

7^{ème}
Rencontre Spatial Radioamateur



 **Electrolab**

HACKERSPACE @NANTERRE



Communications via la Lune «OSCAR-0»

Patrick F1EBK- Bernard F6BVP
Association Dimension Parabole
Radio Club F4KLO – AL REF75



EME (Earth-Moon-Earth)

Les fondamentaux

L'EME consiste 'simplement' à utiliser la Lune comme réflecteur passif.

- Le signal va traverser l'atmosphère, parcourir 400000Km aller, être réfléchi sur la surface lunaire, et revenir !
- Dans notre cas, nous avons privilégié la bande 23cm qui est la plus proche de la bande H1 (21cm).
- L'atténuation de parcours sur 23cm est d'environ 271dB, donc nous comptons beaucoup sur les propriétés de l'antenne pour réussir ce challenge.



Journée mondiale EME
18 avril 2010



http://f6bvp.free.fr/EME-f6kvp_F6BVP.pdf



EME KP4AO Arecibo 435 MHz



EME System - EME Calculator - No_com.DAT

File About

F6KVP/P

Tx Power Output	75 W	Rx to Feed Loss	0.5 dB	Default values	Print
Tx to Feed Loss	0.5 dB	Rx Noise Figure	0.9 dB		
Antenna Gain	13 dBi	Rx Bandwidth	1250 Hz	Frequency	

DX station

Tx Power Output	400 W	Rx to Feed Loss	0.3 dB	Save DX info
Tx to Feed Loss	0.5 dB	Rx Noise Figure	0.9 dB	Default values
Antenna Gain	60 dBi	Rx Bandwidth	250 Hz	

Sky temp. 15 K Path Loss -260 dB

Results @ Home station		Results @ DX station	
System Noise	146.6 K	System Noise	128.6 K
Moon Noise	0 dB	Moon Noise	3.87 dB
Total Noise	146.6 K	Total Noise	313.6 K
Home Signal	-185.8 dBm	DX Signal	-84.5 dBm
(S+N)/N	0 dB	(S+N)/N	65.1 dB
DX Signal	-139 dBm	Home Signal	-146.3 dBm
(S+N)/N	7.7 dB	(S+N)/N	5 dB

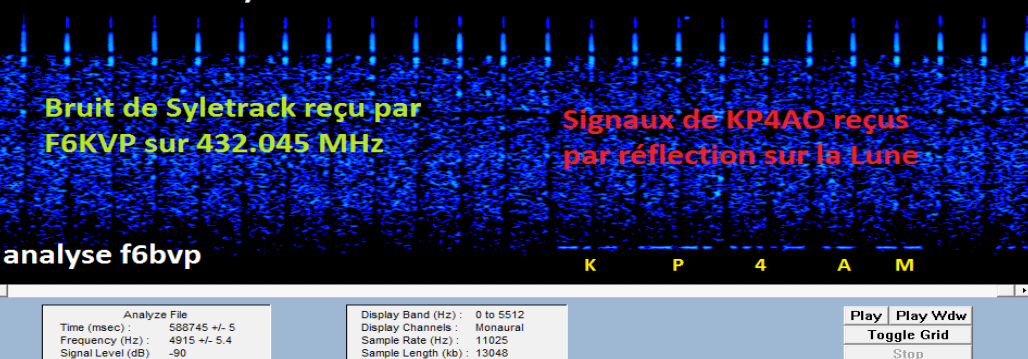
Perigee

Calculation

K
 dBm/Hz

Help EME Budget Noise Measurement

Matériel utilisé : antenne 2 x 21 éléments Maspro + 15dBi en polarisation circulaire
Préamplificateur faible bruit (0,9dB)
Transceiver UHF/VHF Icom IC910H





Association Dimension Parabole Radio Club F4KLO



Radiotélescope située dans le Parc de la Villette
Opéré à distance

F4KLO

04-03-2024 Mon 08:42:33



Diamètre 10m
f/D 0,43
Gain théorique 40 dB
Source septum
Polarisation circulaire
Rx / Tx 1296 MHz
Lobe principal 1,5°
1296-1420 MHz

Située dans le Parc de
la Villette
Opéré à distance

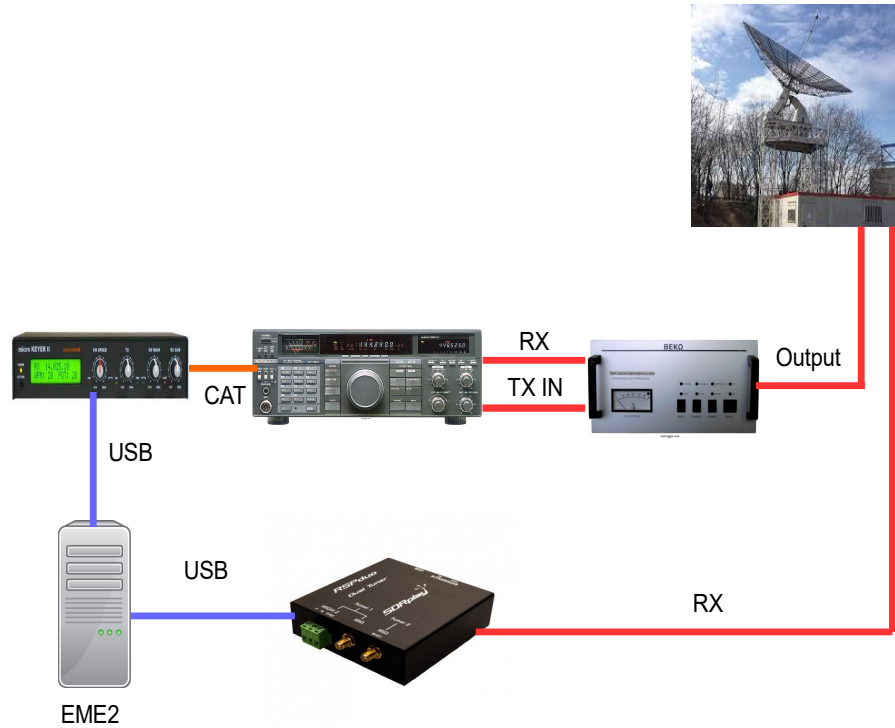


Remplacement de la source Rémi F6CNB / N5CNB





Station EME F4KLO



Guillaume F4JIJ



Source septum à polarisation circulaire

Préamplificateur large bande AD6IW Gain=21dB NF=0.4dB

câble 20m LMR600-UF (-2.6dB)

Préamplificateur ZX60-P33ULN Bande 0.4-3GHz : Gain=15dB NF=0.5dB

@1500MHz ; Gain=16dB NF=0.4dB @1300MHz

Diviseur 2 voies (-3dB) : voie radioastronomie et voie large bande

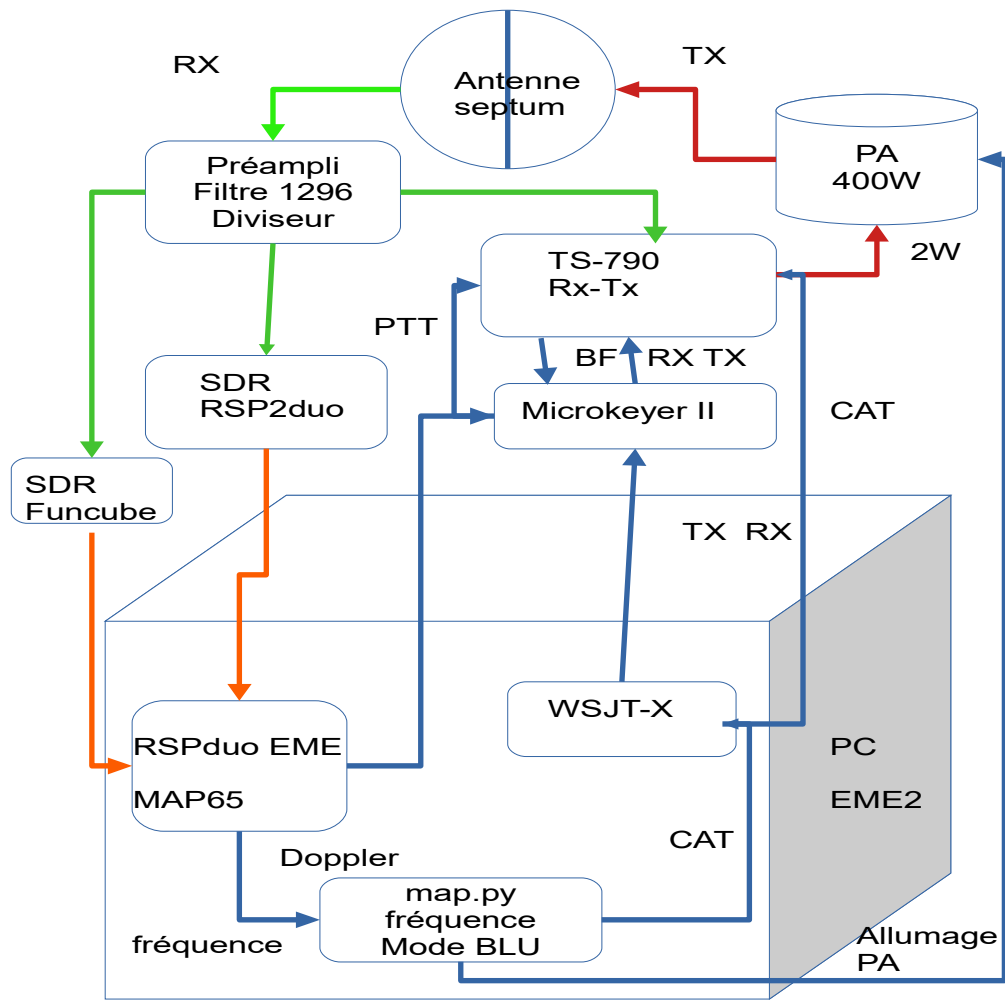
Préamplificateur radioastronomie avec cavité 1420/50MHz – NF=0.4dB

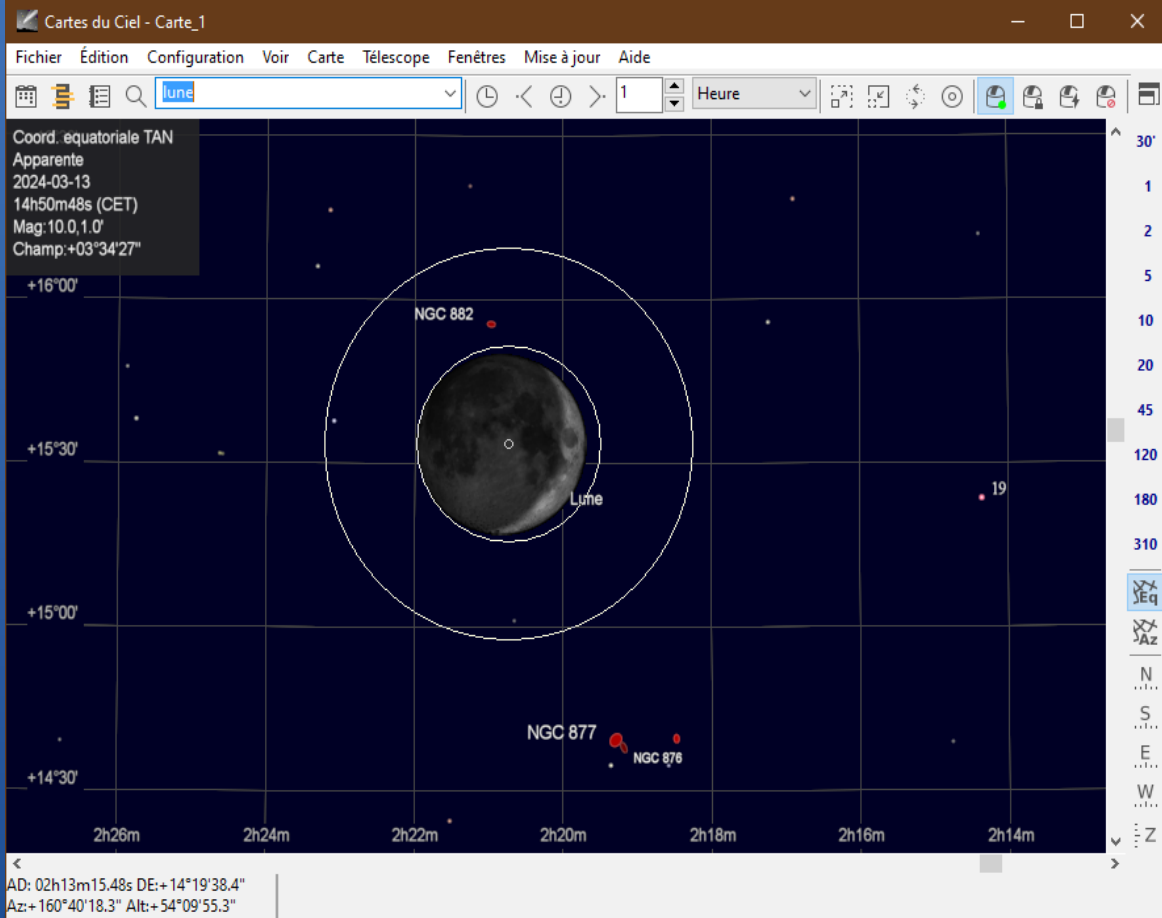
Gain= 30dB

Câble 9m LMR400 (-1.5dB)

Diviseur 2 voies (-3dB)

2 récepteurs PlutoSDR asservis GPS





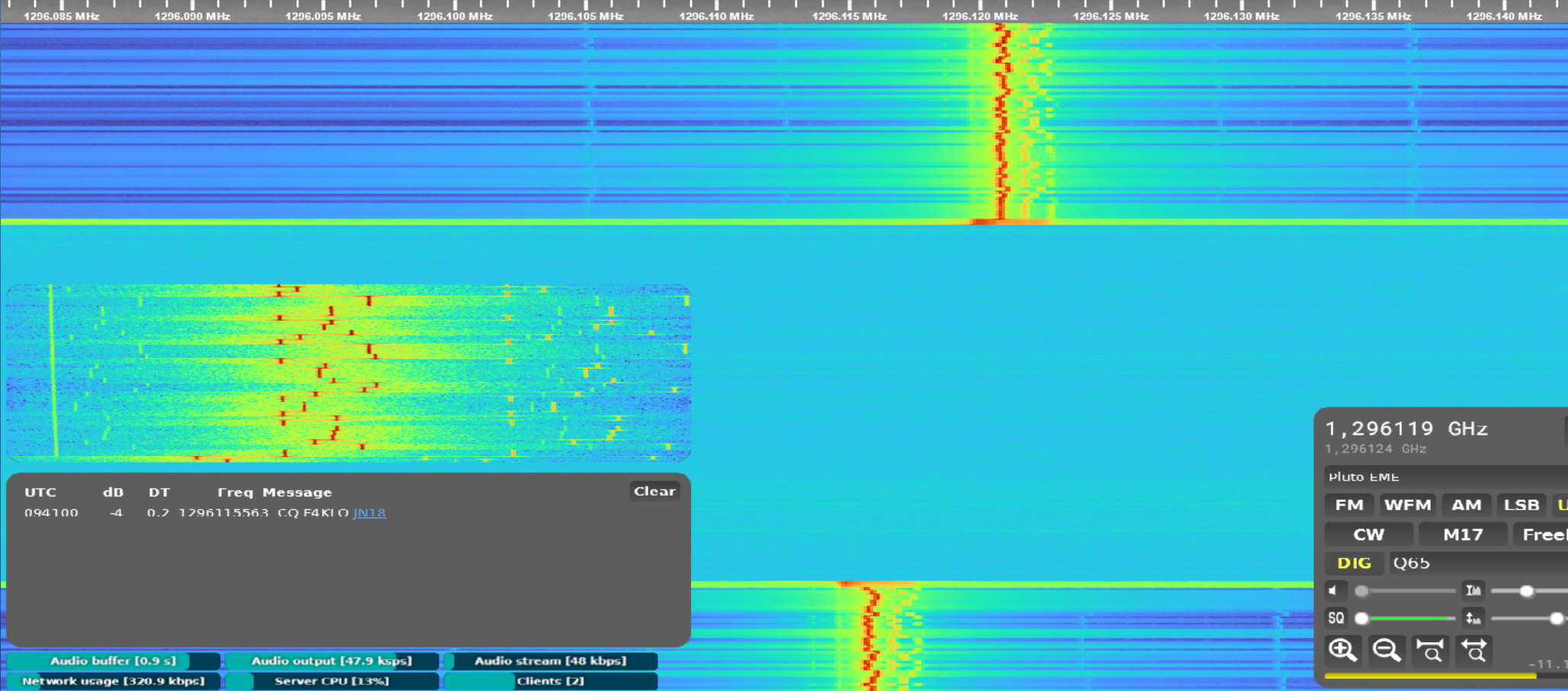
```
f4klo@gpredict: ~/Pyindi/planet
R.A. 2 H 20 min 32 sec Décl. 15° 30' 30"
Destination atteinte !
Poursuite
initializing tracking for moon
1 Ephémérides de la cible : R.A.= 2.343251 Décl.= 15.516407
2 R.A. = 2 H 20 min 35 sec Décl. = 15° 30' 59"
5 Position de départ R.A. = 2.342662 Décl. = 15.380859
Destination cible R.A. = 2.343251 Décl. = 15.516407
10 R.A. = 2 H 20 min 35 sec Décl. = 15° 30' 59"
20 R.A. 2.34 Décl. 15.38
45 R.A. 2 H 20 min 35 sec Décl. 15° 30' 59"
120 R.A. 2.34 Décl. 15.38
180 R.A. 2 H 20 min 35 sec Décl. 15° 30' 59"
310 R.A. 2.34 Décl. 15.38
[Eq] R.A. 2 H 20 min 35 sec Décl. 15° 30' 59"
[Az] R.A. 2.34 Décl. 15.38
N R.A. 2 H 20 min 35 sec Décl. 15° 30' 59"
S R.A. 2.35 Décl. 15.47
E R.A. 2 H 20 min 35 sec Décl. 15° 30' 59"
W R.A. 2.35 Décl. 15.56
Z R.A. 2 H 20 min 35 sec Décl. 15° 30' 59"
R.A. 2.35 Décl. 15.56
R.A. 2 H 20 min 35 sec Décl. 15° 30' 59"
R.A. 2.34 Décl. 15.56
R.A. 2 H 20 min 35 sec Décl. 15° 30' 59"
R.A. 2.33 Décl. 15.56
R.A. 2 H 20 min 35 sec Décl. 15° 30' 59"
R.A. 2.34 Décl. 15.56
R.A. 2 H 20 min 35 sec Décl. 15° 30' 59"
Destination atteinte !
Poursuite
```

Calculs astronomiques (*planet.py*) François-Xavier N5FXH



LZ1DX

HB9Q



UTC	dB	DT	Freq	Message	Clear
094100	-4	0.2	1296115563	CQ F4KLO JN18	

1,296119 GHz
1,296124 GHz

Pluto EME

FM WFM AM LSB US

CW M17 FreeD

DIG Q65

SO

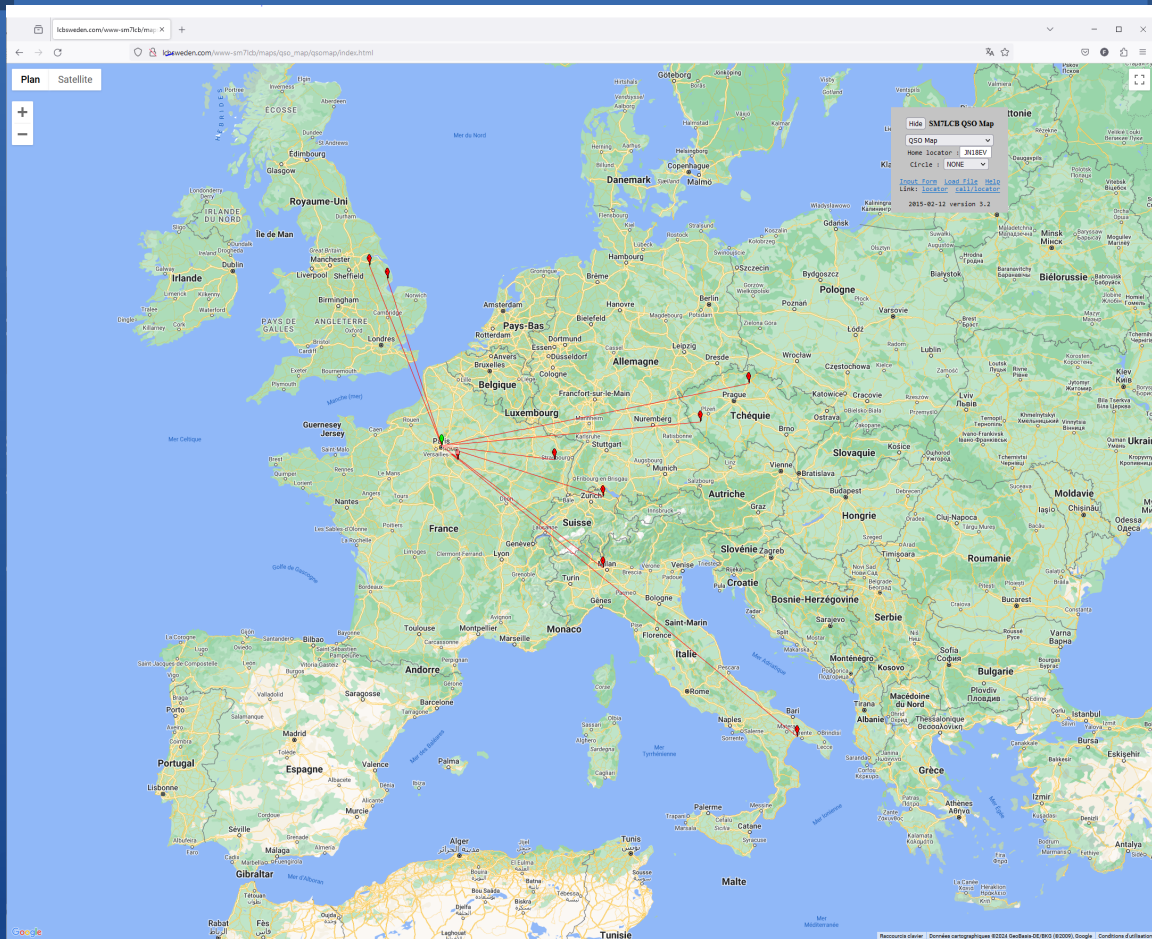
-11.1

Audio buffer [0.9 s] Audio output [47.9 kbps] Audio stream [48 kbps]

Network usage [320.9 kbps] Server CPU [13%] Clients [2]

Carte des QSO du 24/11

Opérateur Map65 Patrick F1EBK





Concours ARRL EME



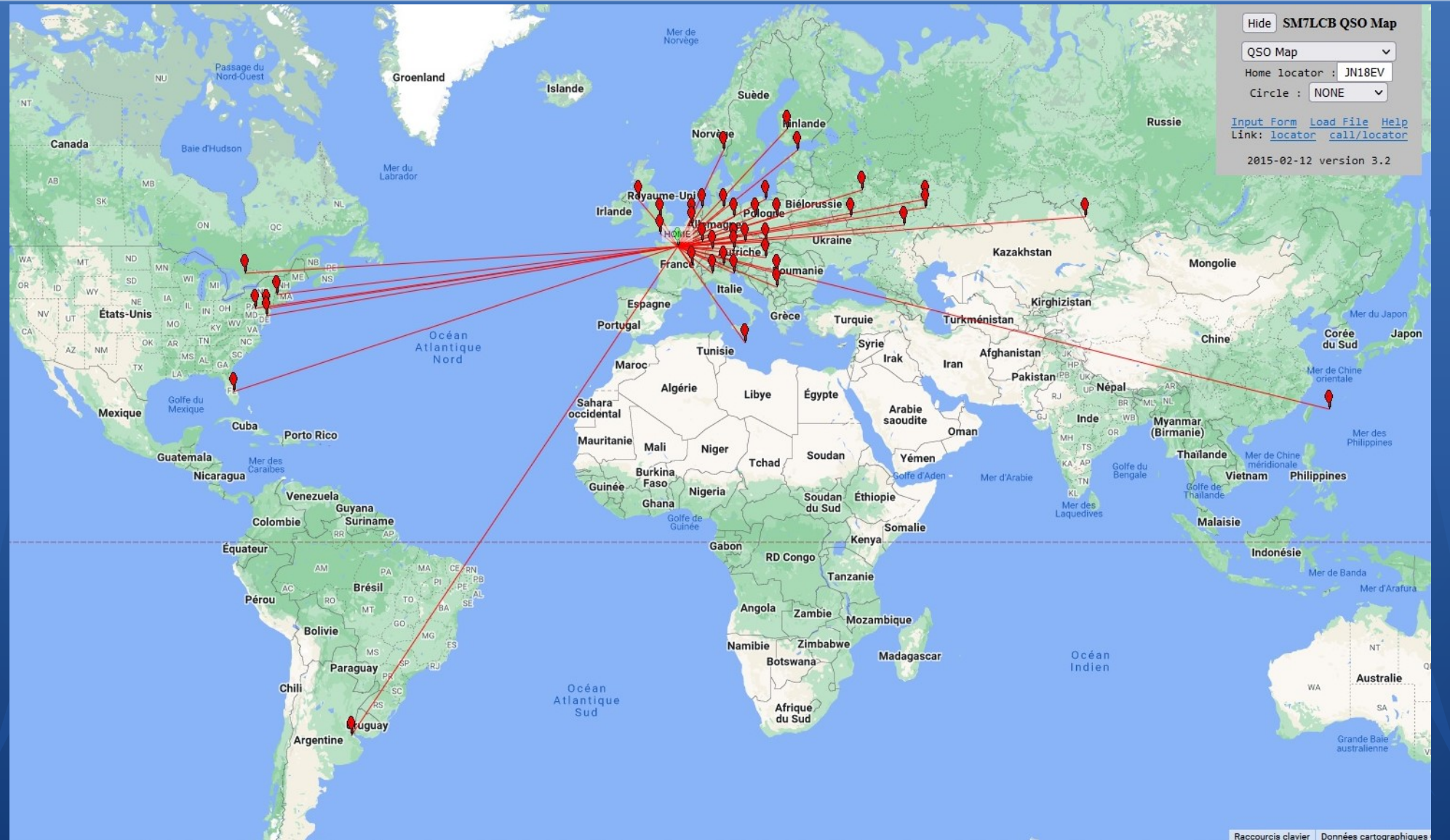
samedi 25 - dimanche 26 novembre 2023

Patrick F1EBK / W6NE mode numérique Q65 (MAP65 K1JT)

OK1KIR, PA3JRK, OK2ULQ, DL7UDA, ES3RF, DF3RU, OK2DL, OK1IL,
GI4DOH, JS6UJS, DK3WDG, SP2SCC, OK1DFC, OH1LRY, W3SZ, RA4HL,
W2ZQ, IN3FCK, RX3DR, G7TZZ, IQ2DB, UA9YLU, WA3GFZ, HG5BMU,
UA4LCF, UA4AAV, OK1USW, OH3MCK, UA5Y, PA0TBR, YU1SAN, SP5GDM,
DJ2DY, PA3FXB, F5JWF, DL6SH, PH0V, DL1SUZ, DL7AIG, LA3PNA,
YO2LAM, OH1BN, G4ALH, WA3RGQ, SP3YDE, NC1I, VE3NYK, LU8ENU

En deux demi journées :

- 49 QSO
- 23 contrées DXCC
- 112700 points (le 1er du concours en attend autour de 2 millions...)





QSO Okinawa

384 400 X 2 = 768800 km



Printed by iColor

Vertical column of six dashed boxes for call sign entry.

TO RADIO F 4 K L O CONFIRMING OUR QSO

DAY	MONTH	YEAR	TIME	RST	BAND	MODE
			<small>JST/UTC</small>			<small>2WAY</small>
25	11	2023	19:37~	-11dB	1296 MHz	EME

TNX QSL

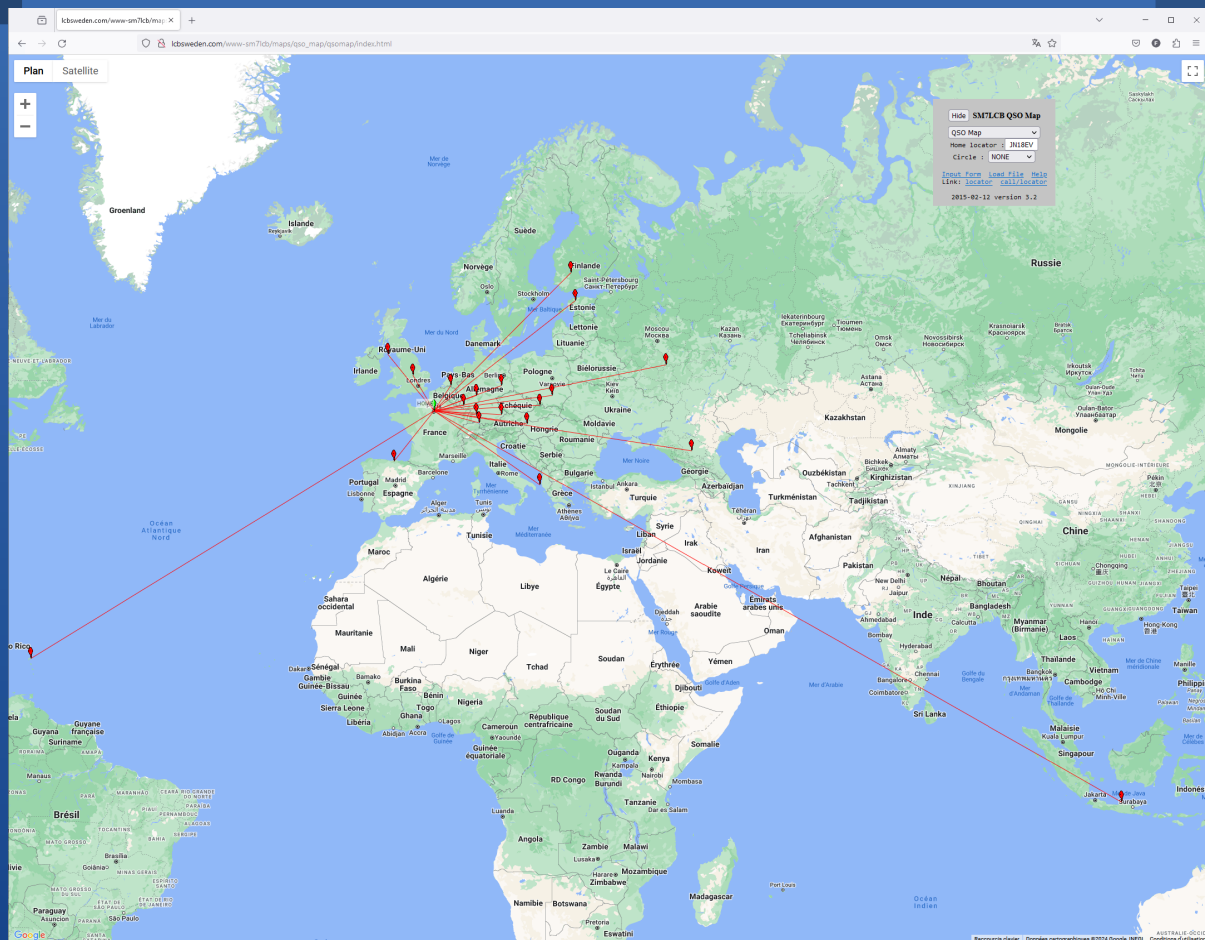
RIG ANT

- 432MHz IC-9100+GPSDO 16x14EL 500W
- 1296MHz IC-9100+GPSDO 3.6mD 250W
- 5760MHz IC-9100+GPSDO+TRV 1.6mD 100W

OP. JS6UJS Shin-ichi Ochiai
QTH. 165-268.Tozato.Ishigaki-city Okinawa. 907-0241 JAPAN

TNX FB EME QSO; 73!

Carte des QSO récents



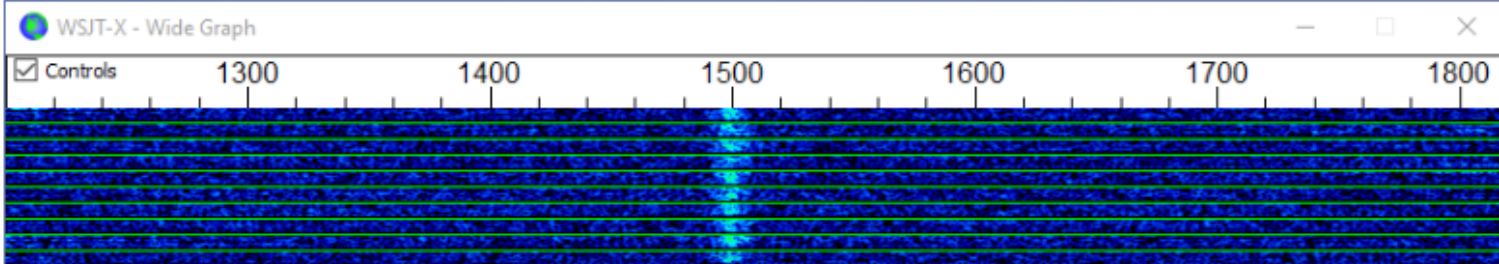


Echo Mode in WSJT-X 2.6.0



1. Transmit a fixed-frequency 1500 Hz tone for 2.3 s
2. Offset receiver frequency by the computed EME Doppler shift
3. Wait approximately 0.2 s for start time of received echo
4. Record the received signal for 2.3 s
5. Compute spectrum of received signal, accumulate average, and display results
6. Reset dial frequency to transmit value
7. Repeat from Step 1

Bob Atkins, KA1GT, Charlie Suckling, DL3WDG, and Joe Taylor, K1JT
https://wsjt.sourceforge.io/Echo_Mode_in_WSJT-X_2.6.0.pdf



WSJT-X v2.6.0-rc5 by K1JT et al.

File Configurations View Mode Decode Save Tools Help

UTC	Hour	Level	Doppler	Width	N	Q	DF	SNR	dBerr
043503	4.584167	53.55	2219	18.0	1	10	-1	-10.2	0.5
043509	4.585834	53.88	2219	18.0	2	10	-1	-9.5	0.5
043515	4.587500	53.70	2219	18.0	3	10	-1	-9.8	0.5
043521	4.589167	53.73	2219	18.0	4	10	-1	-10.3	0.5
043527	4.590833	53.73	2219	18.0	5	10	-2	-10.4	0.5
043533	4.592500	53.91	2219	18.0	6	10	-2	-9.9	0.5
043539	4.594167	53.50	2219	18.0	7	10	-1	-10.1	0.5
043545	4.595833	53.69	2219	18.0	8	10	-1	-9.9	0.5
043551	4.597500	53.62	2219	18.0	9	10	-1	-10.0	0.5
043557	4.599167	53.61	2219	18.0	10	10	-1	-9.9	0.5

Stop Monitor Erase Clear Avg Avg 100 Decode Enable Tx Halt Tx Tune Menus

23cm **1,296.065 000**

H

FT8

FT4

MSK

Q65

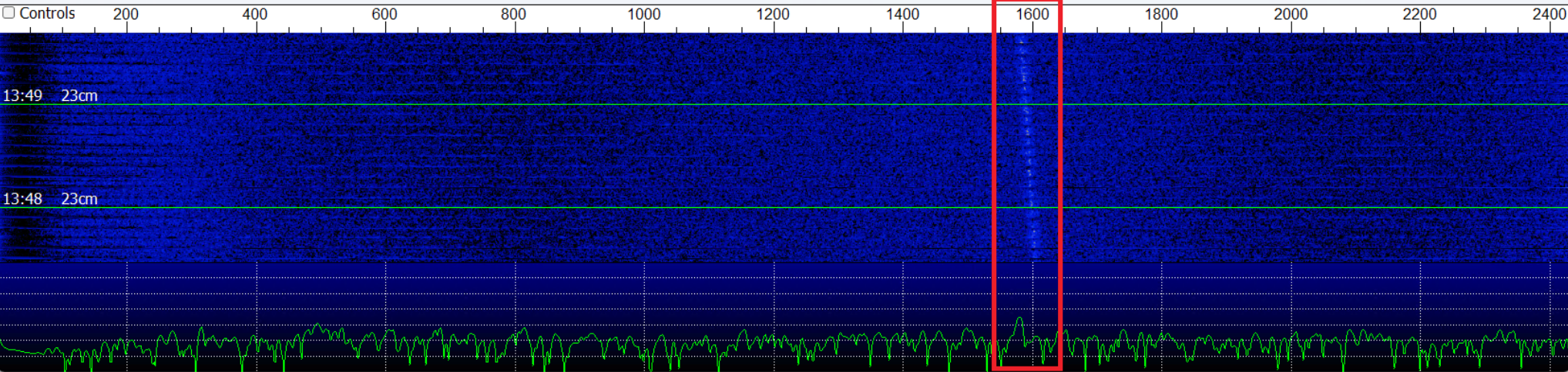
JT65

Lookup Add

2022 Oct 04
15:55:51

- UTC Time in hhmmss format
- Hour UTC in hours and decimal fraction
- Level Relative received noise power (dB)
- Doppler EME Doppler shift at center of lunar disk
- Width EME Doppler spread over full lunar disk
- N Number of accumulated echo or monitor cycles
- Q Estimated quality of averaged data on a 0 – 10 scale
- DF Offset of spectral peak from 1500 Hz
- SNR Average signal-to-noise ratio (dB/2500 Hz)
- dBerr Estimated uncertainty of SNR

WSJT-X - Wide Graph



WSJT-X v2.7.0-rc3 by K1JT et al.

File Configurations View Mode Decode Save Tools Help

UTC	Hour	Level	Doppler	Width	N	Q	DF	SNR	dBerr
134830	13.808333	50.47	93	23.8	32	10	1	-11.0	0.5
134836	13.810000	50.52	92	23.8	33	10	-1	-11.3	0.5
134842	13.811666	50.47	91	23.8	34	10	1	-11.4	0.5
134848	13.813334	50.49	90	23.8	35	10	0	-11.1	0.5
134854	13.815000	50.67	89	23.8	36	10	0	-10.9	0.5
134900	13.816667	50.60	88	23.8	37	10	1	-11.0	0.5
134906	13.818334	50.45	87	23.8	38	10	1	-11.0	0.5
134912	13.820000	50.79	86	23.8	39	10	0	-10.8	0.5
134918	13.821667	50.61	85	23.8	40	10	0	-11.0	0.5
134924	13.823334	50.39	84	23.8	41	10	0	-11.0	0.5
134930	13.825000	50.63	83	23.8	42	10	1	-11.0	0.5
134936	13.826667	50.61	82	23.8	43	10	0	-10.7	0.5

23cm **1 296,065 000**

H

FT8

FT4

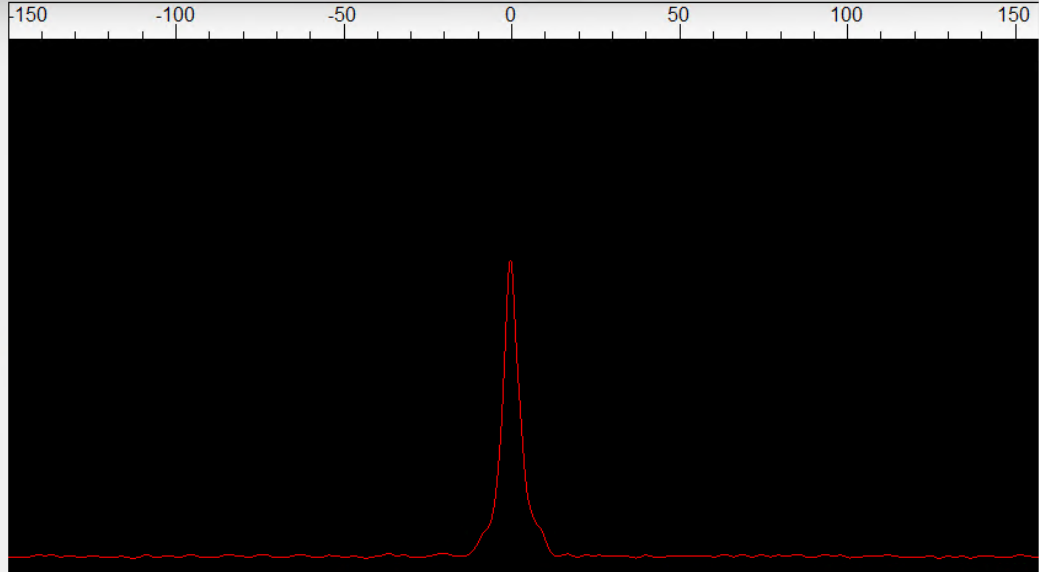
MSK

F4KLO 13 mars 2024

PA 100 W antenne 10m (78m2)

SNR = -11dB

WSJT-X - Echo Graph





Radio Club F4KLO

Parc de la Villette, Paris 19è



 **Electrolab**

HACKERSPACE @NANTERRE

F4KLO

04-03-2024 Mon 08:42:33



- Blog <http://radiotelescope-lavillette.fr>
- Chaîne Twitch TV https://www.twitch.tv/dimension_parabole
- site « temps réel » <http://f4klo.ampr.org/>
- Liste de contact liste@radiotelescope-lavillette.fr

