

# Optional exercises

If you have interest in exploring the baseband data in detail, the following things can be tried:

## Make high resolution spectra of baseband channels

The utility `m5spec` can read baseband data and generate spectra. The program and output text file containing the spectrum is documented in [Reference Manual](#) sections 5.50. This program works on many varieties of VLBA baseband data (including the Mark5B data in the first dataset), but does not work on VDIF data with multiple threads (e.g., from the second dataset). The `dataformat` parameter appropriate for dataset 1 data is `Mark5B-2048-16-2`, and a complete command to generate spectra with 500 spectral points per baseband channel is:

```
m5spec /XXX/YYY.ZZZ 500 2000 spec.out
```

Here the number 2000 is the number of FFT frames to process. Increasing that number will lead to more averaging and a spectrum with higher signal to noise. It might be instructive to change the values of the two numbers (number of spectral points and number of FFTs to process) to get a feel for how these parameters change the output.

The `gnuplot` program can be used to plot the data. First start `gnuplot` in a terminal:

```
gnuplot
```

Then at the prompt you can issue plotting commands such as:

```
p 'spec.out' u 1:2 w l
```

Column 1 (identified in the `1:2` parameter) is the spectral point frequency offset (starting at 0 and extending to the bandwidth of the channel) and column 2 is amplitude data for the first baseband channel. There should be three features of note:

- The bandpass rolls off toward the edge of the band **but does not drop to zero**. What does this imply?
- There are spikes in the data every 1 MHz. These are pulse cal tones. How does the relative strength of pulse cal tones change as the number of spectral points is increased? Why?
- RFI: signal on top of the bandpass that is not related to pulse cal tones is probably RFI. The S-band channels especially have RFI.

It might be instructive to step through the 16 baseband channels to see what real data looks like.

From:  
<https://www.atnf.csiro.au/vlbi/dokuwiki/> - **ATNF VLBI Wiki**

Permanent link:  
<https://www.atnf.csiro.au/vlbi/dokuwiki/doku.php/difx/ivs2016extras?rev=1457034987>

Last update: **2016/03/04 06:56**

