



Daytime CHART Observations of Galactic Quadrants II and III

Ahlea Wright, Adam Beardsley

6/22/2023

Goals/Purpose

- Primary: Observe quadrants II and III to verify data taken from ASU
- Secondary: Observe during the day, including directly at the sun

Packing List

- Horn
- Nooelec amp + filter
- RTL-SDR
- SMA cable
- Pi + Mouse
- Monitor + HDMI cable
- Battery + 2 cables (for monitor and pi)
- RF explorer
- Tape, aluminum tape, foil
- Table
- Garden stakes, lawn chair, and boxes for propping up horn
- Notebook, pen
- Phone
- Tarp (to stay dry on wet grass)

Targets for Observation

We used [Stellarium](#) to find suitable times for observing quadrants II and III.¹ We found that Quadrant II was most up in the morning, and Quadrant III, while not very accessible from our latitude, is best observed in the afternoon. We then found example reference objects to pull off azimuth/altitude coordinates as well as RA/dec which could be converted to galactic coordinates with an [online converter](#). A control trial was run along with both the morning and afternoon sessions by setting the horn on the ground with the waveguide pointed down. Times and coordinates below were for reference. Actually recorded times and coordinates are in the next section.

¹ Stellarium uses your computer's displayed time, not the local time from where data is taken.

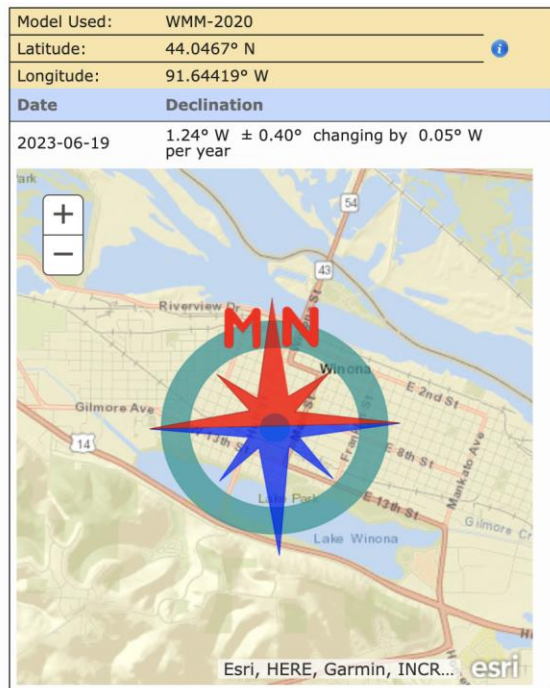
- 08:00 – Caph
 - Galactic Coordinates: $l = 117:42$ $b = -3:10$
 - Az: 344.5° Alt: 74°
- 08:15 – Caldwell 20
 - Galactic Coordinates: $l = 85:40$ $b = -1:2$
 - Az: $292:19$ Alt: 48°
- 08:30 – Sun
 - Galactic Coordinates: $l = 185:23$ $b = 1:43$
 - Az: 86° Alt: 30.5°
- 15:00 – 19 Monocerotis
 - Galactic Coordinates: $l = 218:10$ $b = 0:50$
 - Az: 193° Alt: 41°
- 15:15 – Sun
 - Galactic Coordinates: $l = 185:23$ $b = 1:43$
 - Az: 242° Alt: 57°
- 15:30 – Caph
 - Galactic Coordinates: $l = 117:42$ $b = -3:10$
 - Az: 331° Alt: 24°

Procedure + Location

Data was collected on 19 June 2023 at the park between Winona High School and the small lake. Props were used to hold the horn in position including boxes, a lawn chair, and garden stakes. Scans were taken between 1415-1425 MHz with 10 second integration time and 5 integrations per frequency. We used iPhone apps “Compass” to find the azimuth and “Measure” to find the altitude.

Using a compass for azimuth may introduce an error due to the difference between magnetic north and true north. Using an [online calculator](#), we found that there is a 1.24° difference in

Winona.



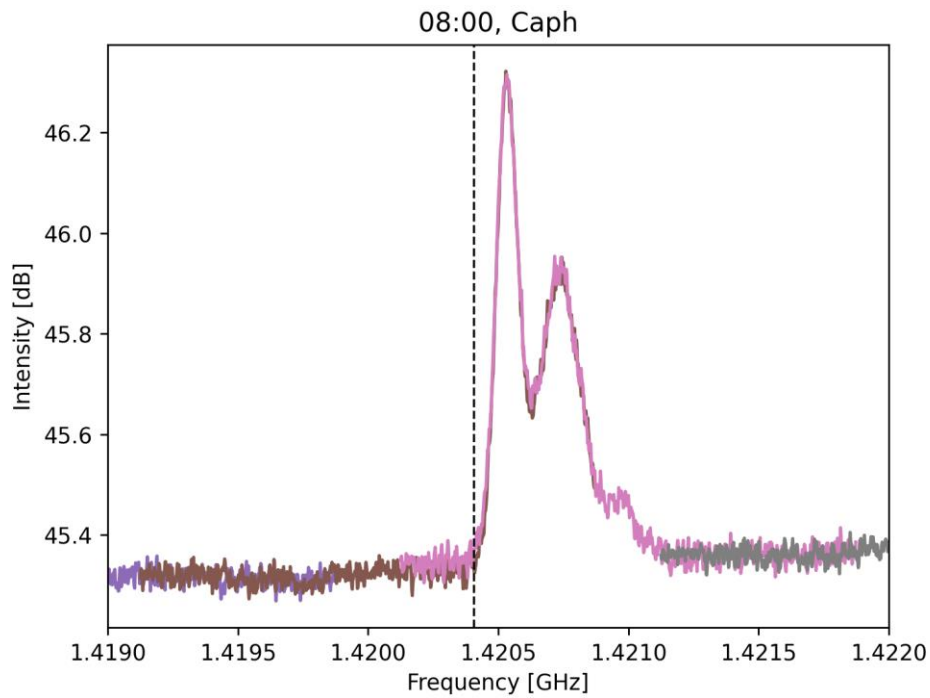
- 08:00 – Caph
 - Az: 343° Alt: 74°
 - Filename: abeardsley_Winona_2023.06.19_1_8:00_am
- 08:16 – Caldwell 20
 - Az: 291° Alt: 48°
 - Filename: abeardsley_Winona_2023.6.19_1_8:16_am
- 08:33 – Sun
 - Az: 85.5° Alt: 30°
 - Filename²: abeardsley_Winona_2023.6.19_4_8:31_am
- 08:43 – Control
 - Filename: abeardsley_Winona_2023.6.19_5_8:40_am
- 14:36 – Control
 - Filename: abeardsley_Winona_2023.06.19_0_2:36_pm
- 15:00 – 19 Monocerotis
 - Az: 193° Alt: 41°
 - Filename: abeardsley_Winona_2023.6.19_1_3:00_pm
- 15:15 – Sun
 - Az: 245° Alt: 54°
 - Filename: abeardsley_Winona_2023.6.19_2_3:14_pm
- 15:30 – Caph
 - Az: 331° Alt: 24°
 - Filename: abeardsley_Winona_2023.6.19_3_3:29_pm

² Note some filenames have different times than the actual observed time. This is because the raspberry pi clock drifts. When using the data, one should use the logged time instead of the filename time.

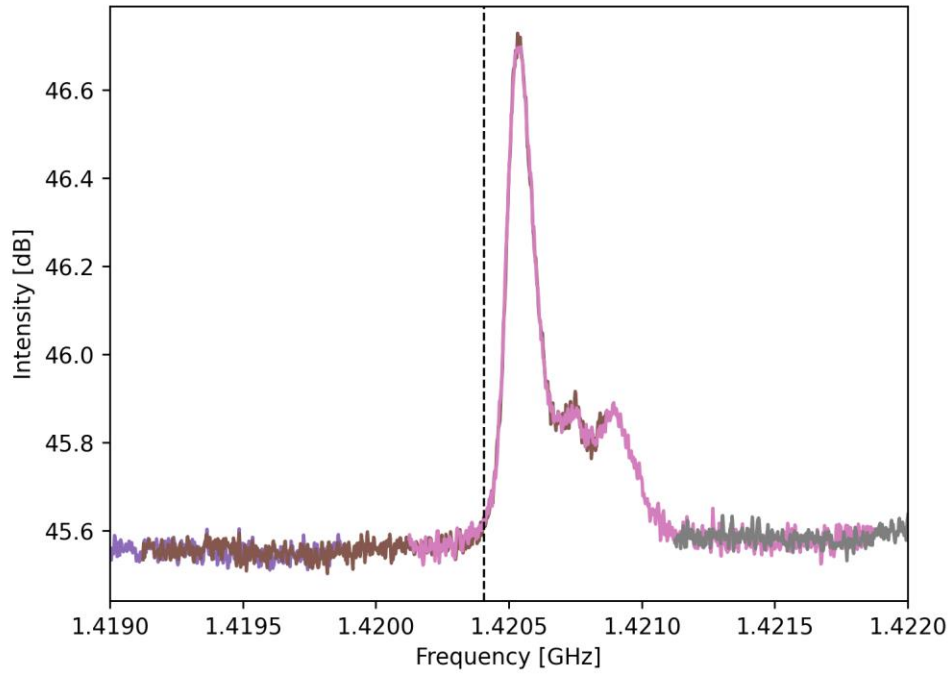
Results/Data

We used the [example analysis](#) notebook available in the CHART repository to do a cursory look at each observation.

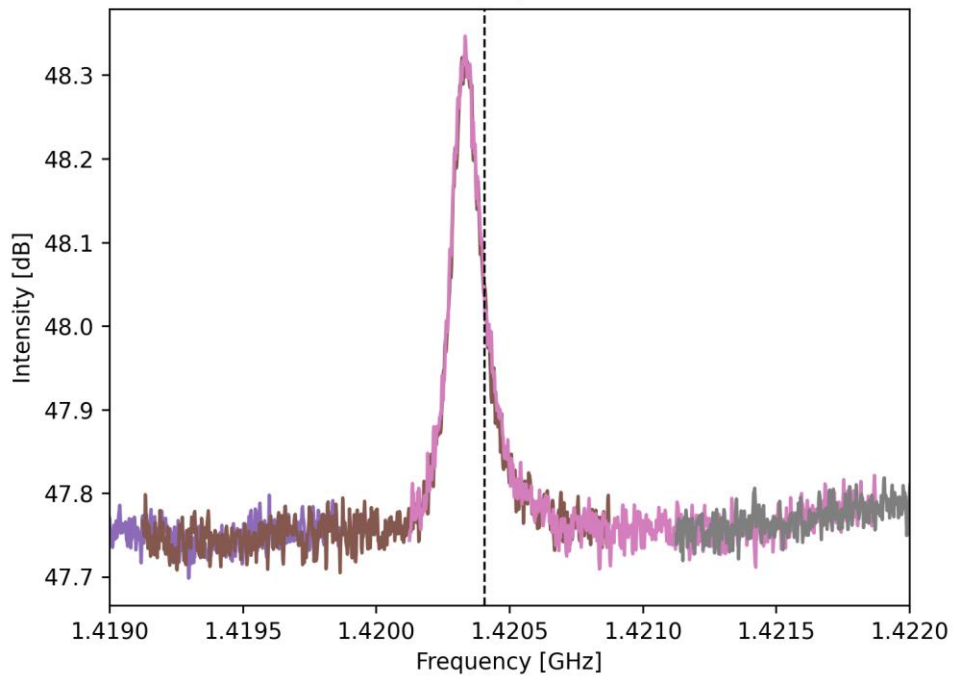
The raw data can be found on enterprise at `/data4/beards/CHART_data/2023-06-19/` or on the radiolab.winona.edu jupyter hub server in the main data directory.



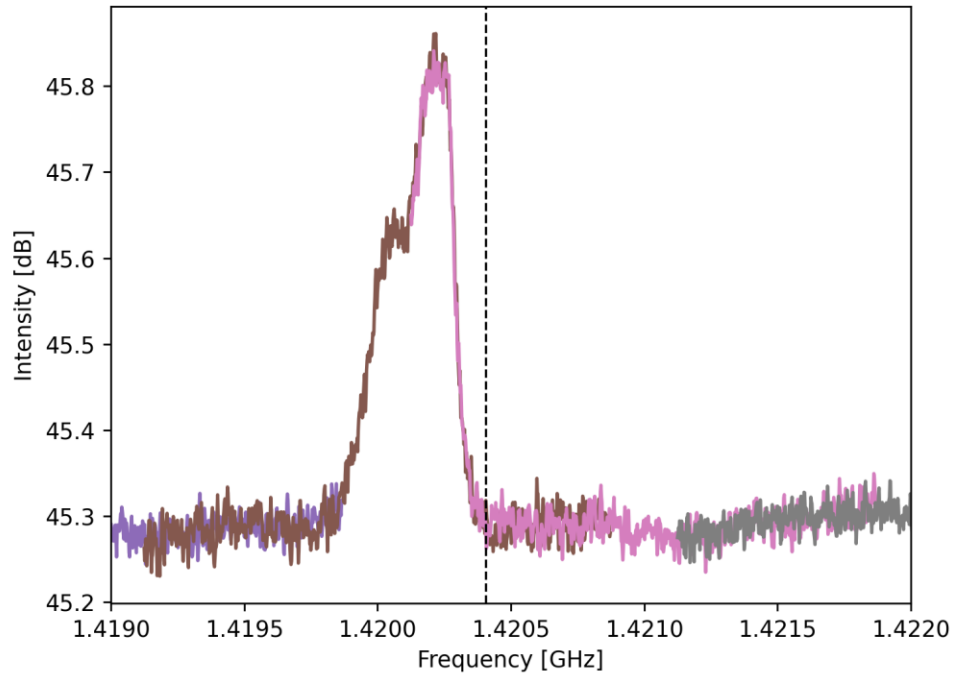
08:16, Caldwell 20



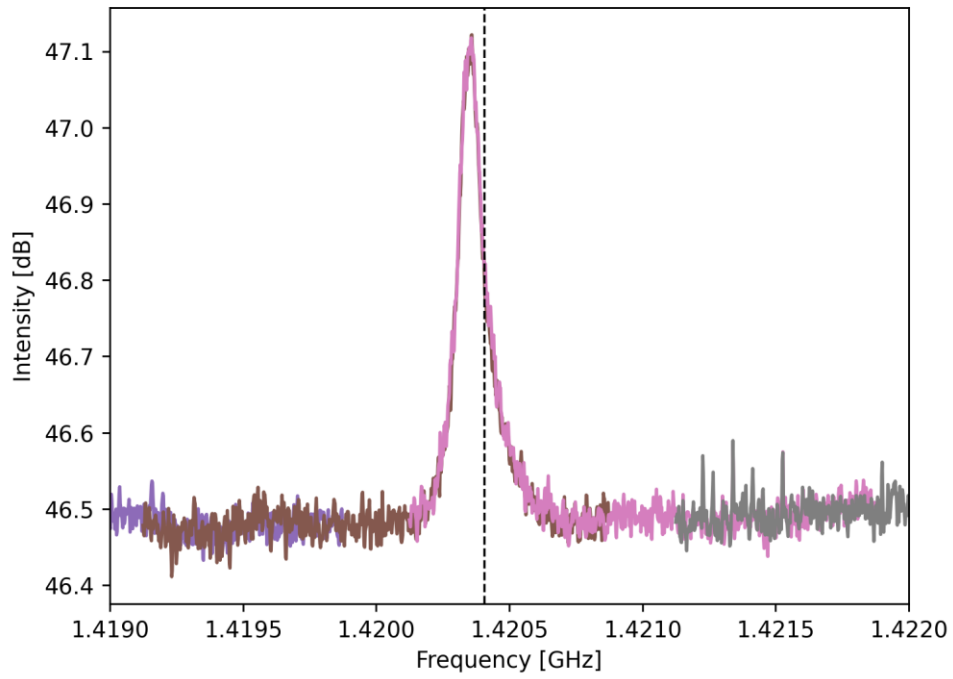
08:33, Sun

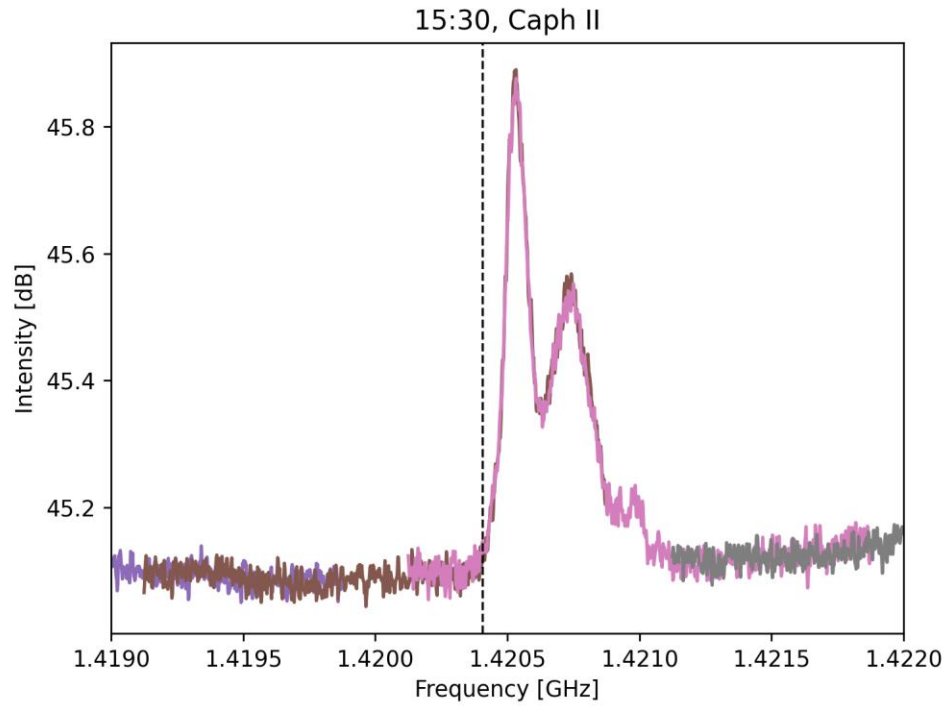


15:00, 19 Monocerotis



15:15, Sun II





Conclusions

The collected data show clear results from Quadrants II and III. The trials pointing at the sun were successful. It was good to have multiple trials looking at the same target to compare. Further analysis is needed to confirm that spectra shapes match expected results.