

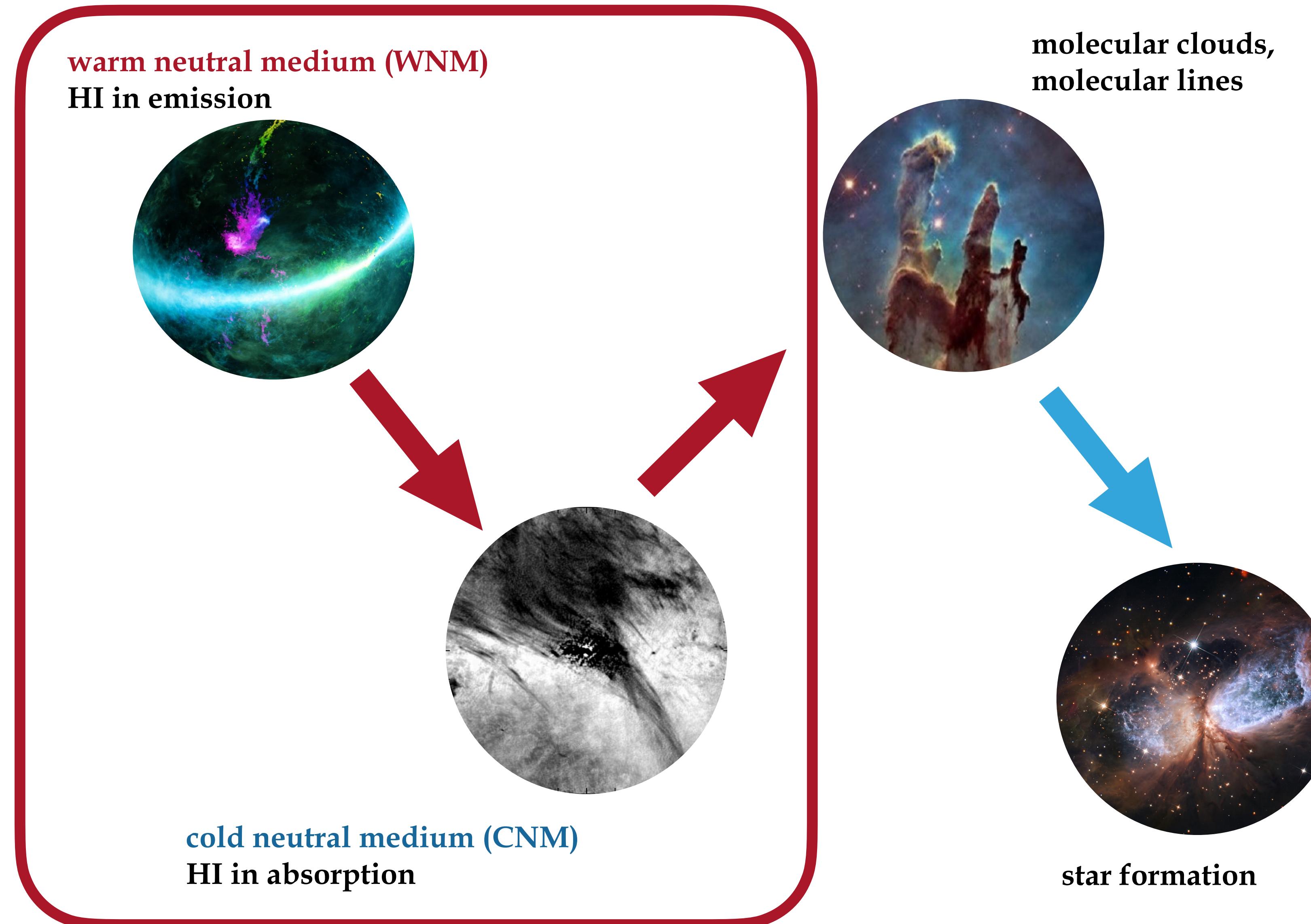
Introduction to Astrophysics and Cosmology

Radiation transfer

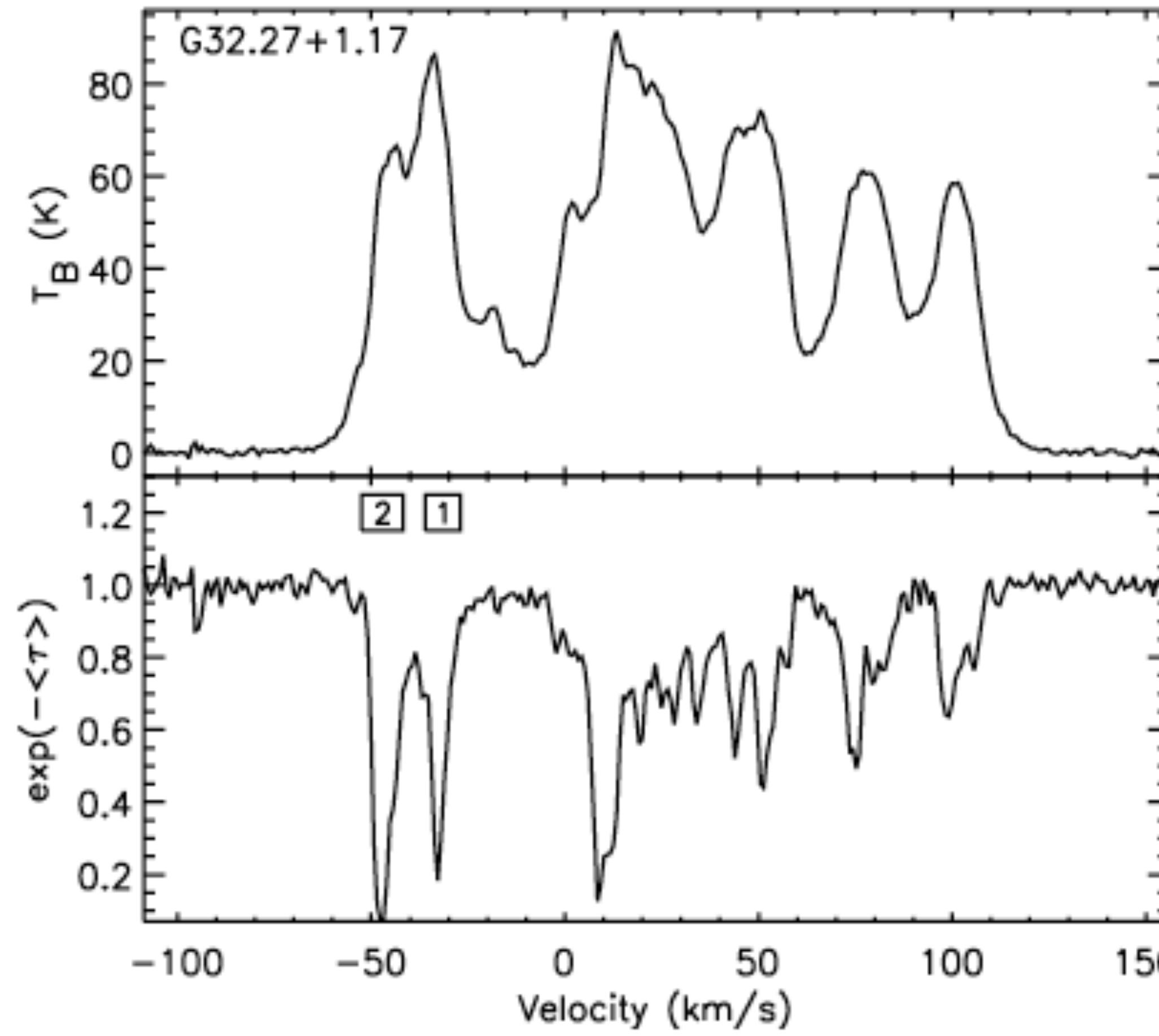
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Warm and cold hydrogen in the Galaxy

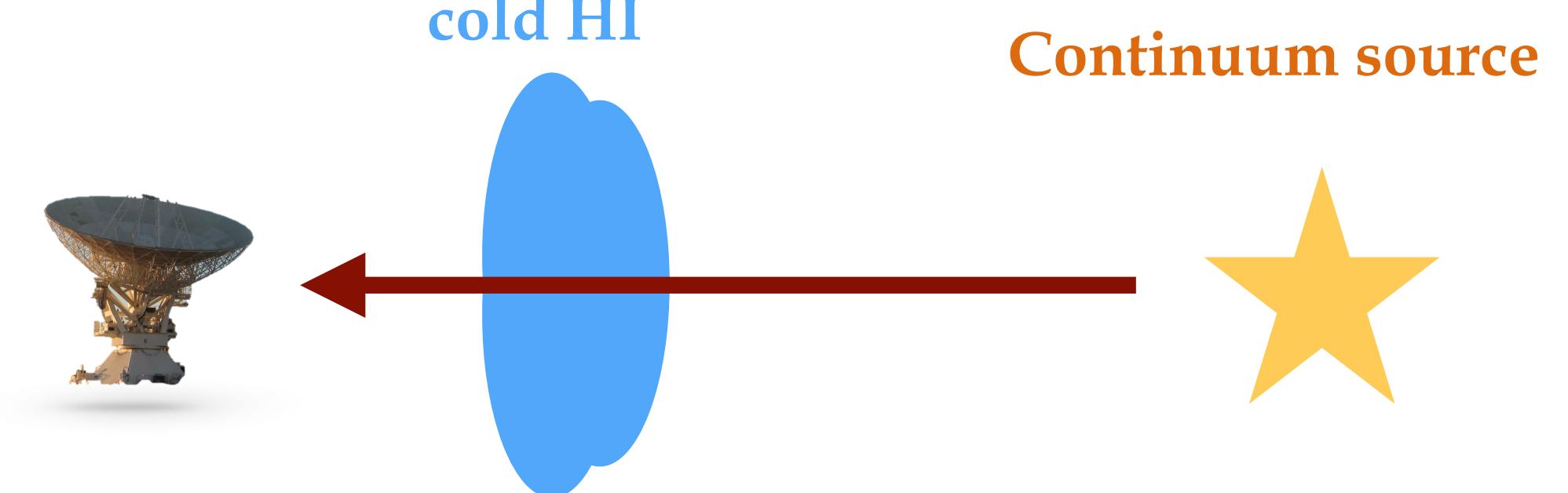


Warm and cold hydrogen in the Galaxy



Warm Neutral Medium
in emission
 $T \sim 10^3$ K

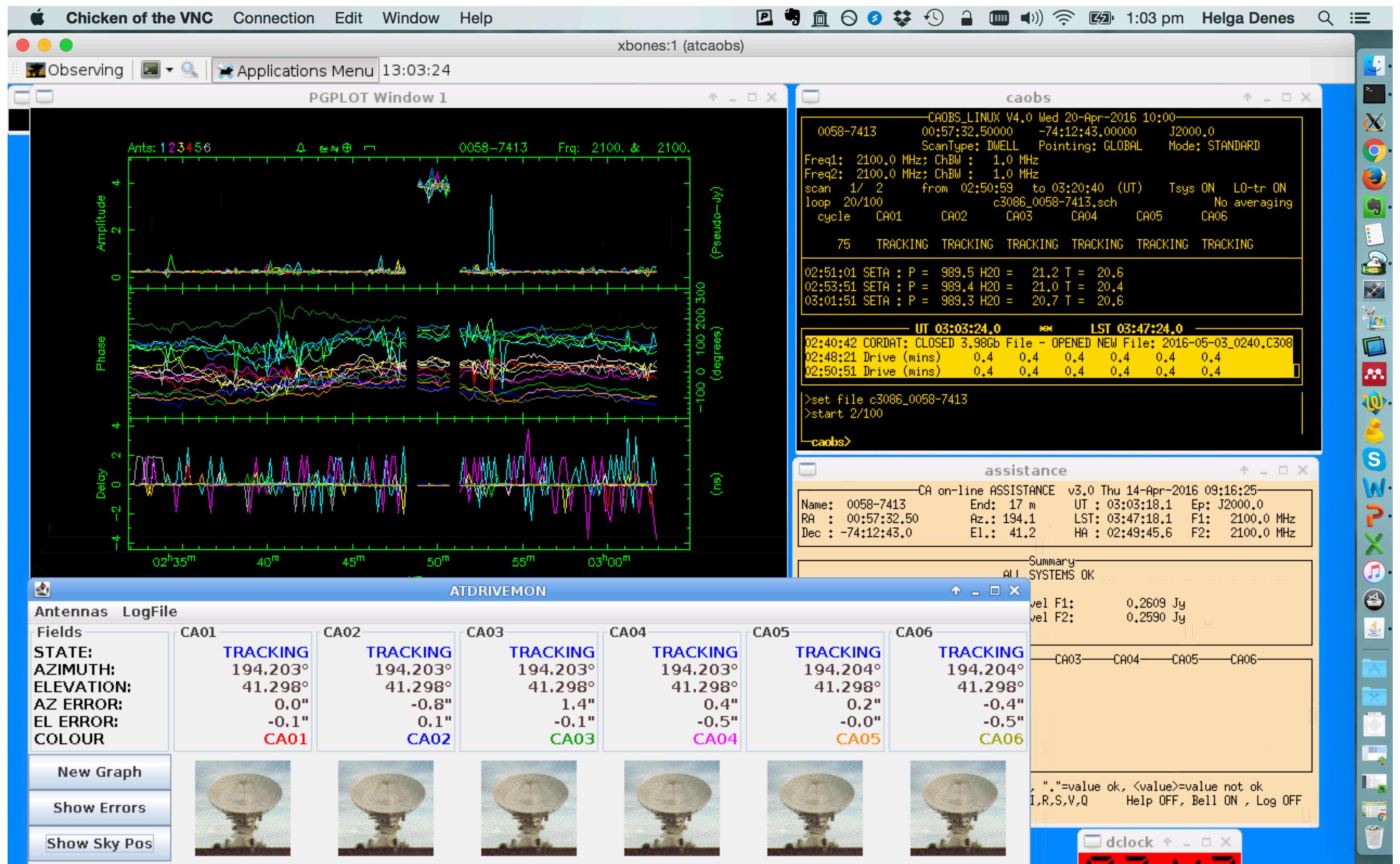
Cold Neutral Medium
in absorption
 $T < 50$ K
~30% of the HI



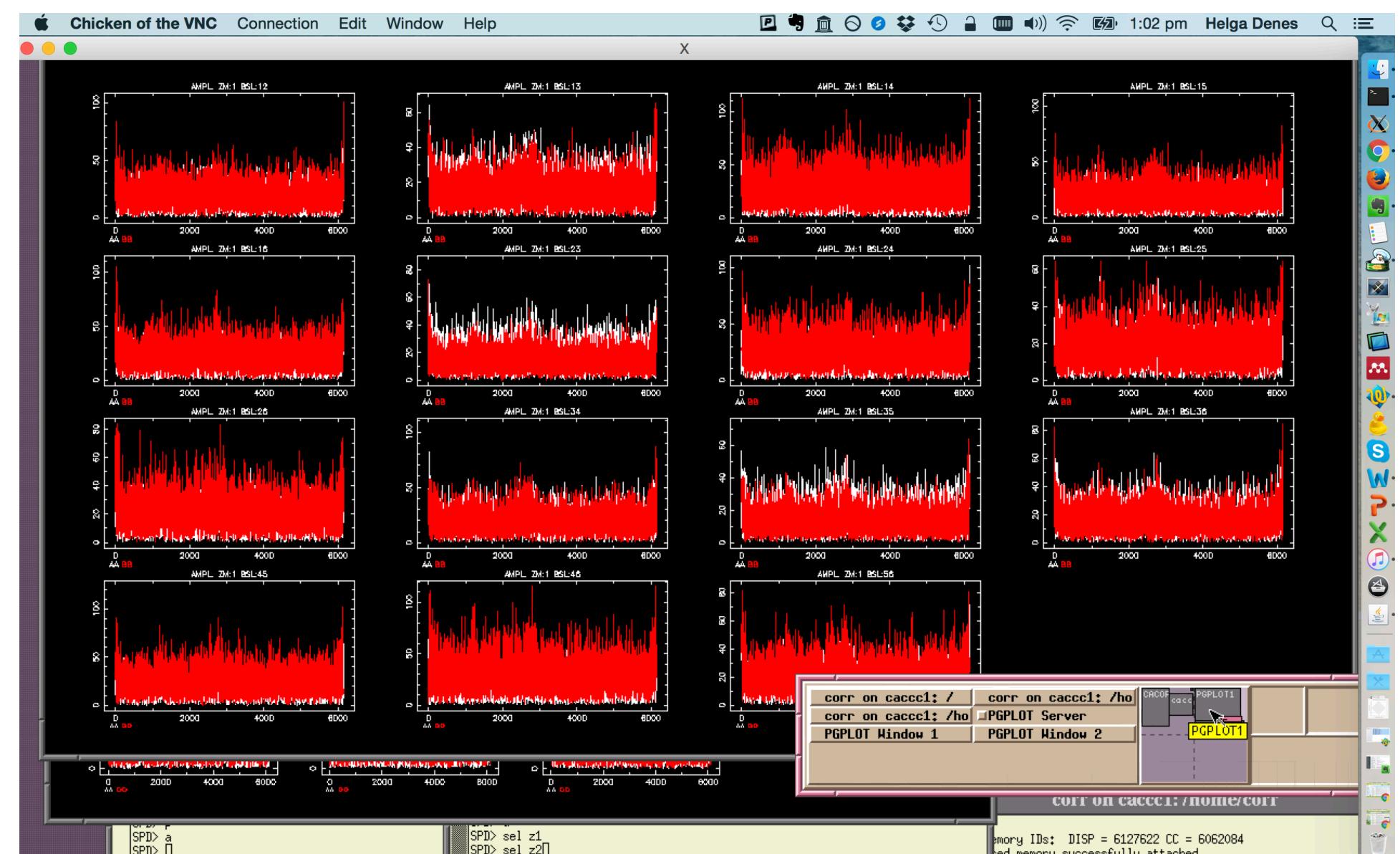
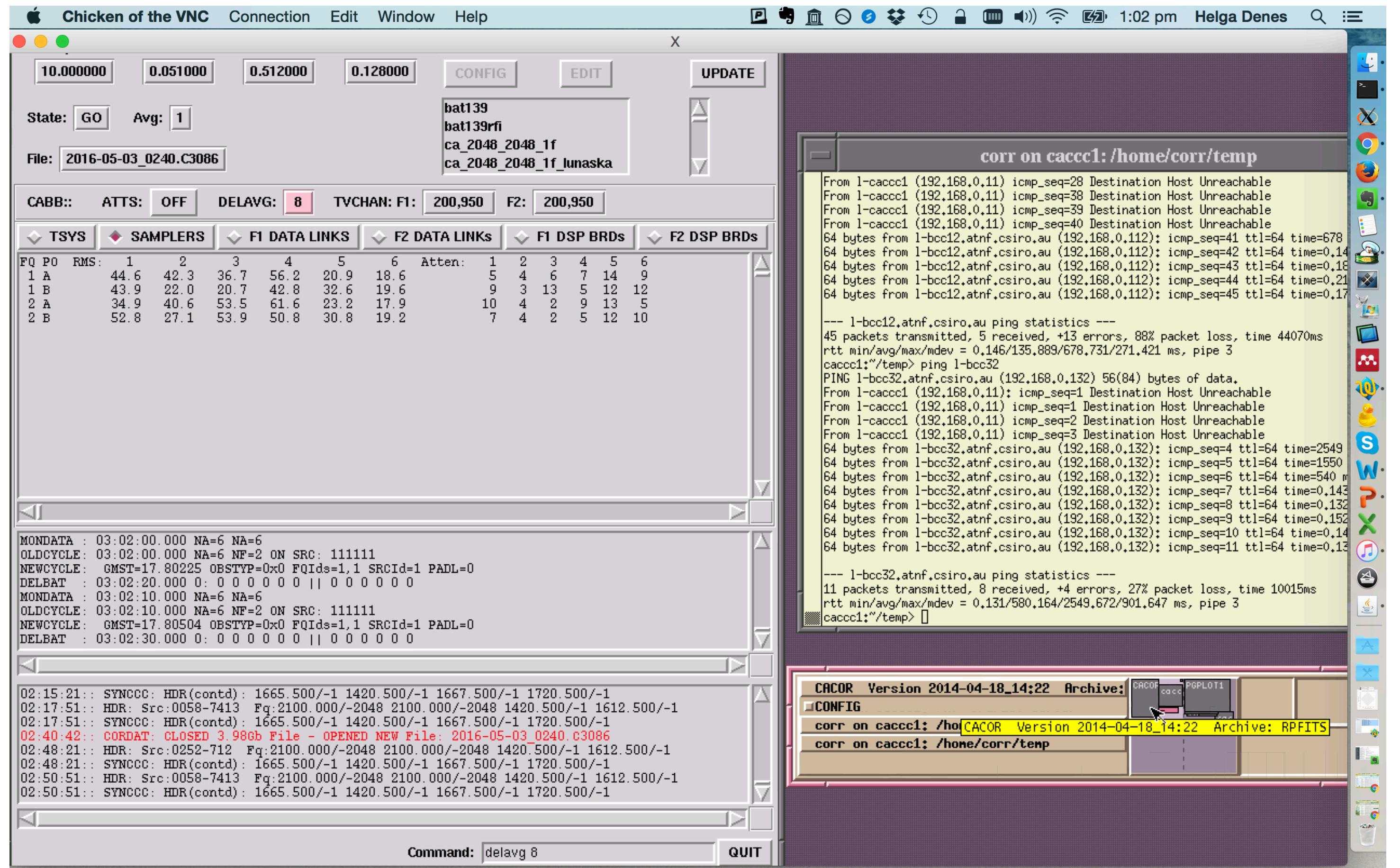
Observing



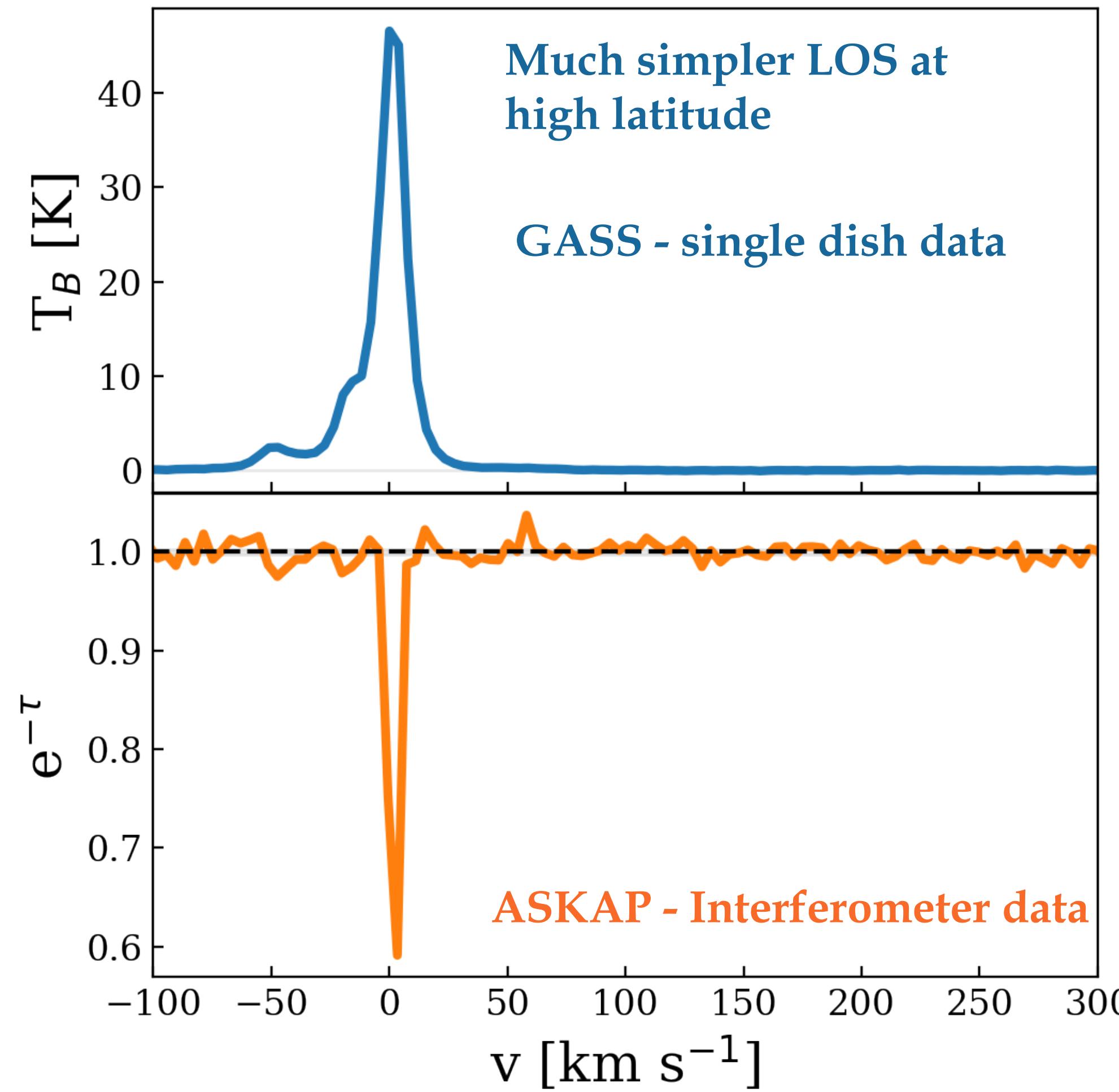
Observing



Observing



A simpler case at high latitude



- How much **cold gas is in the MW halo?**
- **More accurate measurement of N(HI) at high galactic latitudes**
- **A better census of the cold gas at high latitudes**
- Better foreground for extragalactic studies

Warm and cold hydrogen in the Galaxy

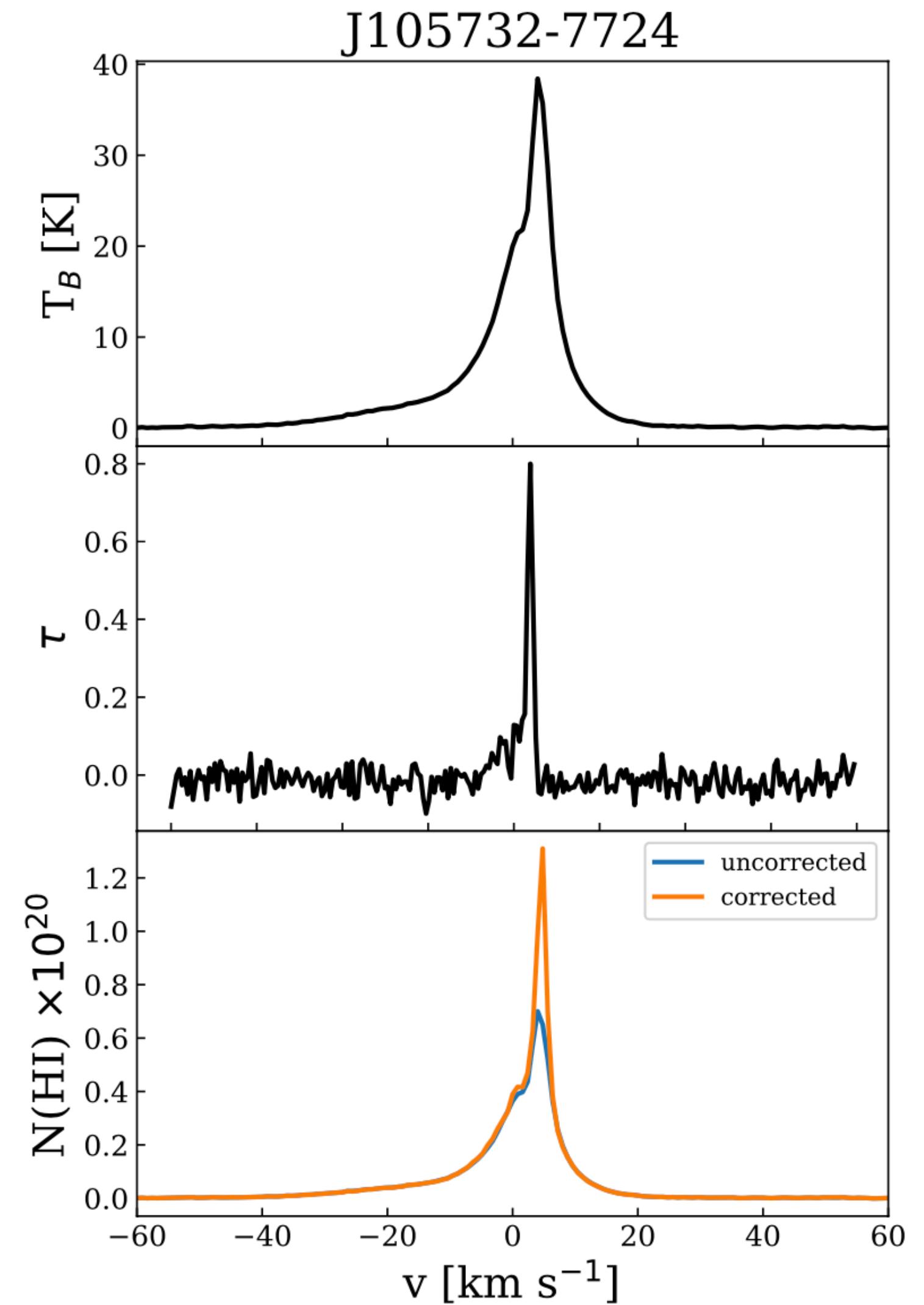
Optically thin case:

$$N(\text{HI}) = C_0 \int T_B(v) dv,$$

Optically thick case:

$$N(\text{HI})_{\text{corrected}} = C_0 \int_{\Delta V} T_B(v) \frac{\tau}{1 - e^{-\tau}} dv,$$

$T_B(v)$ is the brightness temperature \rightarrow the intensity of the radiation
 C_0 is a constant



Warm and cold hydrogen in the Galaxy

