ezRA - Easy Radio Astronomy - ezGal

- Nov-17-2022

ezRA - Easy Radio Astronomy
https://github.com/tedcline/ezRA

The ezGal Galaxy explorer program is a Galaxy Crossing data plotter, which reads one or more condensed data *Gal.npz files, creates several plot image files to study, and creates one experimental combined Galaxy Crossing data *GalC.npz file.

Currently, no ezRA program reads the experimental combined Galaxy Crossing data *GalC.npz files.

*Gal.npz Compressed Data File

```
np.savez_compressed(fileGalWriteName,
   fileObsName=np.array(ezRAObsName),

   fileFreqMin=np.array(fileFreqMin),
   fileFreqMax=np.array(fileFreqMax),
   fileFreqBinQty=np.array(fileFreqBinQty),

   velGLonP180=velGLonP180,
   velGLonP180Count=velGLonP180Count,
   galDecP90GLonP180Count=galDecP90GLonP180Count)
```

ezGal Plot File List

Each ezGal plot image filename starts with “ezGal”, followed by a 3-digit number, followed by a description, followed by “.png” . The first plot filename is “ezGal510velGLon.png”.

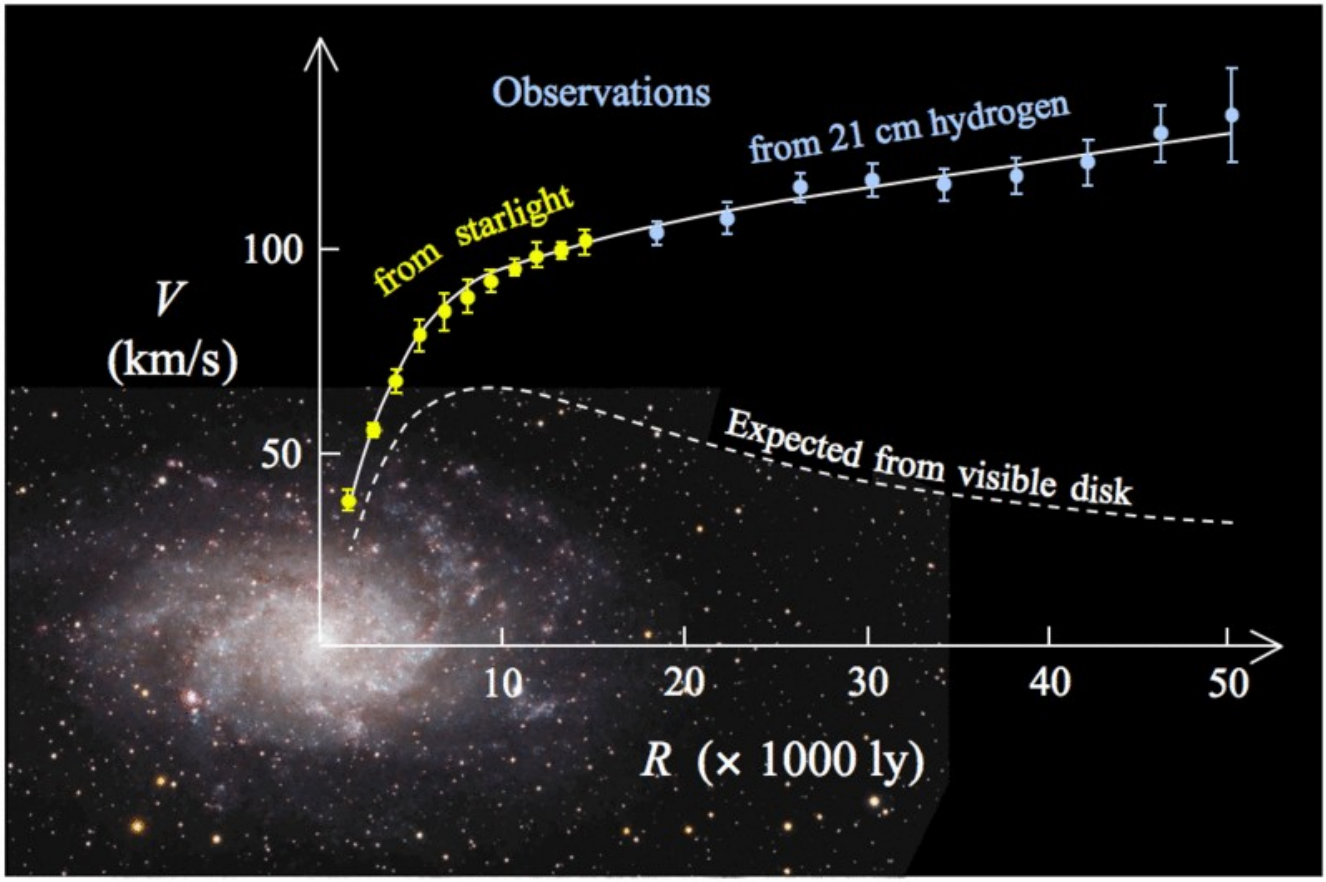
The ezGal plot files are organized into groups. The groupings allows the -ezGalPlotRangeL arguments to speed execution by creating only the related plots that are wanted.

The ezGal5xx plot files are very similar to the ezCon5xx plot files.
The ezCon program reads Galactic crossing spectra from .txt data files.
The ezGal program reads Galactic crossing spectra from *Gal.npz data files, often with more data.

The ezGal5xx plot files are various plots of Galactic plane hydrogen gas velocity information. Many ezGal590 plot files are possible, displaying processed spectra showing gas velocity Doppler effects. An ezGal511velGLonCount.txt file is a scorecard of which 1-degree Galactic Longitude Galactic plane spectra are recorded.

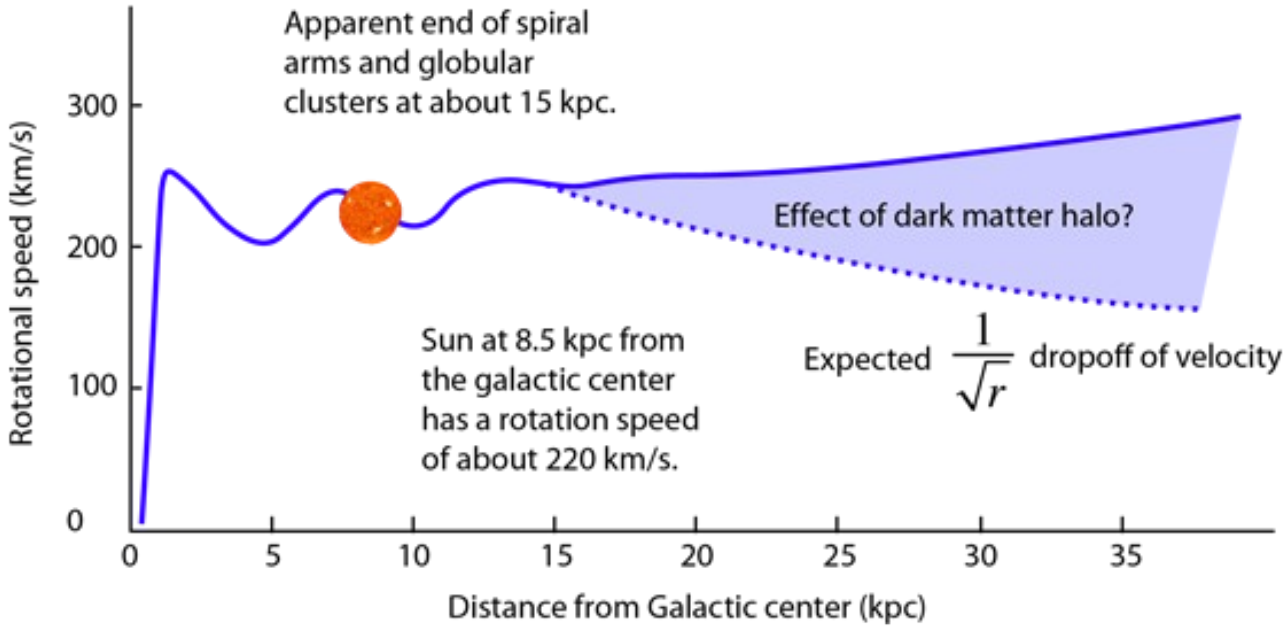
ezGal510velGLon.png	- corrected Galactic crossing spectra vs 1-degree GLongitude
ezGal511velGLonCount.png	- Count of Galactic crossing spectra vs 1-degree GLongitude
ezGal511velGLonCount.txt	- text Count of Galactic crossing spectra vs 1-degree GLon
ezGal520velGLonPolar.png	- Galactic crossing spectra vs Galactic Longitude, Polar
ezGal521velGLonPolarCount.png	- Count of Galactic crossing spectra vs GLongitude, Polar
ezGal530galDecGLon.png	- count of Galactic crossings, Declination vs GLongitude
ezGal540velGLonEdgesB_*.png	- ezGal510velGLon plot with min and max freq dots
ezGal541velGLonEdges_*.png	- ezGal510velGLon plot with only min and max freq dots
ezGal550galRot.png	- Galactic Rotation speed vs Galactic radius

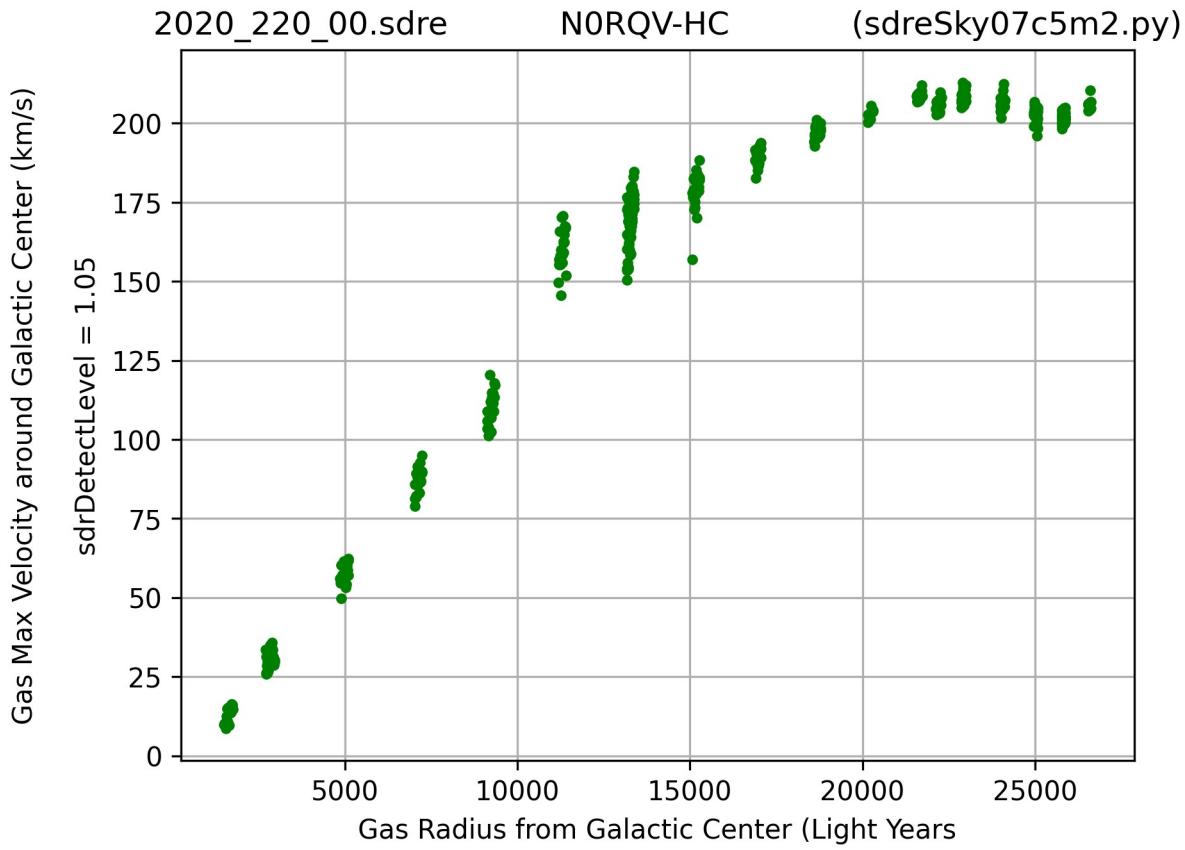
ezGal590gLonDegP180_*ByFreqBinAvg.png - spectrum for one Galactic crossing 1-degree GLon



http://hyperphysics.phy-astr.gsu.edu/hbase/Astro/darmat.html

says





https://en.wikipedia.org/wiki/Galactic_Center

says

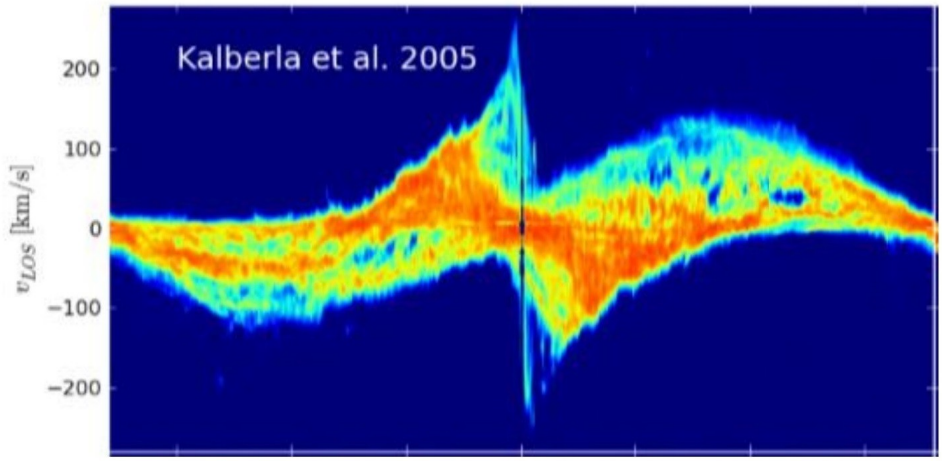
Galactic Center is approximately 8 kiloparsecs (26,000 lightyears) away from Earth.

Velocity vs Galactic Longitude

Go read Rich's

http://dses.science/wp-content/uploads/2020/04/21-Profiling-the-Milky-Way-Structure-by-Plotting-Neutral-Hydrogen-onto-a-Velocity-Galactic-Longitude-Map.pdf

The goal:



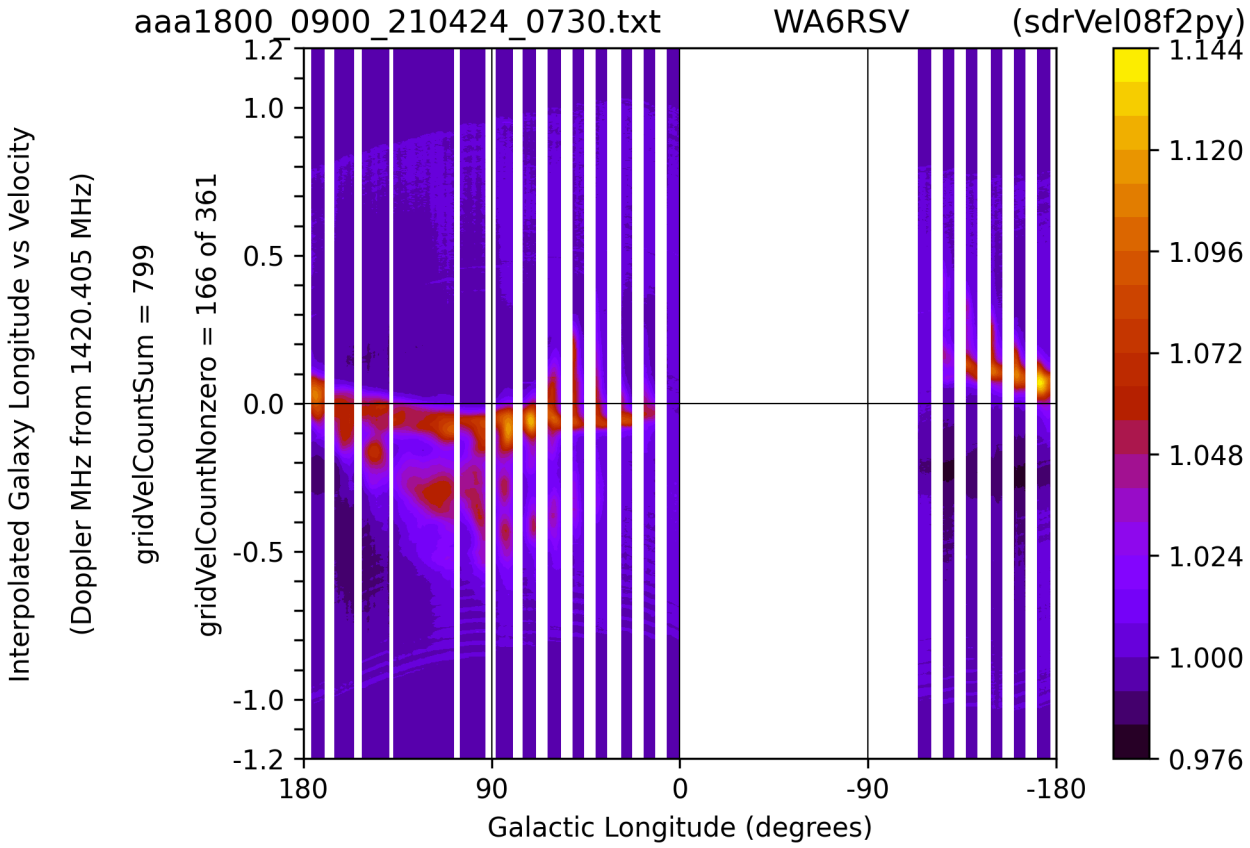
and

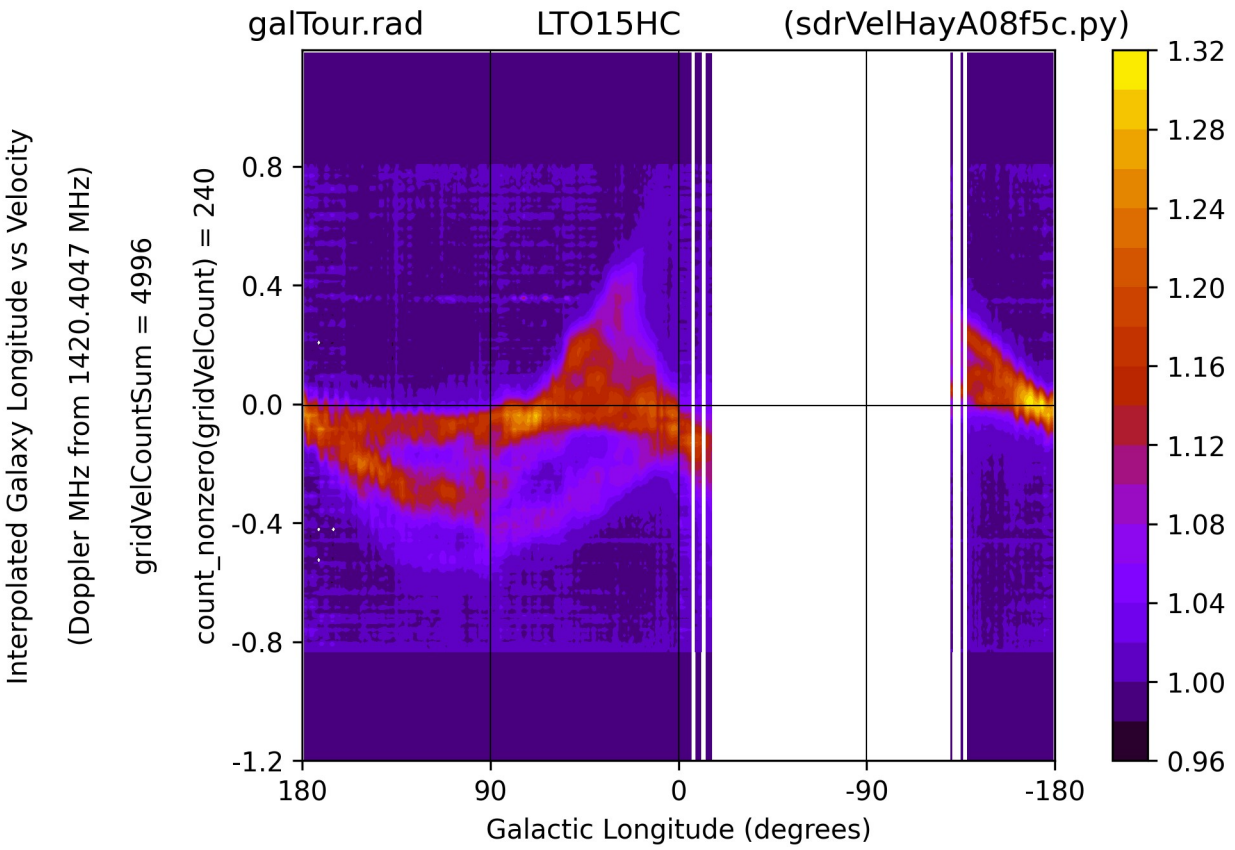
MIT’s

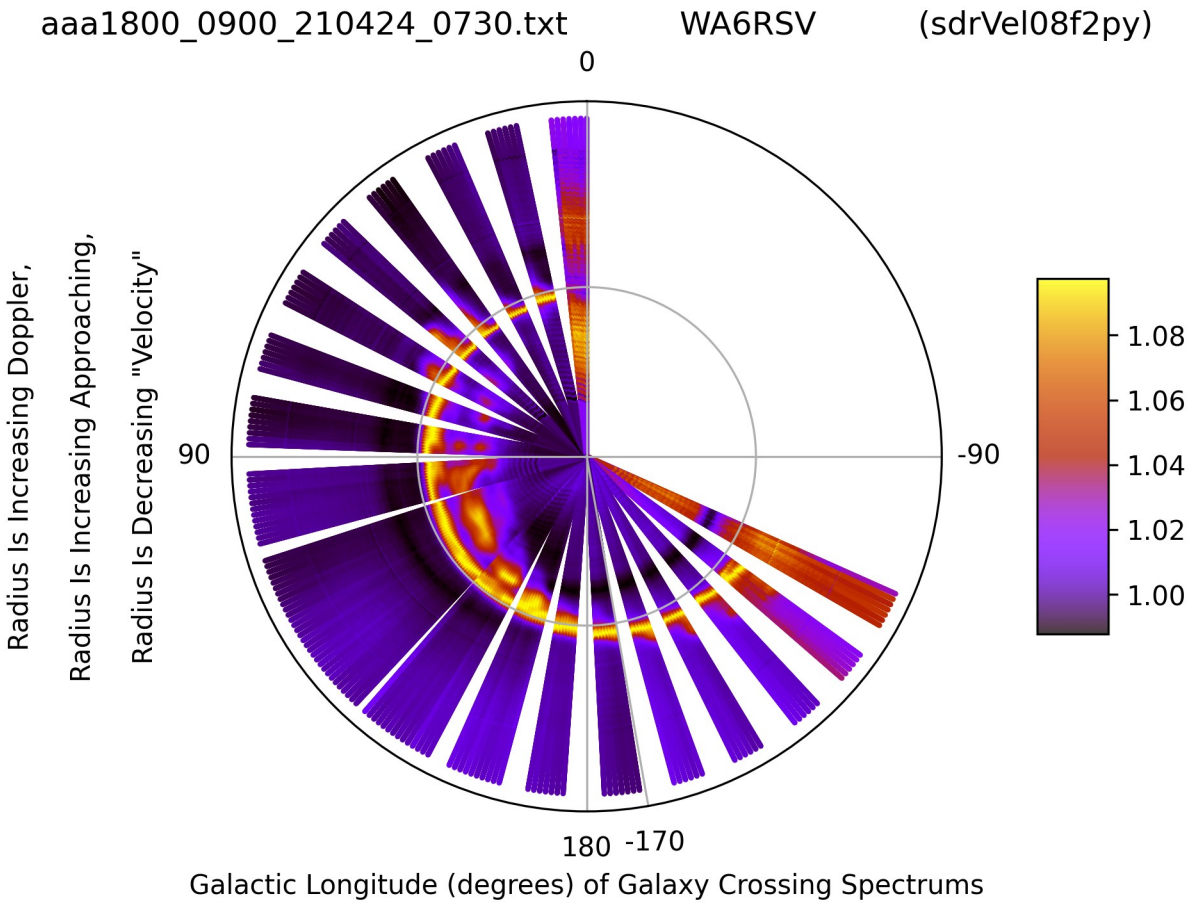
“Mapping the Galaxy with Radio Astronomy”

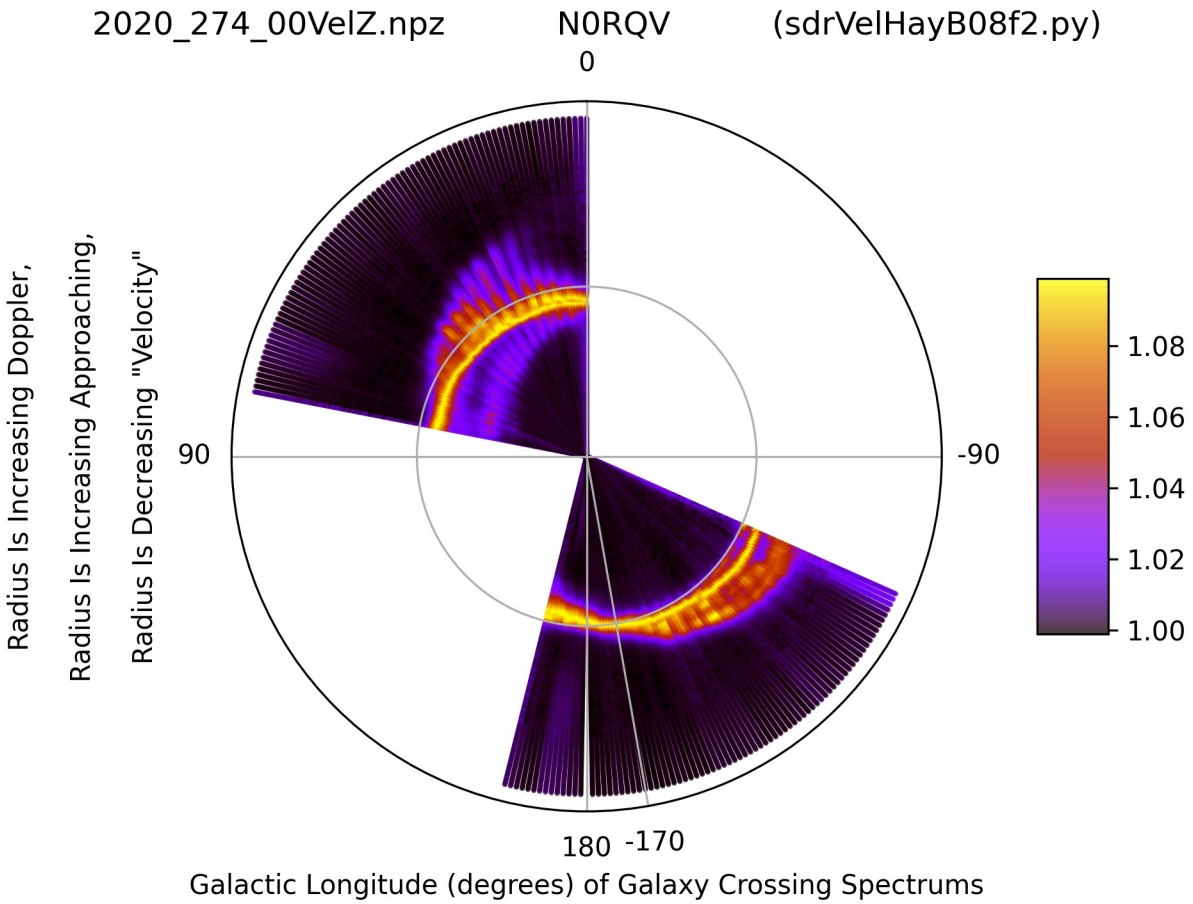
https://www.youtube.com/watch?v=-UrzmAa62ho&ab_channel=ESGPEVSpring2015

So far:


aaa1800_0900_210424_0730.txt
WA6RSV
(sdrVel08f2py)
Interpolated Galaxy Longitude vs Velocity
(Doppler MHz from 1420.405 MHz)
gridVelCountSum = 799
gridVelCountNonzero = 166 of 361
1.2
1.0
0.5
0.0
-0.5
-1.0
-1.2
180
90
0
-90
-180
Galactic Longitude (degrees)
1.144
1.120
1.096
1.072
1.048
1.024
1.000
0.976


galTour.rad
LTO15HC
(sdrVelHayA08f5c.py)
Interpolated Galaxy Longitude vs Velocity
(Doppler MHz from 1420.4047 MHz)
gridVelCountSum = 4996
count_nonzero(gridVelCount) = 240
0.8
0.4
0.0
-0.4
-0.8
-1.2
180
90
0
-90
-180
Galactic Longitude (degrees)
1.32
1.28
1.24
1.20
1.16
1.12
1.08
1.04
1.00
0.96


aaa1800_0900_210424_0730.txt
WA6RSV
(sdrVel08f2py)
0
90
-90
180
-170
Radius Is Increasing Doppler,
Radius Is Increasing Approaching,
Radius Is Decreasing "Velocity"
1.08
1.06
1.04
1.02
1.00
Galactic Longitude (degrees) of Galaxy Crossing Spectrums


2020_274_00VelZ.npz N0RQV (sdrVelHayB08f2.py)
0
90
-90
180
-170
Radius Is Increasing Doppler,
Radius Is Increasing Approaching,
Radius Is Decreasing "Velocity"
1.08
1.06
1.04
1.02
1.00
Galactic Longitude (degrees) of Galaxy Crossing Spectrums