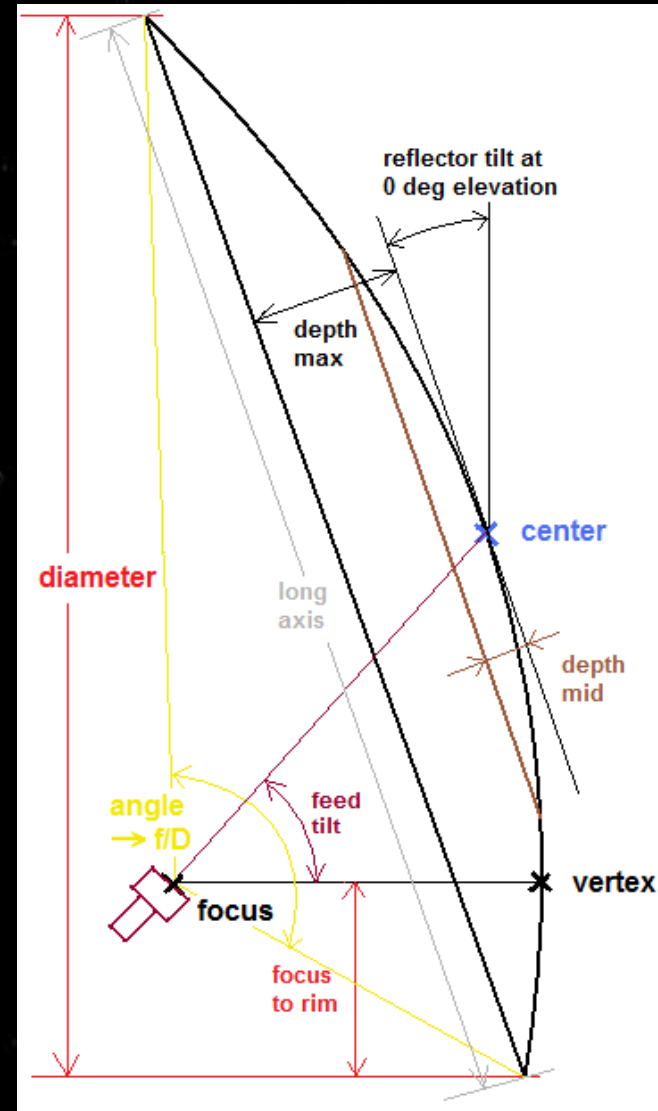
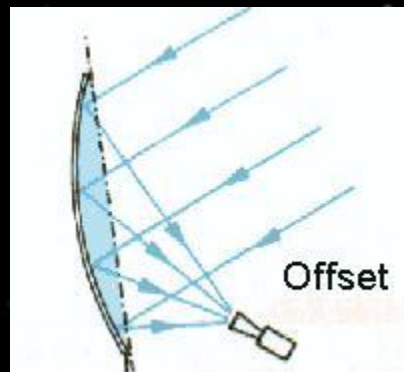
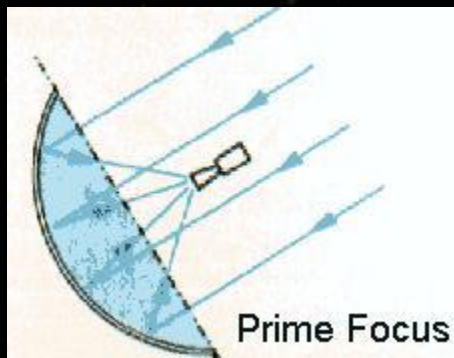


# Receiving Pulsars at OE5JFL EME Station

needed:  
good antenna and good  
software

Antenna: 7,3m **offset dish**,  
own design



# building....

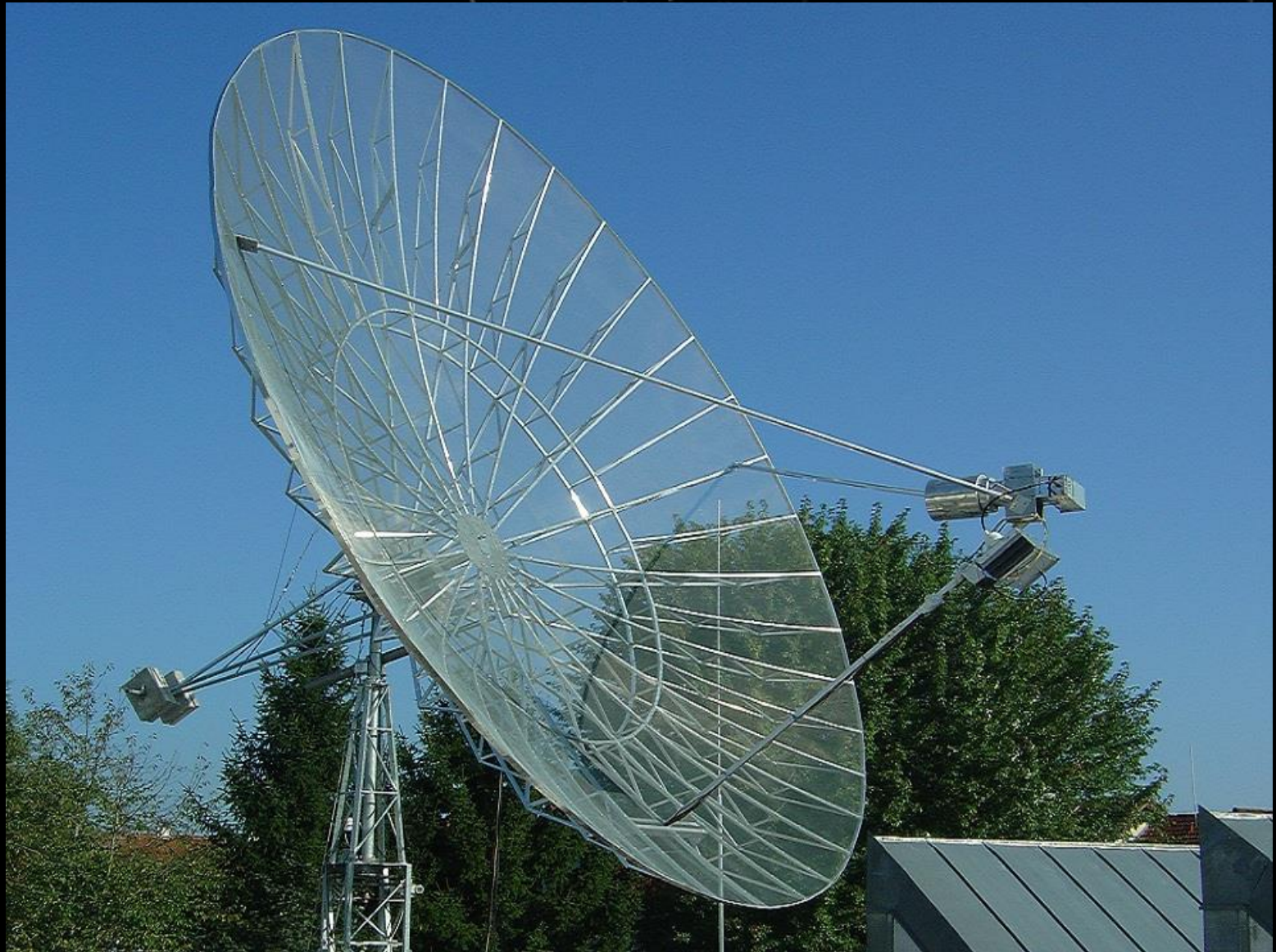
offset dish: different  
rib shape and length



tower: fold-over construction, easier  
access to each reflector point



...and after 2 years



# 0 deg elevation and 40 deg elevation



easy access to the feed....



...and also a platform for some cool drink

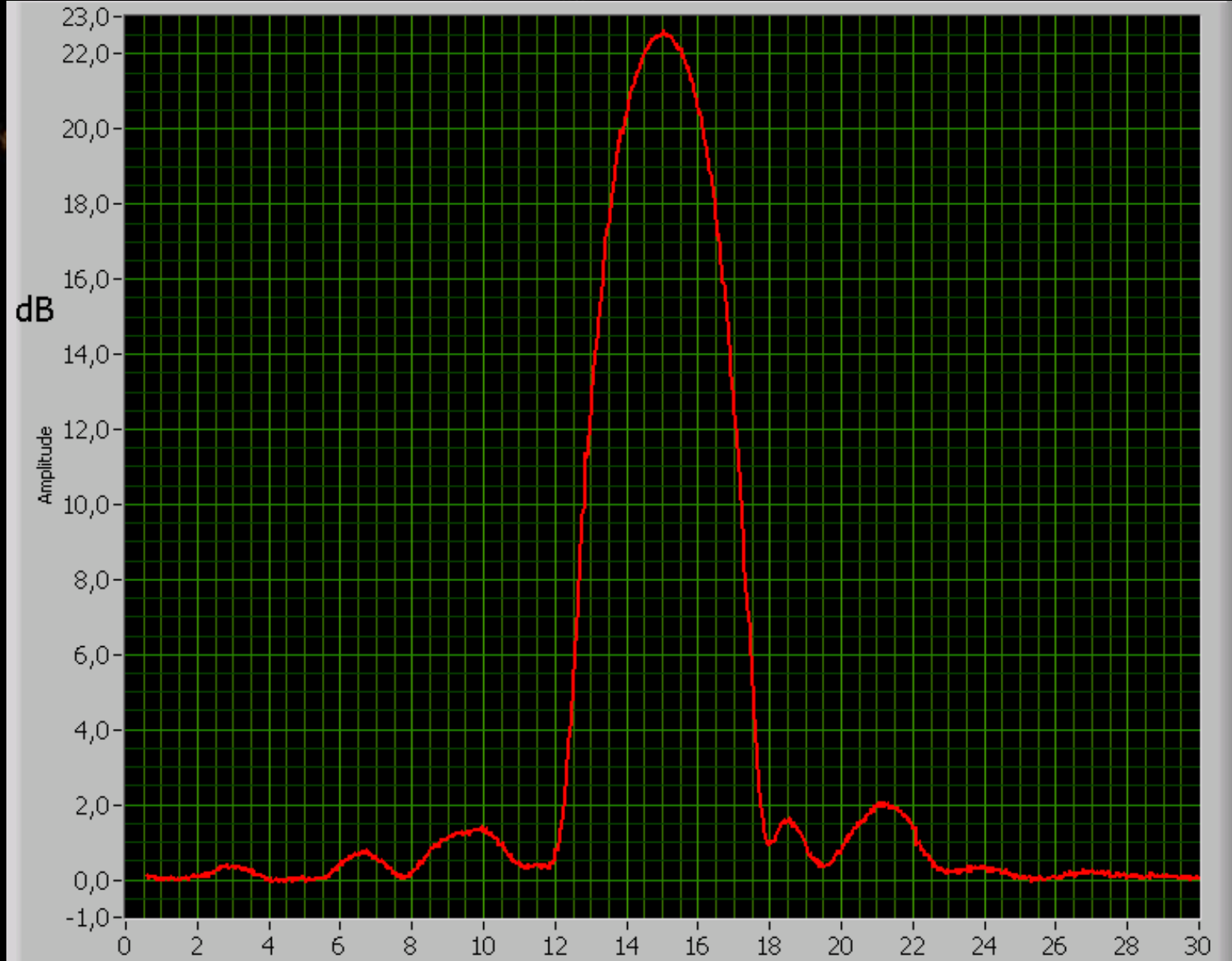


....adding/removing feed is easily done within 10 minutes

70 cm dual dipole feed...and with weather protection



# Sun noise measurement by drift scan on 23cm (SFI=107)

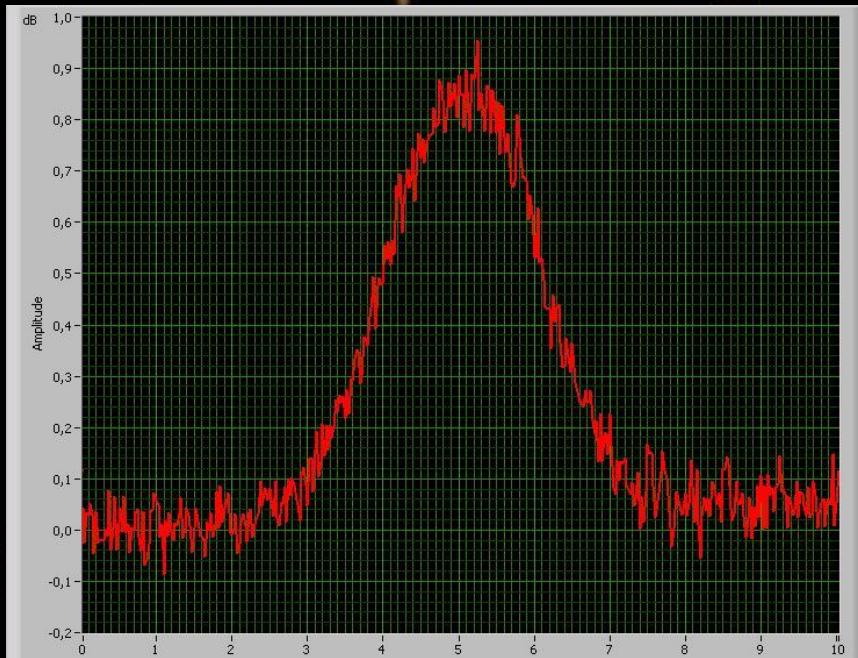




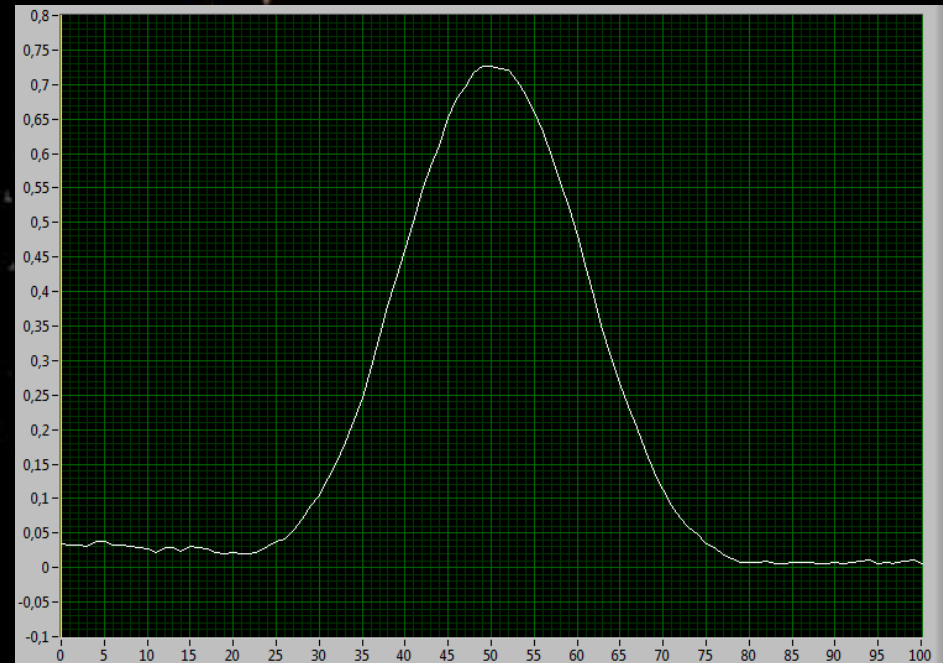
# Measurement of low level broadband noise is better with large bandwidth

Moon noise on 1296 MHz

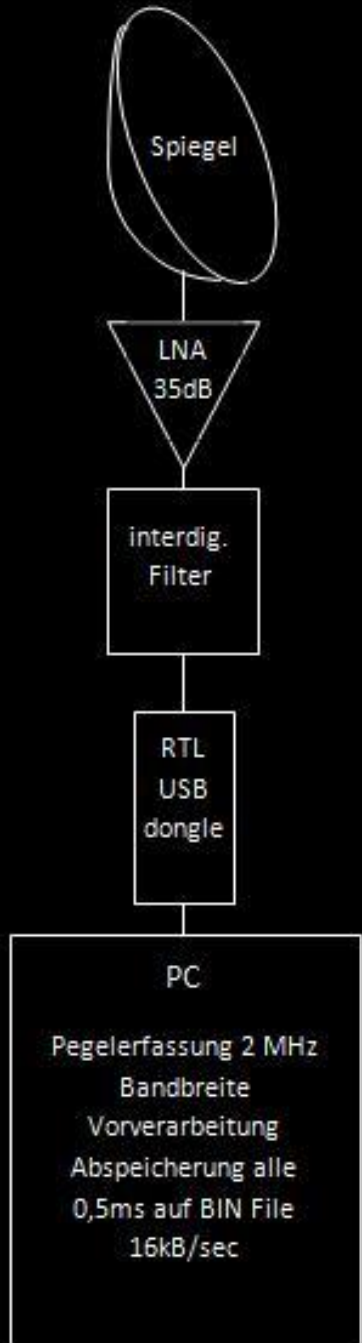
2,5kHz bandwidth



2 MHz bandwidth



# 7,3m dish...romantic nighttime view



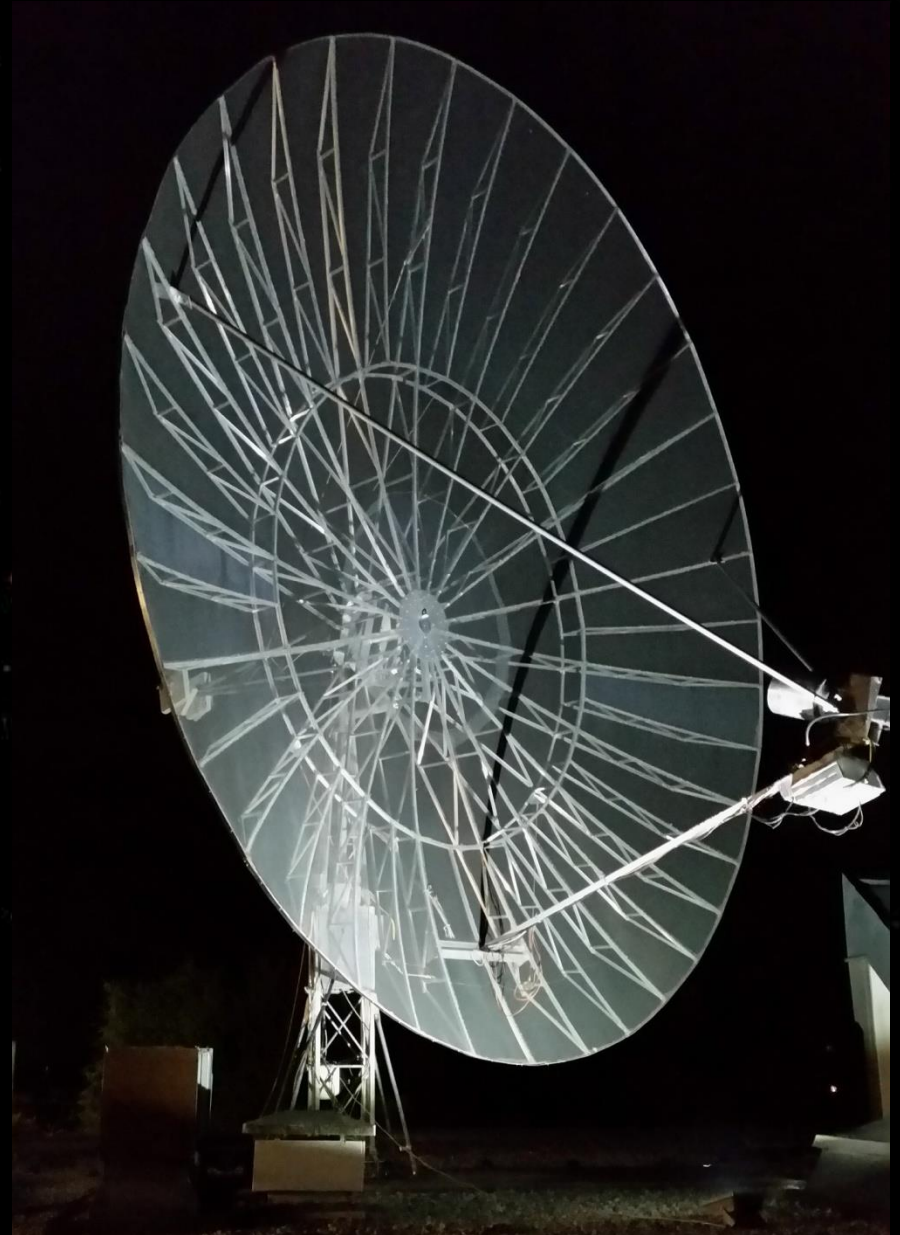
## Software:

for planning  
observations:

**Murmur**

for analyzation  
and display:

**Presto  
IW5BHY**



# List of received pulsars (April 4th 2017)

Pulsar	70cm (424 MHz)	23cm (1294 MHz)
B0329+54	110	85
B0531+21 (Crab) *	10	---
B0823+26	18	9
B0834+06	10	---
B0950+08	32	14
B1133+16	24	11
B1237+25	6	---
B1508+55	9	---
B1642-03	26	9
B1749-28	21	---
B1818-04	8	---
B1911-04	12	---
B1919+21	14	---
B1929+10	33	9
B1933+16	20	31
B1946+35	6	---
B2016+28 **	14	12
B2020+28 **	9	6
B2021+51	16	17
B2111+46	6	---
B2217+47	15	---
B2310+42	11	---

S/N values by IW5BHY software

note \* :

The Crab pulsar was a challenge, 30 rotations/sec and high dispersion.

note \*\* :

The B2016+28 and the B2020+28 are only about 1deg apart from each other. 424 MHz profiles for both pulsars were obtained by analyzing the same recorded file.

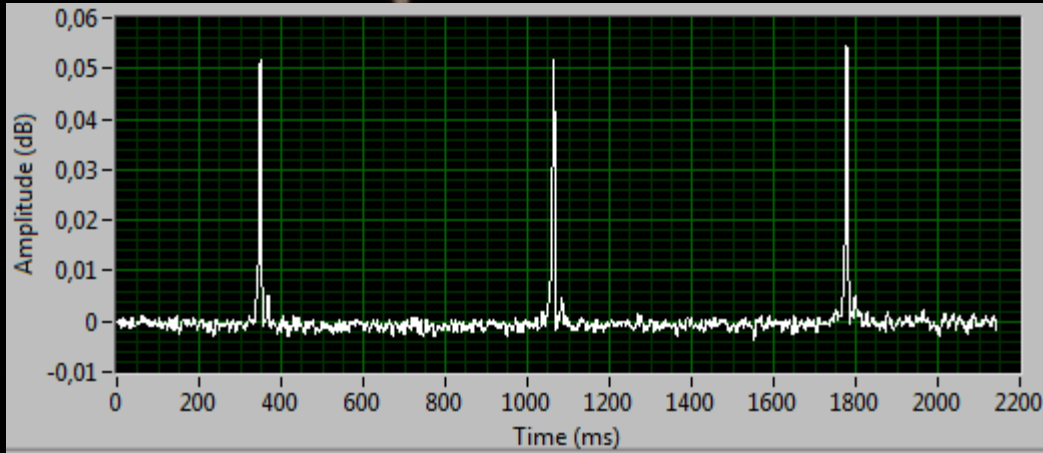
The two weakest pulsars detected are:

424 MHz: B1919+21 (S400 = 57 mJy)

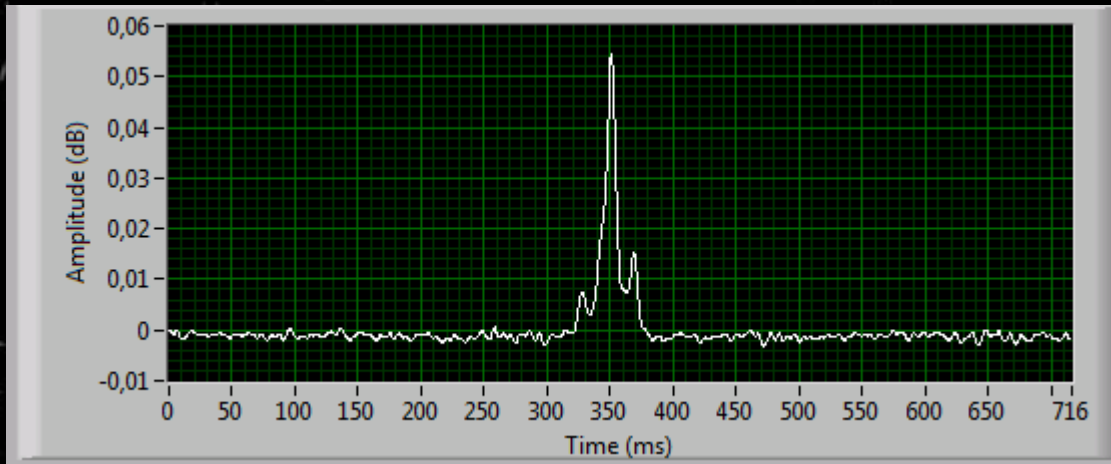
1294 MHz: B0823+26 (S1400 = 10 mJy)

# Pulsar B0329+54

Frequency 1,39 Hz  $\rightarrow$  714 ms period

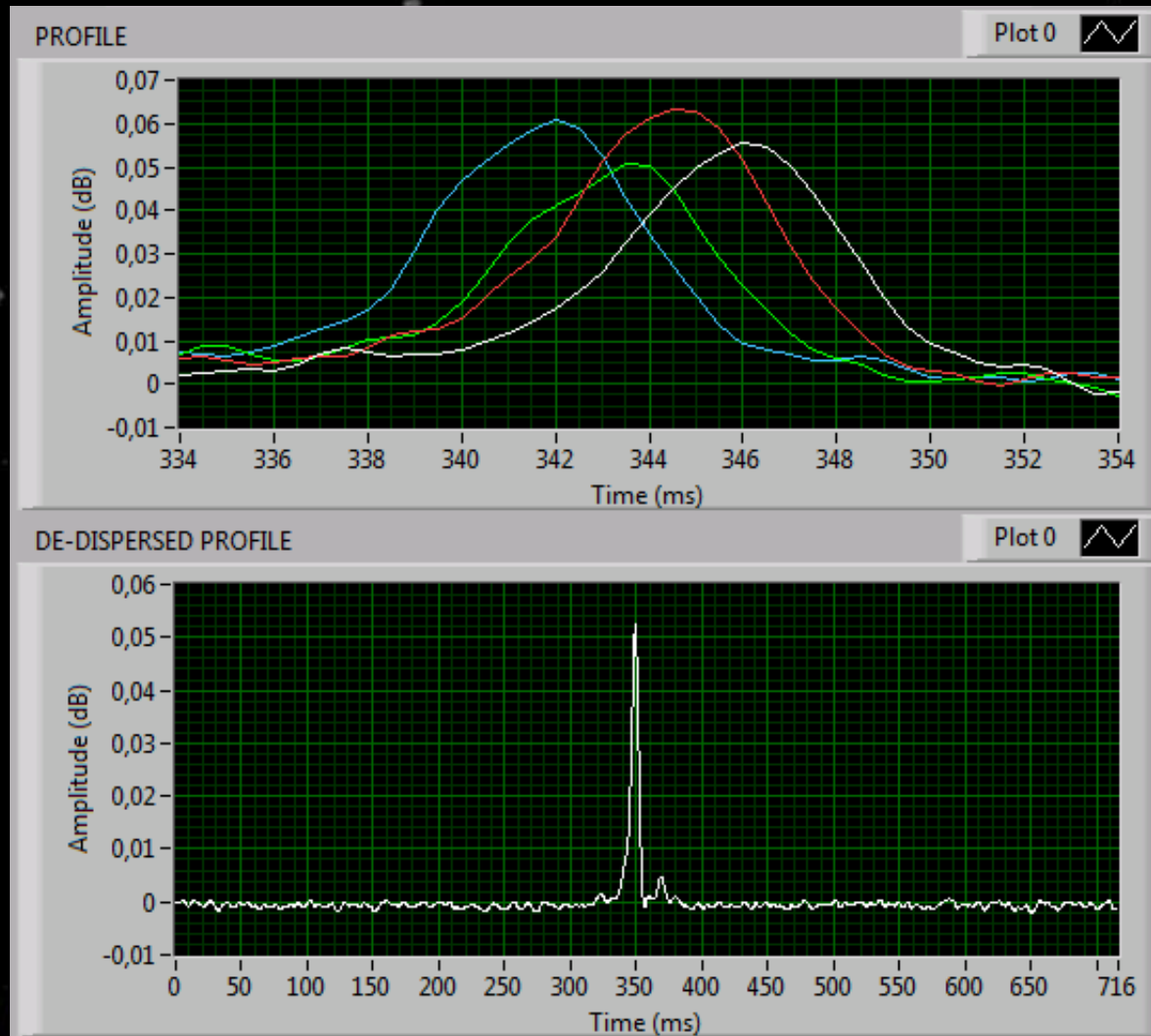


3 pulses 424 MHz

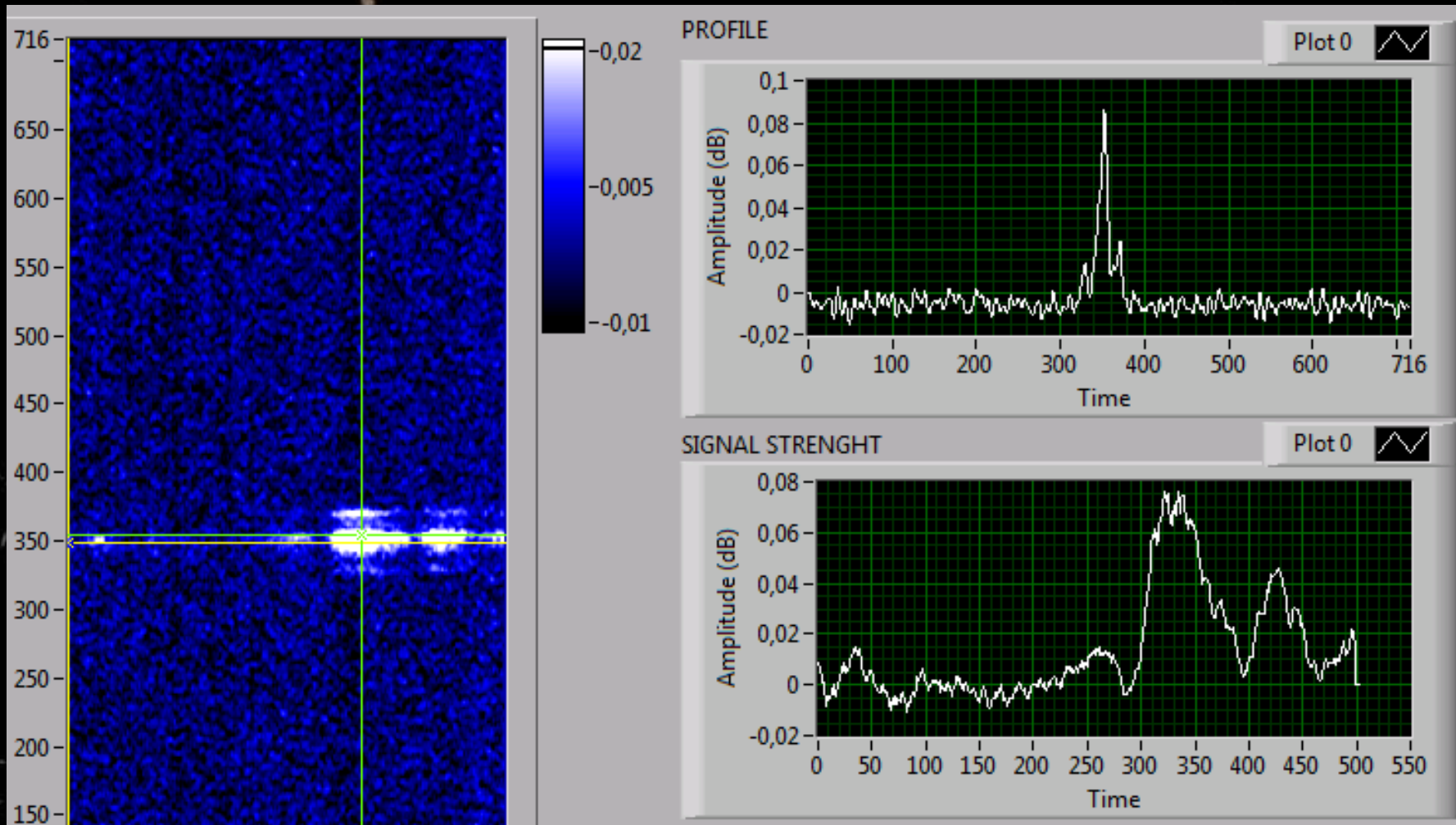


pre- and postpulse in  
normal mode 1294  
MHz

The upper graph shows the dispersion at 424 MHz  
2 MHz bandwidth: 4 channels 500kHz each



# QSB by scintillation on 23cm

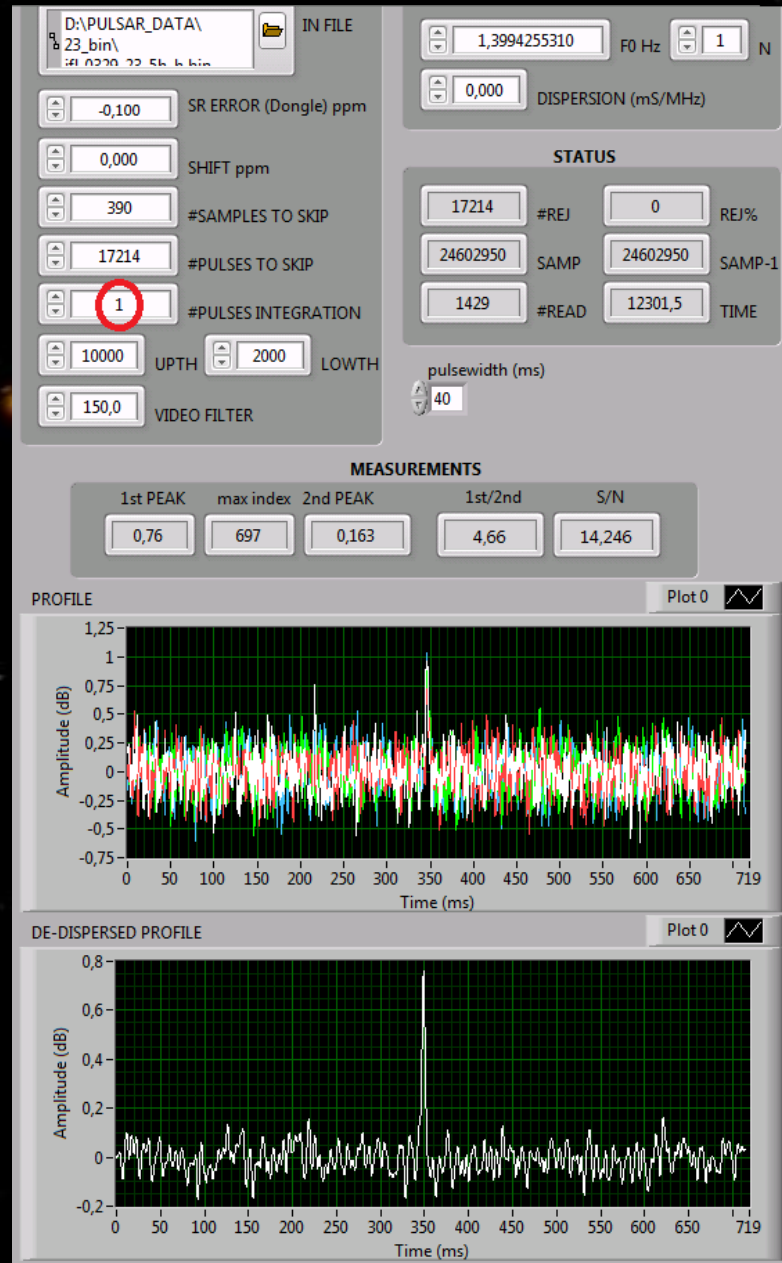


# During signal peaks it is possible to receive single pulses



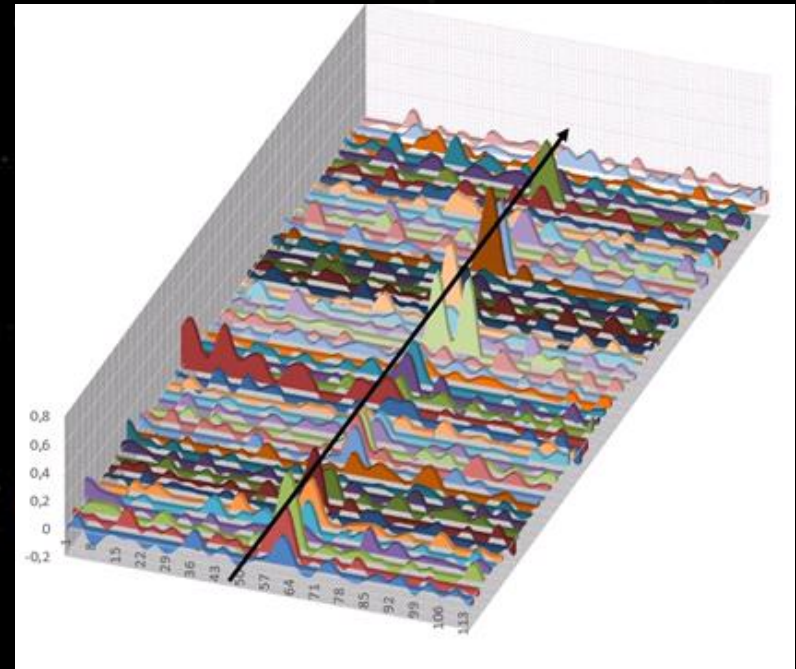
←70cm

23cm→



This 3D plot displays 50 consecutive periods at a peak of positive scintillation.

It is from one piece of observation of 36 seconds containing many single pulses.



Andrea, IW5BHY, has found 50 single pulses in a one hour recording I made on 424 MHz. With a special written program he put the single pulses in a row, and generated an audio file from that. So you can even listen to the sound of the pulsar B0329+54:

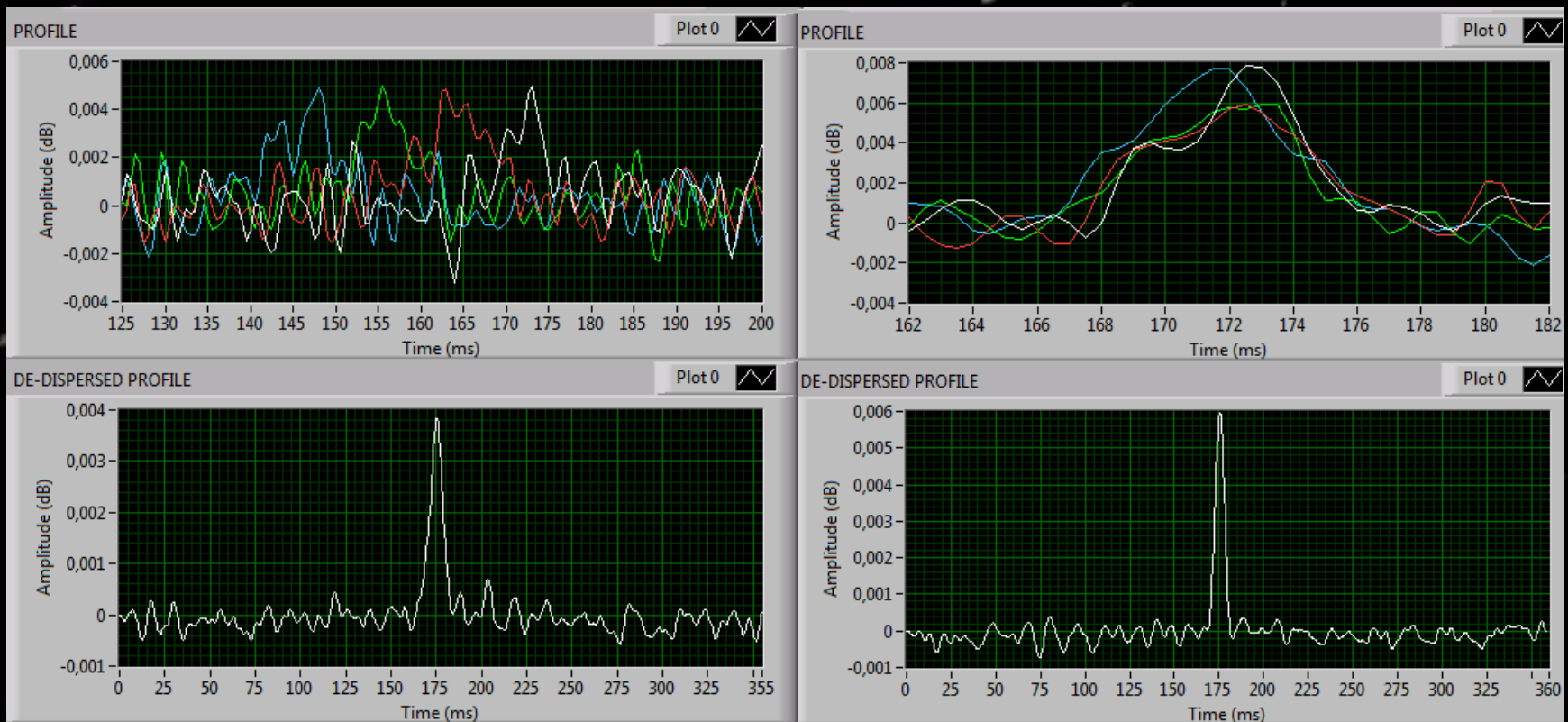




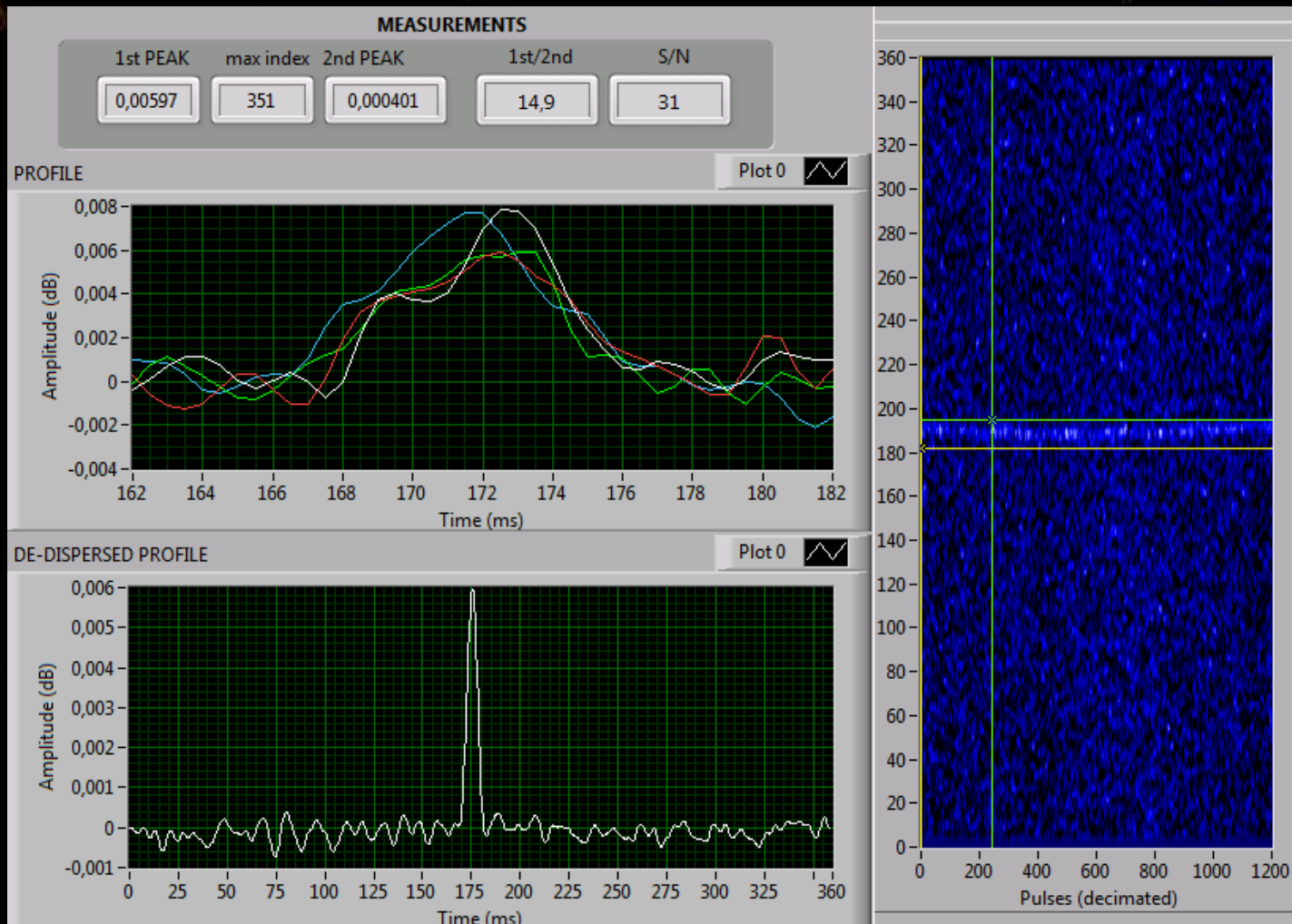
# Pulsar B1933+16, high dispersion

The channels are separated by slightly more than 8ms to each other on 424MHz (left).

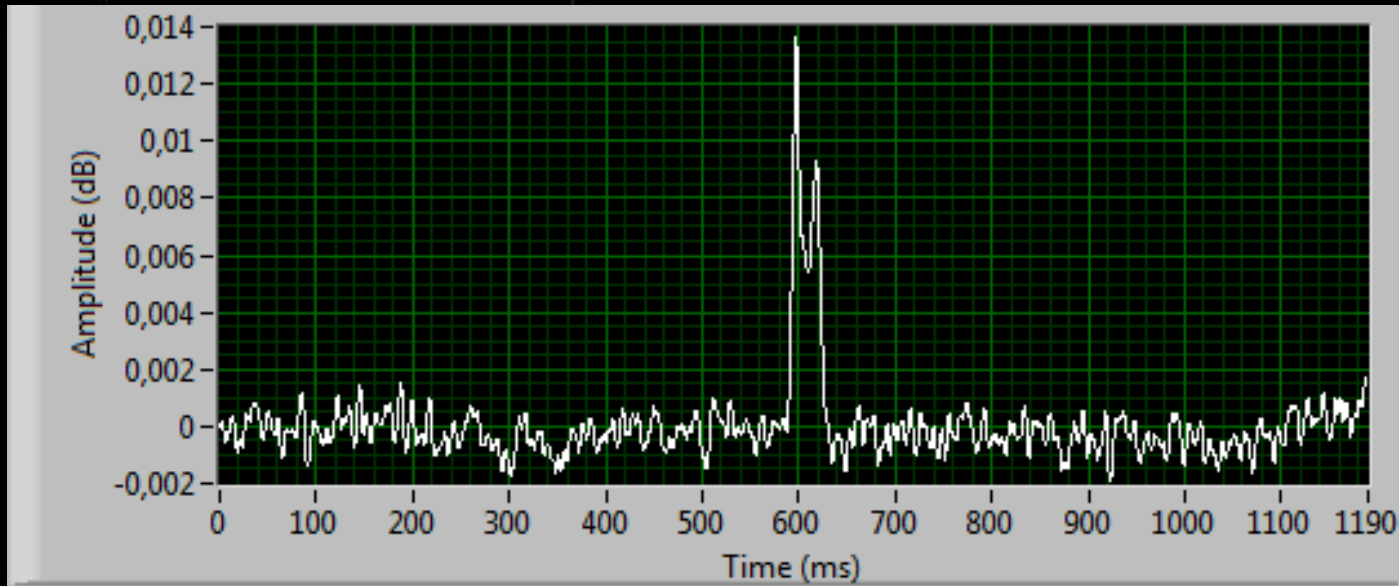
This is nearly as much as the pulse width itself.  
The dispersion is even visible on 1294 MHz (right)



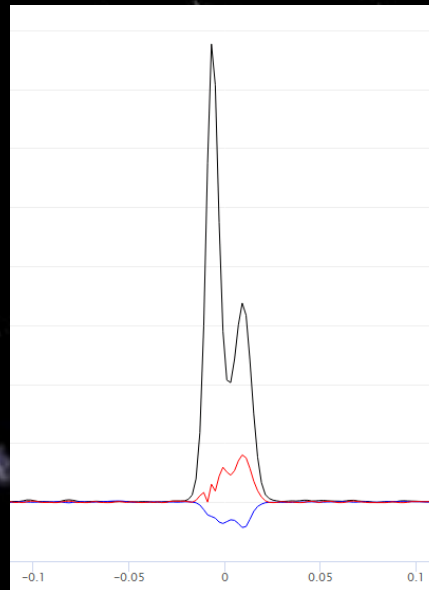
# Pulsar B1933+16, 6 hours observation frequency change by Doppler (1294 MHz)



# Pulsar B1133+16 double pulse (424 MHz)



measured pulse  
profile confirmed by  
EPN profile catalogue



# Crab-pulsar B0531+21

Young pulsar, exists since a supernova explosion in 1054  
(observed on earth as a star even visible at daylight for about two years)

Rotates 30 times per second, fast speed slowdown

Highly dispersed ( 3 ms per channel is the same as the pulse width)

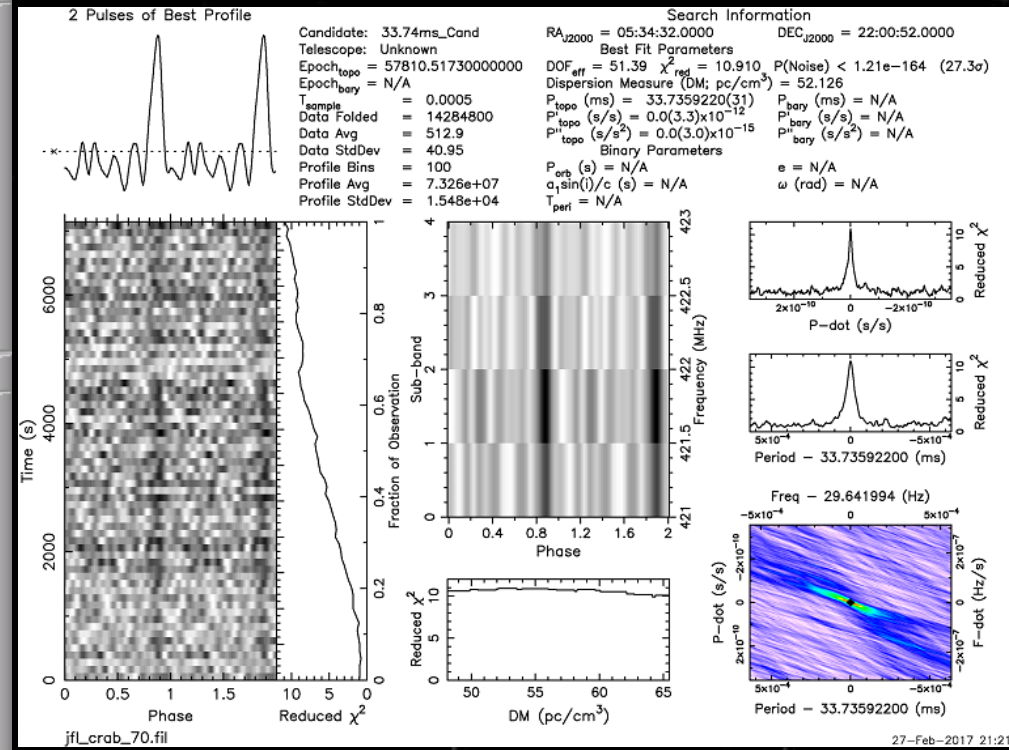
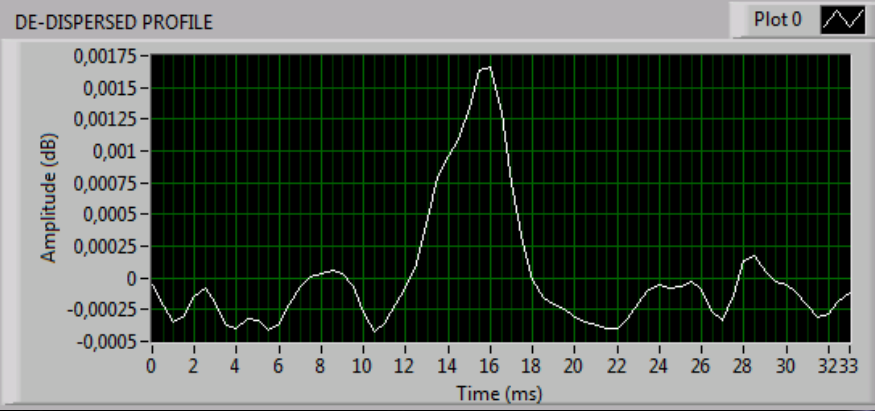
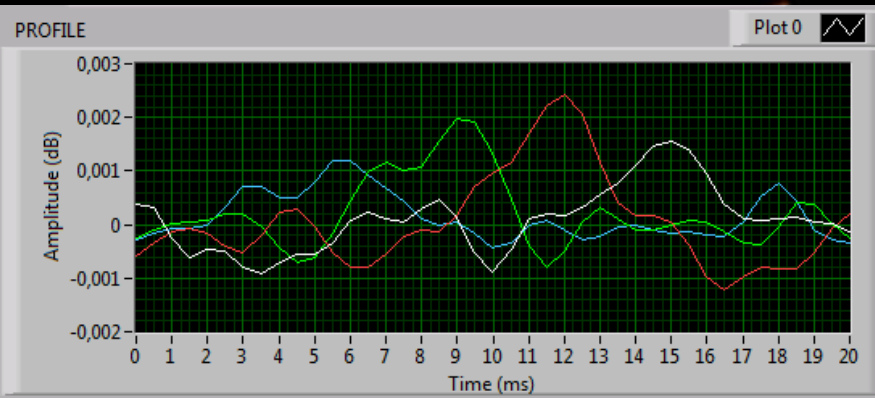
Nevertheless, the pulsar reception was positive even on the  
very first attempt!

The observation time was 2 hours.

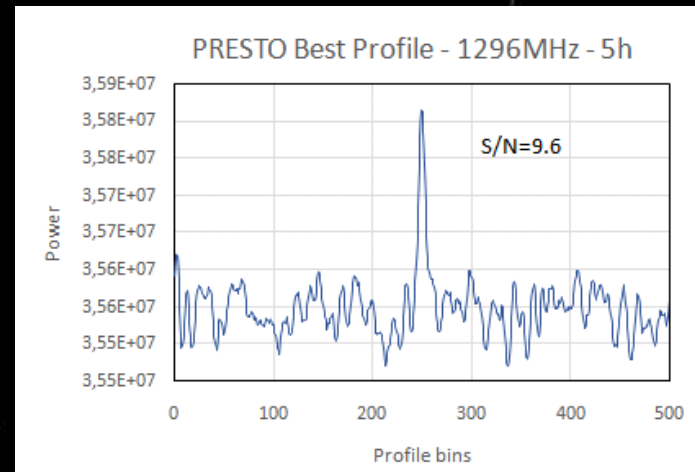
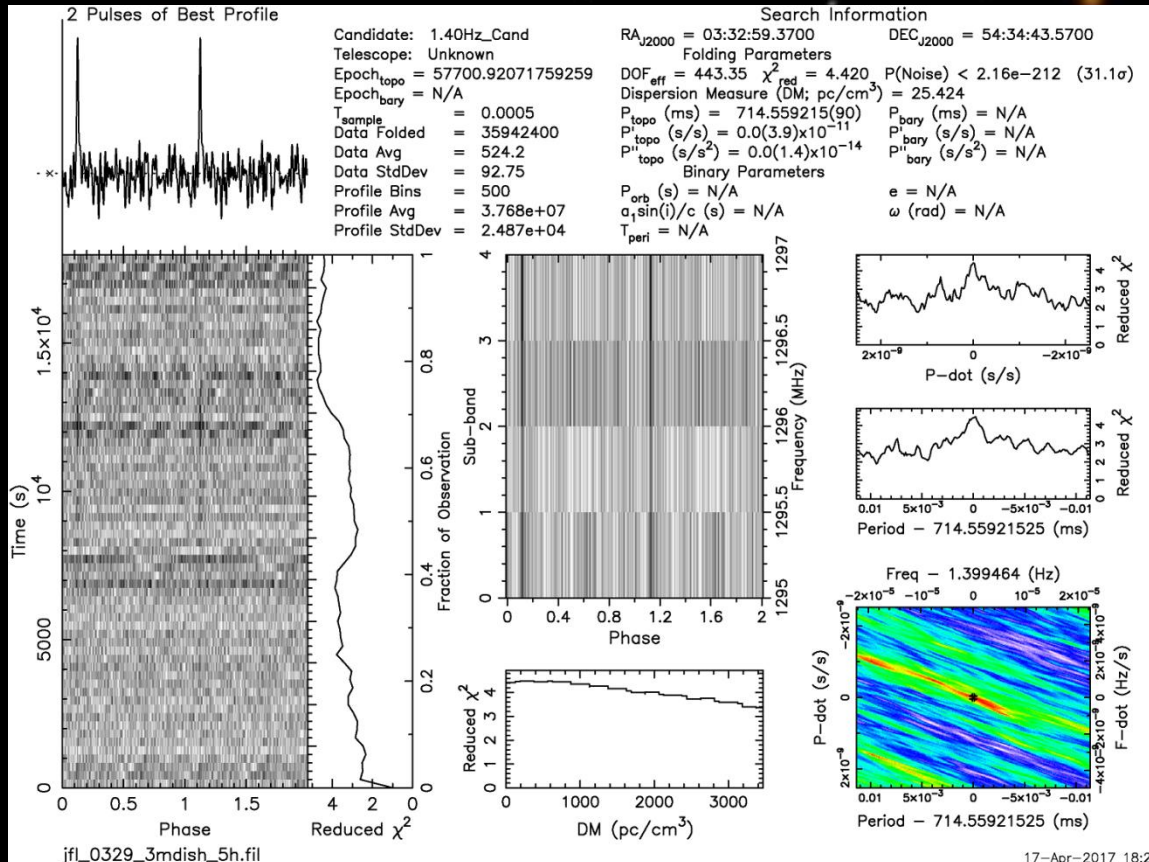
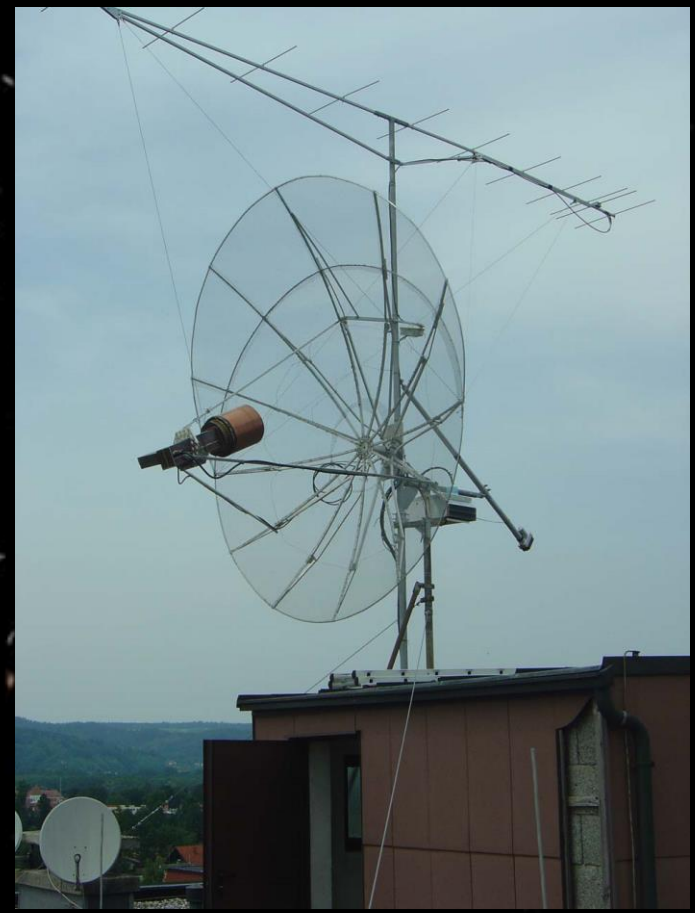
# Crab pulsar

( 424 MHz)

analyzed with IW5BHY software and Presto



# Reception of B0329+54 on 23cm with my 3m dish. (10,5dB sun noise @ SFI=74)



# Planning observations

## Finding candidates using ATNF pulsar catalogue

S400 and S1400 values might be not correct, confirmation by other sources recommended

## Check pulse shape by EPN pulsar profile catalogue

Pulse shape depends on frequency, W50 can be calculated for the planned observation band

## Check results obtained by other stations (Astropeiler 25m dish)

Own chances can be estimated looking at the S/N ratio (example: B0823+26 S1400=10mJy)

## Use Murmur to see possible observation times

RFI might depend on direction, time of the day. Also nighttime hours can cause less sleep ;-)

## **Do not give up when an observation was negative!!**

On one occasion I needed up to 10 observations, 5 hours each, before I had a positive result

# additionally detected pulsars...



PULSAR KOLLEKTION 2016 PULSAR

THE POWER OF TITANIUM

A silver Pulsar Titanium 100M watch with a white dial and metal bracelet. The dial features a date window at 3 o'clock showing the number '8'. The watch is set against a background of a dark, rocky landscape under a starry sky. The text 'PULSAR' and 'TITANIUM 100M' are visible on the dial. The watch has a unidirectional rotating bezel with a scale from 0 to 60 minutes.

[www.pulsar-uhren.at](http://www.pulsar-uhren.at)

Foto: S&P und Druckerei verkehrsmittel GmbH 11.07.2016. Erweiterte, beherrschte Kopierrechte.



**molte grazie  
per la vostra  
attenzione**