

# THOR

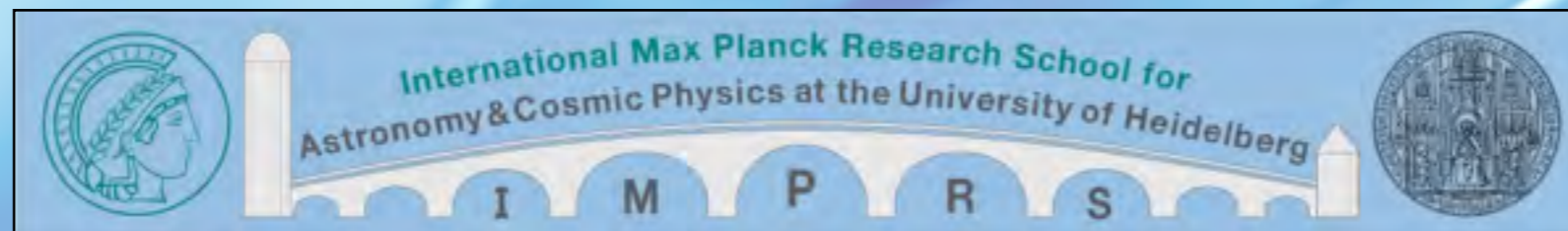
The HI, OH, Recombination Line survey of  
the Milky Way

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**Collaborators:**

Henrik Beuther, Katharine Johnston, Thomas Henning, Simon  
Glover, Jürgen Ott, Paul Goldsmith, Andreas Brunthaler,  
Andrew Walsh...

**and the THOR - team**



## How do molecular clouds form?

### Surveys:

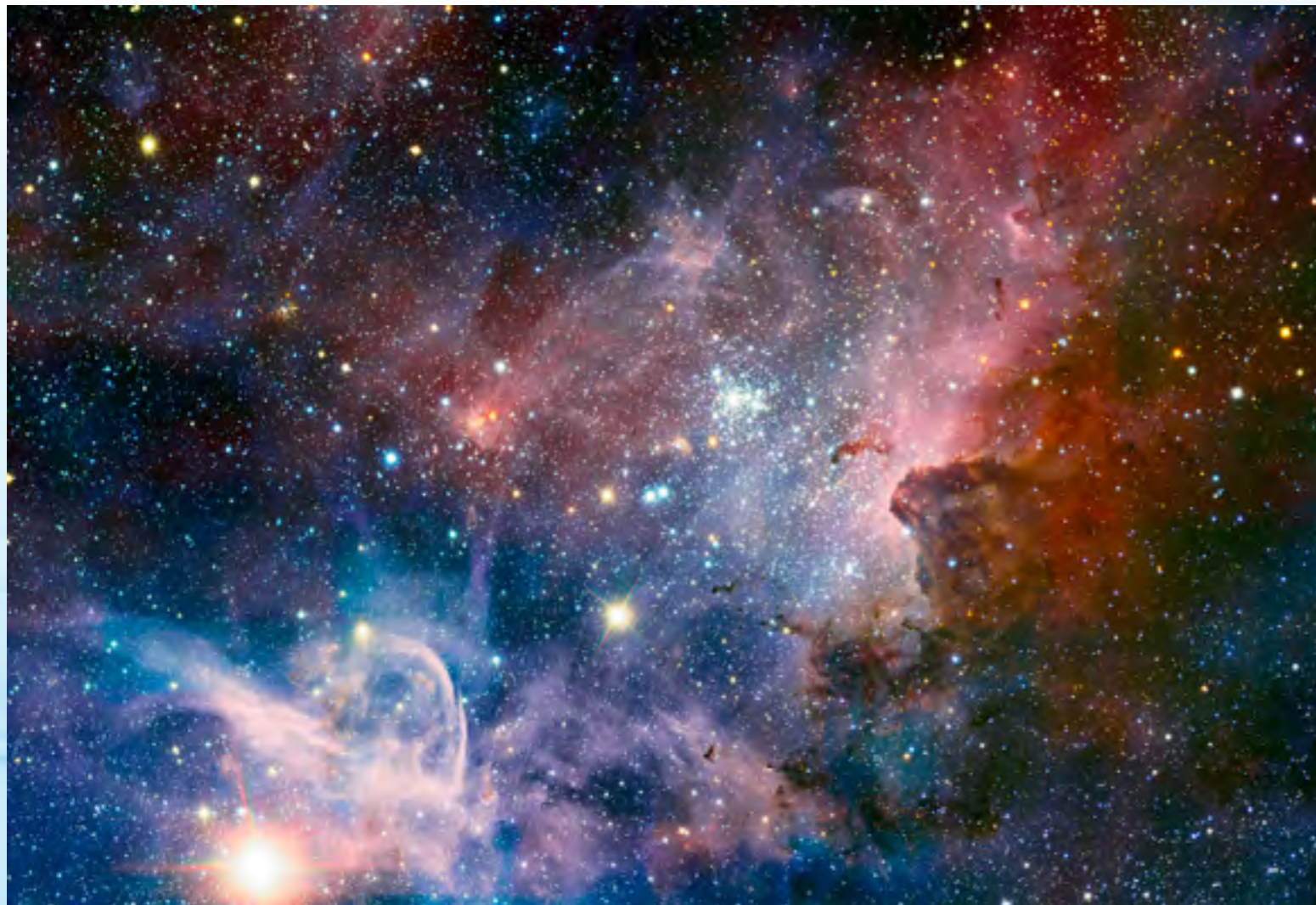


Image: ESO/T. Preibisch

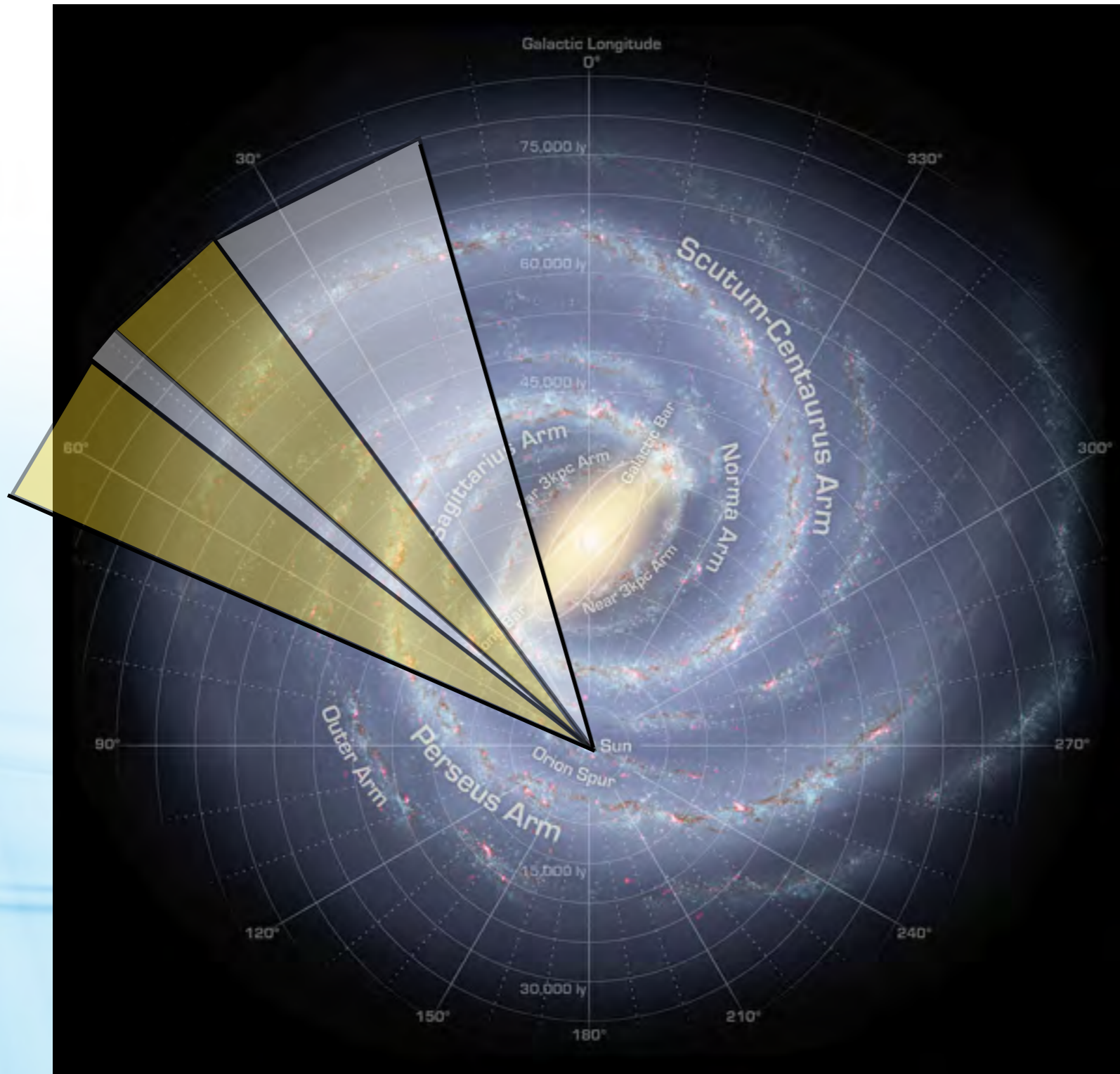


$$\Theta < 20''$$



- **200h VLA C-Array**  
 $\Theta \sim 20''$
- **Velocity range:**  
-200km/s to +200km/s
- **Spectral resolution:**  
 $\Delta v = 1\text{-}4 \text{ km/s}$
- **Continuum:**  
1-2GHz - full polarization

# Observations:



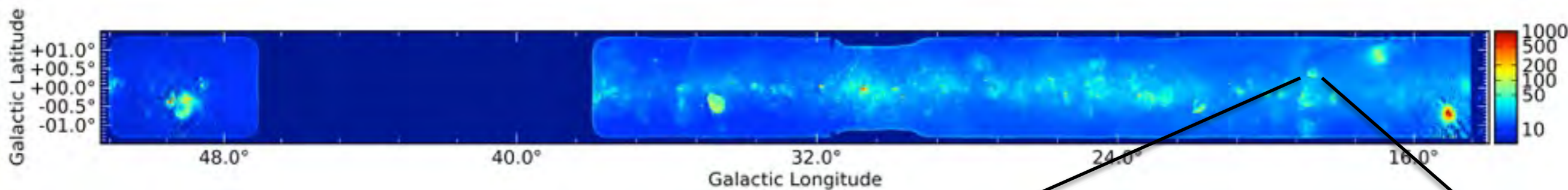
**Coverage:**

$l = 15 \sim 67 \text{ deg}$

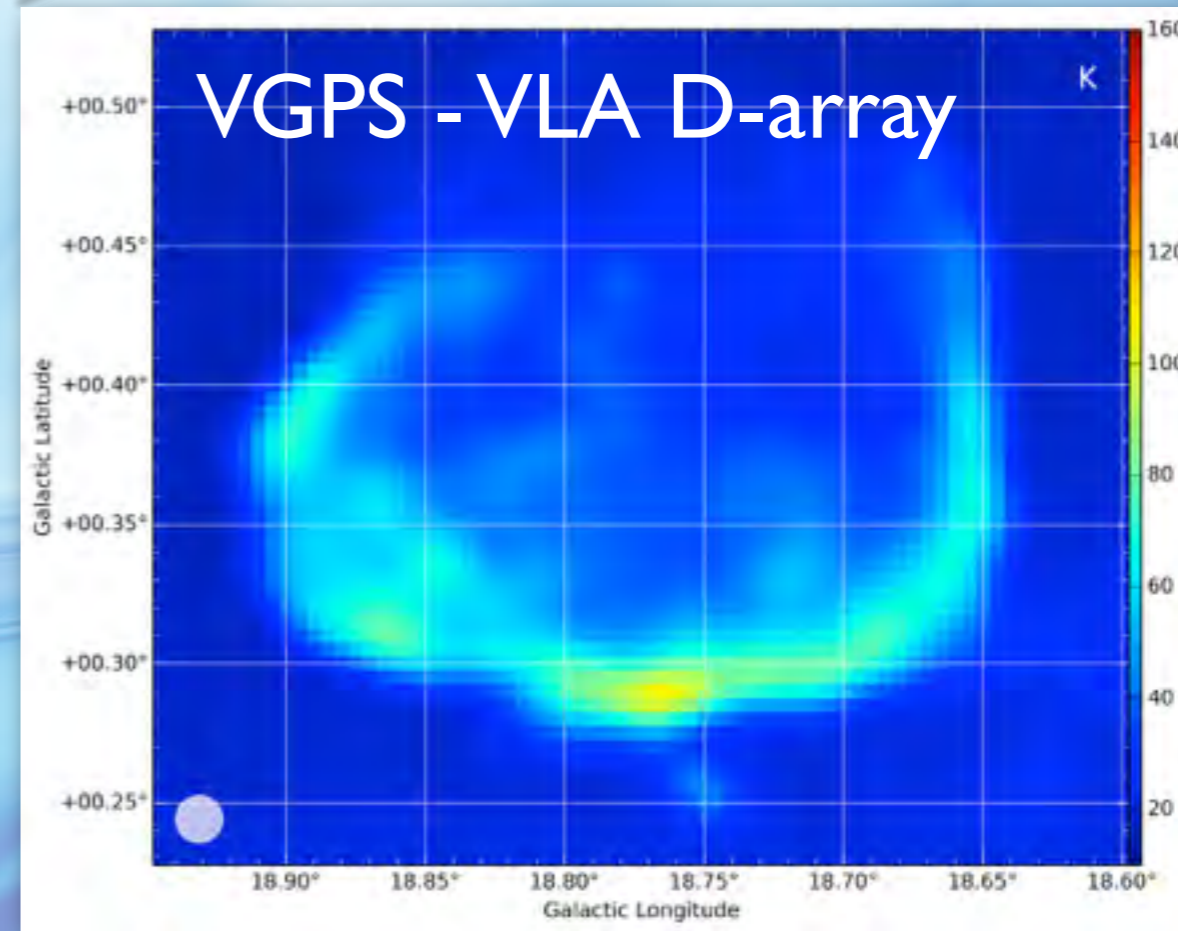
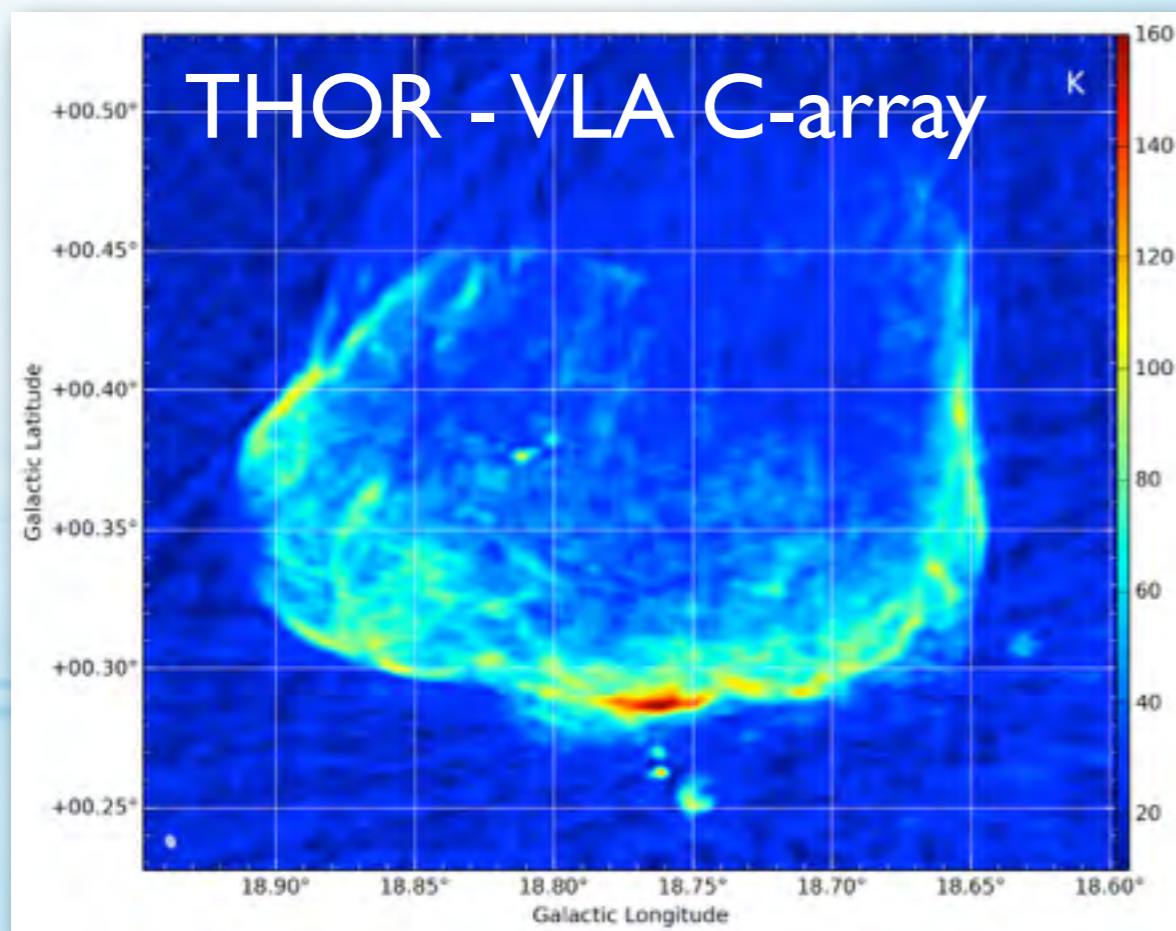
$b = -1 \sim +1 \text{ deg}$

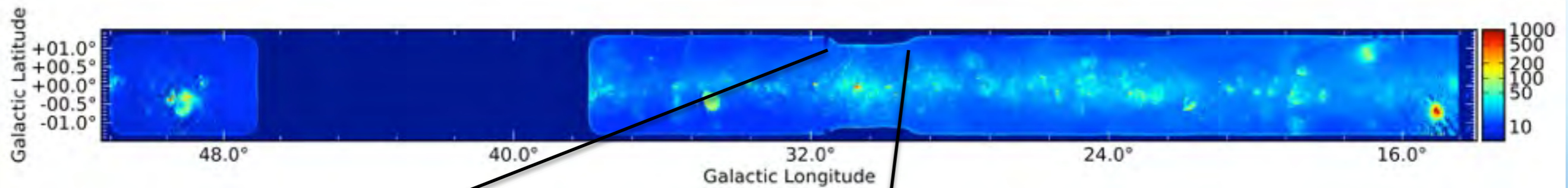
Image: R. Hurt - NASA JPL-Caltech

# THOR - Survey:

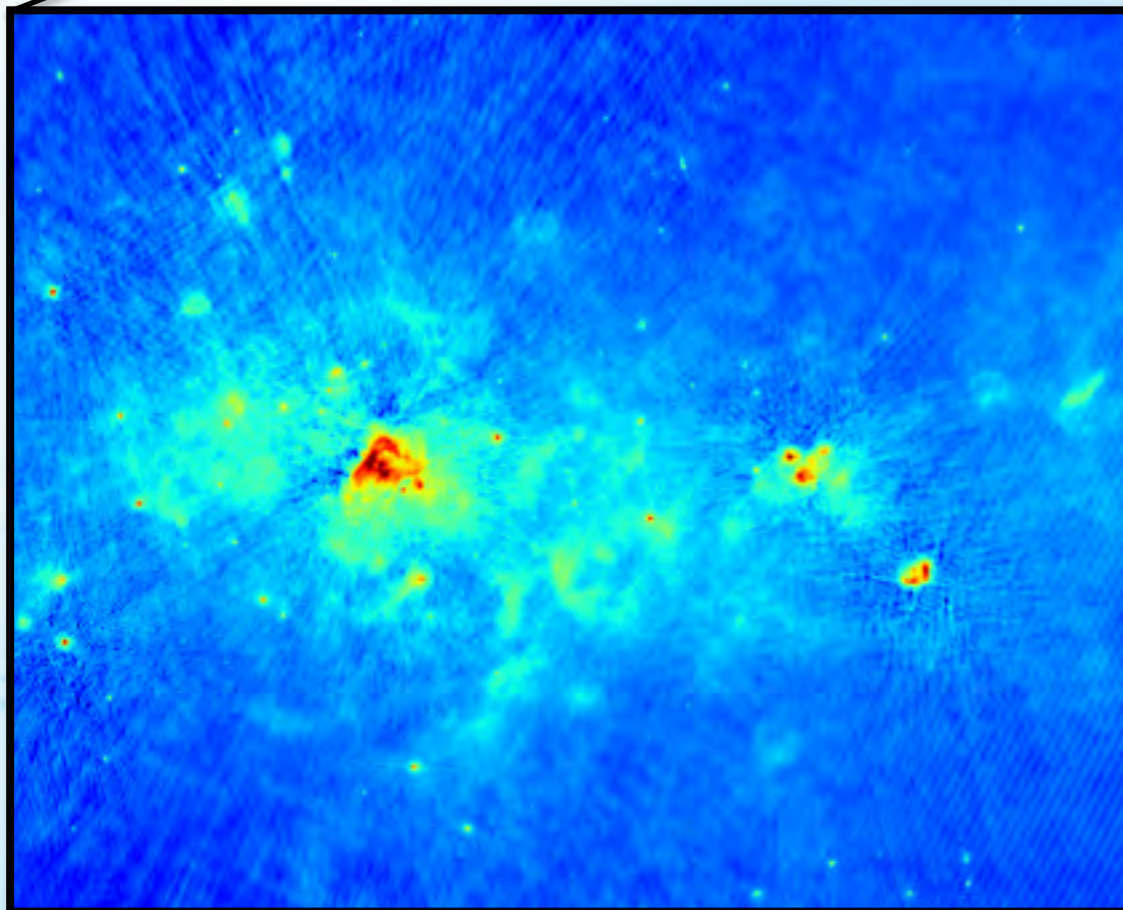


SNR G18.8+0.3





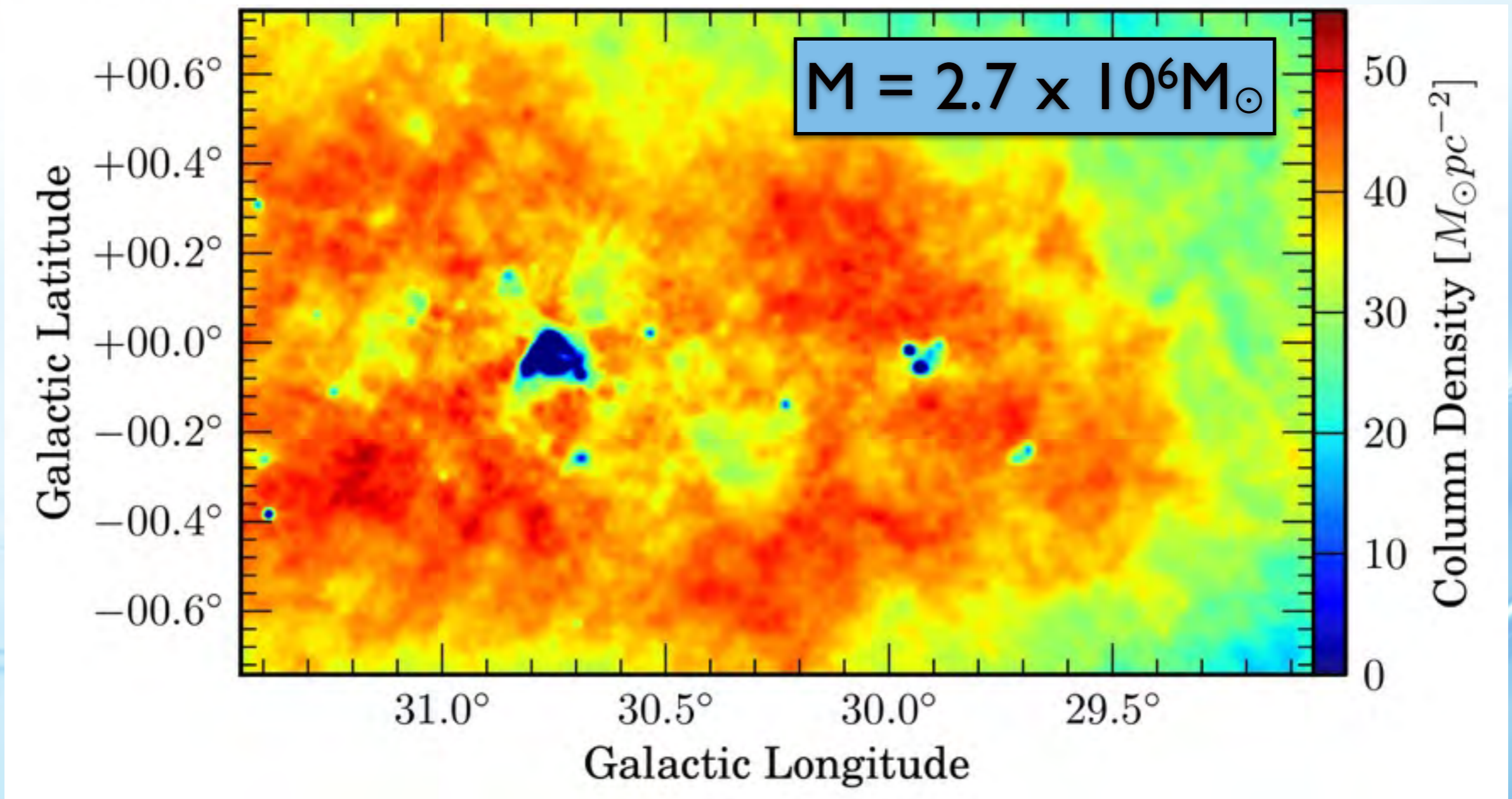
W43



- Intersection of arm with bar
- $d = 5.5 \text{ kpc}$
- Mass:  $\sim 10^6 M_{\odot}$
- $\sim 0.1 M_{\odot} \text{ yr}^{-1}$

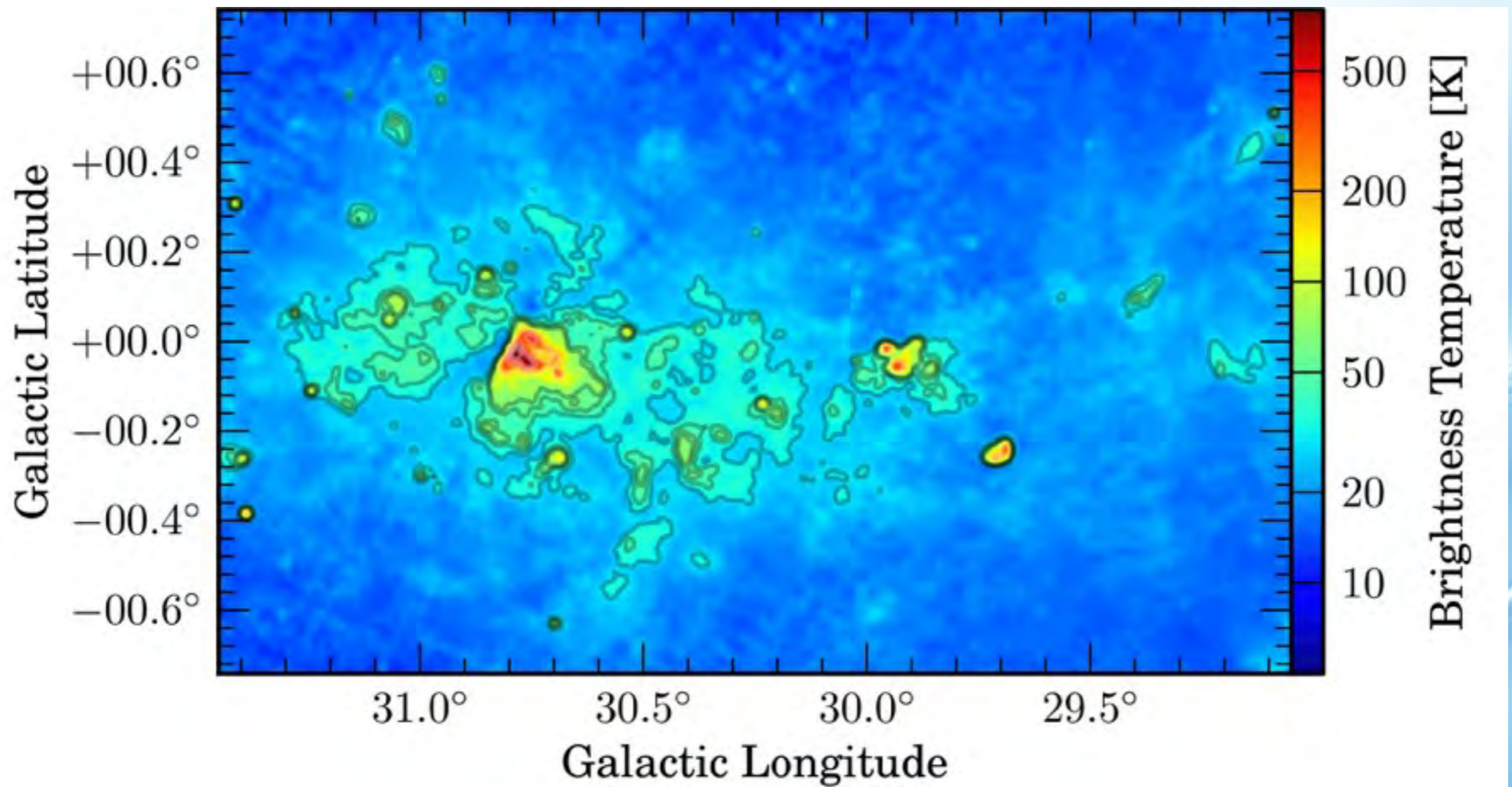
Motte et al. 2003, 2014, Nguyen et al. 2011  
Beuther et al. 2012, Carlhoff et al. 2013  
Louvet et al. 2014, ...

optical thin assumption



Bihr et al. [subm.]

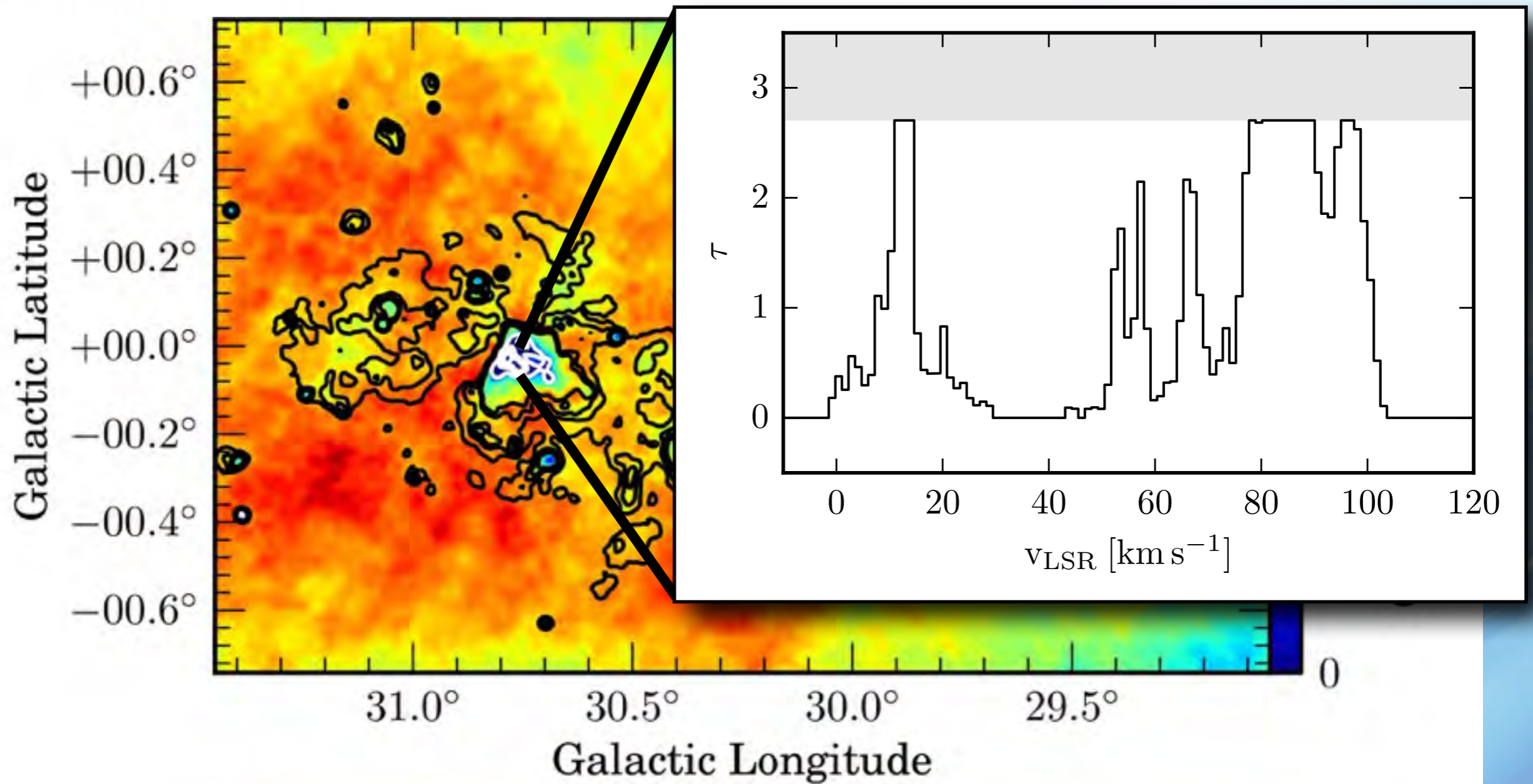
## continuum emission at 21cm



Bihr et al. [subm.]

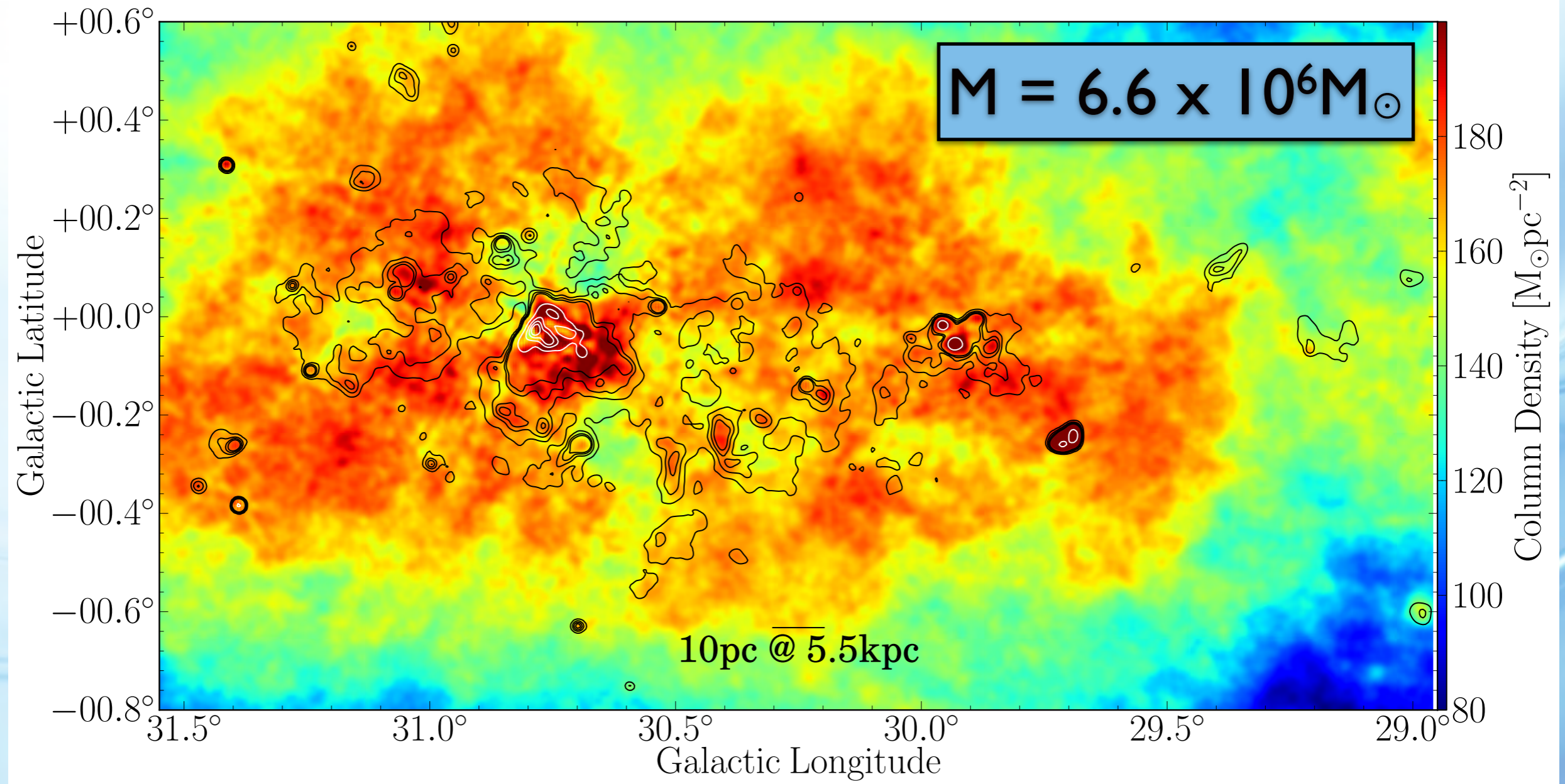


optical thin assumption



Bihr et al. [subm.]

## HI column density optical depth corrected

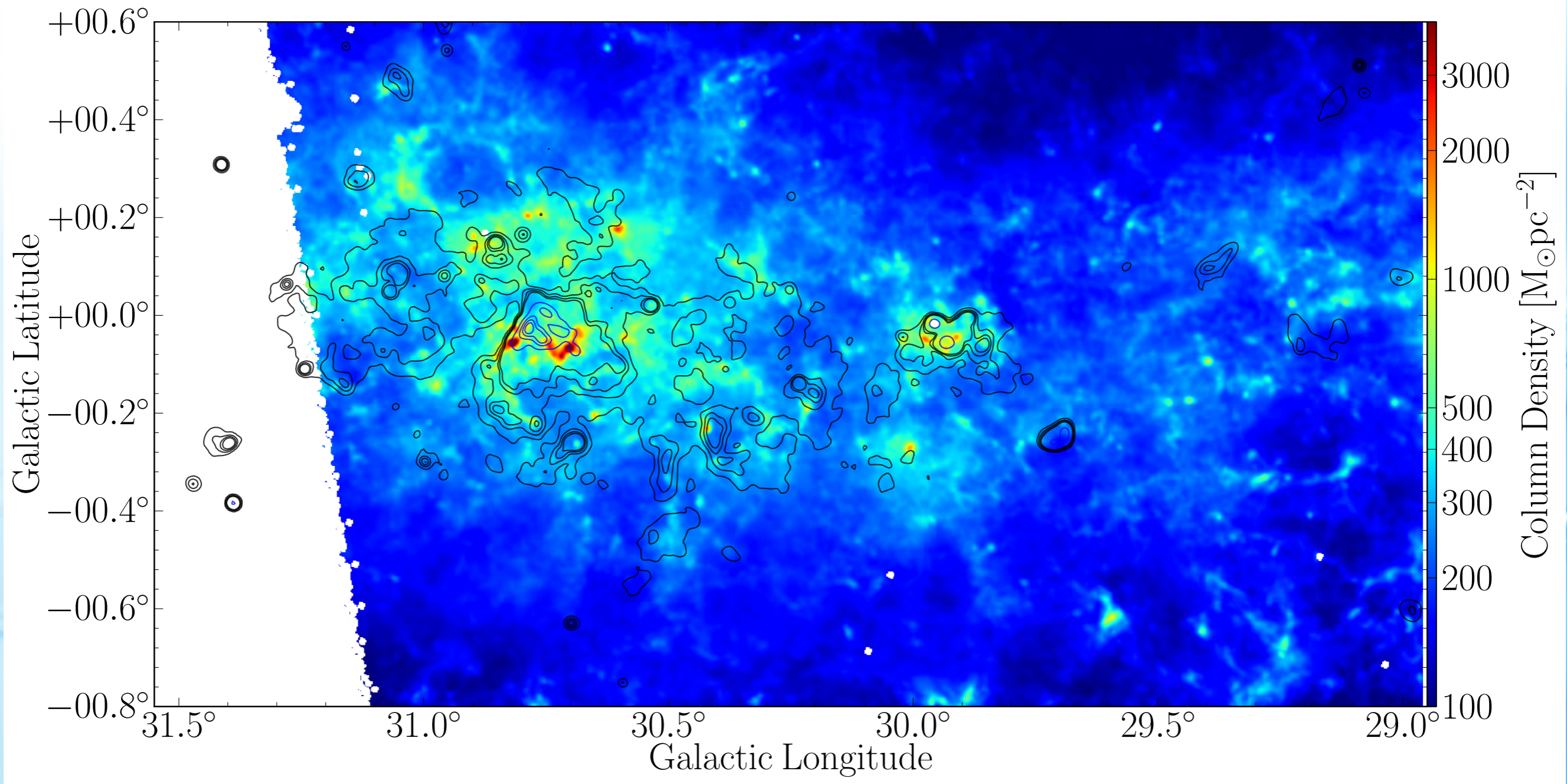


Bihr et al. [subm.]

# Hydrogen:

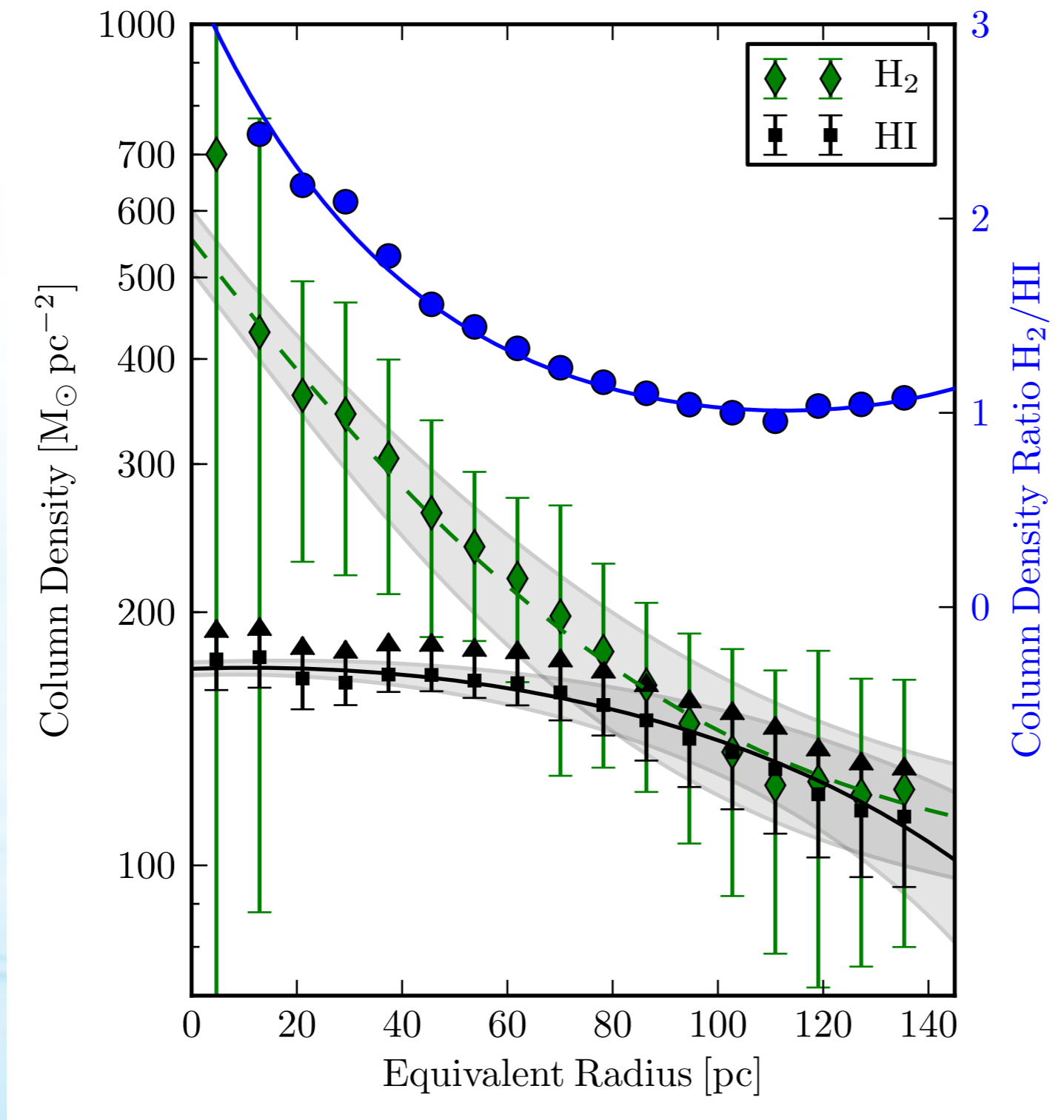


## H<sub>2</sub> column density (Herschel dust)

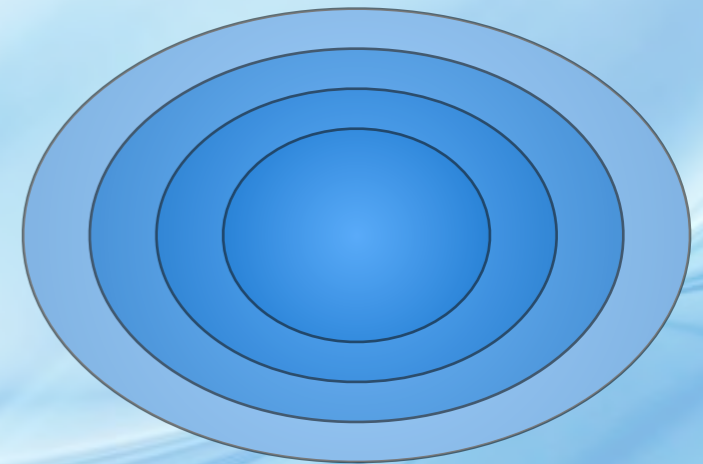


Bihr et al. [subm.]

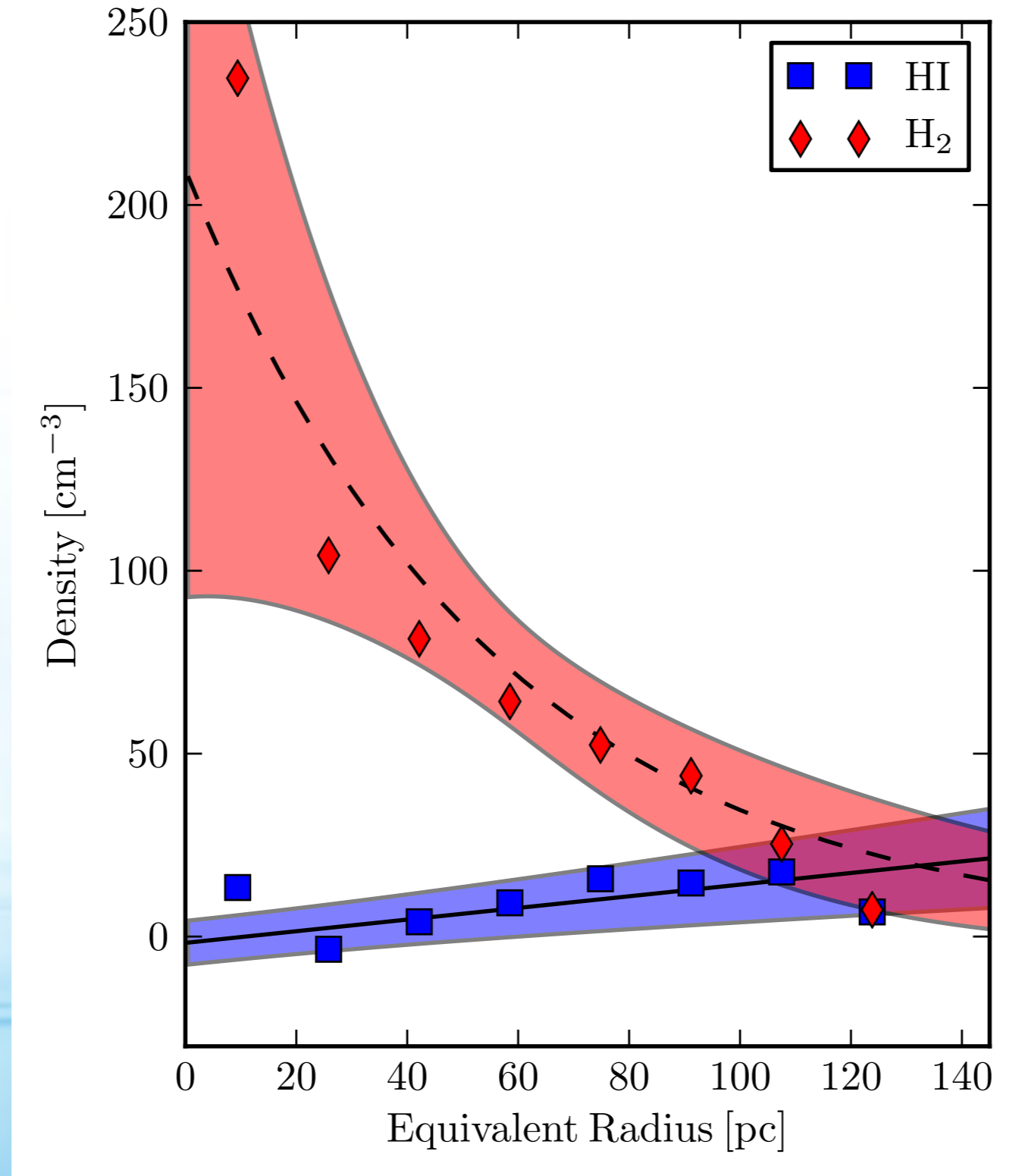
# HI column density



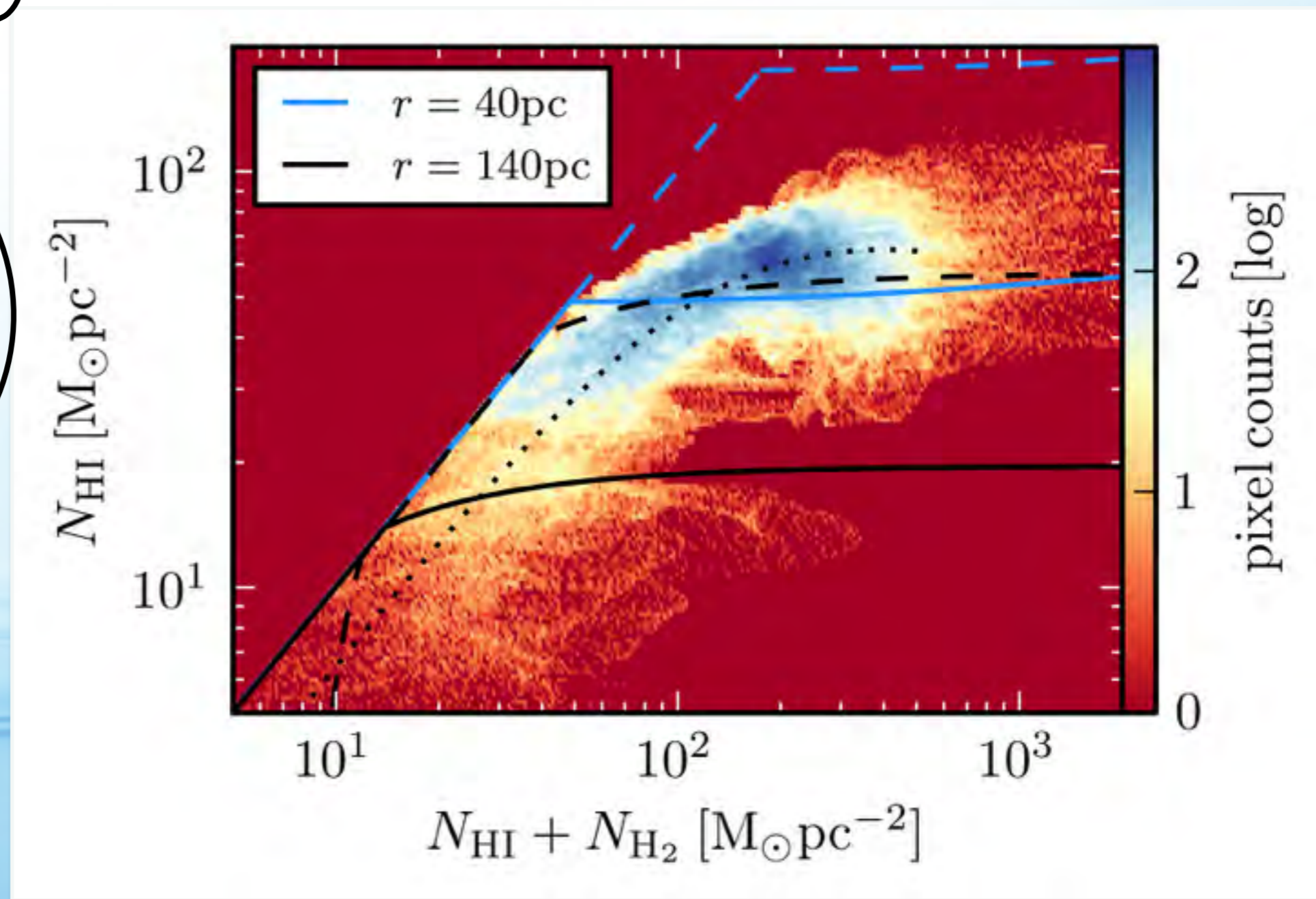
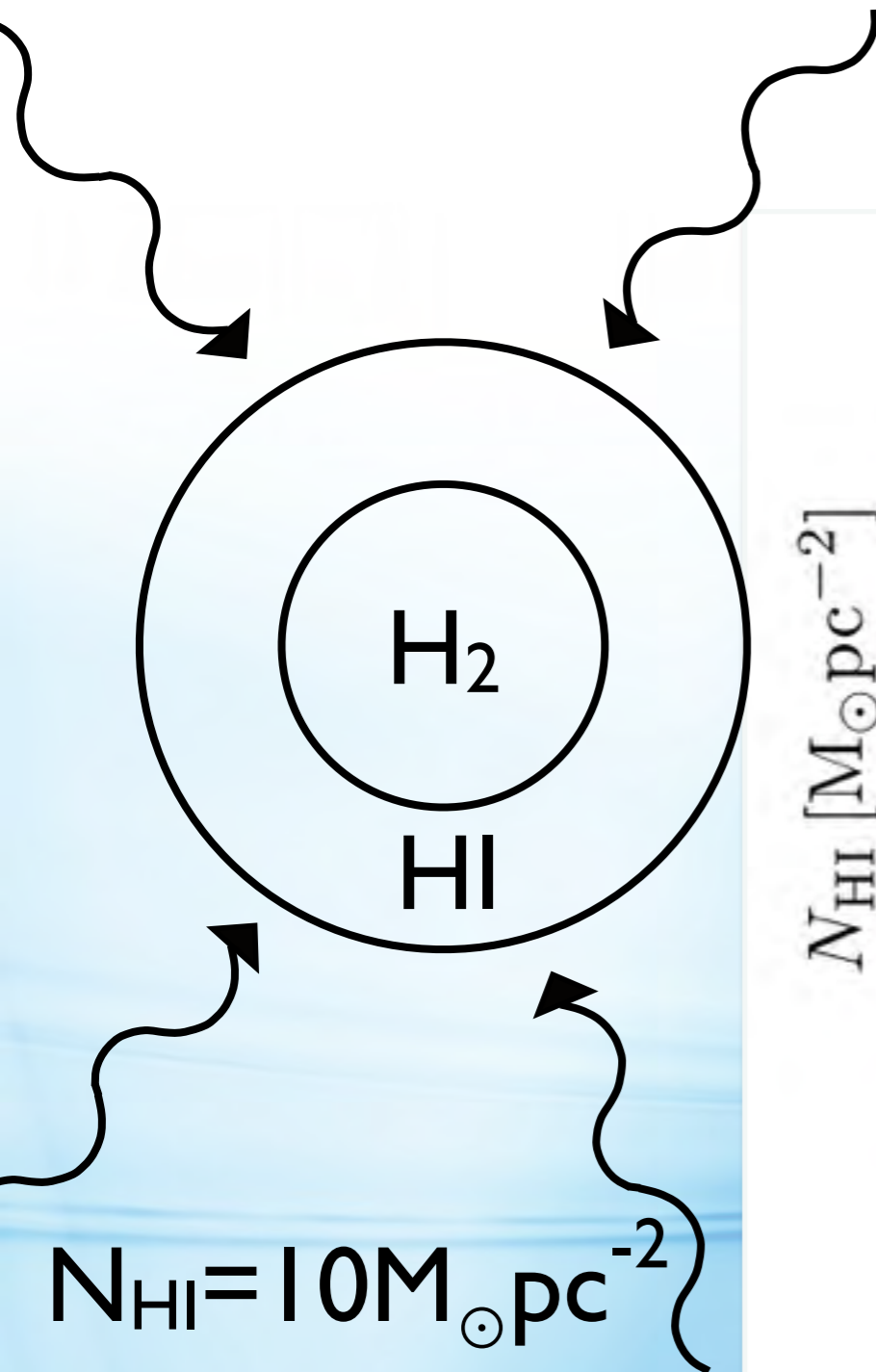
Bihr et al. [subm.]



# HI density:



Bihr et al. [subm.]



Bihr et al. [subm.]

- Optical depth corrections crucial
- Simple theoretical models do not work



Galactic Latitude

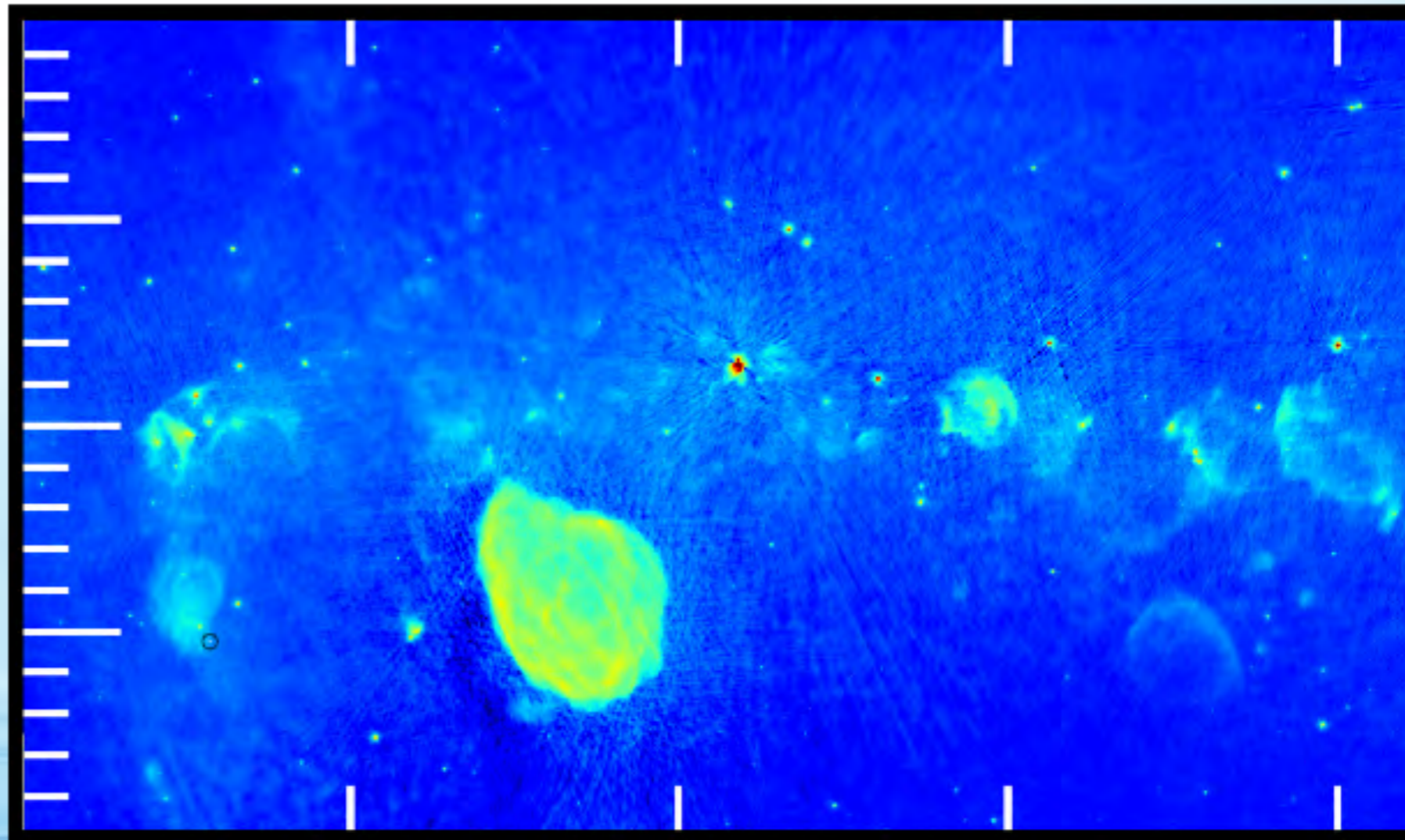
+01.0°

+00.5°

+00.0°

-00.5°

-01.0°



36.0°

Galactic Longitude



# Continuum - spectral index:

