

Useful Web-based Pulsar Tools

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1 THE ATNF PULSAR CATALOGUE

1.1 EXPLORING PULSARS' PARAMETERS

A very useful tool for pulsar astronomers is the Australia Telescope National Facility (ATNF) pulsar catalogue, which maintains information on (most) published pulsars and many of their most commonly used parameters. It can be used to examine various questions about individual pulsars and populations of pulsars. Begin by pointing your browser to

<http://www.atnf.csiro.au/people/pulsar/psrcat/>

There you will find a page that allows for the selection of various parameters. Click on a parameter name for a description, if you are unsure what it represents. To select a set of parameters, check the box next to the parameters you want and click the "Table" button. This will result in a list of the selected parameters for all of the pulsars, pulsars listed in the "Pulsar Names" box, or the pulsars that meet conditions that have been specified in the "Conditions" box. Play around with a few queries and then use the ATNF Pulsar Catalogue to answer the following questions.

1. How many MSPs (spin period < 20 ms) are currently in the ATNF database?
2. What fraction of the known MSPs are in globular clusters?
3. What fraction of galactic field MSPs (not in globular clusters or magellanic clouds) are in binary systems?

4. What is the fastest and slowest spinning pulsars?
5. How many pulsars are within 1 degree of the Galactic center?
6. How many pulsars are known to have γ -ray counterparts? Of these, what fraction are MSPs?
7. How many pulsars have been detected by the High Time Resolution survey being done with Parkes?

1.2 QUICK PLOTTING WITH THE ATNF CATALOGUE

The ATNF Catalogue also provides a way to produce quick plots for examining parameters in various ways. On the main ATNF catalogue page, you can select parameters and then put the names of those parameters into the boxes for the X-Axis and Y-axis at the bottom. Then press the "Plot" button to view a plot.

1. Make the traditional period vs period derivative plot. Do you notice anything in particular about the high energy pulsars and/or the binary pulsars?
2. Plot galactic longitude on the x-axis and DM on the y-axis. What does this plot tell you?
3. Plot galactic latitude on the x-axis and DM on the y-axis. You should see some peaks, do you know the cause of them?

Note: The ATNF pulsar catalogue can also be downloaded and installed as a command line tool: `psrcat`.

2 EPN DATABASE OF PULSAR PROFILES

The European Pulsar Network (EPN) maintains a database of pulsar profiles at:

<http://www.epta.eu.org/epndb/>

Go to that link, then click on "Browse NEW Archive" (you can look at the old archive too if you are curious). You will be taken to a page that lists pulsars and for each pulsar there links to profiles for various observing frequencies. This archive enables for you to look at pulse profiles at a variety of frequencies for many of the known pulsars.

1. Find PSR B0950+08 and click through the many frequencies available. How does the profile change versus frequency?
2. For PSR B1237+25, what is the peak linear polarization / peak total intensity?

3. AN NRAO staff member, let's call him Frank, wants to examine the polarization properties of the VLA at P-band (350 MHz) and wants to use a pulsar for testing the system. He has time in the local sidereal time (LST) range 05:00 to 07:00. Which if any pulsars do you suggest and why?

3 TOOL FOR CHECKING POTENTIAL NEW PULSAR DISCOVERIES

The ATNF Catalogue mentioned above contains most published pulsars, however there is typically a delay between discovery and publication of a new pulsar. Therefore, a number of pulsars are known that aren't found in the ATNF. Many of the ongoing pulsar surveys maintain a public list of their discoveries to help people identify already discovered pulsars. For example, the Green Bank North Celestial Cap (GBNCC) pulsar survey's webpage is located at:

<http://astro.phys.wvu.edu/GBNCC>

However, it can be time consuming and problematic to check each of these pages individually for every suspected new discovery. A tool for checking these pages has recently been developed by Julia Deneva. This tool checks each of the known pulsar lists that it knows about and the ATNF catalogue for pulsars near a source that you enter. The tool's location is:

<http://astro.cornell.edu/~deneva/tabscri/tabscri.php>

Let's say you are working on a pulsar survey and have 5 candidates that are likely to be pulsars, with the parameters below. Which ones have already been discovered and in which survey was it discovered?

1. Right Ascension=07:32:40, Declination=+23:23:46, spin period=4.0900213 ms, dispersion measure=44.525 pc cm⁻³
2. Right Ascension=16:43:21, Declination=-21:47:25, spin period=1539.28 ms, dispersion measure=72.476 pc cm⁻³
3. Right Ascension=21:34:51, Declination=-45:23:06, spin period=238.360, dispersion measure=194.295 pc cm⁻³
4. Right Ascension=17:44:53, Declination=-01:06:20, spin period=679.560 ms, dispersion measure=67.265 pc cm⁻³
5. Right Ascension=10:43:49, Declination=-18:54:29, spin period=8.6730276, dispersion measure=36.723 pc cm⁻³