



Andy's Ham Radio Linux®



Andy Stewart
KB1OIQ
April 11, 2024

Presented to
Algonquin Amateur Radio Club
Marlboro, MA USA

Biographical Info

Tech: 1/07, General 1/08, Extra 1/09

President: PART of Westford, MA (9/09 - 8/19)

ARRL EMA: Assistant Section Manager (2016), ACC (2017)

Founder: Worcester Linux Users' Group (1997)

Founder and Acting President:

Chelmsford Linux Meetup Group (2006-2020)

Linux Instructor:

Chelmsford Community Education (2004 - 2011)

Linux user since 1997

Computer Engineer – digital logic verification

Most Recent Interests

- Antique radios
 - Electrical restoration, especially 1920s/1930s radios
- Homebrewing
 - Many kits
 - Built a 1920s style regenerative receiver with plugable coils for different frequency ranges
- FT-8, GridTracker, Fox hunting
- Of course: Andy's Ham Radio Linux
- A new project (more later)

Goals

- Promote Linux
- Give back to ham radio and Linux communities
- Build on top of an existing Linux distribution
- Create a software collection containing as much ham radio software as possible – nothing proprietary
- Goal: Everything just works!
- Focus on the radio hobby!
- The idea of "Andy's Ham Radio Linux" began this way

Andy's Ham Radio Linux

- V25a is Xubuntu 22.04.* remastered
- Download the ISO file from SourceForge
 - Search for: Andy's Ham Radio Linux
 - Software is GPL or similarly free license
- Ways to get started:
 - Download the ISO first, then.....
 - Boot it in Virtualbox, or.....
 - Create a bootable USB thumb drive
- Install to the hard drive once you decide you like it
- ---> Be sure to read the GETTING_STARTED guide(!!!) <---

Target Computer

- Any x86_64 computer 10 years old or less
- Minimum: 4 GB of memory
- Disk Space: 20 GB after installation
- Processor speed is not an issue for most ham radio programs, Exception: SDR
- Networking: wired or wireless
- USB required for installation

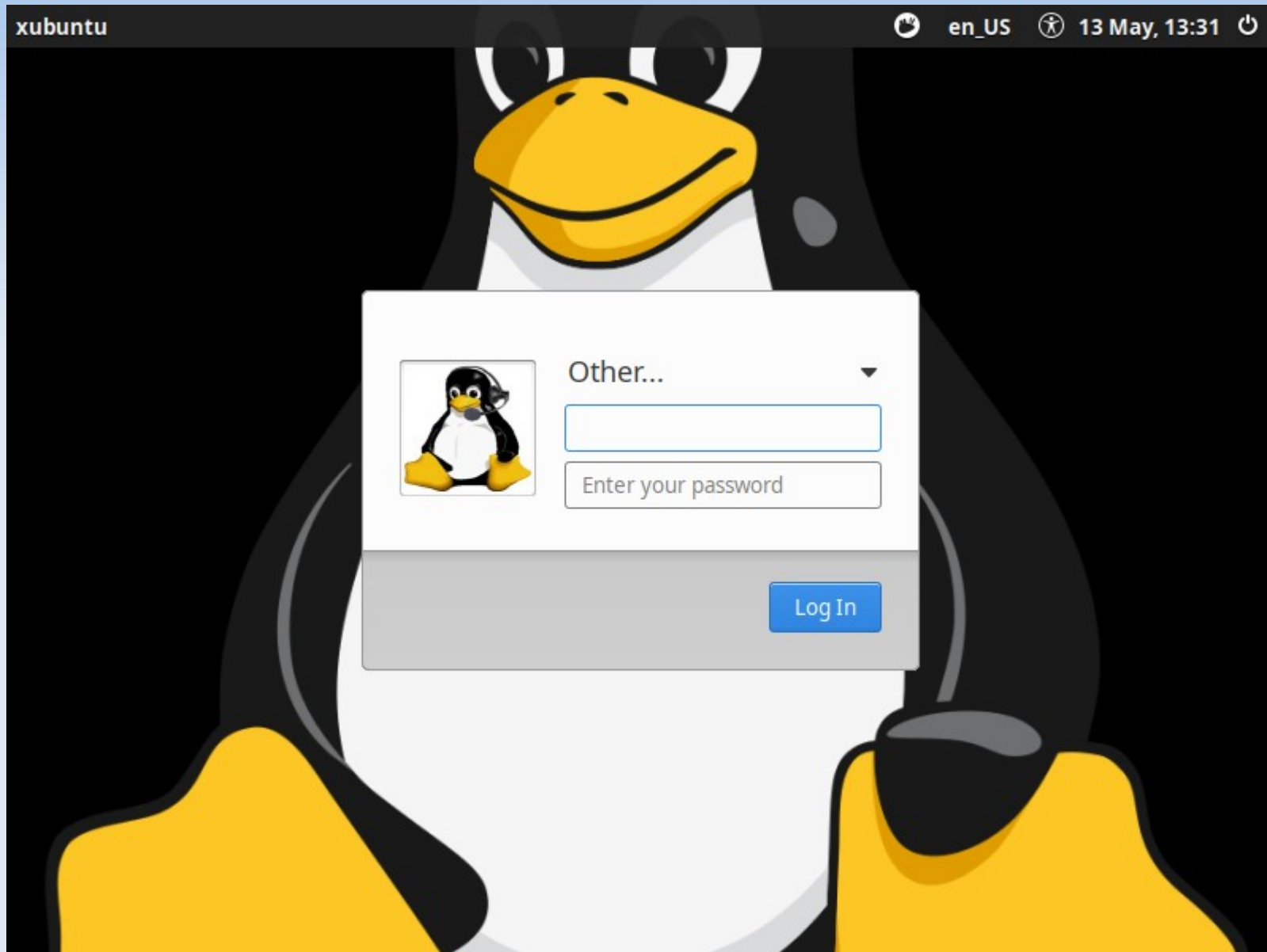
Initial Boot before Installation



GETTING_STARTED

- PLEASE - PLEASE - PLEASE:
 - Be sure to download and read the GETTING_STARTED document BEFORE you begin the installation.
 - Follow the helpful hints!
- If you have problems logging in, you likely didn't read or properly follow the instructions in the document.

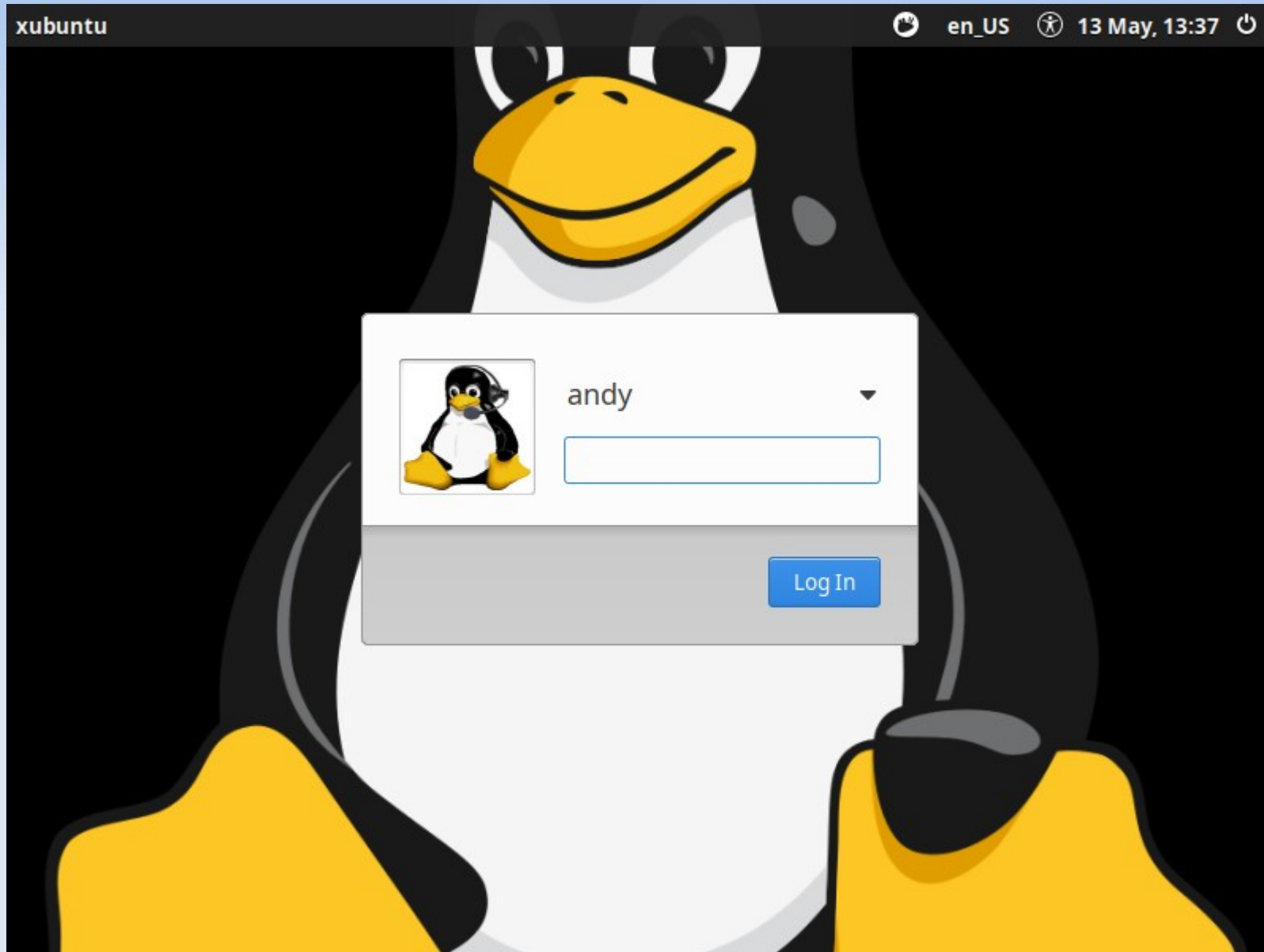
Initial Login Screen After Installation



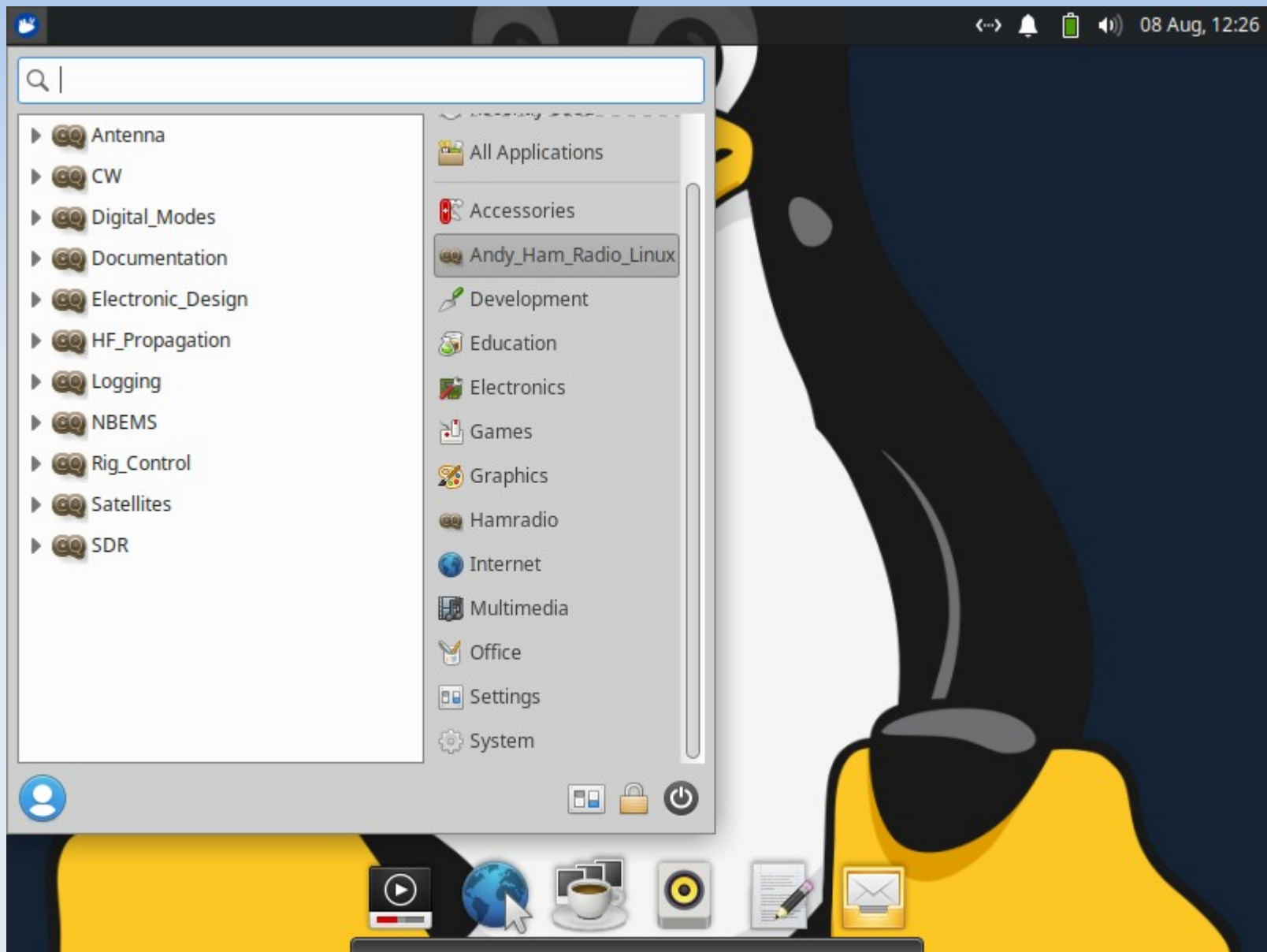
fix_account

- Login as user: xubuntu
- Hit enter
- Hit enter again or click "Log In" (no password)
- Open a terminal window
- `sudo /root/bin/fix_account`
- Log out, log in using updated account
- Done! That was easy!

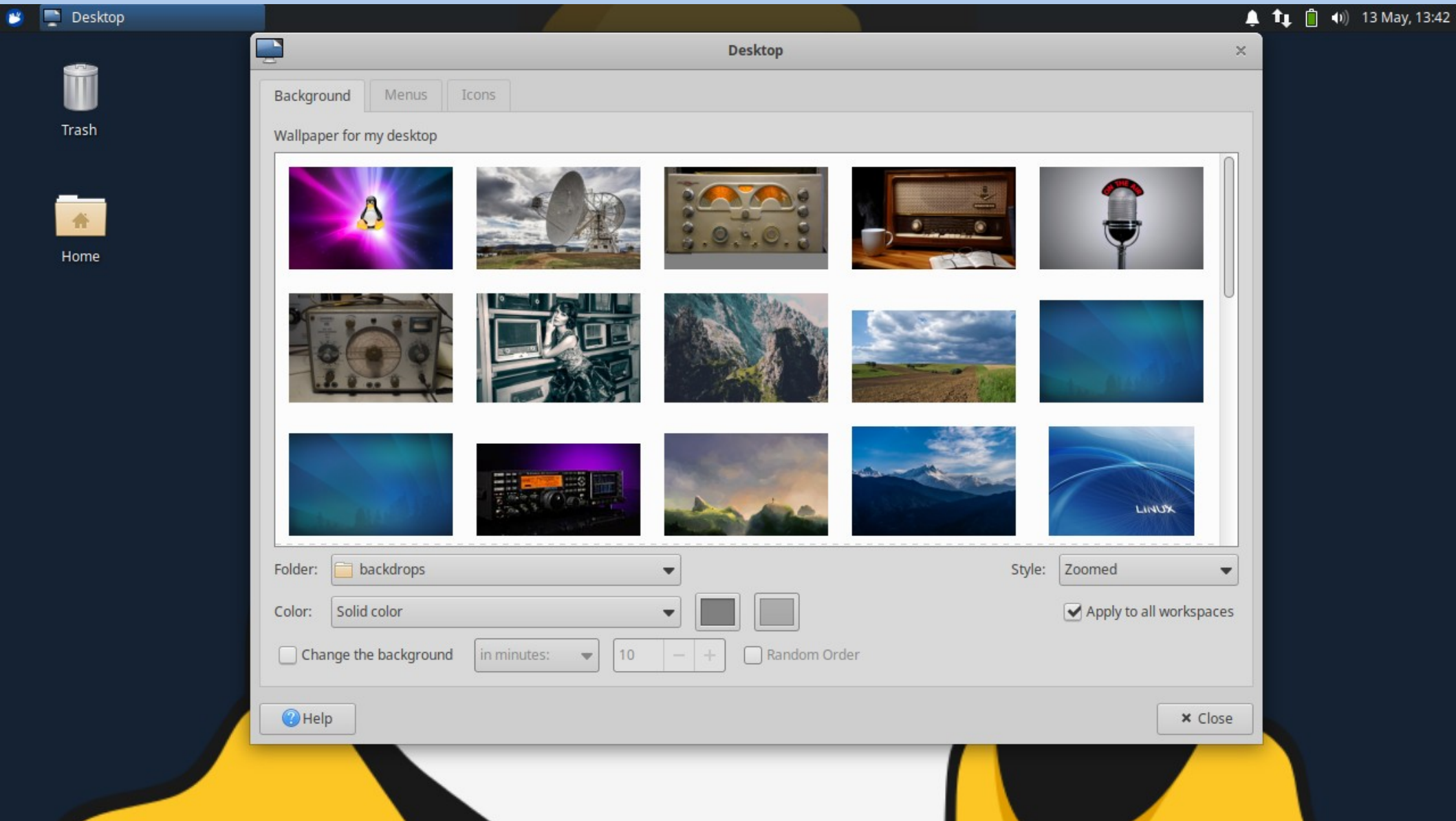
Initial Login Screen after fix_account



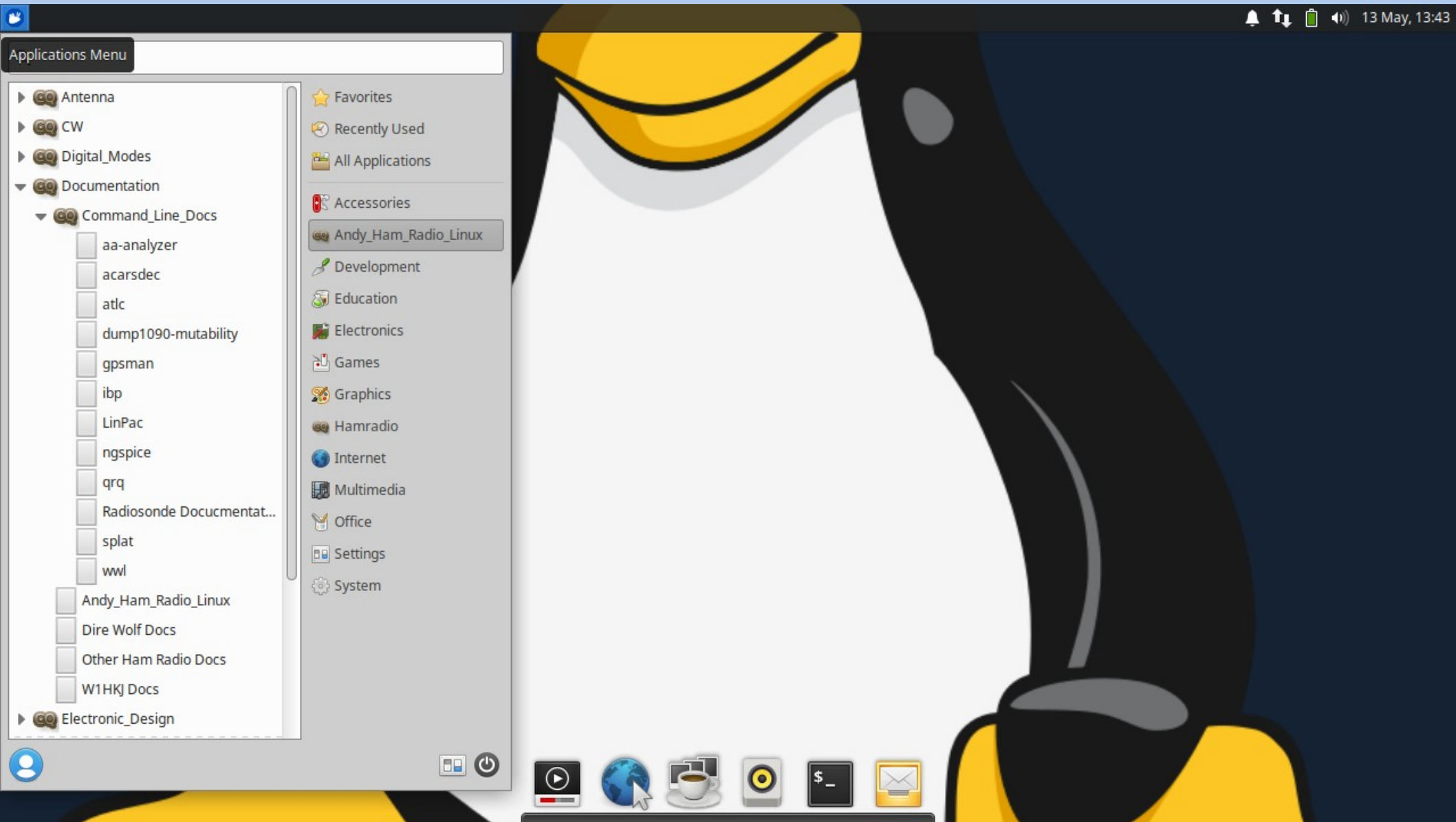
Initial Desktop



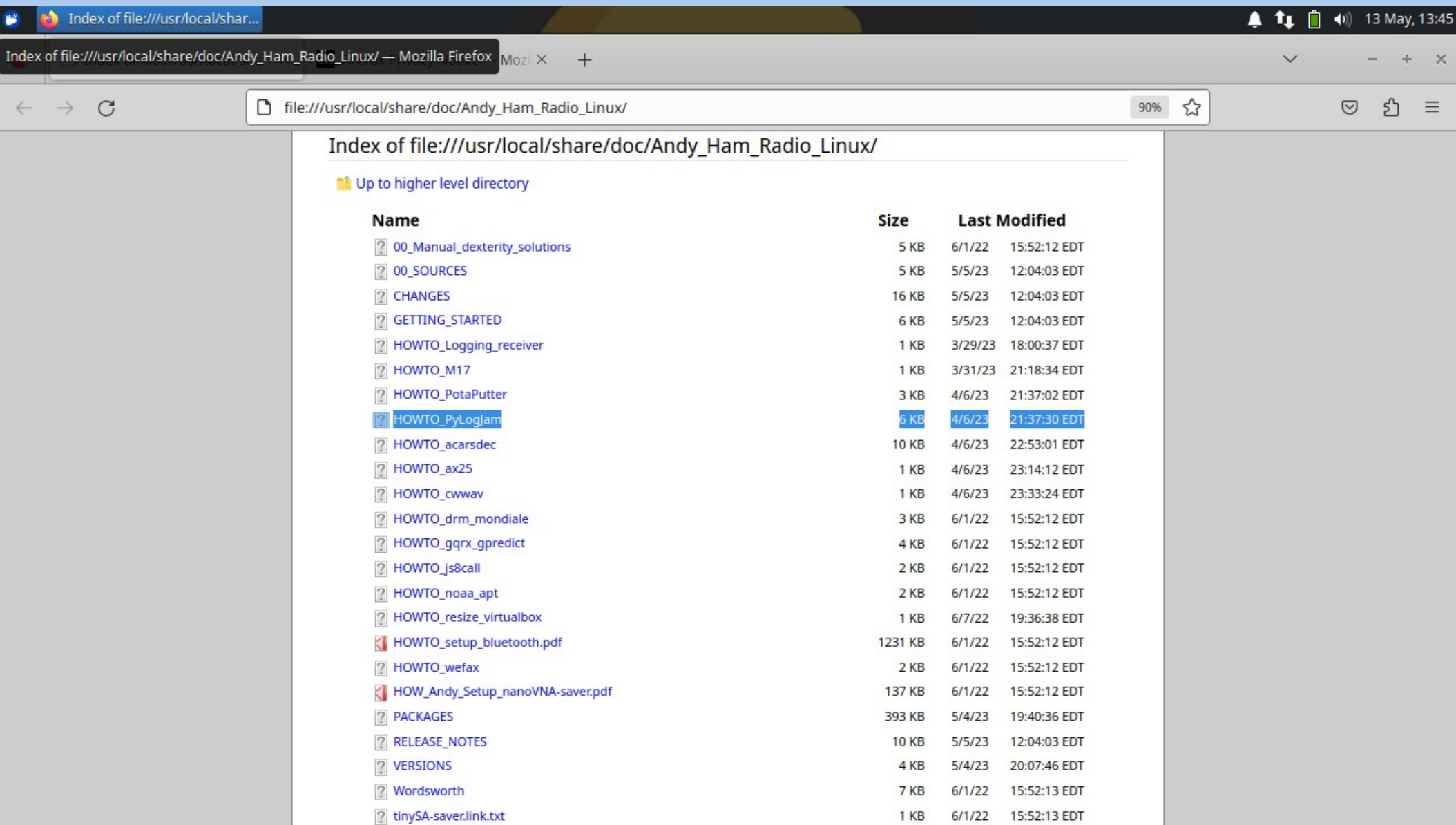
Desktop Backgrounds



Documentation



AHRL Documentation

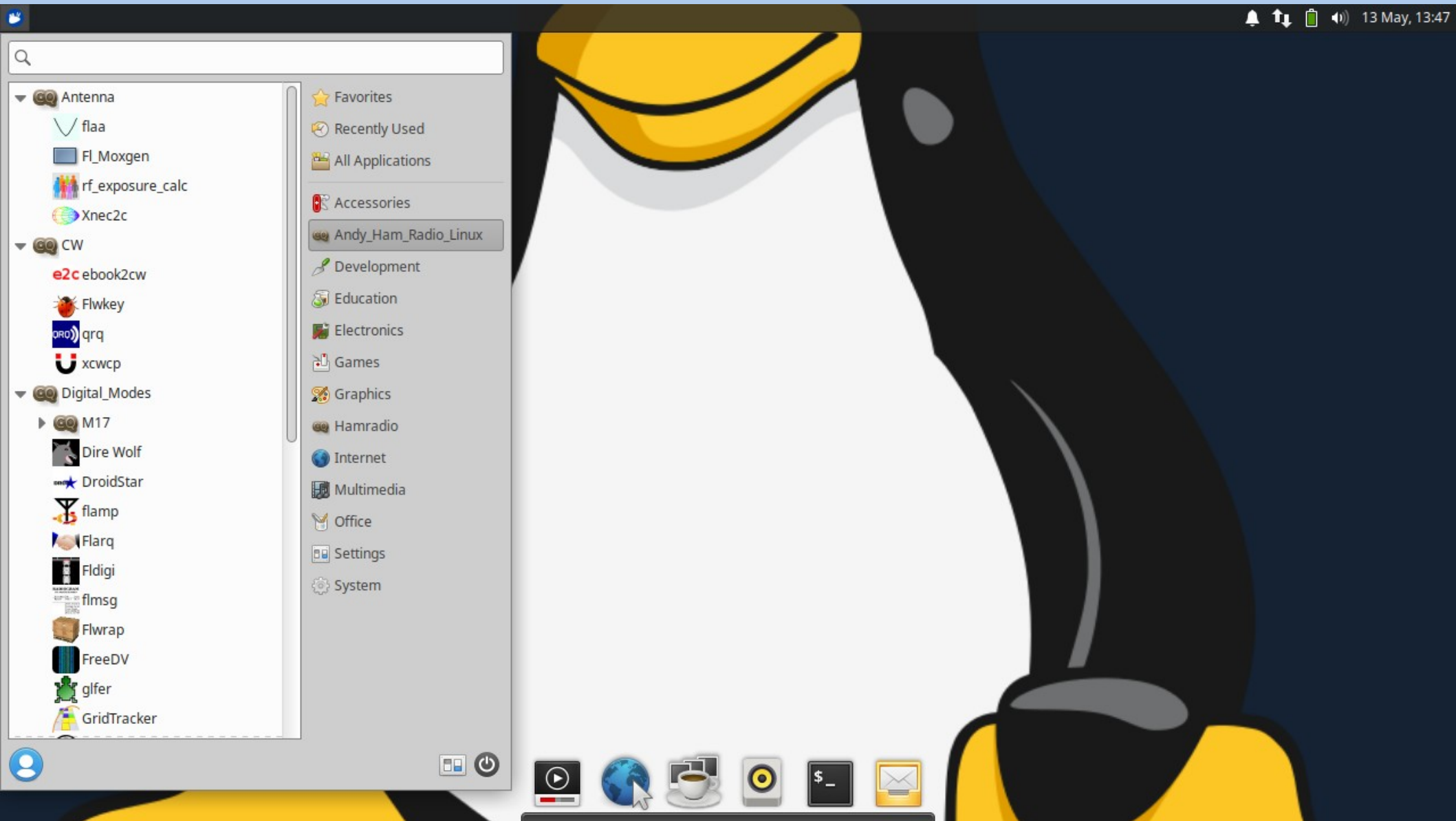


Index of file:///usr/local/share/doc/Andy_Ham_Radio_Linux/

[Up to higher level directory](#)

Name	Size	Last Modified
00_Manual_dexterity_solutions	5 KB	6/1/22 15:52:12 EDT
00_SOURCES	5 KB	5/5/23 12:04:03 EDT
CHANGES	16 KB	5/5/23 12:04:03 EDT
GETTING_STARTED	6 KB	5/5/23 12:04:03 EDT
HOWTO_Logging_receiver	1 KB	3/29/23 18:00:37 EDT
HOWTO_M17	1 KB	3/31/23 21:18:34 EDT
HOWTO_PotaPutter	3 KB	4/6/23 21:37:02 EDT
HOWTO_PyLogJam	6 KB	4/6/23 21:37:30 EDT
HOWTO_acarsdec	10 KB	4/6/23 22:53:01 EDT
HOWTO_ax25	1 KB	4/6/23 23:14:12 EDT
HOWTO_cwwav	1 KB	4/6/23 23:33:24 EDT
HOWTO_drm_mondiale	3 KB	6/1/22 15:52:12 EDT
HOWTO_gqrx_gpredict	4 KB	6/1/22 15:52:12 EDT
HOWTO_js8call	2 KB	6/1/22 15:52:12 EDT
HOWTO_noaa_apt	2 KB	6/1/22 15:52:12 EDT
HOWTO_resize_virtualbox	1 KB	6/7/22 19:36:38 EDT
HOWTO_setup_bluetooth.pdf	1231 KB	6/1/22 15:52:12 EDT
HOWTO_wefax	2 KB	6/1/22 15:52:12 EDT
HOW_Andy_Setup_nanoVNA-saver.pdf	137 KB	6/1/22 15:52:12 EDT
PACKAGES	393 KB	5/4/23 19:40:36 EDT
RELEASE_NOTES	10 KB	5/5/23 12:04:03 EDT
VERSIONS	4 KB	5/4/23 20:07:46 EDT
Wordsworth	7 KB	6/1/22 15:52:13 EDT
tinySA-saver.link.txt	1 KB	6/1/22 15:52:13 EDT

Menu #1



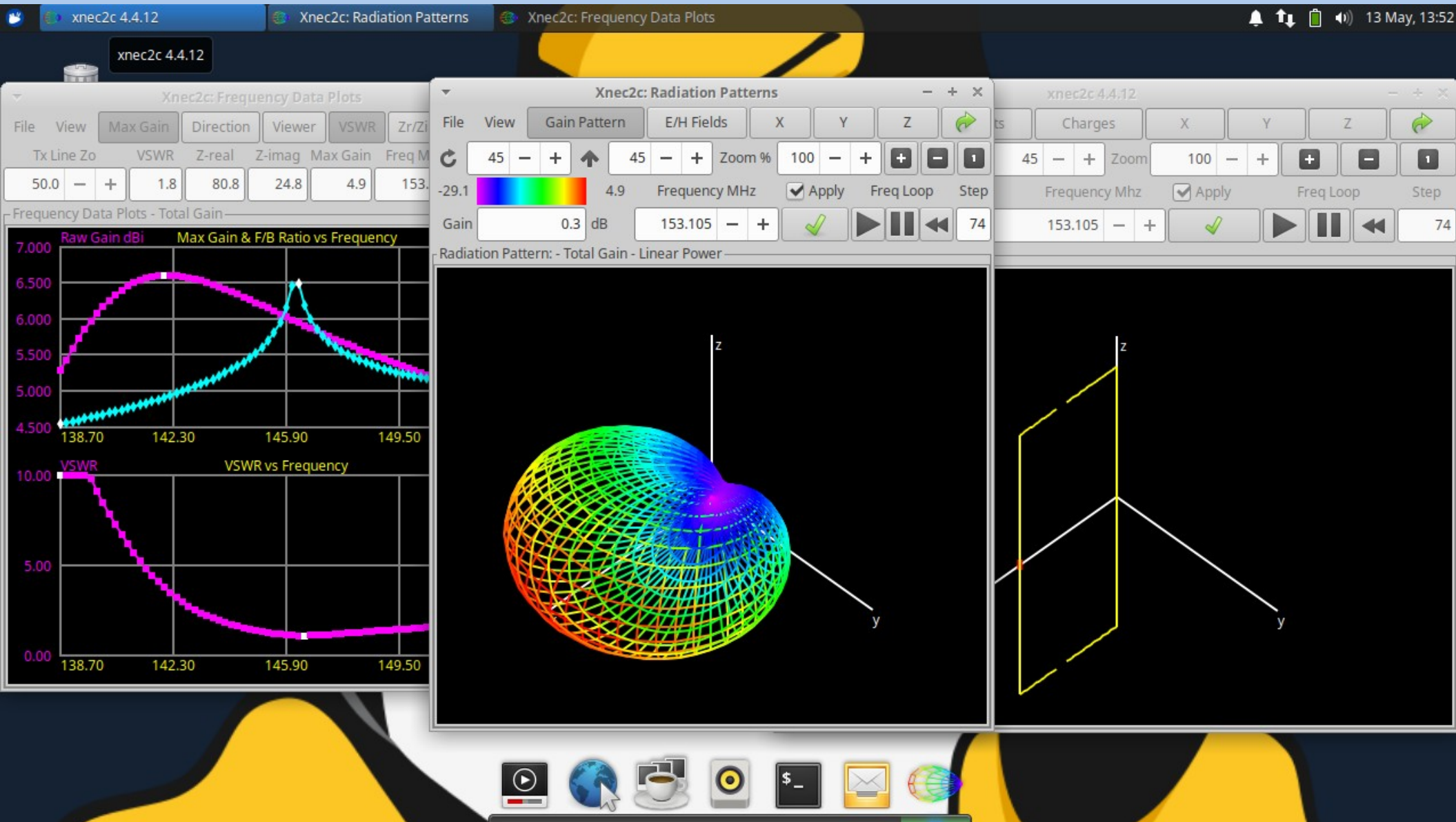
Moxon Rectangle - fl_moxgen

The screenshot shows the **fl_moxgen** application window. The interface includes a menu bar with **File** and **Help**. The main area contains input fields for **Frequency (MHz)** (146), **Wire Size** (12), and a unit selector set to **AWG**. A **Calculate** button is present. Below the inputs is a diagram of a Moxon Rectangle antenna with dimensions A, B, C, D, and E. The diagram labels the **Feedpoint**, **Driven Element**, and **Reflector**. To the right of the diagram, the calculated dimensions are displayed in inches:

Dimension	Value	Unit
A	29.172	in
B	4.048	in
C	1.172	in
D	5.561	in
E	10.781	in

Below the dimensions is a **Result Units** section with radio buttons for **Inches** (selected), **Feet**, **Millimeters**, and **Meters**. A **Quit** button is located at the bottom right of the application window.

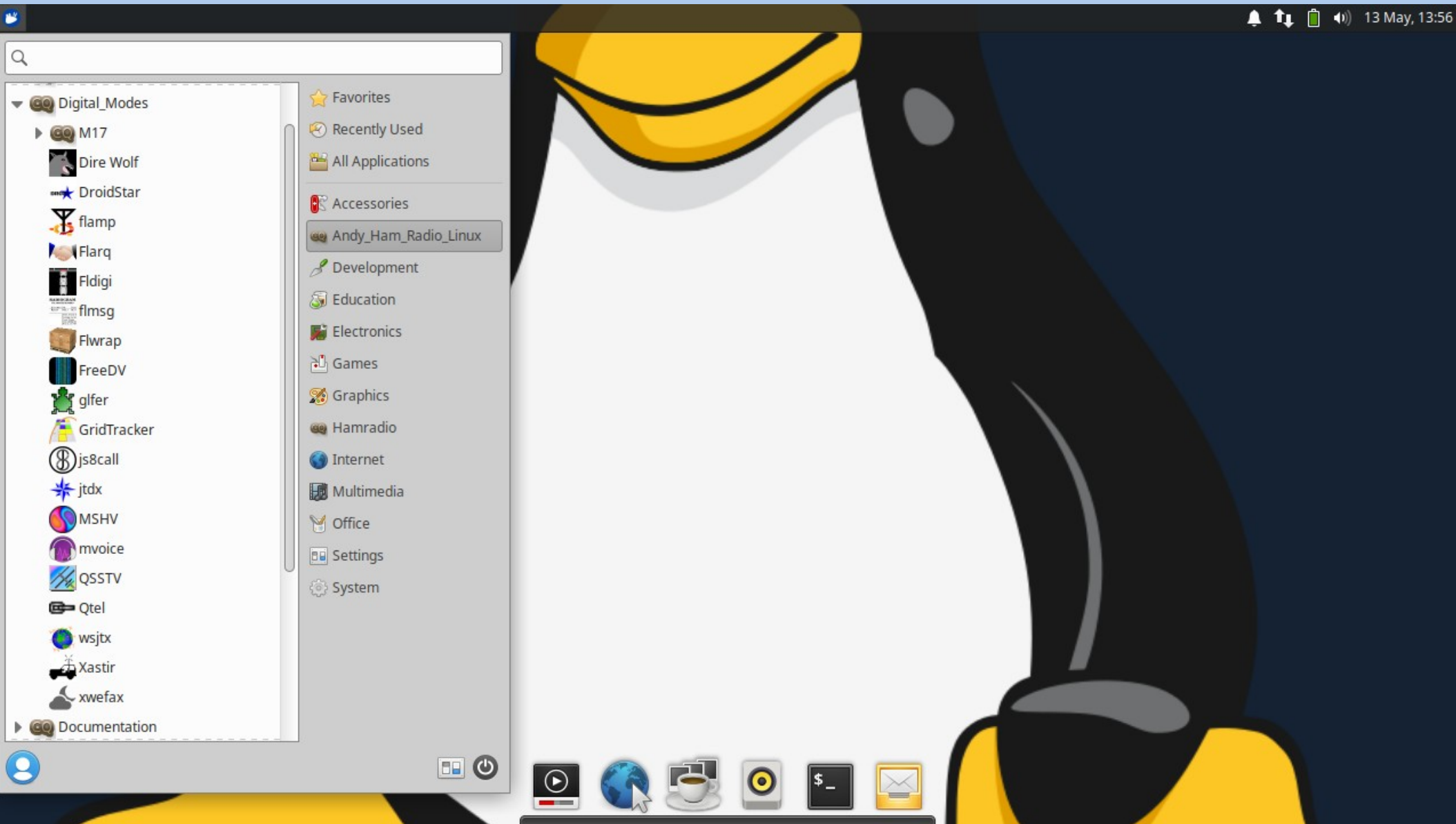
Antenna modeling - xnec2c



CW and Fox Hunting

The screenshot displays a Linux desktop environment with a yellow and black penguin-themed background. The desktop includes a taskbar at the top with icons for 'Micro-Fox Config GPL' and 'Xcwcp', and a dock at the bottom with various application icons. The 'Micro-Fox Config GPL' window is open, showing a menu with 'File' and 'Help', and several configuration fields: 'Tone Speed' (50 ms), 'Tones Duration' (15 sec), 'Loop Time' (30 sec), 'Initial Delay' (0 sec), 'Frequency' (146.565 MHz), and 'Calibration' (0.000 %). A 'Tones' list contains a sequence of numbers: 1, 5, 1, 5, 1, 3, 3, 3, 1, 5, 1, 5, 1, 3, 3, 3, 1, 6, 1, 6, 1, 4, 4, 4, 1, 6, 1, 6, 1, 4, 4, 4, 1, 7, 1, 7, 1, 5, 5, 5, 1, 7, 1, 7, 1, 5, 5, 5, 1, 8, 1, 8, 1, 6, 6, 6, 1, 8, 1, 8, 1, 6, 6, 6. Below these fields is a 'Morse Code ID' section with a 'Text' field containing 'MICROFOX', a 'Speed' field (20 WPM), and a 'Tone' field (7). An 'Enable LED' checkbox is checked. At the bottom of the window are buttons for 'Configure', 'Read Config', 'Save', 'Read Version', 'Write Config', 'Load', and 'Quit'. The 'Xcwcp' terminal window is also open, displaying the text 'TAUAC ZCPWU JNQTA ROTER VAUNJ FOZAG PTGLV KMXCI RLYIG YBUTH NPHIE' and 'Output: PulseAudio'.

Menu #2



Digital Modes - wsjtx

The screenshot displays the WSJT-X v2.5.4 software interface. The main window is titled "WSJT-X v2.5.4 by K1JT, G4WJS, K9AN, and IV3NWV". It features a menu bar with "File", "Configurations", "View", "Mode", "Decode", "Save", "Tools", and "Help".

The interface is divided into several sections:

- Band Activity:** A table showing received signals. The selected mode is 20m. The table has columns for UTC, dB, DT, Freq, and Message. The selected entry is: UTC: 172630, dB: -6, DT: 0.3, Freq: 687, Message: N2DMI N0JZ -16.
- Rx Frequency:** A table showing received signals. The selected mode is 20m. The table has columns for UTC, dB, DT, Freq, and Message. The selected entry is: UTC: 172515, dB: -4, DT: -1.1, Freq: 1415, Message: CQ N8HCS EN63 U.S.A.
- Controls:** Includes buttons for "CQ only", "Log QSO", "Stop", "Monitor", "Erase", "Decode", "Enable Tx", "Halt Tx", and "Tune". There are also checkboxes for "Tx even/1st" and "Hold Tx Freq".
- Frequency and Mode:** The current mode is 20m and the frequency is 14.074 000. The transmit rate is 1423 Hz and the receive rate is 1423 Hz. The report rate is -15. There are checkboxes for "Auto Seq" and "Call 1st".
- DX Call and Grid:** The DX Call is EA8J and the DX Grid is IL18. The distance is 3161 mi and the azimuth is 89. There are buttons for "Lookup" and "Add".
- Generate Std Msgs:** A list of standard messages with "Next" and "Now" buttons and a power slider. The selected message is "CQ KB1OIQ FN42".
- Wide Graph:** A waterfall plot showing frequency activity over time. The x-axis is frequency in kHz (500 to 3000) and the y-axis is time (17:24:45 to 17:26:30). A red box highlights a signal at approximately 14.074 MHz.

GridTracker

- As of v25a: GridTracker is installed by default
- This is a MOST EXCELLENT program!
- Graphically manage grids:
 - Needed, Contacted but not confirmed, Confirmed
- Talks to wsjtx (and wsjtx talks to xlog)
- Logs sent to LoTW and others

GridTracker

GridTracker 1.22.0503 [Band: 20m Mode: FT8 Layer: Grids - Worked 498 Confirmed 445]

GridTracker
 14.074.000 Hz (20m) FT8
 Mon 08 Aug 2022 17:33:37 UTC
 EA8J IL18 -15
 Canary Is. 3154mi 89°

RECEIVE

Rx Calls 47 QSO 22607
 Rx DXCC 4 QSL 7744
 Clear Live Clear Log

Map View Filters
 Band Auto
 Mode Auto
 Prop Unknown
 Data Logbook & Live

Legend
 QSO QSL
 QSX CQ CQDX
 QRZ QTH WSPR

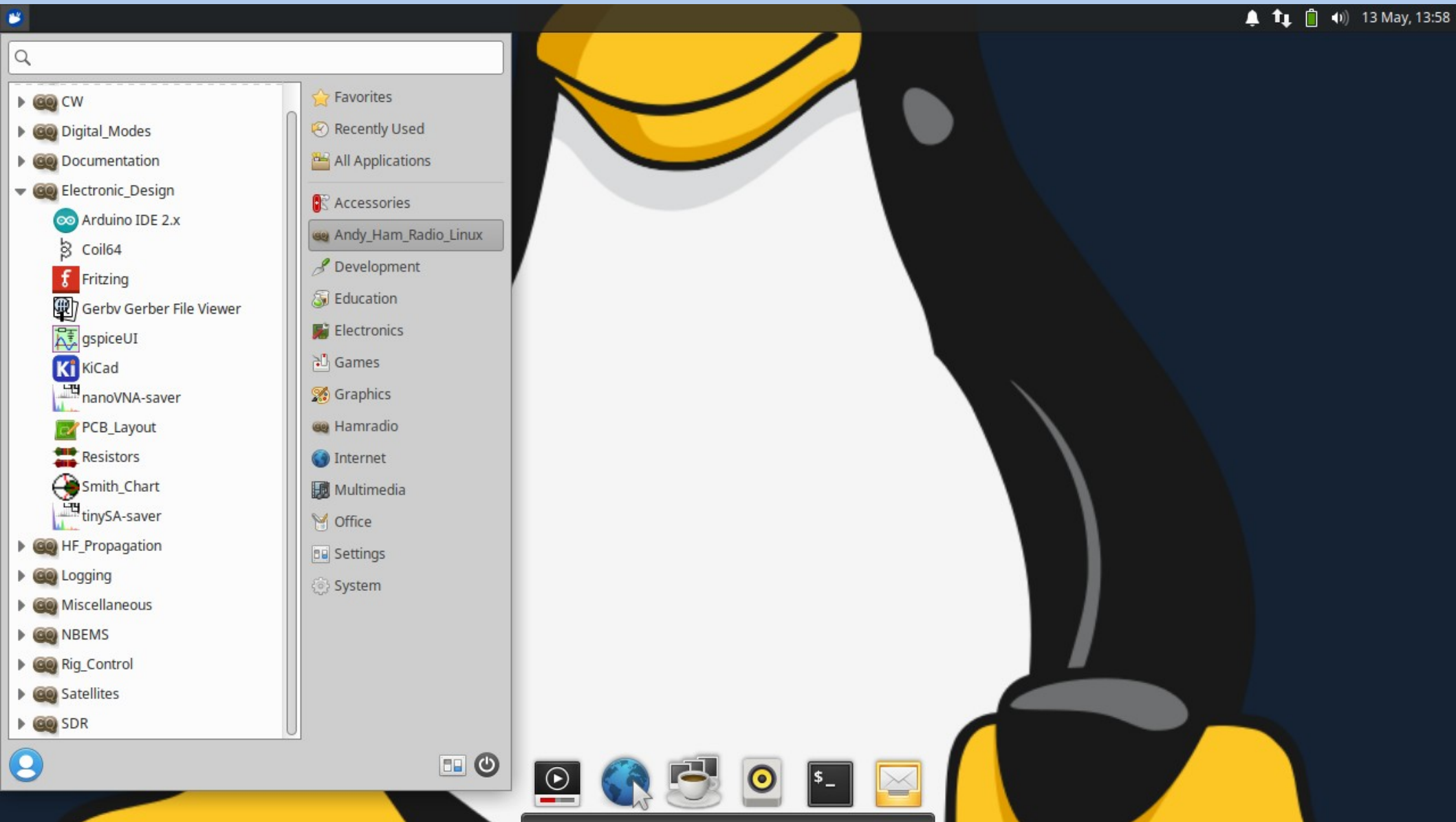
Call Roster: 47 heard • 11 in roster • 3 wanted

RECEIVE Halt Tx Logbook Live Band & Mode Callsigns All Traffic/Only Wanted Hunting New+Unconfirmed More Controls

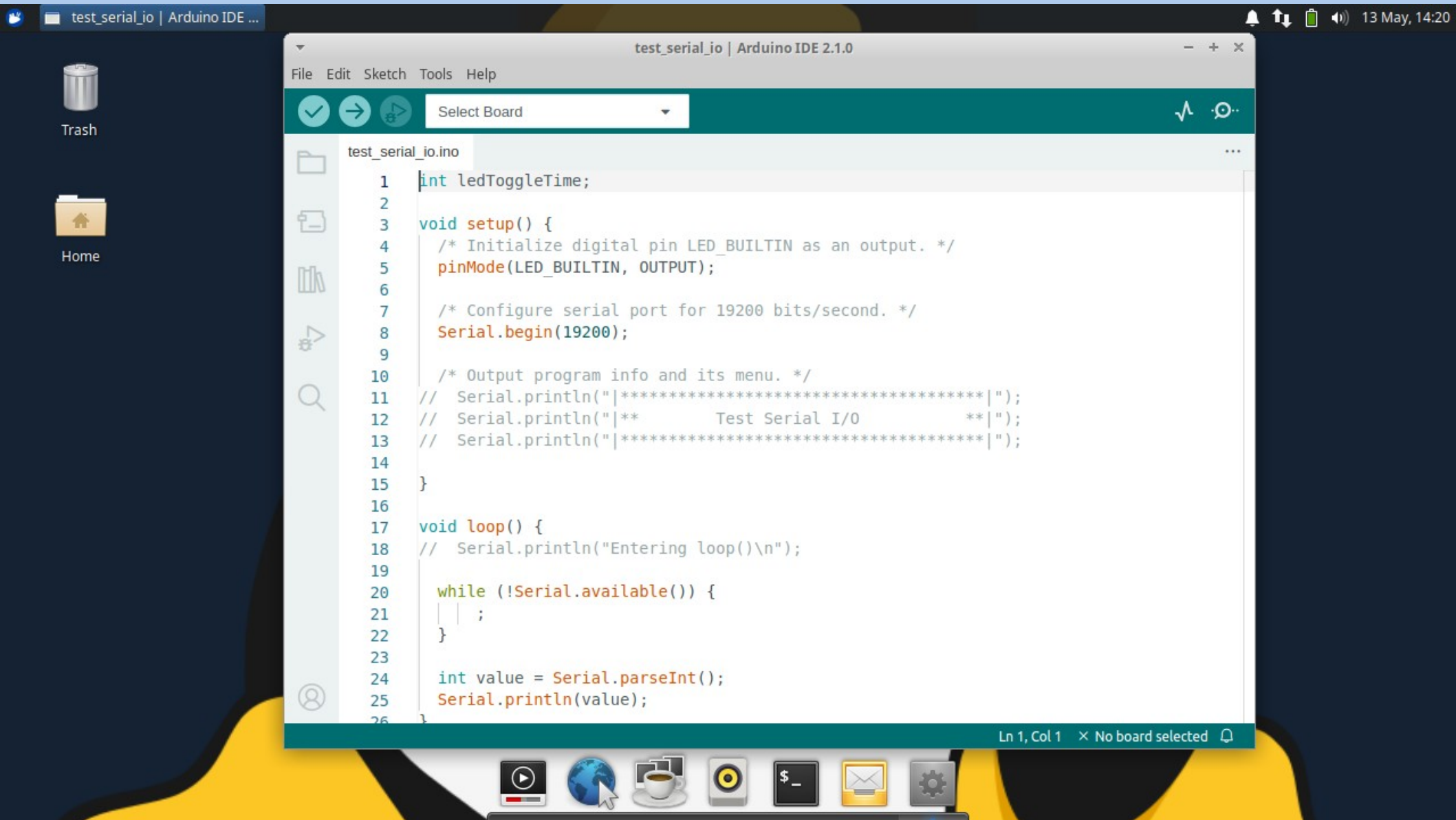
Callsign	Grid	Calling	DXCC	Flag	State	County	Cont	dB	Azim	PX	OAMS	Age
K9FE	EN51	CQ	United States		IL	Dupage	NA	-11	271	K9		0s
KF9UG	EN71	CQ	United States		IN	¿ Allen ?	NA	10	268	KF9		0s
LZ3CB	KN32	CQ	Bulgaria				EU	-12	52	LZ3		15s

20m / FT8
 GridTracker
 v1.22.0503

Menu #3



Electronic Design - arduino



Electronic Design - coil64

The screenshot displays the Coil64 v2.1.26 software interface. On the left, a 3D model of a coil is shown with dimensions: D (former diameter), l (winding length), d (wire diameter), and k (wire diameter with insulation). Below the model is a list of coil forms, with "One layer close-winding coil" selected.

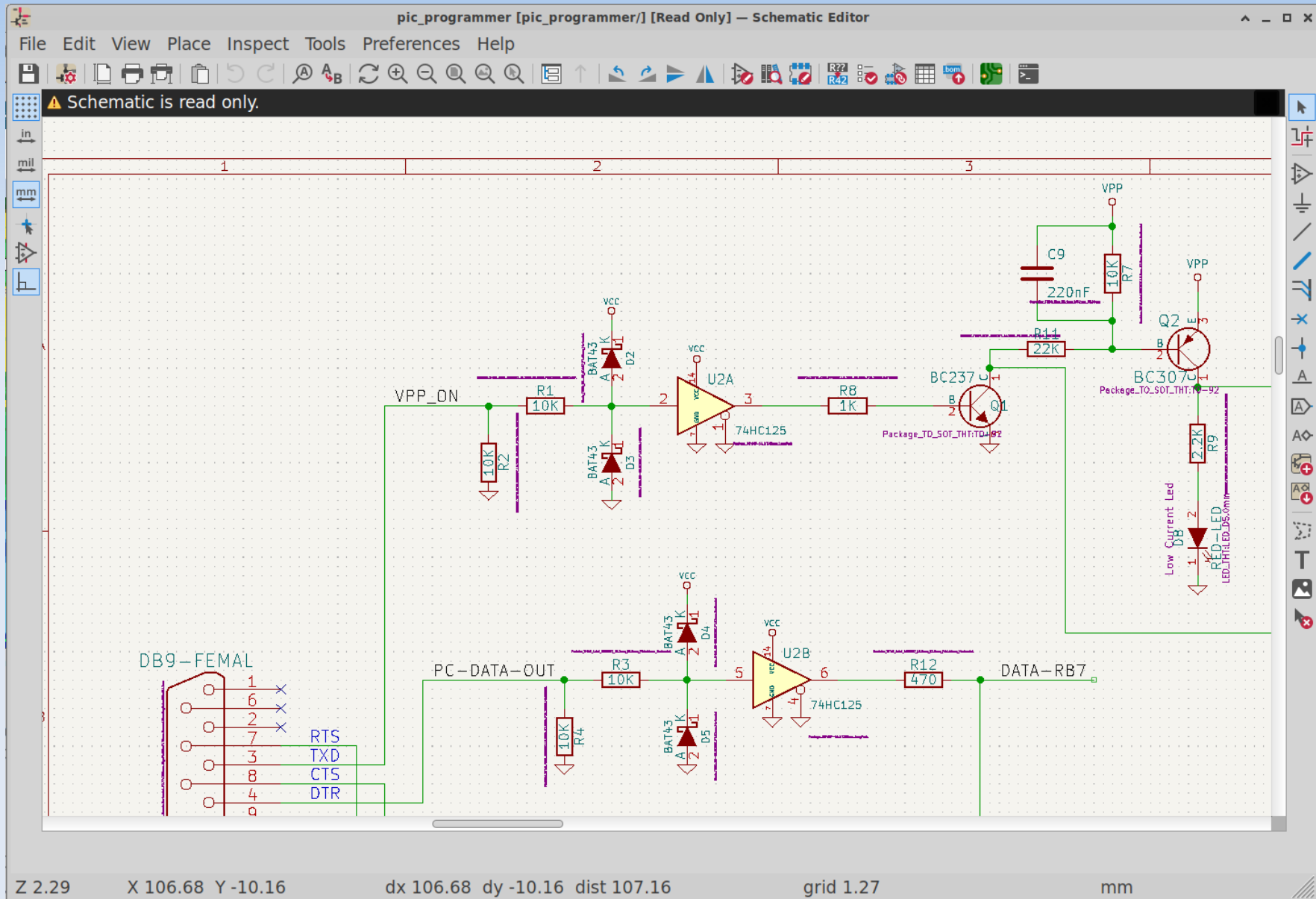
The main window contains the following input fields and options:

- Coil: Inductance, LC circuit
- Inductance L: 50 microH
- Frequency f: 0.6 MHz
- Former diameter D: 37 mm
- Wire diameter d: 3 mm
- Wire diameter with insulation k: 3.27 mm
- Select initial data of the calculation:
 - Former diameter and wire diameter
 - Former diameter and winding length
- Wire material:
 - Copper
 - Silver
 - Aluminum
 - Tin

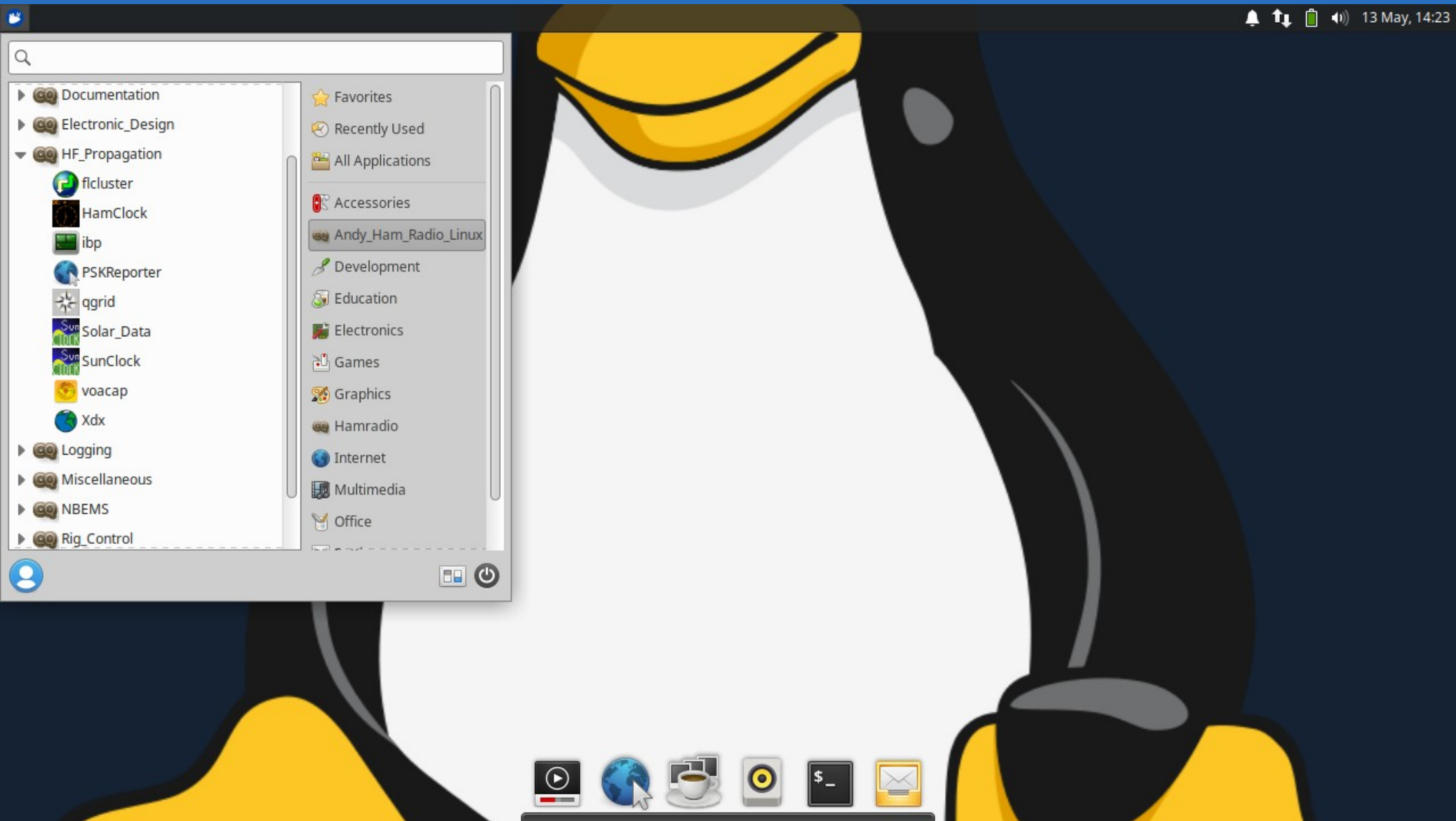
A "Calculate" button is located at the bottom of the main window.

On the right, a calculation window titled "Coil64 v2.1.26 - One layer close-winding coil" shows the input parameters: Inductance L: 50 microH and Frequency f: 0.6 MHz. Below the window is a toolbar with various icons.

Electronic Design - kicad



Menu #4



HF Propagation #1

ImageMagick: solar.gif

Solar-Terrestrial Data - <http://www.n0nbh.com>

08 Aug 2022 1838 GMT

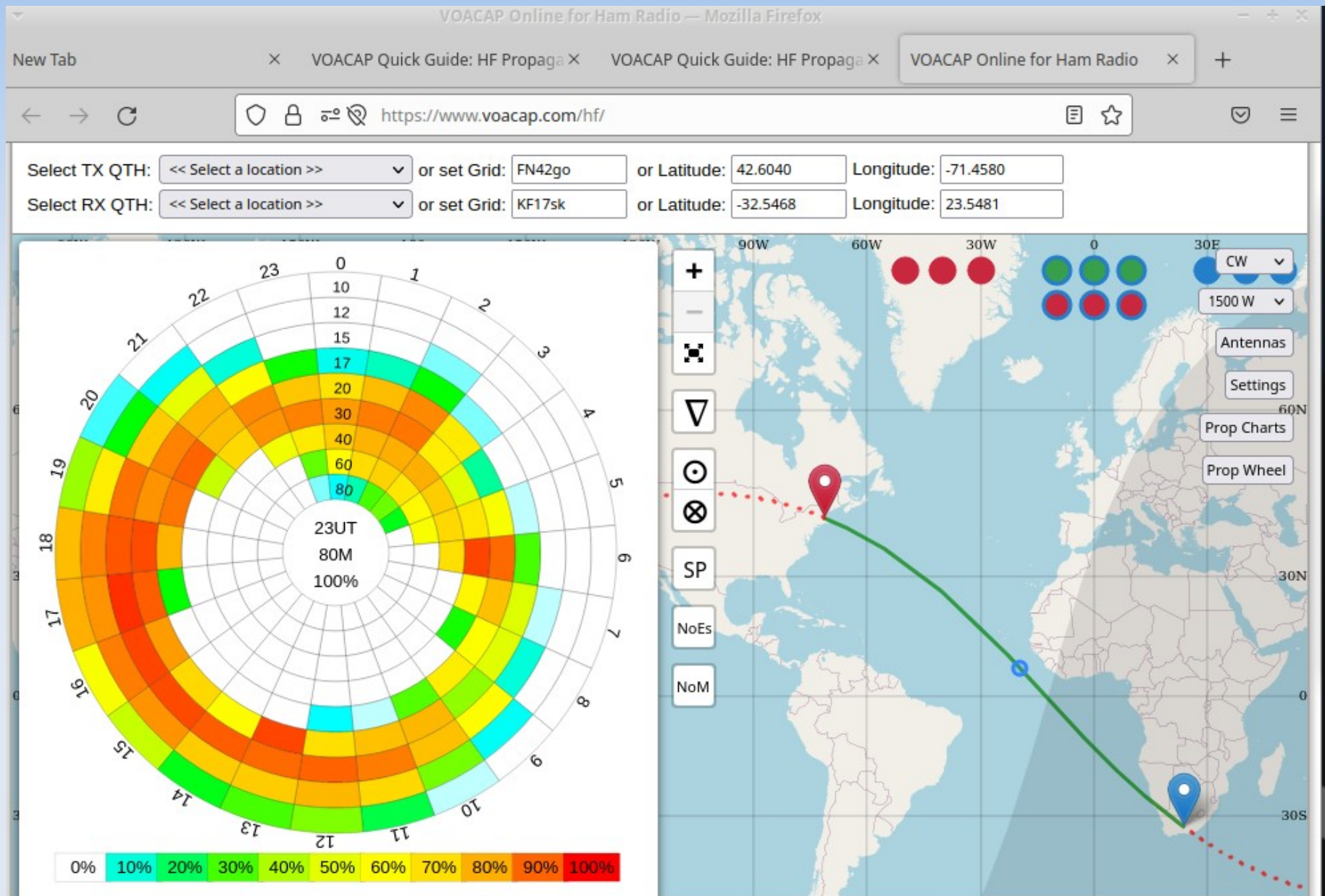
SFI 116	SN 74	VHF Conditions		HF Conditions		
A 24 K 3 / PIntry	X-Ray B4.5	Item	Status	Band	Day	Night
304A 129.8 @ SEM	Ptn Flx 16	Aurora	Band Closed	80n-40n	Poor	Fair
Elc Flx 976	Aurora 5/n=1.99	6n EsEU	50MHz ES	30n-20n	Good	Good
Aur Lat 62.5°	Aur Lat 62.5°	4n EsEU	Band Closed	17n-15n	Fair	Fair
Bz -3.3 SW 575.6	MUF	2n EsEU	High MUF	12n-10n	Poor	Poor
	MS	2n EsNA	Band Closed	Geomag Field	UNSETTLD	
		EME Deg	Poor	Sig Noise Lvl	S2-S3	
				MUF US Boulder	18.05	
				Solar Flare Prb	20%	
				(C) Paul L Herrman 2021		

QGrid 3.2

File Help

Locator	Home	Remote	Compass		
	FN42GO	FN32LL			
Latitude	42 36 15	42 28 45			
Longitude	-71 27 30	-73 2 30			
Bearing	264	Distance			
To Lat/long		To Locator	Clear		

HF Propagation #2



Logging SW: Xlog



Log Edit Options Tools Page Settings Help

Write Update Delete

QSO 691

Date: 16 Aug 2010
UTC: 0023
Call: AB1HD
MHz: 50
Mode: SSB
TX(RST): 59
RX(RST): 59
 QSL out QSL in
Locator: FN42ho
Remarks: Rich, Chelmsford, MA 01824 USA

NR	DATE	UTC	CALL	BAND	MODE	RST	MYRST	QSLOL	QSLIN	LOCATOR
691	16 Aug 2010	0023	AB1HD	50	SSB	59	59			FN42ho
690	16 Aug 2010	0023	WA1KBE	50	SSB	59	59			FN42ho
689	08 Aug 2010	2035	VE3CWU	7	CW	579	229			FN03
688	08 Aug 2010	2000	N2JNZ	7	CW	459	559			FN24
687	08 Aug 2010	1910	KL7GLL	7	CW	459	449			FM18
686	31 Jul 2010	2145	I5ZSS	18	SSB	59	58			JN53ku
685	12 Jul 2010	0016	WA1KBE	50	SSB	59	59			FN42ho
684	11 Jul 2010	2151	WM4X	7	CW	579	579			FM18
683	11 Jul 2010	2140	W8JRA	7	CW	559	559			EN80
682	11 Jul 2010	1627	N8KZH	7	CW	359	559			EN90
681	11 Jul 2010	1305	W1ZX	7	CW	599	419			FN30
680	11 Jul 2010	1240	VA2NB	7	CW	359	579			FN25

Ready.   22 Aug 2010 1330 UTC

CQRLOG

New QSO ... (CQRLOG for Linux), database: Log 001

File View Window Statistics Online log Help

qsodate	time_on	time_off	callsign	freq	mode	rst_s

QSO nr. 1 QTH profile: New country!!

Call: Frequency: Mode: AUTO RST sent: RST rcvd:

Name: QTH: GRID: PWR: QSL_S: QSL_R:

ITU: WAZ: IOTA: State: County: Award:

DXCC ref.: Comment to QSO: QSL VIA:

Offline

Date: Start time: End time:

Comment to callsign:

DXCC statistic

	1.8	3.5	7	10.1	14	18	21	24	28	50	144	430
SSB												
CW												
DIGI												

DXCC info

USA, Massachusetts

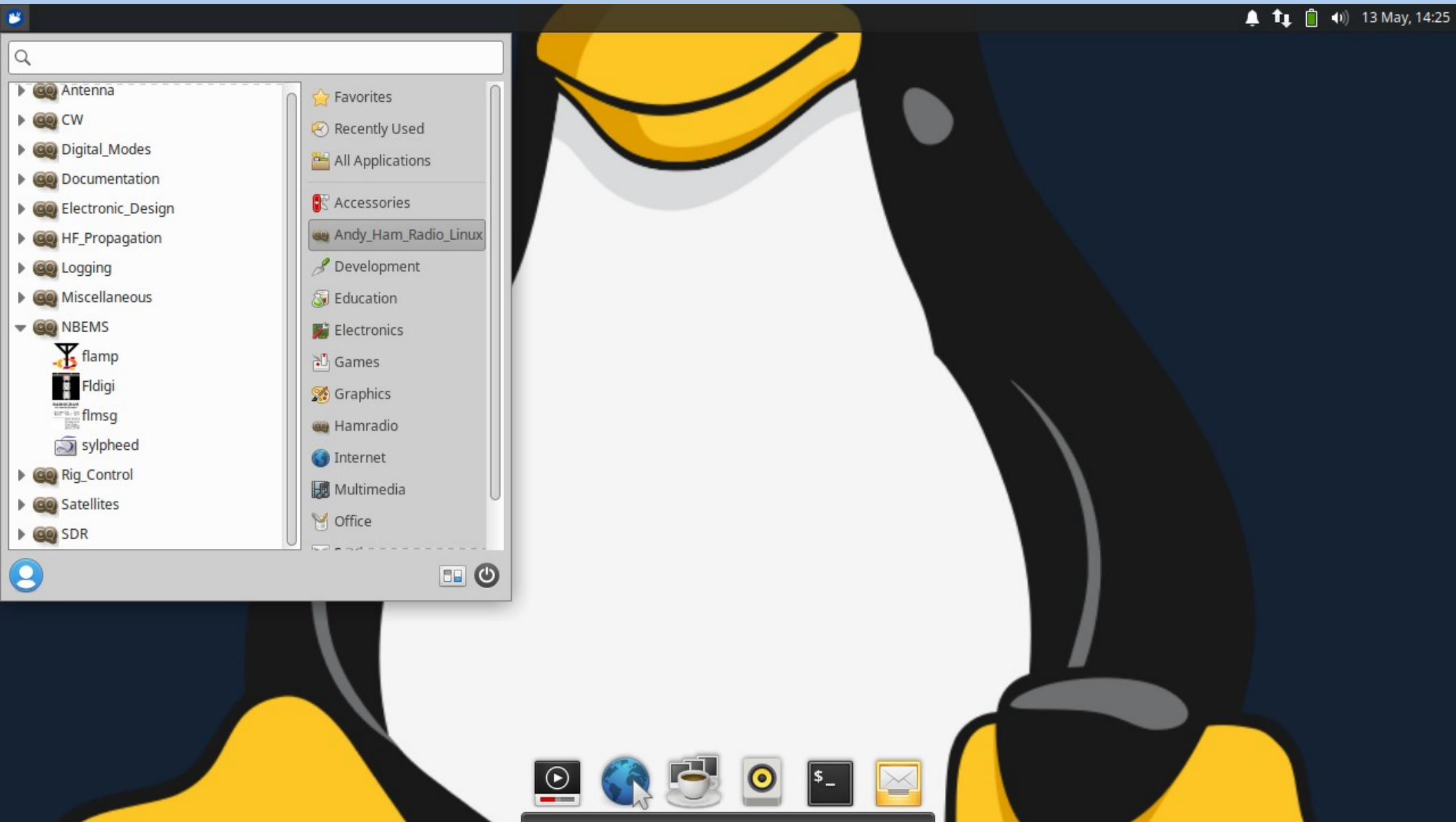
WAZ: 05 Cont: NA
 ITU: 08 DXCC: W
 LAT: 42.2373N LONG: 71.5314W
 DIST.: AZIM:
 10:17:51 23:14:24
 2019-09-05 22:08:41 GE
 Local:

Callbook (HamQTH.com)

Save QSO [enter] Quit program

My grid (to change press CTRL+L) Ref. call (to change press CTRL+R) KB1OIQ Ver. 2.3.0 (001)

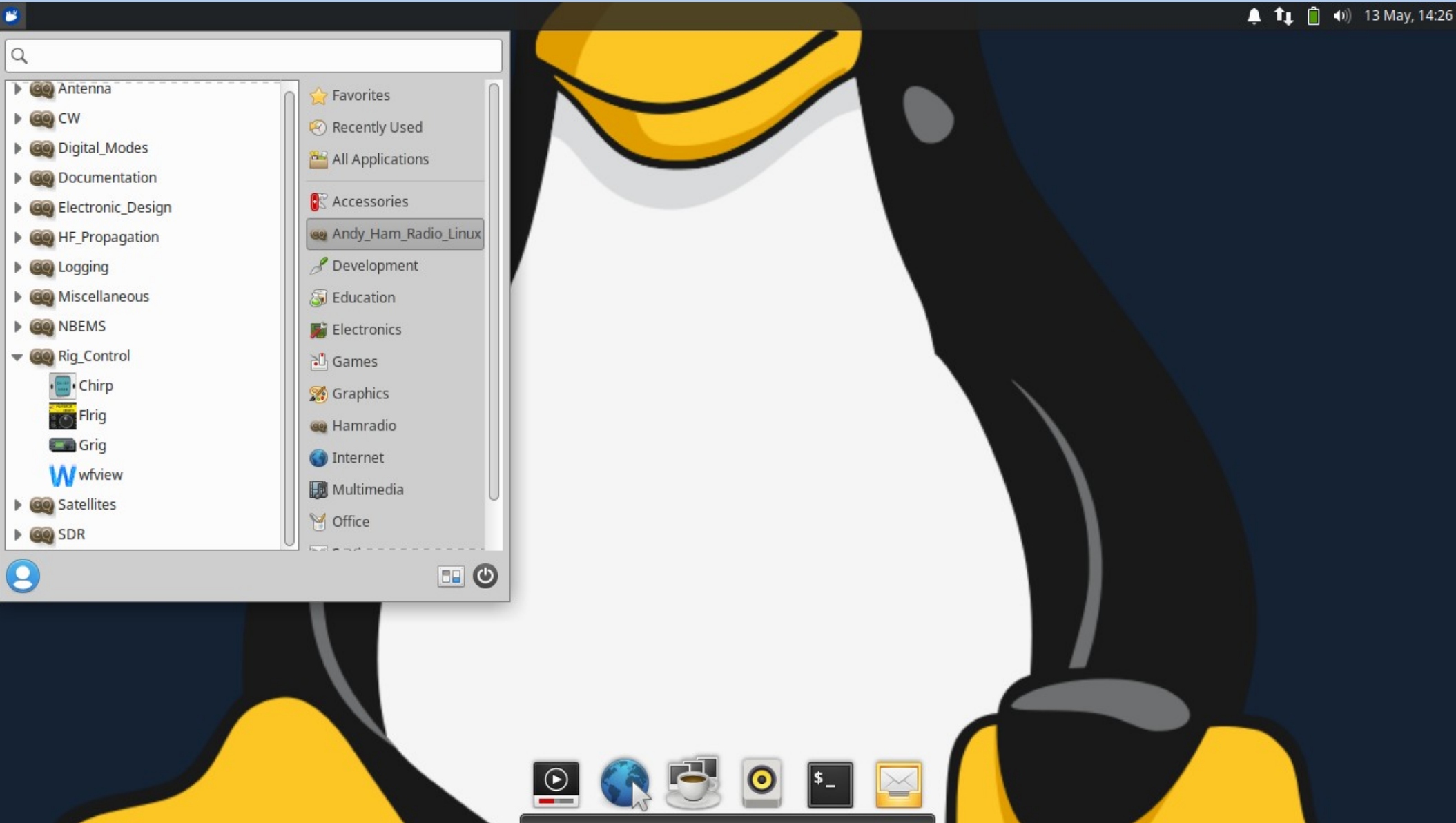
Menu #5



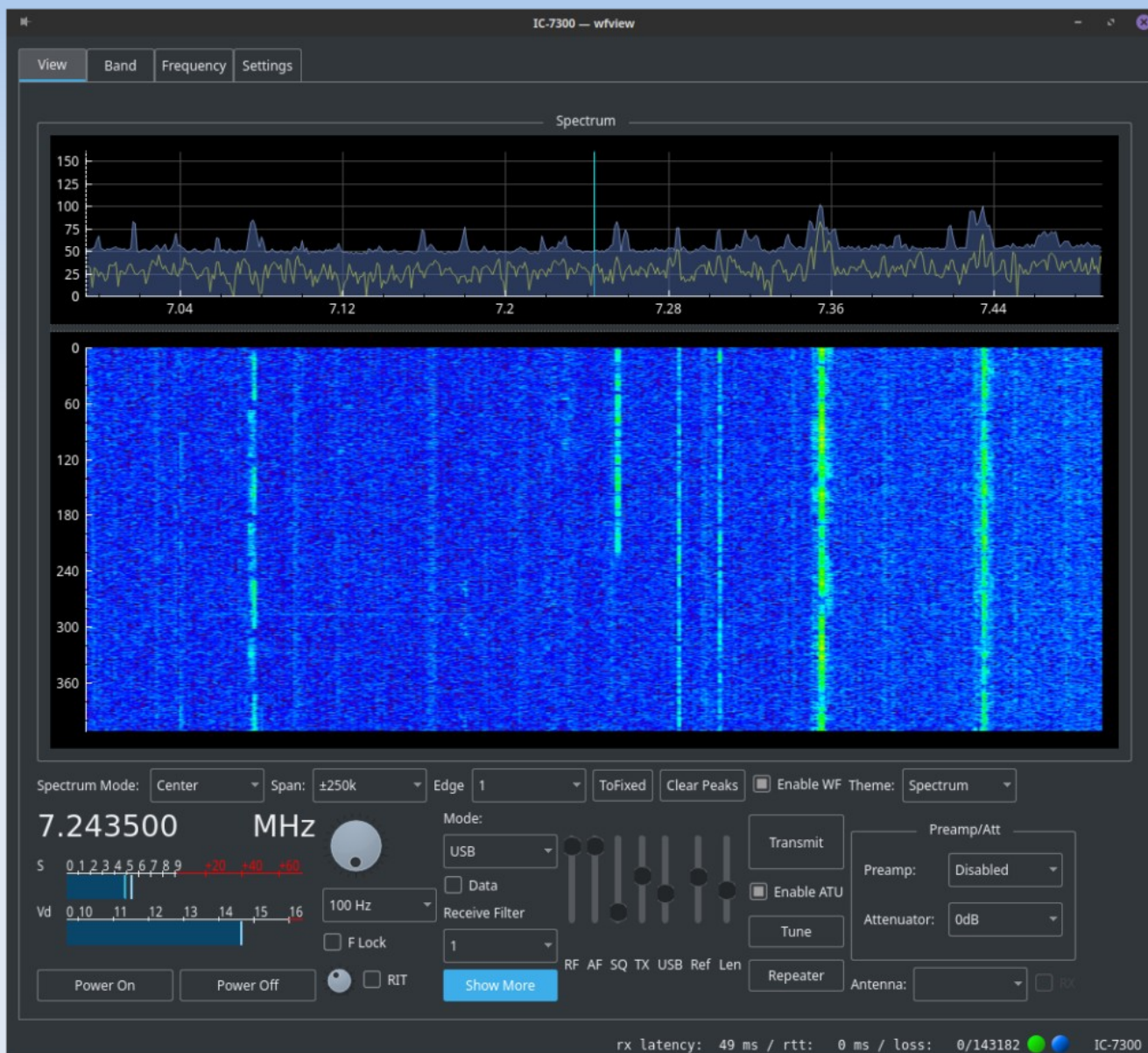
NBEMS

- Narrow Band Emergency Messaging System
- Open Source software suite
- Runs on the 3 major operating systems
- No infrastructure required
- Used by EMCOMM folks
- Ties in with sylpheed email program

Menu #6



Rig Control - wfview



Satellites - FoxTelem

AMSAT Telemetry Analysis T... 13 May, 14:29

Applications Menu
Trash
Home

AMSAT Telemetry Analysis Tool

File Decoder Spacecraft Help

Input Fox-1E

Health WOD VU Rad (1E) VU Rad WOD Measurements

Satellite Mode: Telemetry Payloads Decoded:
Latest Realtime: Epoch: Uptime: Max: Epoch: Uptime: Min: Epoch: Uptime:

Radio			
	RT	MIN	MAX
TX Temperature (C)	0000	0000	0000
PA Current (mA)	0000	0000	0000
RSSI (dBm)	0000	0000	0000
Fwd Power (mW)	0000	0000	0000
Ref Power (mW)	0000	0000	0000
VGA Control (V)	0000	0000	0000
TX Antenna	0000		
RX Antenna	0000		

Computer Hardware			
	RT	MIN	MAX
Temperature (C)	0000	0000	0000
Battery I2C	0000		
PSU1 I2C	0000		
PSU2 I2C	0000		
RF I2C	0000		
Ground Resets	0000		
IHU Hard Error Data	0000		

Computer Software			
	RT	MIN	MAX
Spacecraft Spin (rpm)	0000	0000	0000
Diagnostic Info	0000		
WOD Stored (000s)	0000		
Safe Mode	0000		
Auto Safe Mode	0000		
Auto Safe Allowed	0000		
Science Mode	0000		
Soft Error	0000		

Battery			
	RT	MIN	MAX
Cell A (V)	0000	0000	0000
Cell A + B (V)	0000	0000	0000
Cell A + B + C (V)	0000	0000	0000
Temperature A (C)	0000	0000	0000
Temperature B (C)	0000	0000	0000
Temperature C (C)	0000	0000	0000
Current (mA)	0000	0000	0000
Board Temp (C)	0000	0000	0000

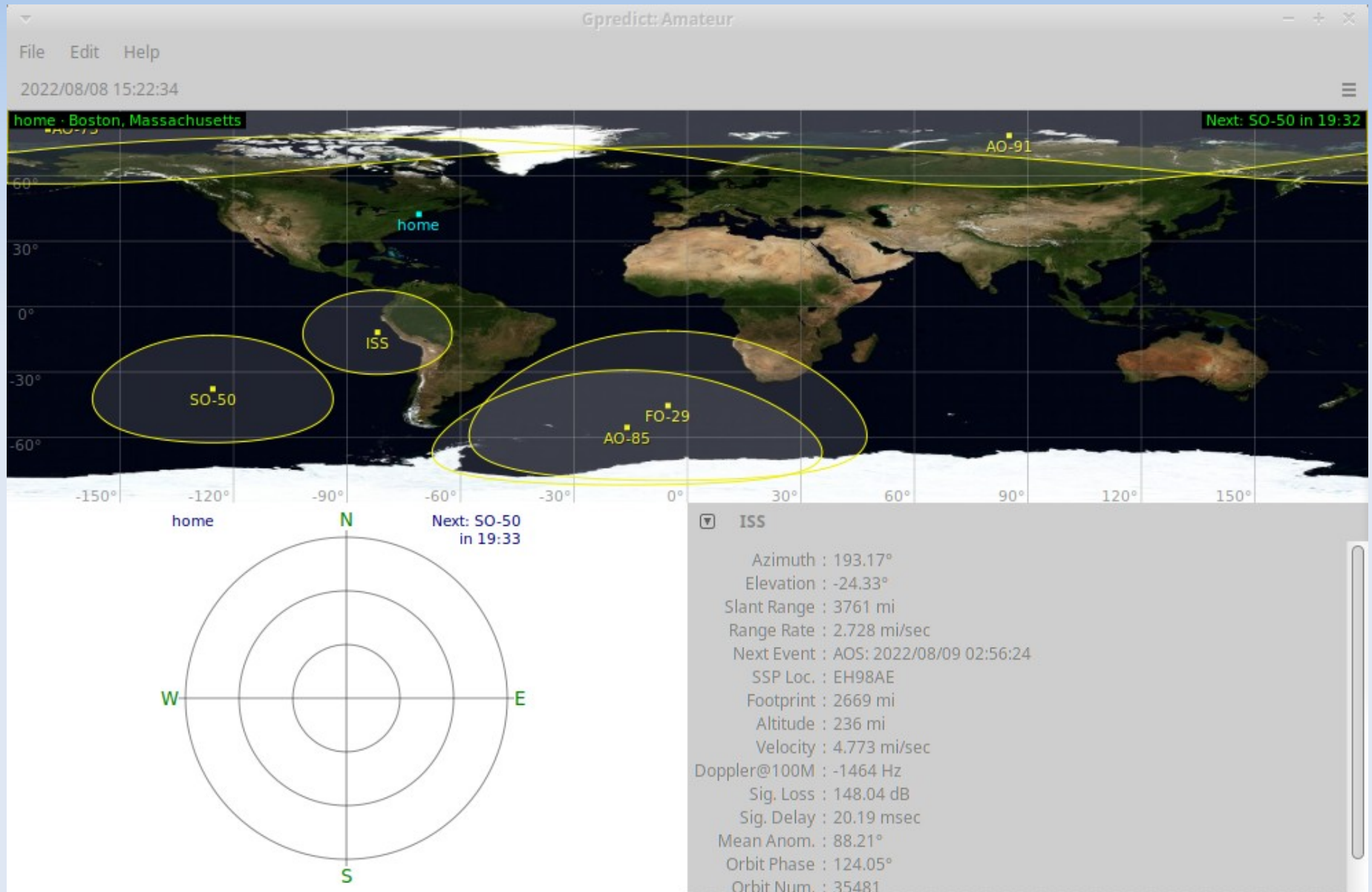
MPPT			
	RT	MIN	MAX

Experiments			
	RT	MIN	MAX
EXP4 Temp (C)	0000	0000	0000
Vanderbilt Radiation	0000		

Current RT MAX MIN Display Raw Values Display UTC Time Last 180 samples Captured:

Version 1.12z3 - 27 Oct 2022 Logs: /home/andy/ SDR Errors: 0 / 0 Audio missed: 0.0% / 0 Frames: 0 Payloads: 0 Queue: 0 / 0

Satellites - gpredict



SDR – GNU Radio Companion

- SDR = Software Defined Radio
- Draw a block diagram of your signal processing
- GRC will write the Python code and execute it
- Supports SDR devices such as:
 - RTL-SDR dongle
 - HackRF
- Many tutorials are available online

SDR – GNU Radio Companion #1

The screenshot displays the GNU Radio Companion (GRC) interface for a project named 'hackrf_lesson_1.grc'. The main workspace shows a signal flow graph with the following components:

- RTL-SDR Source**: Sync: Unknown PPS, Number Channels: 1, Sample Rate (sps): 2M, Ch0: Frequency (Hz): 99.5M, Ch0: DC Offset Mode: 0, Ch0: IQ Balance Mode: 0, Ch0: Gain Mode: False, Ch0: RF Gain (dB): 10, Ch0: IF Gain (dB): 20, Ch0: BB Gain (dB): 20.
- Low Pass Filter**: Decimation: 10, Gain: 1, Sample Rate: 2M, Cutoff Freq: 75k, Transition Width: 25k, Window: Hamming, Beta: 6.76.
- Rational Resampler**: Interpolation: 12, Decimation: 5, Taps: Fractional BW: 0.
- WBFM Receive**: Quadrature Rate: 480k, Audio Decimation: 10.
- Multiply Const**: Constant: 250m.
- Audio Sink**: Sample Rate: 48 kHz.
- QT GUI Frequency Sink**: FFT Size: 2048, Center Frequency (Hz): 99.5M, Bandwidth (Hz): 2M.
- QT GUI Waterfall Sink**: FFT Size: 1024, Center Frequency (Hz): 99.5M, Bandwidth (Hz): 2M.
- QT GUI Range** (freq): ID: freq, Label: Freq, Default Value: 99.5, Start: 88, Stop: 108, Step: 100m.
- QT GUI Chooser** (Station): ID: freq, Label: Station, Num Options: 4, Default option: 99.5, Option 0: 99.5 (Label 0: WCRB), Option 1: 100.7 (Label 1: WZLX), Option 2: 104.5 (Label 2: WXLO), Option 3: 105.7 (Label 3: WROR).
- QT GUI Range** (Volume): ID: volume, Label: Volume, Default Value: 250m, Start: 0, Stop: 1, Step: 25m.

At the bottom left, a terminal window shows the following output:

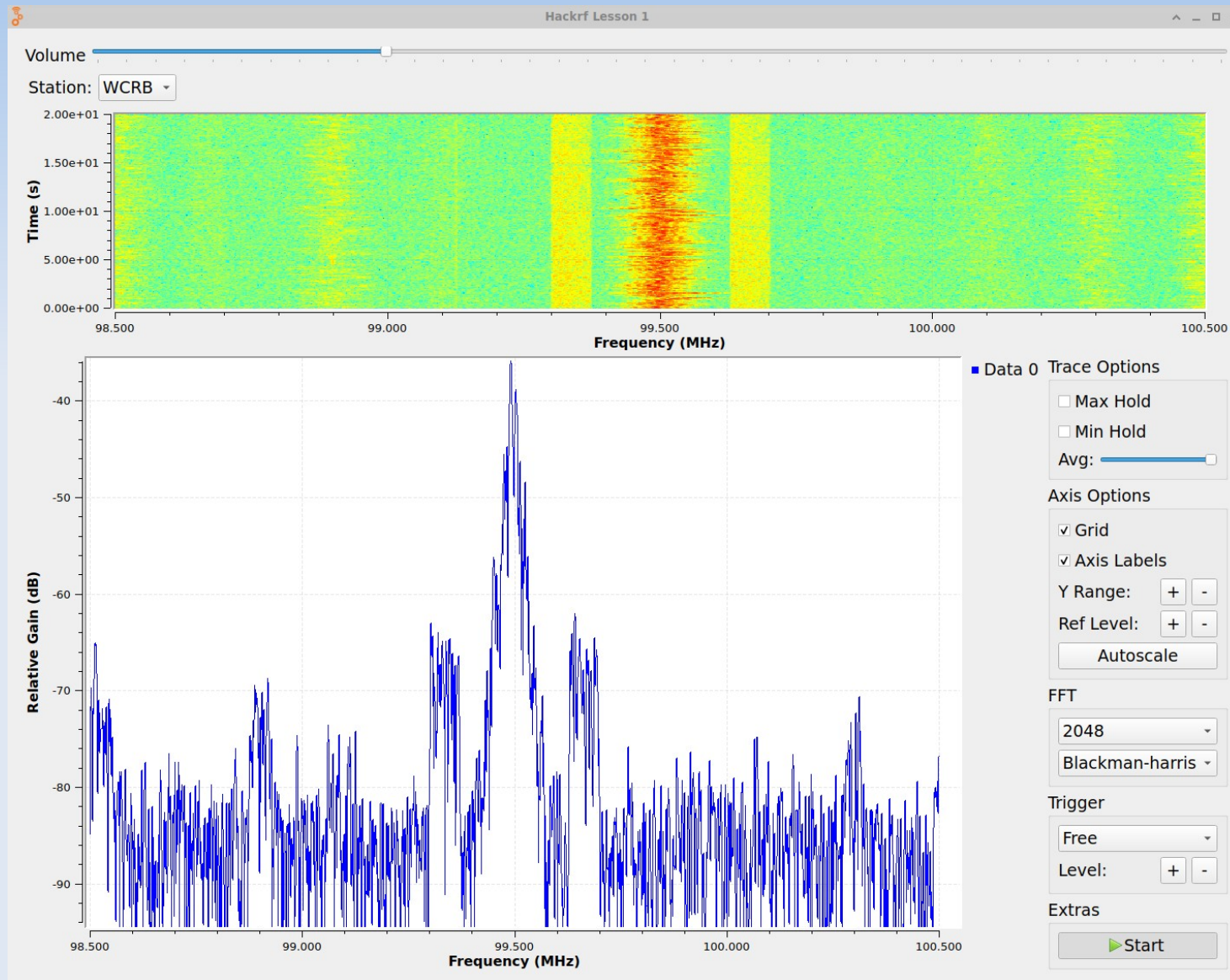
```
00000001
Detached kernel driver
Found Rafael Micro R820T tuner
[R82XX] PLL not locked!
Exact sample rate is: 2000000.052982 Hz
[R82XX] PLL not locked!
Allocating 15 zero-copy buffers
aU
```

At the bottom right, a variable table is visible:

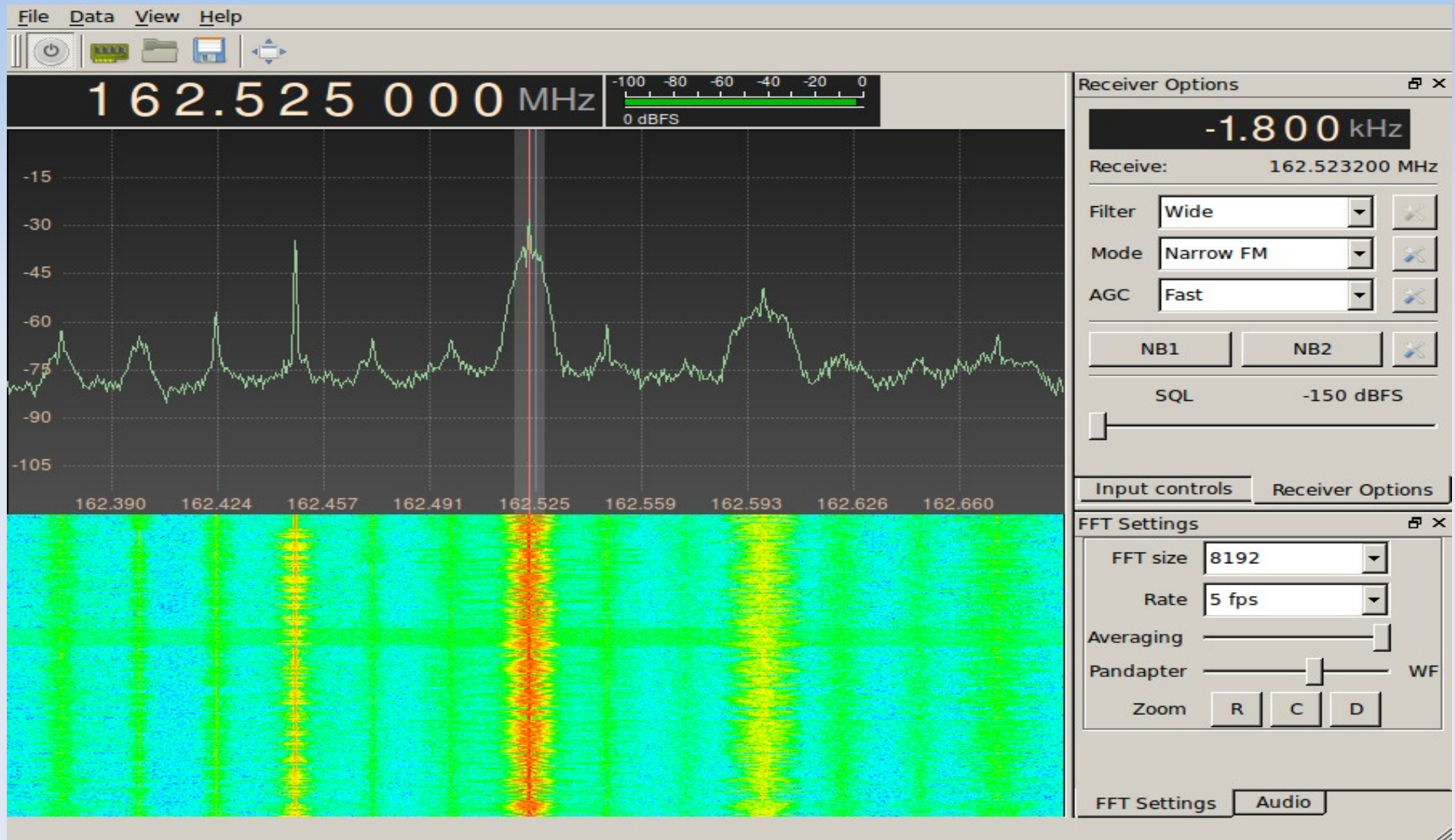
ID	Value
Imports	
Variables	
freq	99.5
freq	99.5
samp_ra	2000000.0

A sidebar on the right lists various GNU Radio blocks, including Core, Audio, Boolean Operators, Byte Operators, Channelizers, Channel Models, Coding, Control Port, Debug Tools, Deprecated, Digital Television, Equalizers, Error Coding, File Operators, Filters, Fourier Analysis, GUI Widgets, Impairment Models, Industrial I/O, Instrumentation, IQ Balance, IQ Correction, Level Controllers, Math Operators, Measurement Tools, Message Tools, Misc, Modulators, Networking Tools, and OFDM.

SDR GNU Radio Companion #2



SDR - gqrx



SDR - sdrangel

The screenshot displays the SDRangel v7 software interface. The main window is titled "SDRangel v7" and features a menu bar with "File", "View", "Workspaces", "Preferences", and "Help". Below the menu bar is a toolbar with various icons for file operations and playback. The interface is divided into several sections:

- Top Left:** A control panel for the RTL-SDR[0] device. It shows a frequency of 0,444,500 kHz, a sample rate of 1,024,000 S/s, and a resolution bandwidth of 2,500 kHz. Other settings include LO ppm, Auto DC/IQ, Bias T, Fp, Cen, and Gain (43.9 AGC).
- Top Right:** A plot titled "R:0 RTL-SDR[0]" showing a spectrum plot with a center frequency of 444.5000M and a sample rate of 64.000k. The plot shows a noisy signal with a prominent peak at approximately 444.5125M.
- Bottom Left:** A control panel for the NFM Demodulator. It shows a frequency offset of +0,012,500 Hz, a gain of -52.7 dB, and various filter settings including CS (12.50 k), RF (12.5k), AF (3.0k), and FMd (±2.5k). Other settings include CTCSS, DCS (023N), and Vol (100).
- Bottom Right:** A spectrogram plot showing the signal's frequency over time. The plot shows a clear signal structure with a central peak and sidebands.

The status bar at the bottom of the window displays the following information: "SDRangel 7.0.0-alpha.1-10-g632378205 Qt 5.15.2 OpenGL 4.6 x86_64 Ubuntu 21.10 2022-04-27 19:25:40 CEST".

What's new and cool?

- Free Digital Voice (FreeDV)
 - Codec2: David (VK5DGR) Rowe
 - <https://freedv.org/>
- M17 Project
 - Low level protocols using Codec2
 - <https://m17project.org/>
 - Jan 2023: liberated two TYT MD-380s which now run M17(!)
 - M17 software available in AHRL v25a
 - I'm eager to learn more about M17

Raspberry Pi Version of AHRL

- 0.1alpha is IN PROGRESS
- Release date: prior to the Dayton Hamvention (middle of May 2024)
- Tested on:
 - Raspberry Pi OS 5.2
 - Raspberry PI 5
 - 64-bit OS
- Other configurations MIGHT work

Raspberry Pi 5 AHRL Screenshot

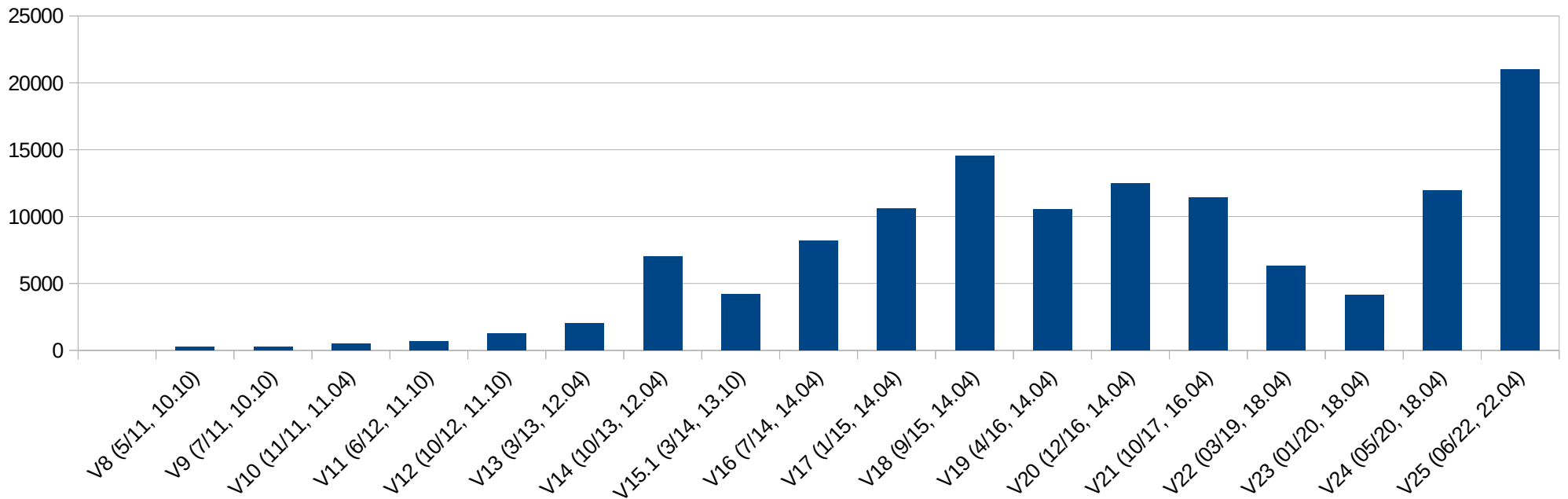
The screenshot displays the Xnec2c software interface on a Raspberry Pi 5 desktop. The desktop background is a scenic image of a boat on water at night with a lantern. The desktop environment includes a sidebar menu with categories like Programming, Education, Internet, Sound & Video, Graphics, Other, and Accessories. A search menu is open, showing results for 'flaa', 'FLMoxgen', 'rf_exposure_calc', and 'Xnec2c'. The Xnec2c application is running in the foreground, showing three main windows:

- Xnec2c: Frequency Data Plots:** This window displays a graph with three data series: 'Raw Gain dBi' (magenta line), 'Max Gain & F/B Ratio vs Frequency' (cyan line), and 'F/B Ratio dB' (green line). The x-axis represents frequency in MHz, with markers at 138.70, 141.10, 143.50, and 146.189. The y-axis represents gain in dB, with markers at 4.750, 5.000, 5.250, 6.250, 6.500, and 6.750. A table at the top of the window shows parameters: Tx Line Zo (50.0), VSWR (1.1), Z-real (51.7), Z-imag (-5.2), Max Gain (6.0), and Freq MHz (146.189).
- Xnec2c: Radiation Patterns:** This window shows a 3D radiation pattern plot of a sphere with a color gradient from blue to red. The axes are labeled X, Y, and Z. The gain is set to 2.5 dB and the frequency is 146.189 MHz.
- xnec2c 4.4.12:** This window shows the 'Structure Geometry' of the antenna, which is a rectangular loop structure in a 3D coordinate system with axes X, Y, and Z.

Downloads

Number of Downloads

Andy's Ham Radio Linux



Awarded 03/2022

- 11 years and 100,000 downloads later.....
- <https://nediv.arri.org/2022/03/02>



Sourceforge

- Go there: <http://www.sourceforge.net>
- Search for KB1OIQ
- Other ham radio programs are there:
 - uBITX modified for blind amateur radio users
 - Bionics configuration programs
 - MicroFox, TinyTrack
 - Wordsworth – collaboration with K1IG
 - a way to learn CW
 - aa-analyzer for older Rig Expert analyzers

Related Online Videos

- Online video of a similar talk to RATPAC:
 - Radio Amateur Training Planning and Activities Committee
 - <https://youtu.be/BOlHi73zY74>
- Online Review of AHRL by KB9RLW Kevin, "The Old Tech Guy"
 - <https://www.youtube.com/watch?v=HEd5uMoksa8>

Last Slide!

- Questions?
- Slides available:
 - Email: kb1oiq@arri.net
- Thanks for coming to this talk!
- Have a lot of fun, and 73 de Andy KB1OIQ