# Fw: SETI Spectrometer Data

Ekaterina Vydra

Mon 1/11/2016 1:18 PM

To:Andy Lezcano <alezcano4033@eagle.fgcu.edu>; Austin Nafziger <arnafziger0478@eagle.fgcu.edu>; Andrew Henk <ajhenk0955@eagle.fgcu.edu>;

1 attachment (1 KB)

spc00441_20151208_120903.hdr;

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**From:** John K. Arballo <John.K.Arballo@jpl.nasa.gov>
**Sent:** Monday, January 4, 2016 1:16 PM
**To:** Ekaterina Vydra
**Cc:** Steve Levin
**Subject:** SETI Spectrometer Data

Hi Katya,

I hope you took some time away from your studies to enjoy the holidays.

I owe you some information about the SETI spectrometer data format. Each spectrometer hit is stored in the following C struct (I'm currently using int16_t for the spectrum_no and power but just assume uint16_t as below for now), with binary mode I/O using fread/fwrite:

```
#include <stdint.h>

struct hit_struct{
   uint16_t spectrum_no;
   uint16_t pfb_bin;
   uint16_t fft_bin;
   uint16_t power;
};
```

where
1) spectrum_no is the spectrum number starting at 0 at the beginning of a sky frame scan. Each spectrum for bee2 is ~0.67 sec.
2) power is just a raw power from the spectrometer

3) pfb_bin is the coarse polyphase filter bank (PFB) bin number, ranging from 0 to 4095
4) fft_bin is the fast Fourier transfer (FFT) bin number, ranging from 0 to 32767

The frequency is derived from 3 and 4 above as follows:

1) The PFB bin upper and lower ranges are swapped, so the range 0 to 2047 becomes 2048 to 4095; 2048 to 4095 becomes 0 to 2047.

```
if (pfb_bin < 2048)
  pfb_bin += 2048;
else
  pfb_bin -= 2048;
```

2) The FFT bin upper and lower ranges are swapped, so the range 0 to 16383 becomes 16384 to 32767; 16384 to 32767 becomes 0 to 16383.

```
if (fft_bin < 16384)
  fft_bin += 16384;
else
  fft_bin -= 16384;
```

3) Our bandwidth is 200 MHz (centered at 8450 MHz), so the frequency within our 200 MHz range is then...

200.0e6 * (pfb_bin * 32768 + fft_bin) / (32768 * 4096)

(the above calculation is shown with integers for brevity but the actual calculation is done in double precision)

A plain text header file (see attached example file) is associated with each binary data file. Some of this is fairly obvious but I'll send you some additional explanation for this file when I get a chance.

I hope this helps. Please ask if I've left anything out or if you have other questions.

John