

Data Processing School :: Exercise PSR 01

Source directory	/data/lofarschool/data/Exercise-PSR-01
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Context

This exercise illustrates low-level inspection of beam-formed data, which can be used to detect pulsars, planets, the Sun, and flare stars to name a few. This interactive, “by hand” inspection is likely at a lower level than one would normally use in practice in a reduction pipeline, but is crucial for debugging or for putting interesting signals “under the microscope”.

Prerequisite

Simply an understanding of what beam-formed data is, i.e. the signal in the entire field of view (no spatial resolution within this) as a function of time and frequency. Here the field of view is that of 4 HBA tiles beam-formed together.

Description

In this exercise, the user will do some basic, very low-level inspection of beam-formed or “pulsar-like” data (apologies to the planet, flare star, and solar people for the use of the later term). This includes interactive inspection of timeseries (i.e. the individual subbands as a function of time) and the Fourier transforms of these. One can zoom in on interesting features to measure the time at which they occur or their frequency. Hardcopy plots can be made to save interesting data views.

Files & Directories

SOURCE DIR: lioff02X:/data/lofarschool/data/Exercise-PSR-01

DATA:

B0809+74_081220_4tiles_subXXX.dat: timeseries of subband XXX

B0809+74_081220_4tiles_subXXX.fft: Fourier transform of subband XXX

B0809+74_081220_4tiles_subXXX.inf: metadata for subband XXX

SAMPLE PLOTS:

Some examples of the plots the user can create:

Sample_timeseries_plot_sub283.ps: shows the timeseries with the running mean and +/-1 sigma deviation

Sample_harmonics_plot_sub323.ps: shows harmonics of a given fundamental frequency

Sample_powerspec_plot_sub323.ps: zoom showing peaks in the power spectrum

OTHER:

PULSAR_ENV: required environment variables for PRESTO (bash shell assumed)
COMMANDS.txt: some sample commands the user can run

Step-by-step instructions

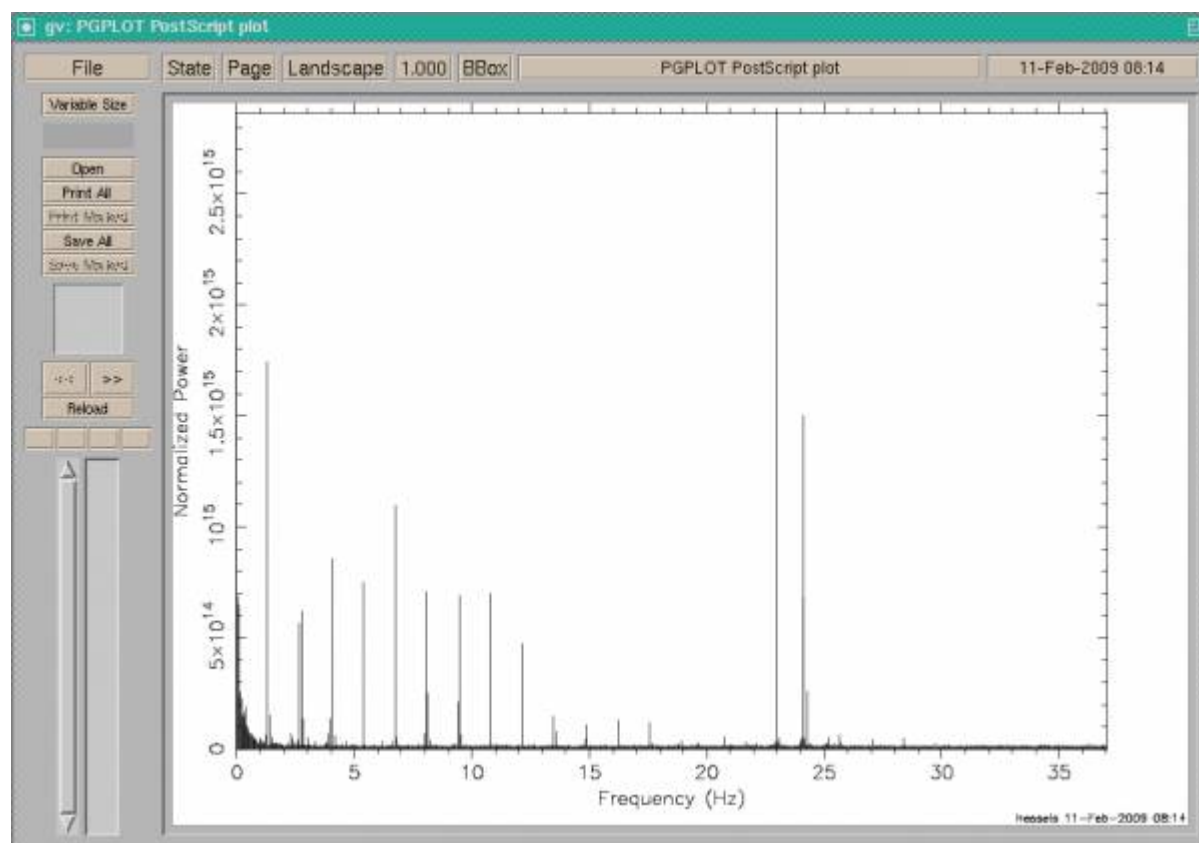
Run “exploredat B0809+74_081220_4tiles_subXXX.dat” to view the timeseries of subband XXX.

Run “explorefft B0809+74_081220_4tiles_subXXX.fft” to view the power spectrum of subband XXX.

In both cases, you can use the commands printed to the terminal to navigate and re-scale these. Note that you can also save data views as postscript files.

Compare the subbands with each other and note the intermittent and periodic RFI.

Example outputs



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