

# DETECTING GALACTIC H1 LINE USING THE 4-M SRT

**Team - 'SAHA'**

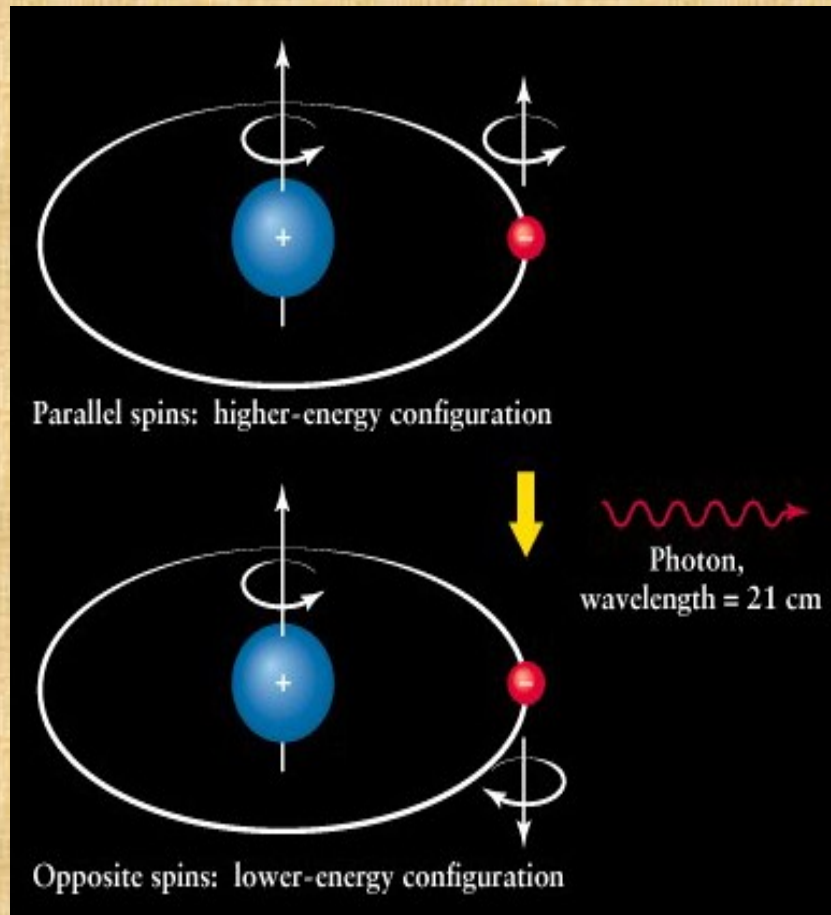
**Group No.-6**

**Srijit Paul, Ashutosh Tripathi,  
K.Saranya, Shreyash Rawat,  
Shravani Kale, Kiran Wani.**

# Over view : What we did?

- detection of the galactic HI line emission from Milky Way and understanding of physics behind it.
- obtained the line of sight component of the velocity of the Neutral Hydrogen clouds.
- measured the width and position of the obtained

# What Is H1 Emission?

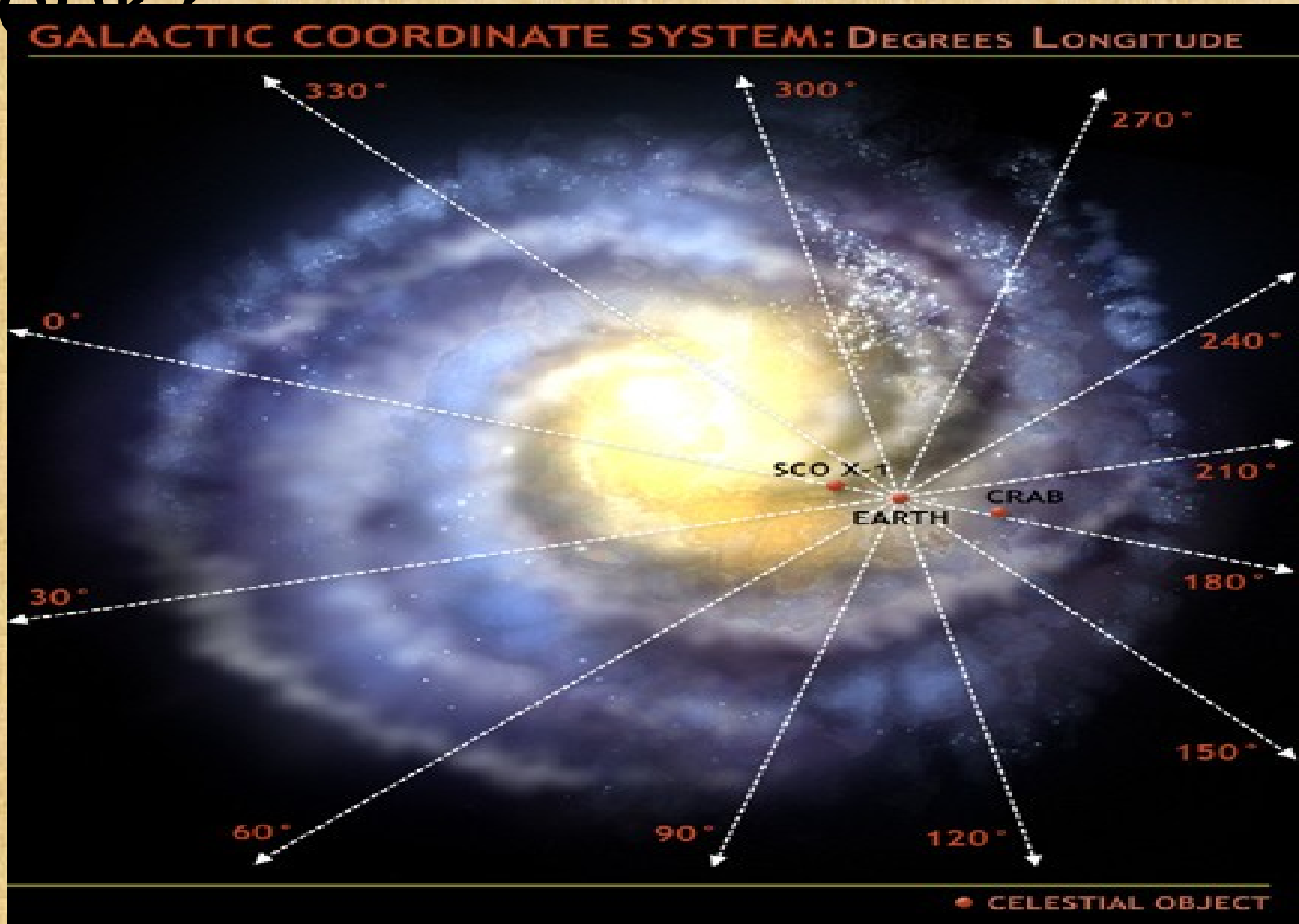


- H1 emission line arises due to change in spin of electron from parallel to anti-parallel spin in Neutral Hydrogen.
- During the change in spin of electron, it emits the low energy photon of wavelength 21 cm, which is known as H1 line.

# How we did?

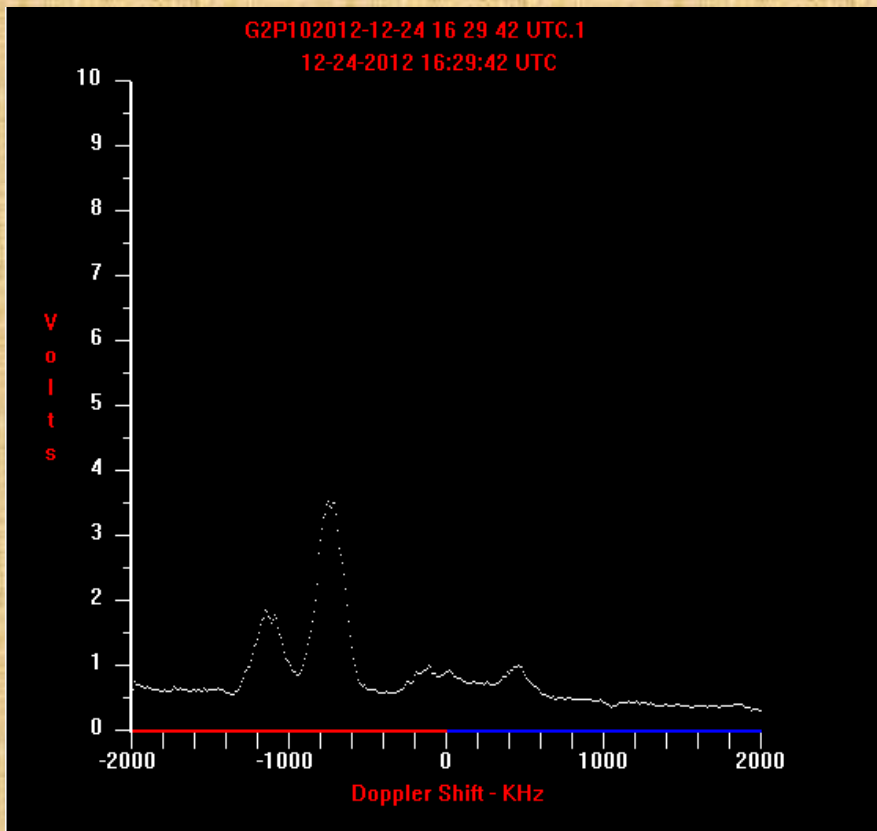
- Initially epoch and coordinate(RA/DEC to Alt/Az) conversions were completed.
- Initialization of the telescope was successfully done.
- The settings of receiver were browsed for H1 line in spectral mode.
- Spectrum for the sources were obtained according to the Alt/Az of the respective sources.

Where all we wanted to  
look?

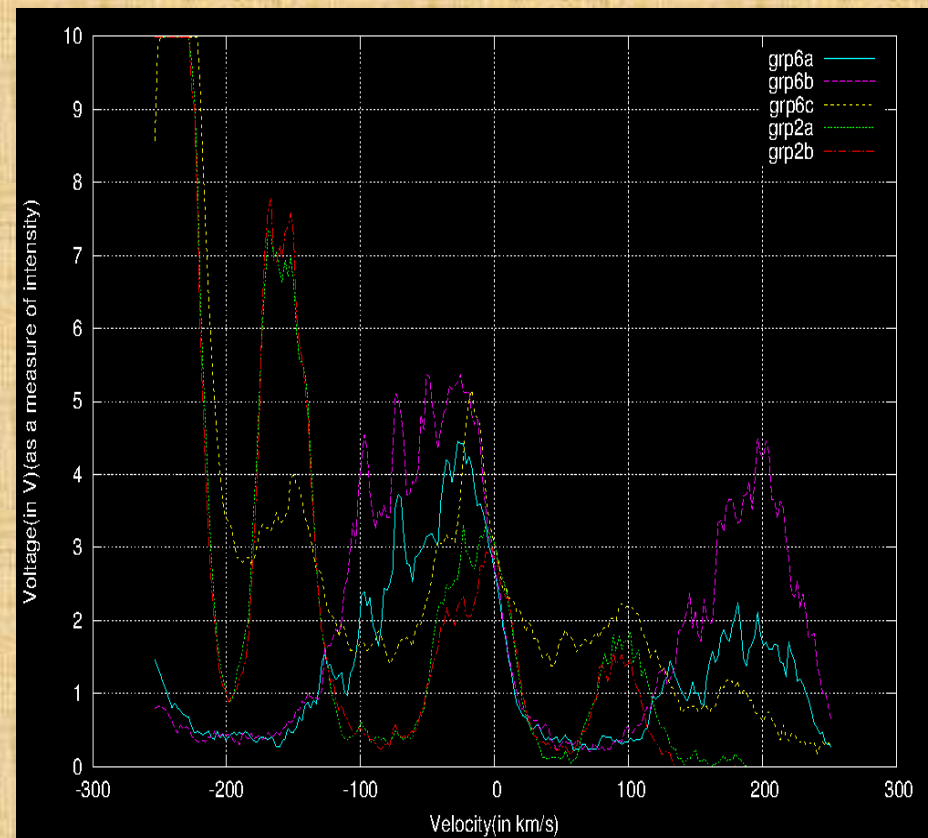


# What we got?

This was cleanest.. of all(got by g2)



This was the dirtiest when we take all of them together(after some calc)



Now, what calculation we did?

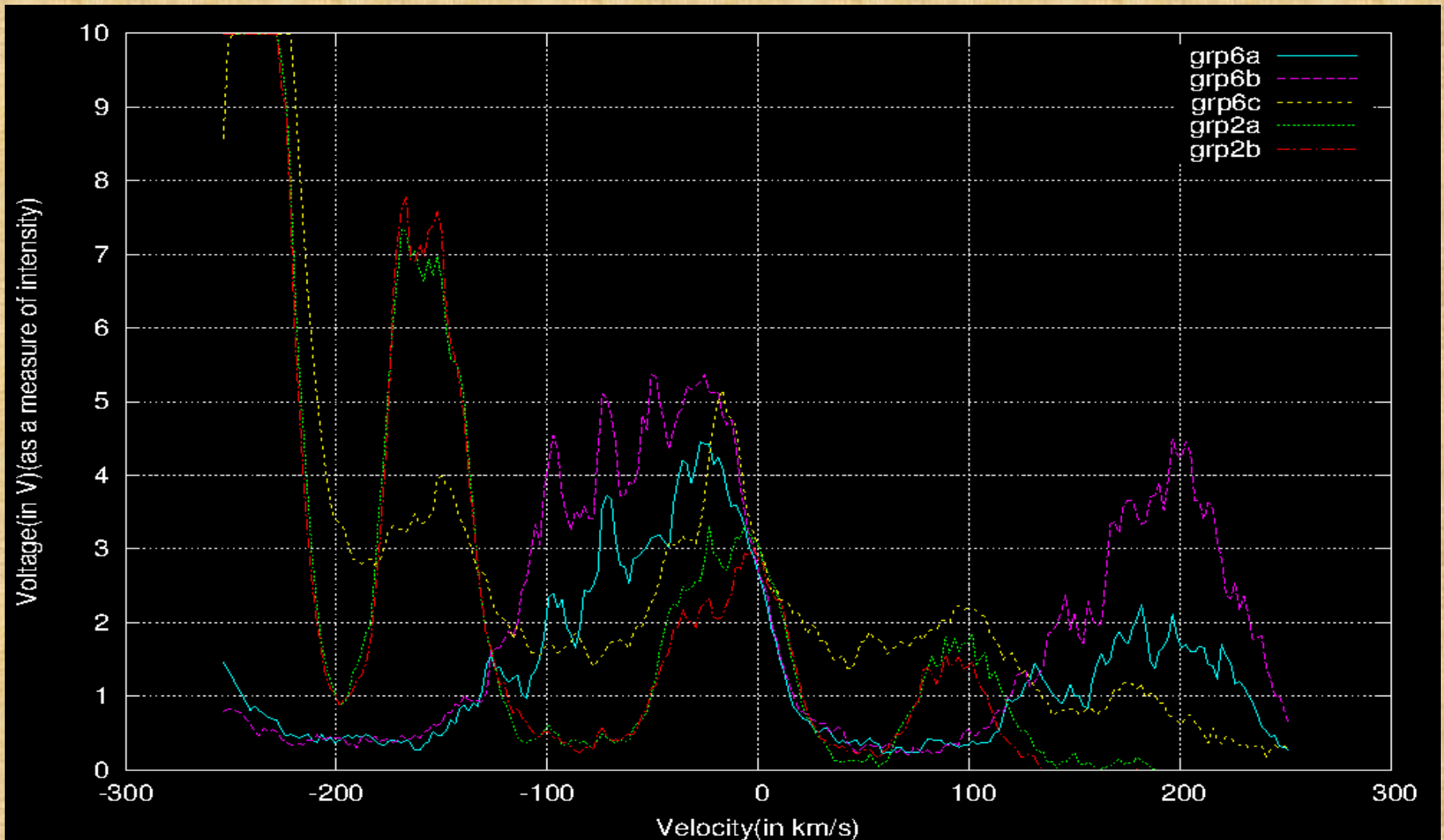
$$\frac{\Delta\nu}{\nu} = \frac{v}{c}$$

No.... What factors affect velocity  
we measure?

Earth's rotation



So.. When we made all corrections...  
then what went wrong!!!

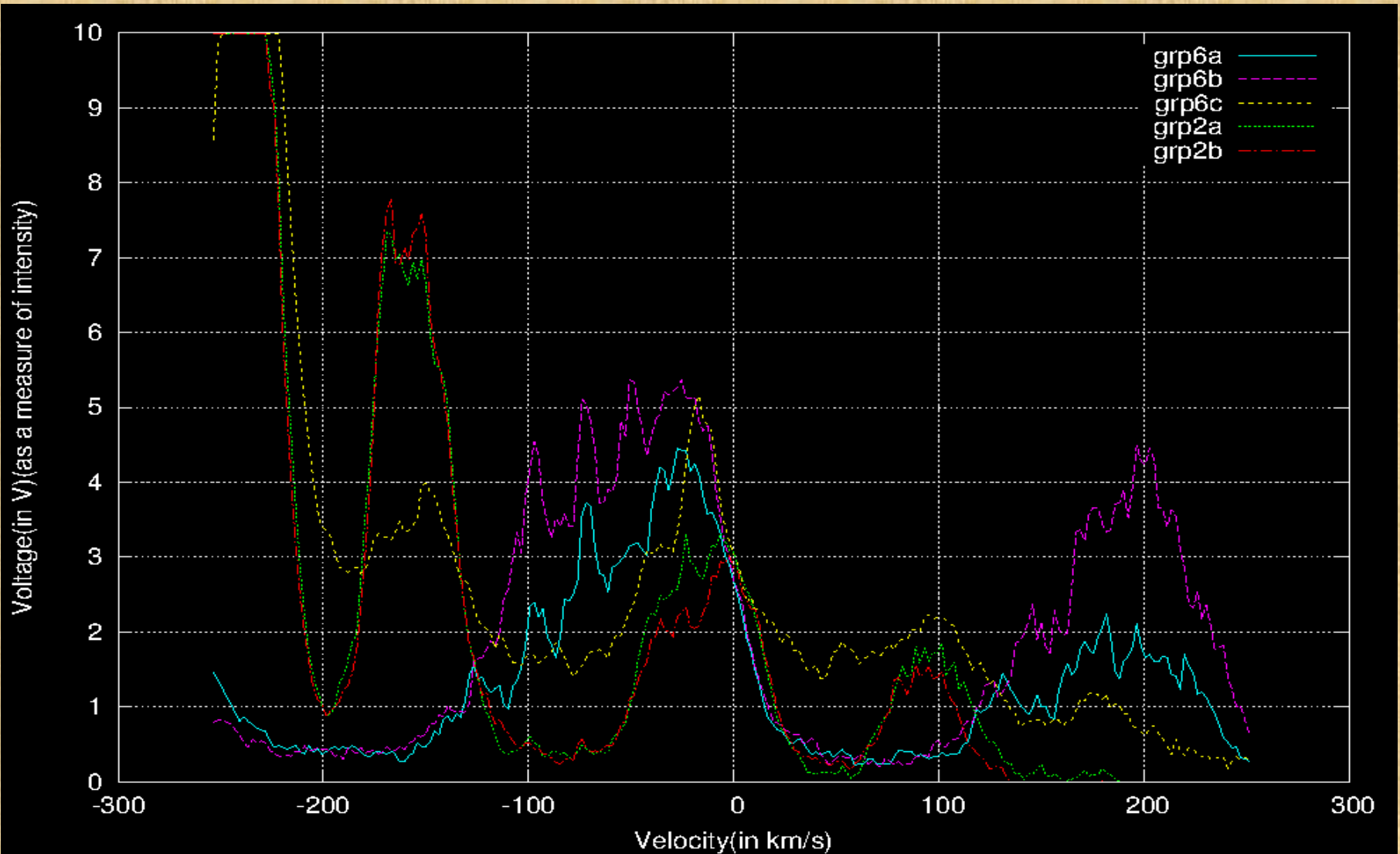


# The main culprit...

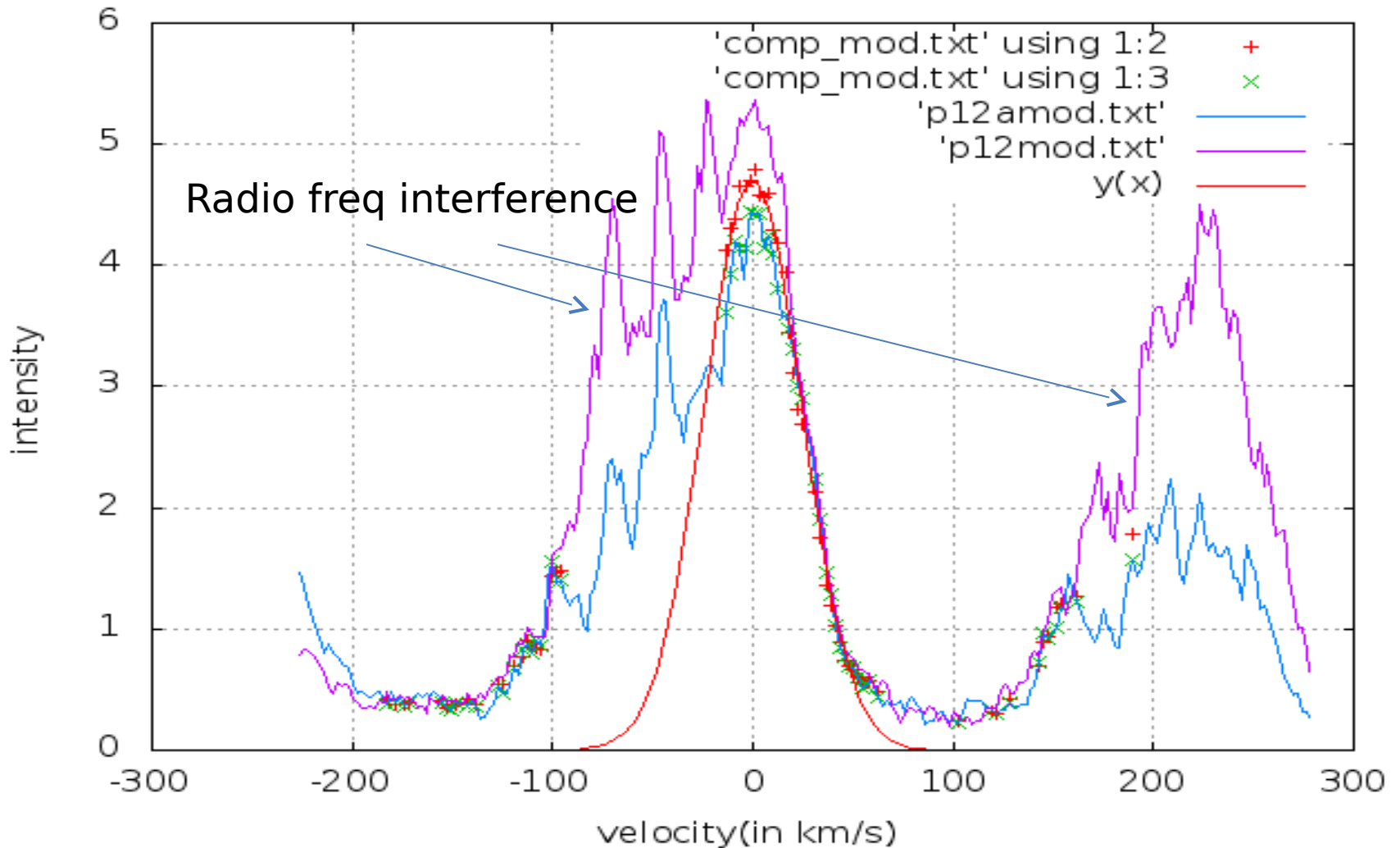
## Radio frequency interference!!!!!!

Find a way to skim them

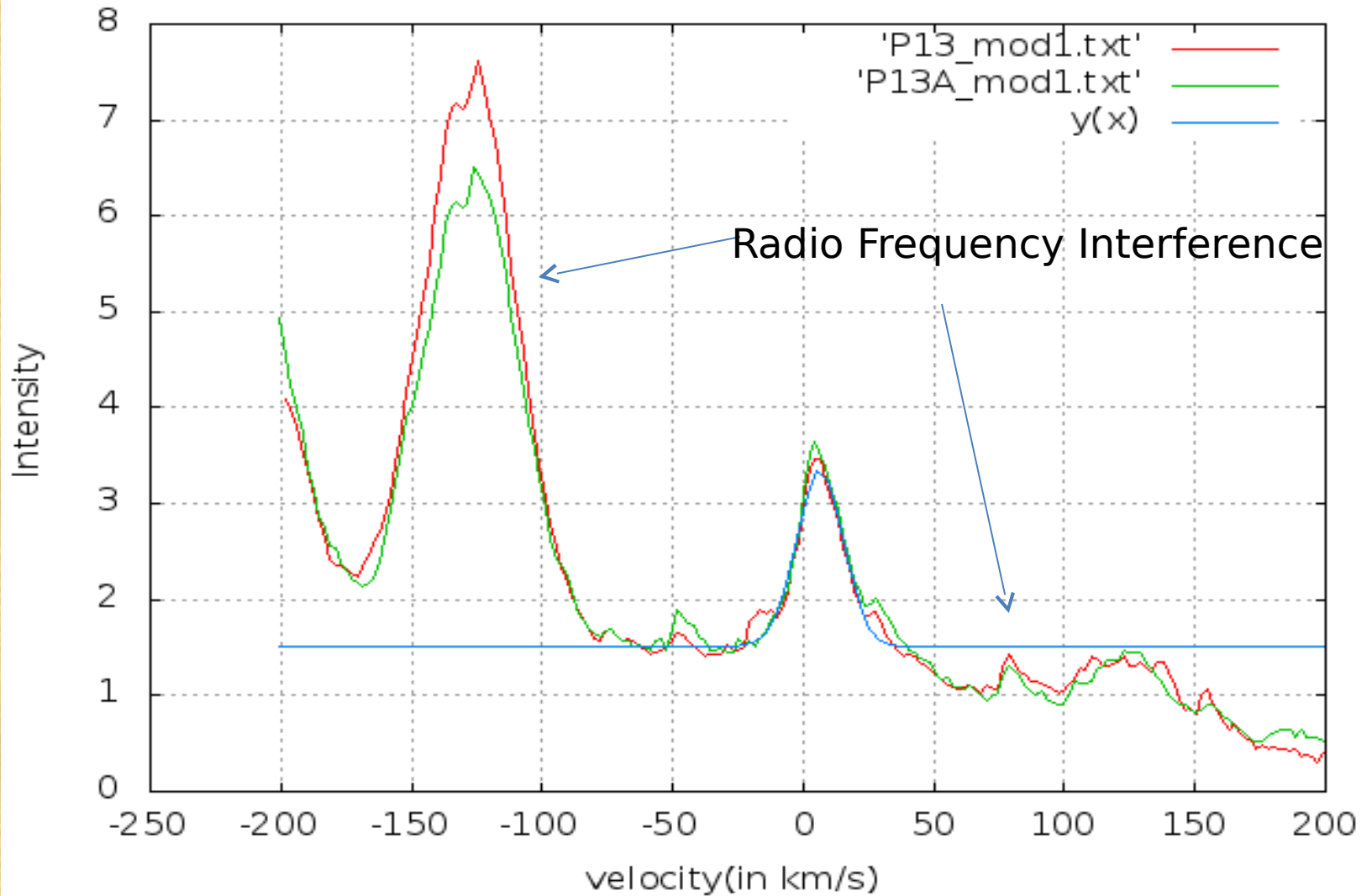
# Hunt down the Gaussian!!!! ( you need a good eye)



# Yippee!!! We got the Gaussian!

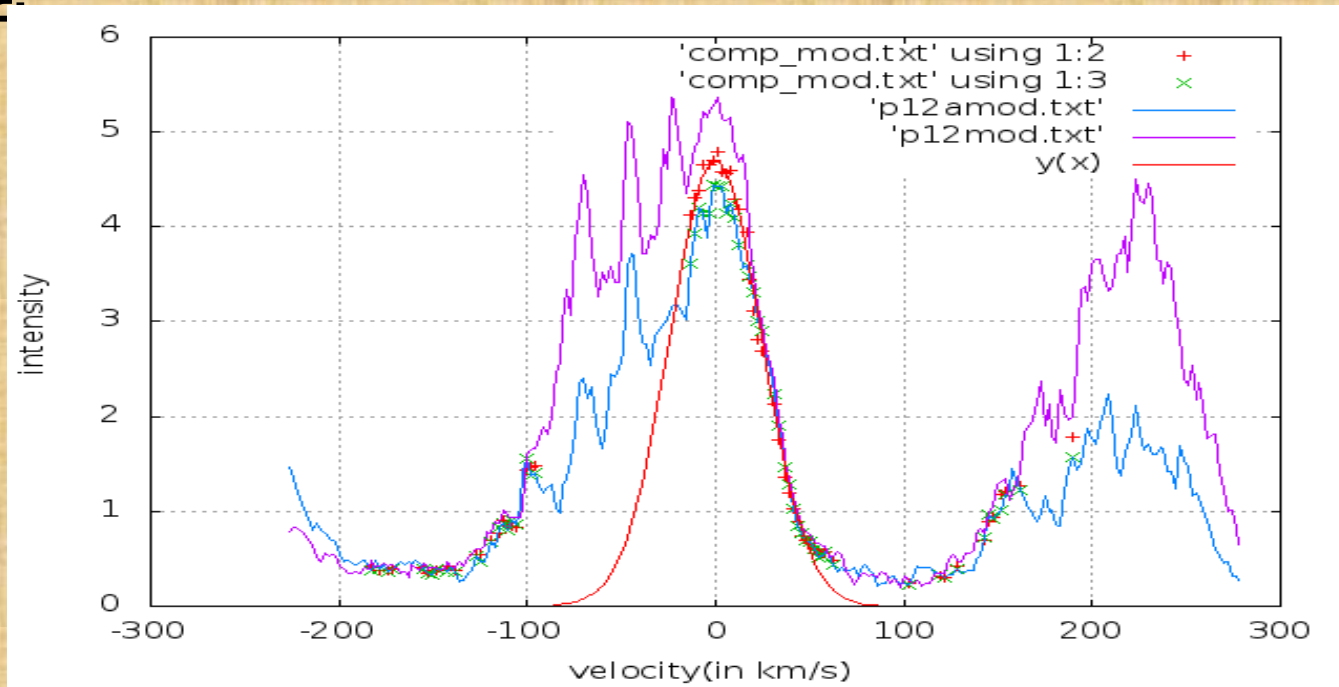


# One more instance..(P 13 )

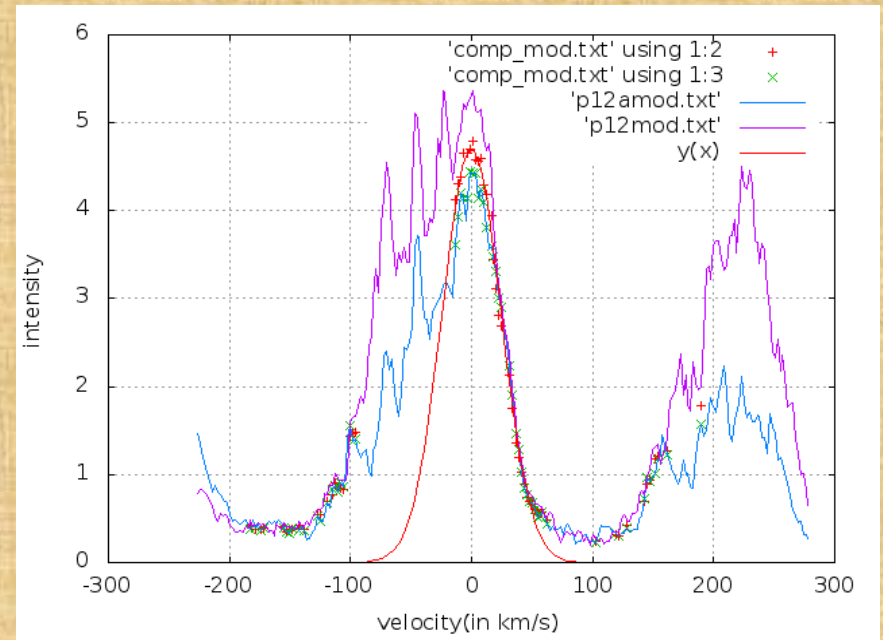
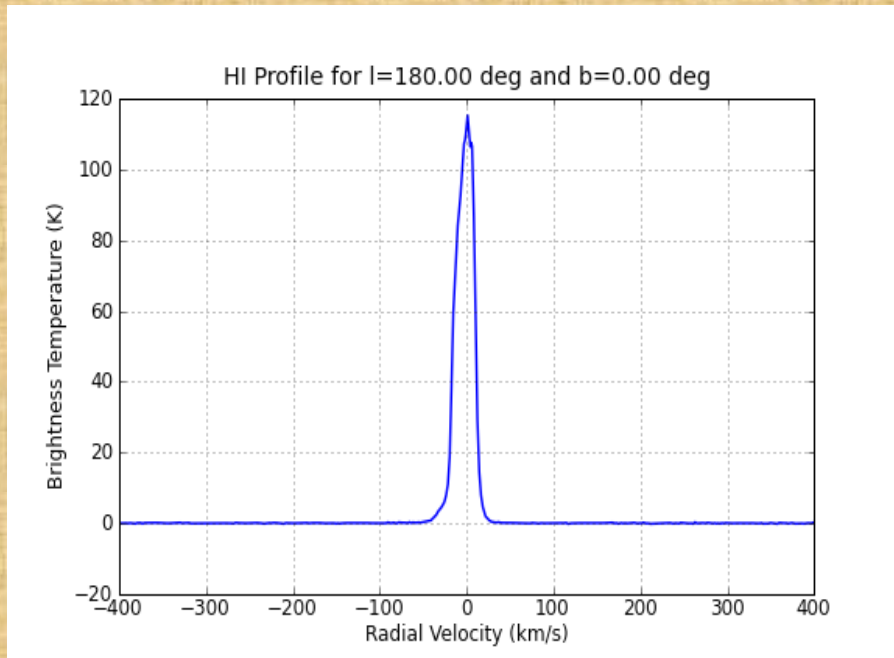


# Interpretation of Graph

- For P12 , the galactic longitude was 180 deg.
- Thus, theoretically we should get no Doppler shift and we get no Doppler shift

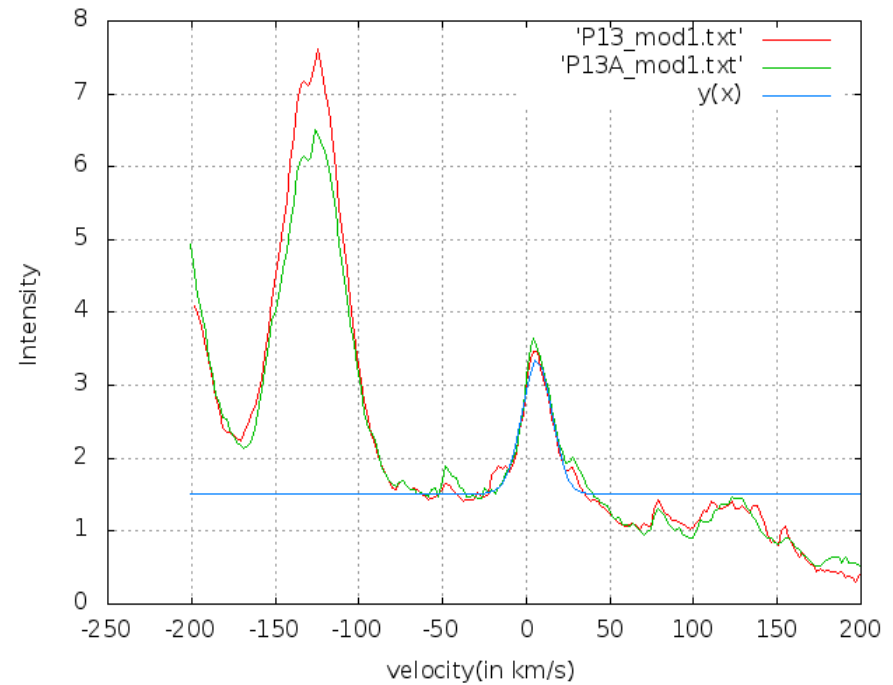
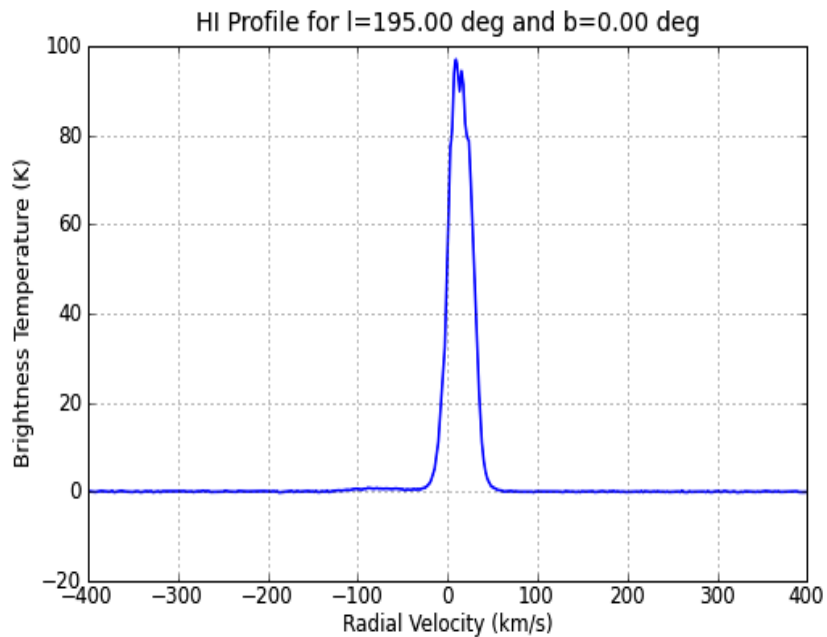


# Comparison with Lydong Dwinglo HI survey(standard) P12 SOURCE



# P 13 Source

( Caution: baseline is not fitted)





# Comparison for p12

- Dweingloo Database
- $a = 117.758 \pm 0.7306$
- $b = -1.85997 \pm 0.07077$
- $c = 13.9626 \pm 0.1001$
- Our result
- $a = 4.14623 \pm 0.1169$
- $b = 1e-30 \pm 0.01067$
- $c = 27.9581 \pm 91.29$
- $d = 1e-30 \pm 0.05347$

# Comparison for p13

- Dwiengloo Database

- $a = 99.5172 \pm 0.3575$        $b = 13.8989 \pm 0.05132$        $c = 17.4925 \pm 0.07258$

- 

Our results

$$a = 1.83784 \pm 0.07528$$

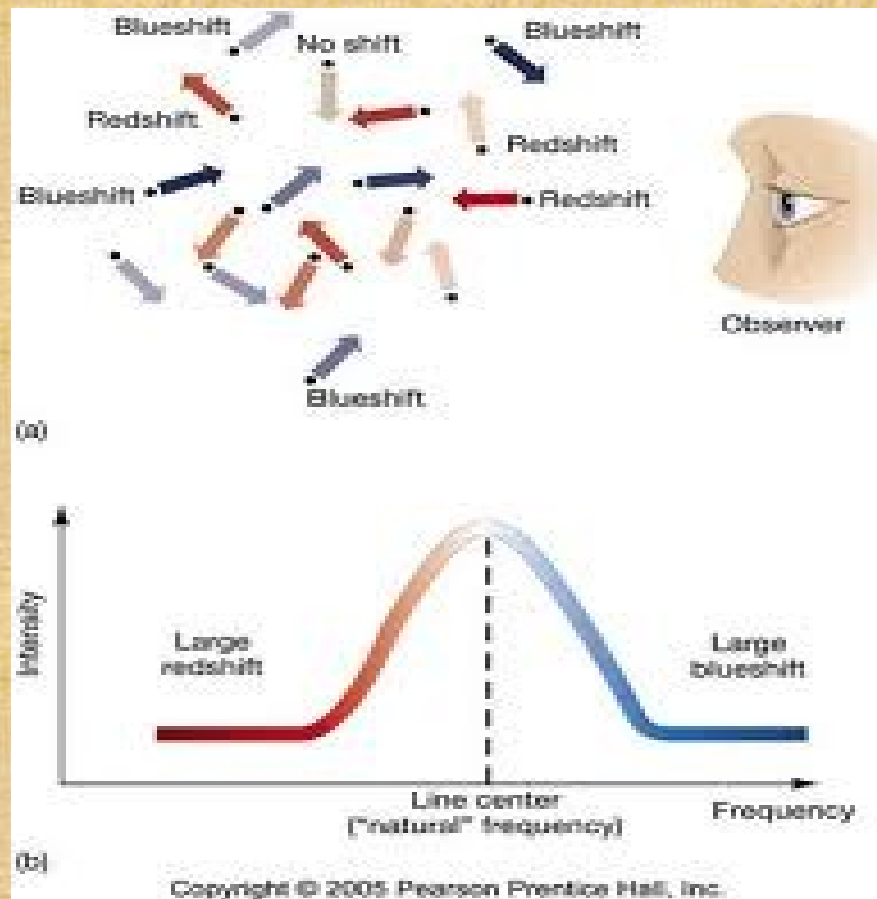
$$b = 6.2065 \pm 0.394$$

$$c = 12.64 \pm 0.6719$$

$$d = 1.51531 \pm 0.03861$$

# Why broadening???????

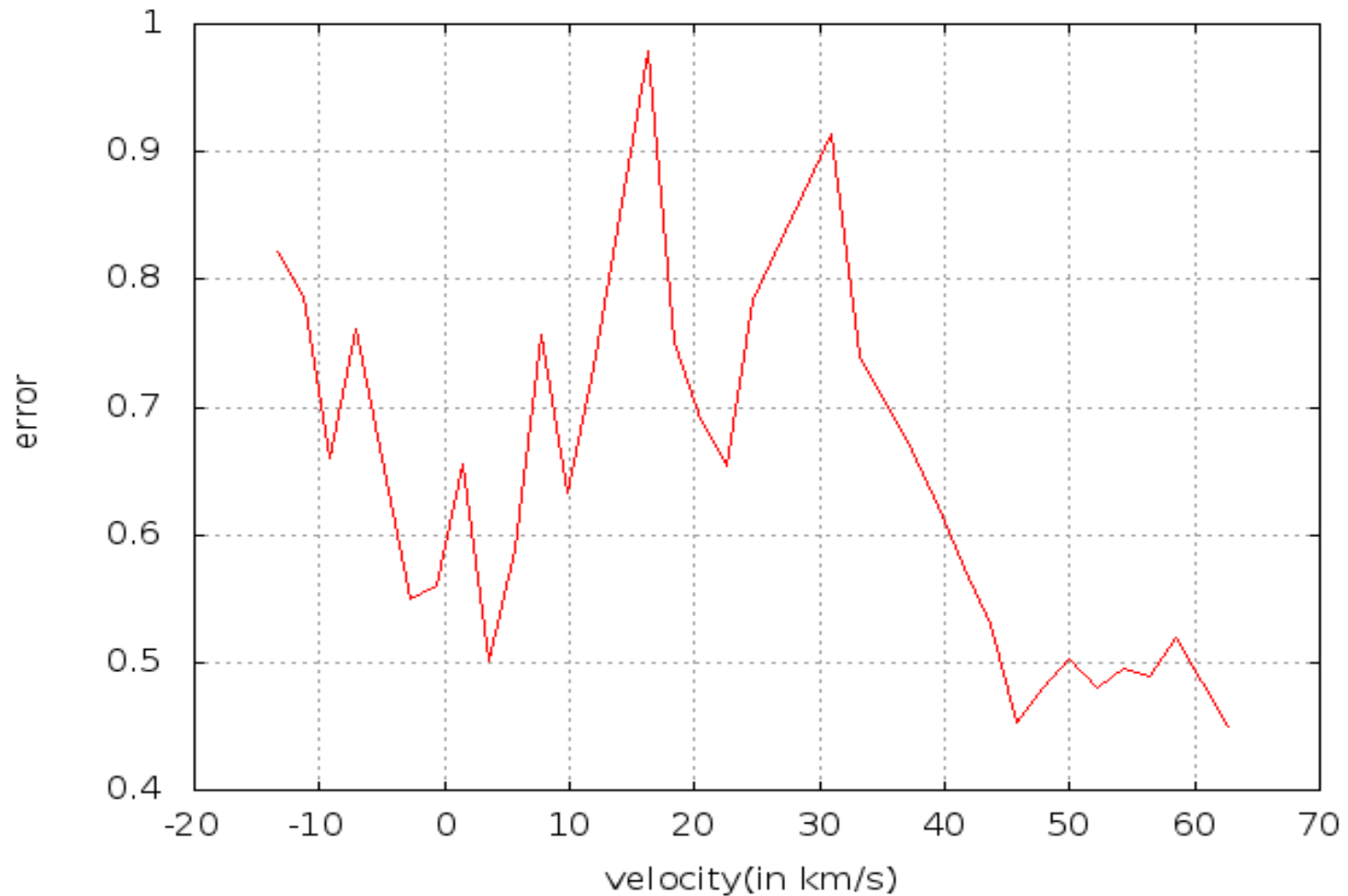
- Doppler broadening, Pressure broadening



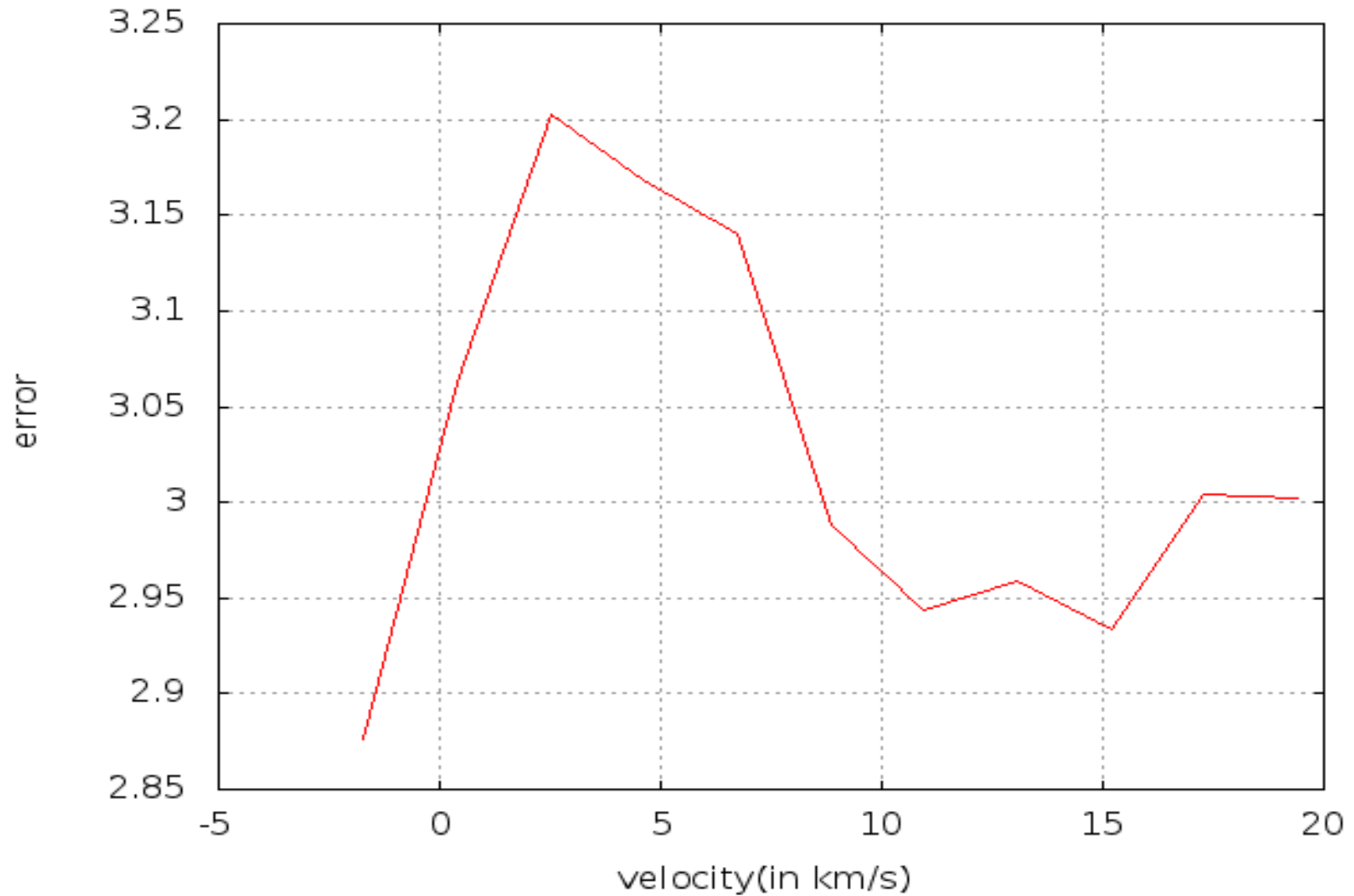
# OUR SPECULATIONS FOR BROADENING

The possible broadening in our data compared to Leiden dwingeloo could be induced due to fitting error(or inclusion of some RFI's in our window)

# Errors in fitting in P12



# Errors in fitting P13



Thank you