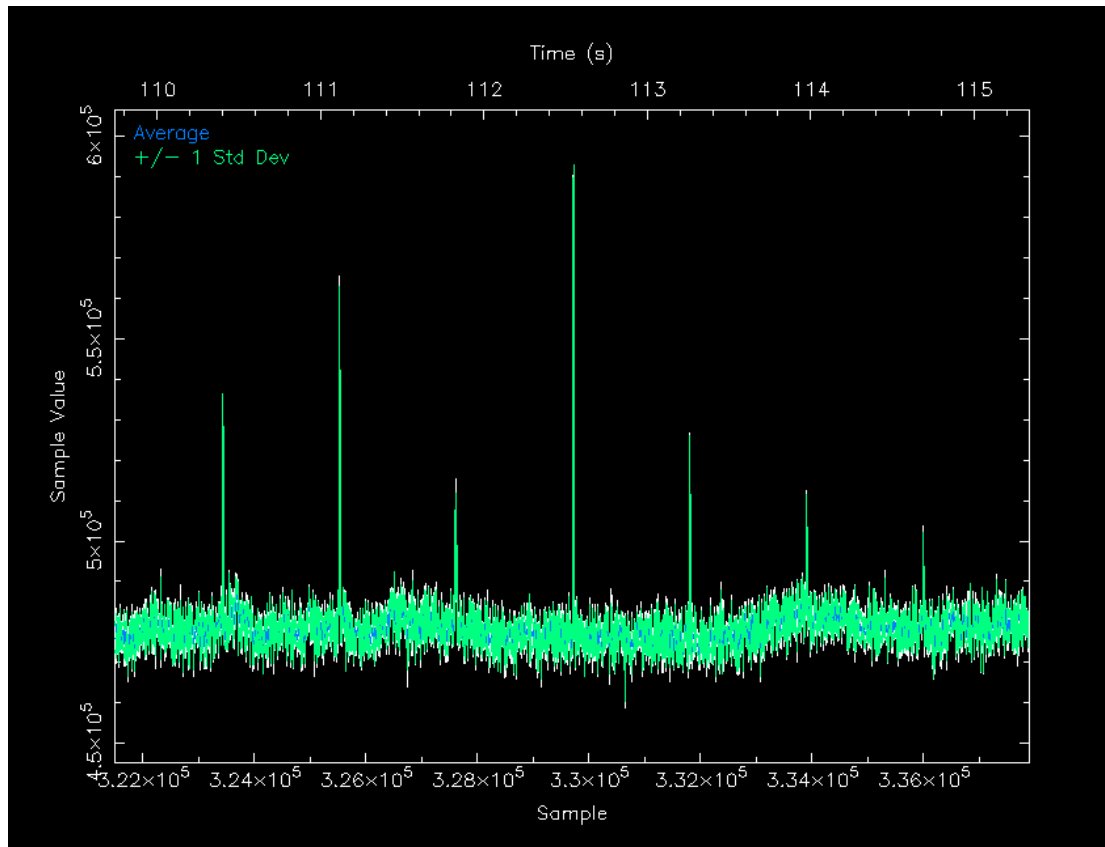
1) 408 MHz, August 25, 2025



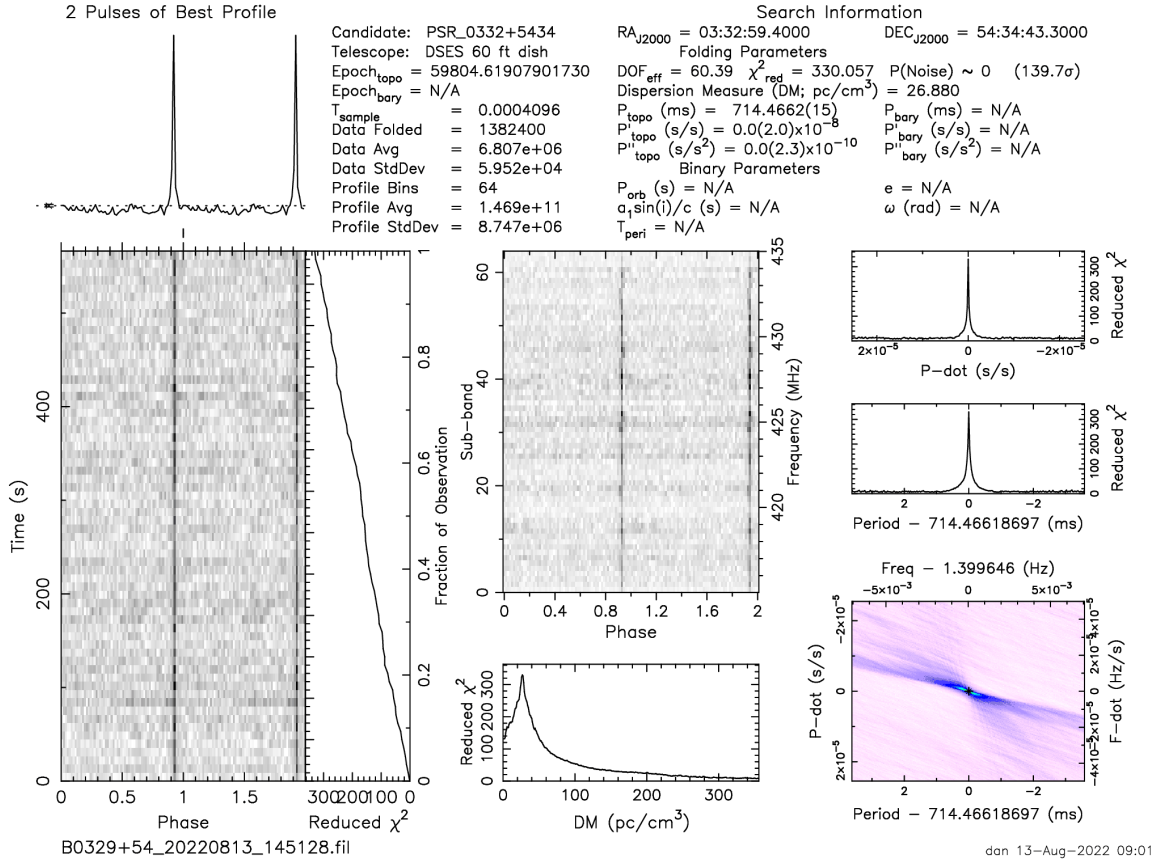
This outstanding 10 minute data collection has very little RFI. The Chi-squared value is an order of magnitude larger than anything we've previously recorded. The strong, clean signal reflects recent site work, including new feed line, new receiver, and improved grounding and bonding in the new building. A 60 second data collection would suffice. Data collection parameters are listed in the table below.

B0329+54 Parameters	Values
Date & Time (UTC)	20250825, 230117
Source distance; Flux density	1.7 kpc = 5,480 light years; S400 = 1500 mJy
Source period; Dispersion measure	P = 0.714 sec; DM = 26.7
Source RA, DEC (J0332+5434)	03h 32m 59.4s ; +54° 34' 43.3''
Observers	Ray, Rick, Bill M., Dan
Telescope	DSES 60 ft. dish (18.3 m) Haswell, CO
Dish pointing and tracking	System1 (Glen, Lewis, Phil)
Antenna	408 MHz dual dipole, +30 dB LNA, 90 MHz filter
Polarization; Beamwidth (HPBW)	Linear; 2.7°
Receiver	B210+GPS, BW = 24 MHz. Freq = 392 MHz, Gain = 48
Computer	System76 desktop, 16 core, Pop!_OS (Ubuntu 22.04)
Planning software	I0NAA Murmur, Stellarium, ATNF pulsar catalog
Data collection & processing software	GnuRadio 3.10, Python 3.10, PRESTO 4.0
Run time; # channels, width	600 seconds; 256, 0.094 MHz

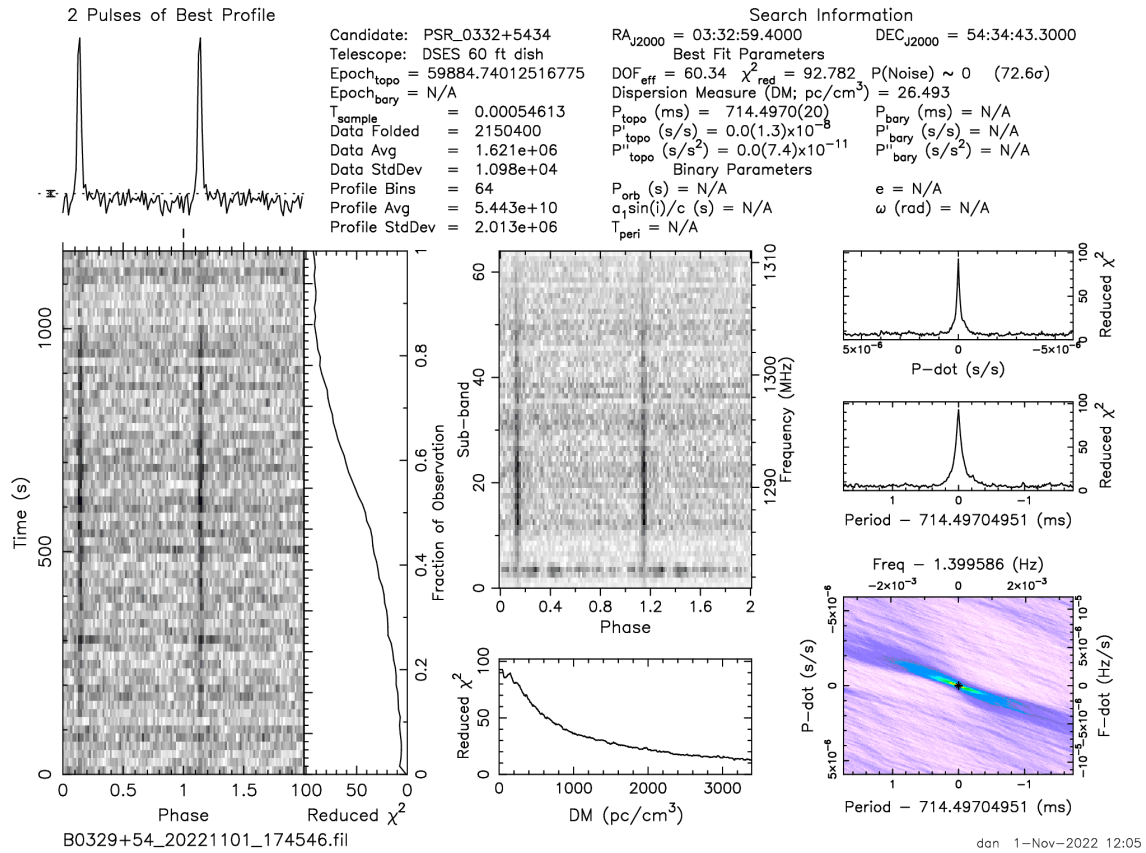
The 5 second time series plot below shows a sequence of pulses (p = 0.714 sec) from the August 25, 2025 collection. For most of our pulsars, the individual pulses are either at or below the noise floor.



For comparison, the collection below used the same 408 MHz dual dipole antenna with a B210 SDR, but from the communications trailer August 13, 2022. This 10 minute collection covered 410-435 MHz.



dan 13-Aug-2022 09:01



2) 1,296 MHz, November 1, 2022

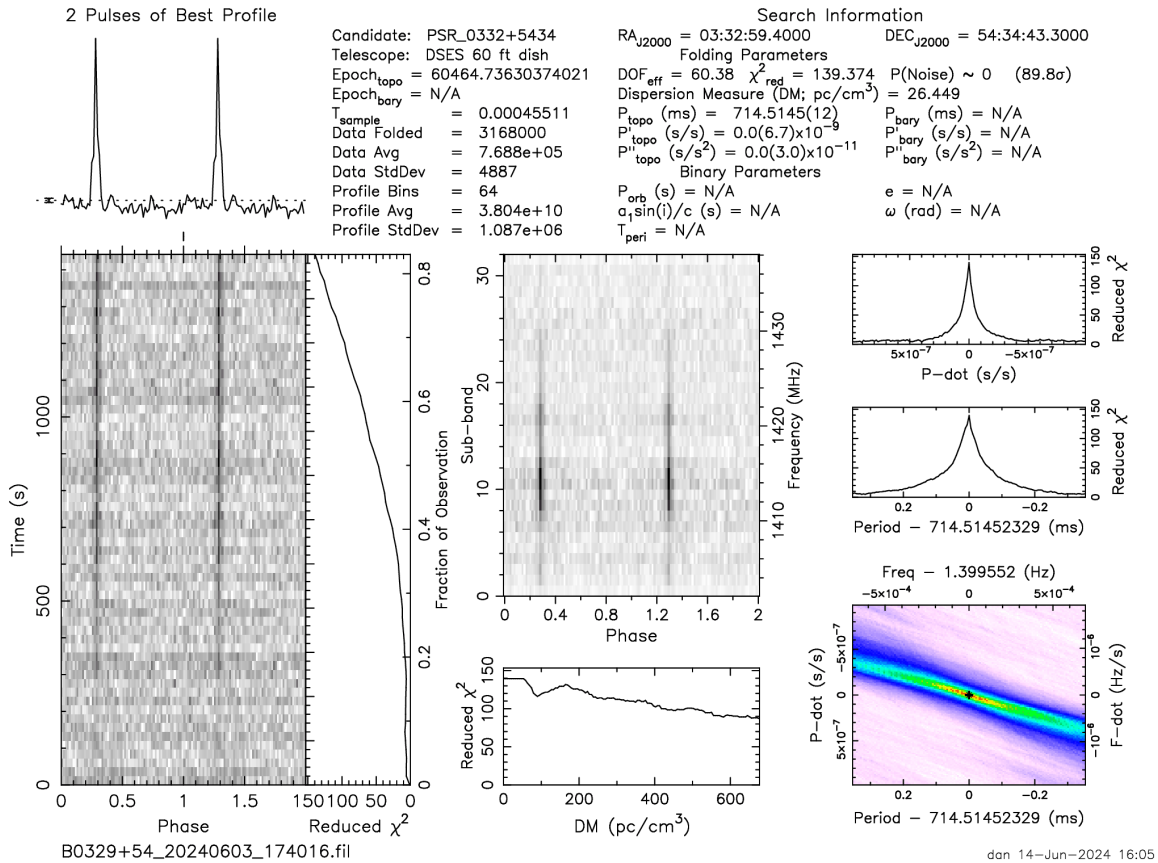
B0329+54 Parameters	Values
Date & Time (UTC)	20221101, 174546
Source distance; Flux density	1.7 kpc = 5,480 light years; S1400 = 203 mJy
Source period; Dispersion measure	P = 0.714 sec; DM = 26.7
Source RA, DEC (J0332+5434)	03h 32m 59.4s ; +54° 34' 43.3''
Observers	Ray, Dan
Telescope	DSES 60 ft. dish (18.3 m) Haswell, CO
Dish pointing and tracking	System1 (Glen, Lewis, Phil)
Feed horn	1,296 MHz septum feed, +30 dB LNA, 30 MHz filter
Polarization; Beamwidth (HPBW)	Circular; 0.9°
Receiver	B210+GPS, BW = 30 MHz. Freq = 1296 MHz, Gain = 64
Computer	System76 desktop, 16 core, Ubuntu 22.04
Planning software	I0NAA Murmur, Stellarium, ATNF pulsar catalog

Data collection & processing software GnuRadio 3.10, Python 3.10, PRESTO 4.0

Run time; # channels, width 1200 seconds; 512, 0.06 MHz

This was a good result using the same feed horn we used for 1,296 MHz EME moon bounce contests in 2021-22. PSR B0329+54 exhibits scintillation on the order of 10-30 minutes due to diffractive interstellar scintillation. In this case the pulse trace in the Phase-Time plot is much fainter at the beginning and end of this 20 minute collection.

3) 1,420 MHz, June 3, 2024



This 24 minute sample at 1,420 MHz also exhibits diffractive interstellar scintillation in the Phase-Time plot. The collection parameters are listed in the table below.

B0329+54 Parameters	Values
Date & Time (UTC)	20240603, 174016
Source distance; Flux density	1.7 kpc = 5,480 light years; S1400 = 203 mJy
Source period; Dispersion measure	P = 0.714 sec; DM = 26.7
Source RA, DEC (J0332+5434)	03h 32m 59.4s ; +54° 34' 43.3''
Observers	Ray, Dan
Telescope	DSES 60 ft. dish (18.3 m) Haswell, CO
Dish pointing and tracking	System1 (Glen, Lewis, Phil)
Feed horn	1,420 MHz feed, +35 dB LNA, 60 MHz filter
Polarization; Beamwidth (HPBW)	Circular; 0.8°
Receiver	B210+GPS, BW = 36 MHz. Freq = 1420 MHz, Gain = 64
Computer	System76 desktop, 16 core, Pop!_OS (Ubuntu 22.04)
Planning software	I0NAA Murmur, Stellarium, ATNF pulsar catalog
Data collection & processing software	GnuRadio 3.10, Python 3.10, PRESTO 4.0
Run time; # channels, width	1400 seconds; 256, 0.14 MHz