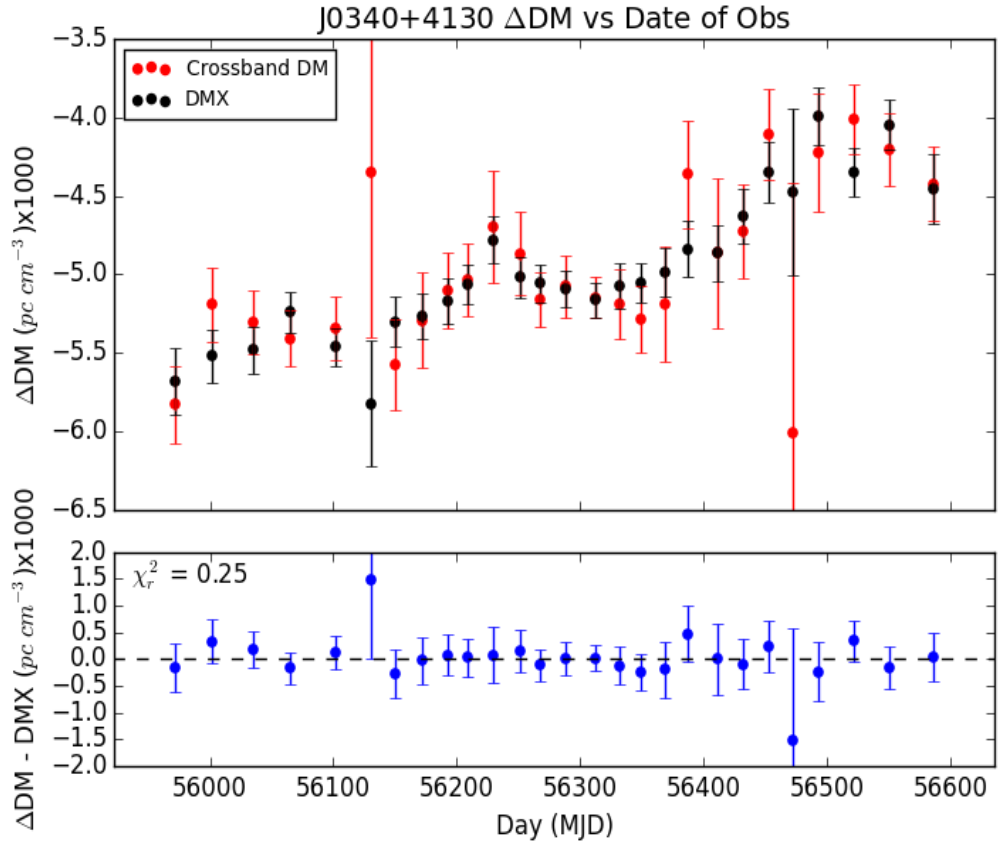**Top**: Postfit residuals for J0340+4130 using NANOGrav .par and .tim files from the 9 year data release.
**Center**: Postfit residuals for J0340+4130 using Fermi .par and .tim files.
**Bottom**: Postfit residuals for J0340+4130 using NANOGrav .par file and Fermi .tim file.
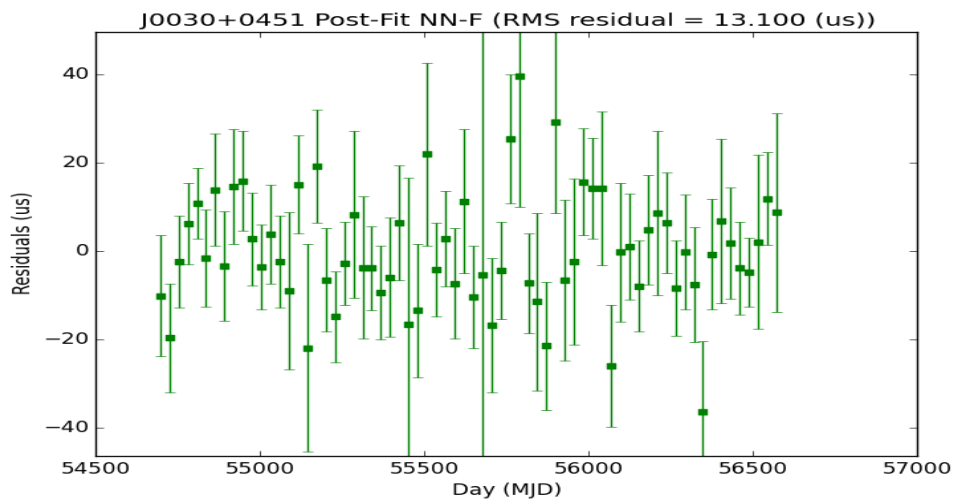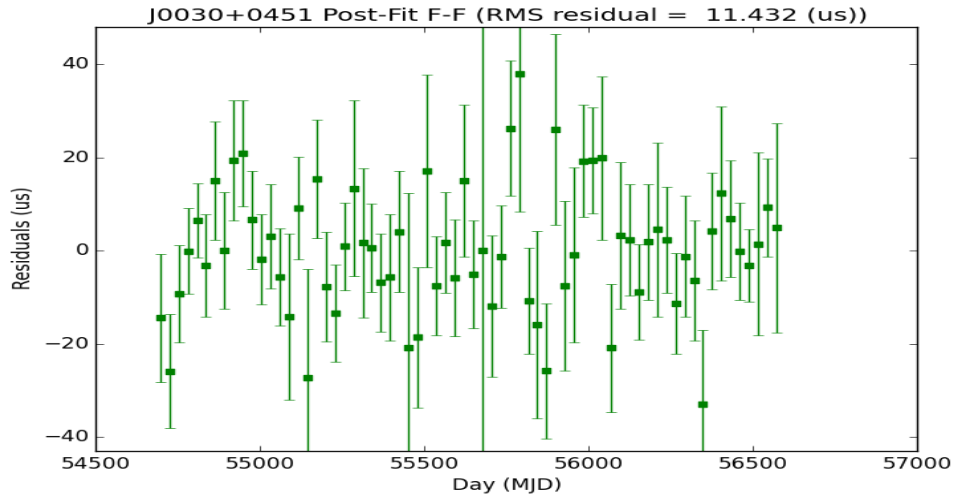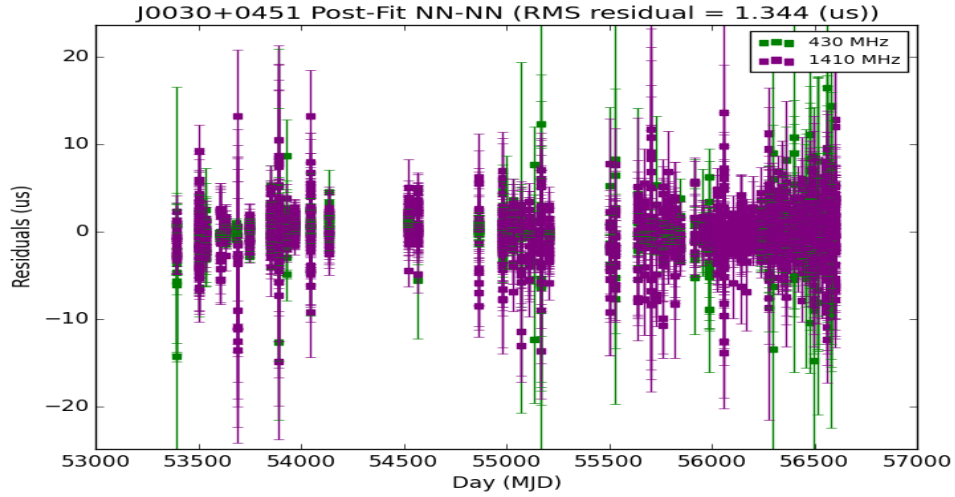Fit in all three figures was done only for the parameters F0 and F1.

**Top panel**:
Red: Derived DMXs for each observation epoch for J0340+4130 based on multifrequency residuals from Fermi-adjusted NANOGrav .par file with original DMXs removed and NANOGrav .tim file.
Black: DMXs for each observation epoch for J0340+4130 extracted from original NANOGrav .par file.
**Bottom panel**:
Difference between original DMXs and derived DMXs as given on top panel. $\chi_r^2$ corresponds to the reduced size squared based on deviation from the zero line.

**Top**: Postfit residuals for J0030+0451 using NANOGrav .par and .tim files from the 9 year data release.
**Center**: Postfit residuals for J0030+0451 using Fermi .par and .tim files.
**Bottom**: Postfit residuals for J0030+0451 using NANOGrav .par file and Fermi .tim file.
Fit in all three figures was done only for the parameters F0 and F1.

**Top panel**:
Red: Derived DMXs for each observation epoch for J0030+0451 based on multifrequency residuals from Fermi-adjusted NANOGrav .par file with original DMXs removed and NANOGrav .tim file.
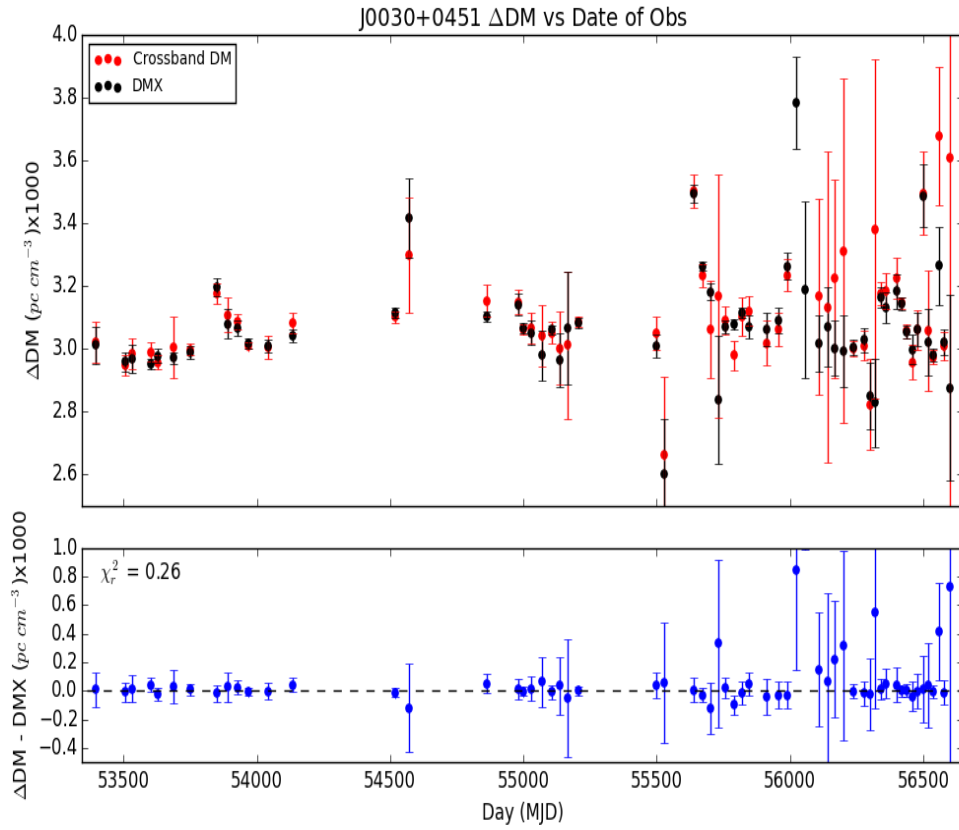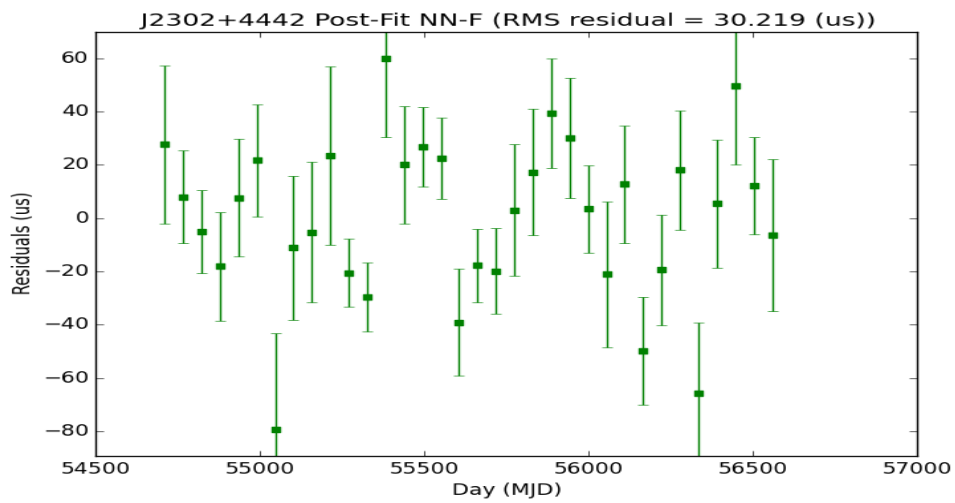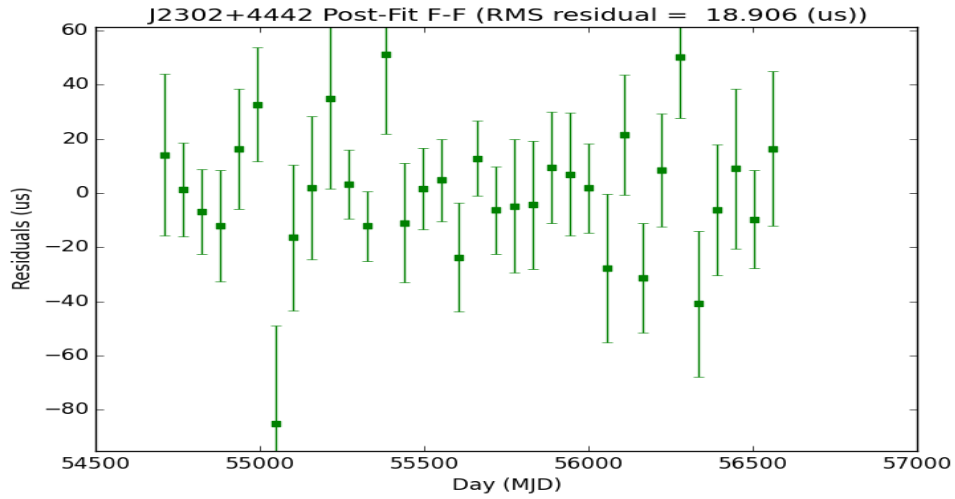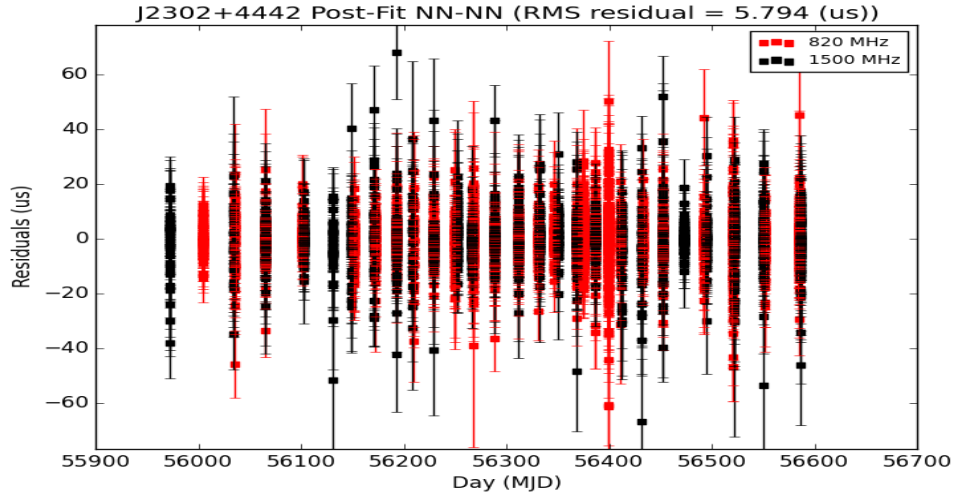Black: DMXs for each observation epoch for J0030+0451 extracted from original NANOGrav .par file.
**Bottom panel**:
Difference between original DMXs and derived DMXs as given on top panel. $\chi_r^2$ corresponds to the reduced size squared based on deviation from the zero line.

**Top**: Postfit residuals for J2302+4442 using NANOGrav .par and .tim files from the 9 year data release.
**Center**: Postfit residuals for J2302+4442 using Fermi .par and .tim files.
**Bottom**: Postfit residuals for J2302+4442 using NANOGrav .par file and Fermi .tim file.
Fit in all three figures was done only for the parameters F0 and F1.

**Top panel**:
Red: Derived DMXs for each observation epoch for J2302+4442 based on multifrequency residuals from Fermi-adjusted NANOGrav .par file with original DMXs removed and NANOGrav .tim file.
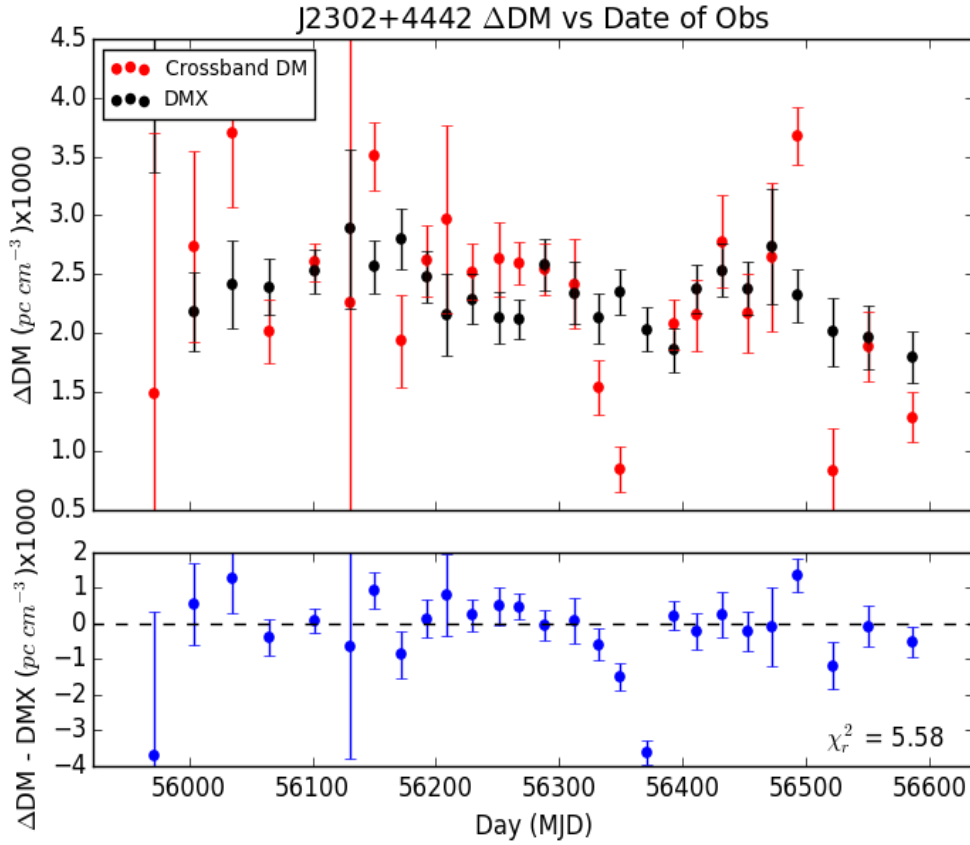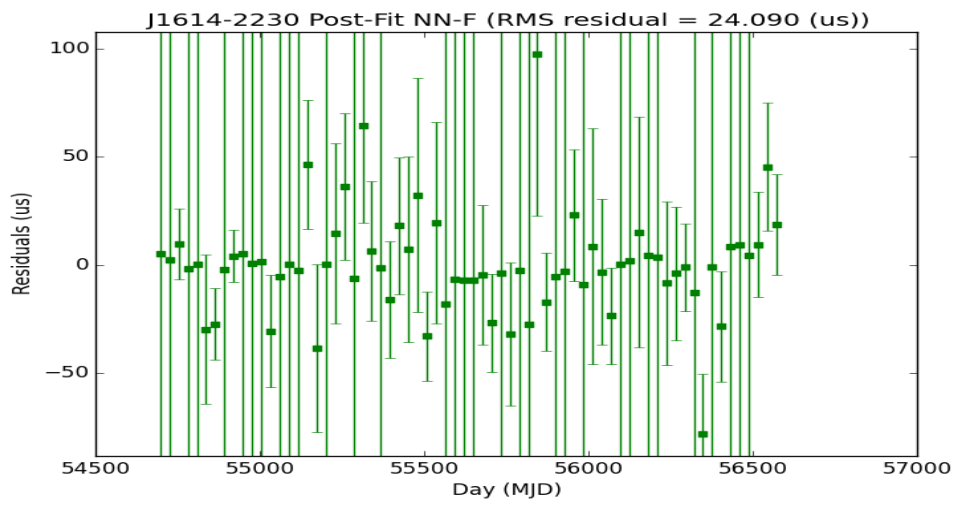Black: DMXs for each observation epoch for J2302+4442 extracted from original NANOGrav .par file.
**Bottom panel**:
Difference between original DMXs and derived DMXs as given on top panel. $\chi_r^2$ corresponds to the reduced size squared based on deviation from the zero line.

**Top**: Postfit residuals for J1614-2230 using NANOGrav .par and .tim files from the 9 year data release.
**Center**: Postfit residuals for J1614-2230 using Fermi .par and .tim files.
**Bottom**: Postfit residuals for J1614-2230 using NANOGrav .par file and Fermi .tim file.
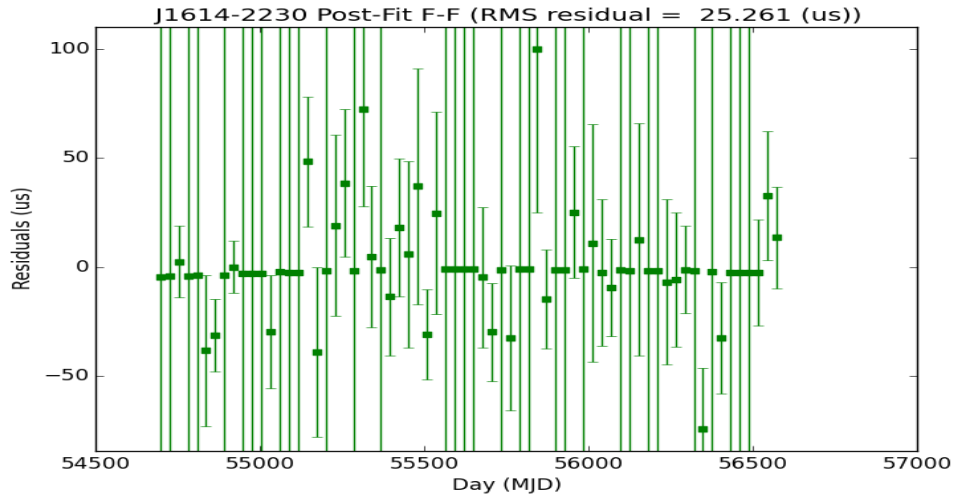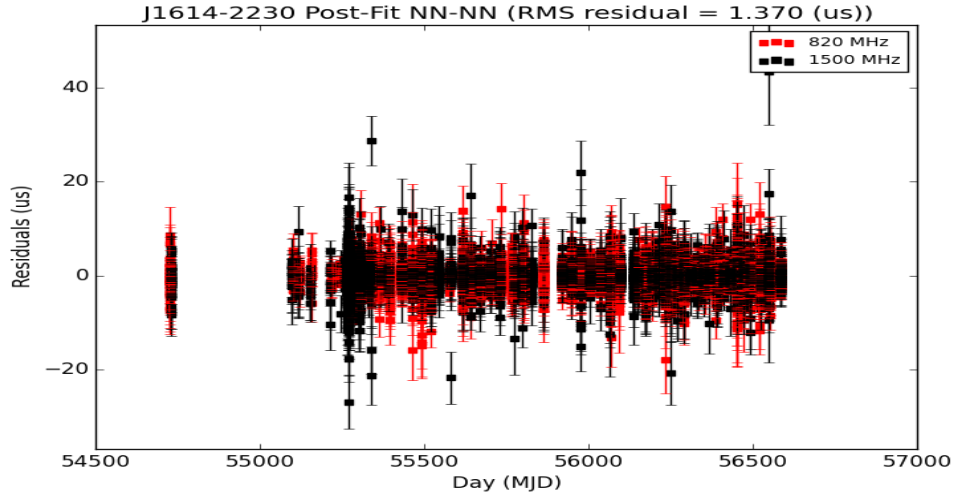Fit in all three figures was done only for the parameters F0 and F1.

**Top panel**:
Red: Derived DMXs for each observation epoch for J1614-2230 based on multifrequency residuals from Fermi-adjusted NANOGrav .par file with original DMXs removed and NANOGrav .tim file.
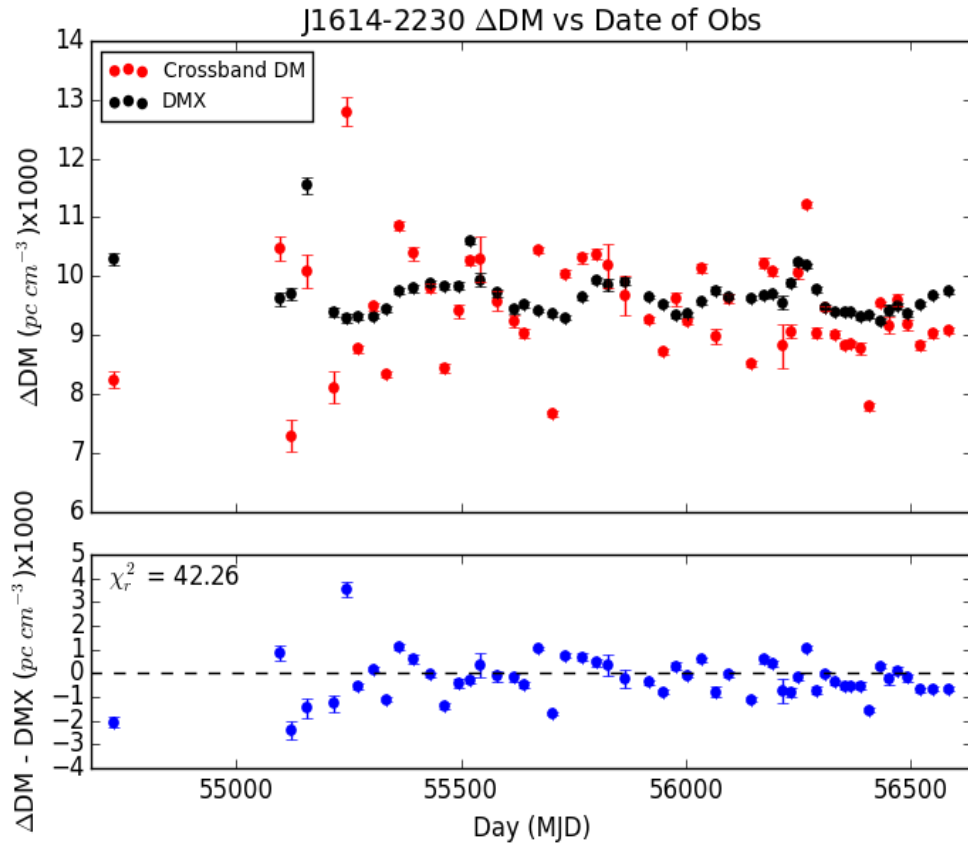Black: DMXs for each observation epoch for J1614-2230 extracted from original NANOGrav .par file.
**Bottom panel**:
Difference between original DMXs and derived DMXs as given on top panel. $\chi_r^2$ corresponds to the reduced size squared based on deviation from the zero line.

## Procedure

1. Created modified NANOGrav (NN) and Fermi (F) .par files to fit only for F0 and F1. In the case of NN .pars also deleted DMX parameters.

2. First three plots were created based on lists generated by the Tempo2 command

   ```
   tempo2 -output general2 -f ~.par ~.tim -s "{freq} {post} {bat} {err}\n"
   ```

   using the corresponding .par and .tim files created in step (1).

3. For the fourth plot, ran Tempo2 graphically with NN .par file and Fermi .tim file, fitted as many parameters as possible in order to get the lowest possible residual, and created a new .par file using postfit parameters. Then ran Tempo2 again via

   ```
   tempo2 -output general2 -f pulsarname_noDMXNNPostFermiFit.par
   pulsarname_OriginalNN.tim -s "{freq} {pre} {bat} {err}\n"
   ```

   where the .par file corresponds to the modified .par file created previously, and the .tim file corresponds to the original NN .tim file.

4. Analyzed output from previous step to plot red data points on the top panel, following the relationship

   $$t = \frac{k_{DM}DM}{f^2} \tag{1}$$

   Used original NN .par file to plot original DMXs (black data points on top panel), and the difference between the derived DMXs and the original DMXs (blue points in bottom panel).