The Wonders of TMC-1C

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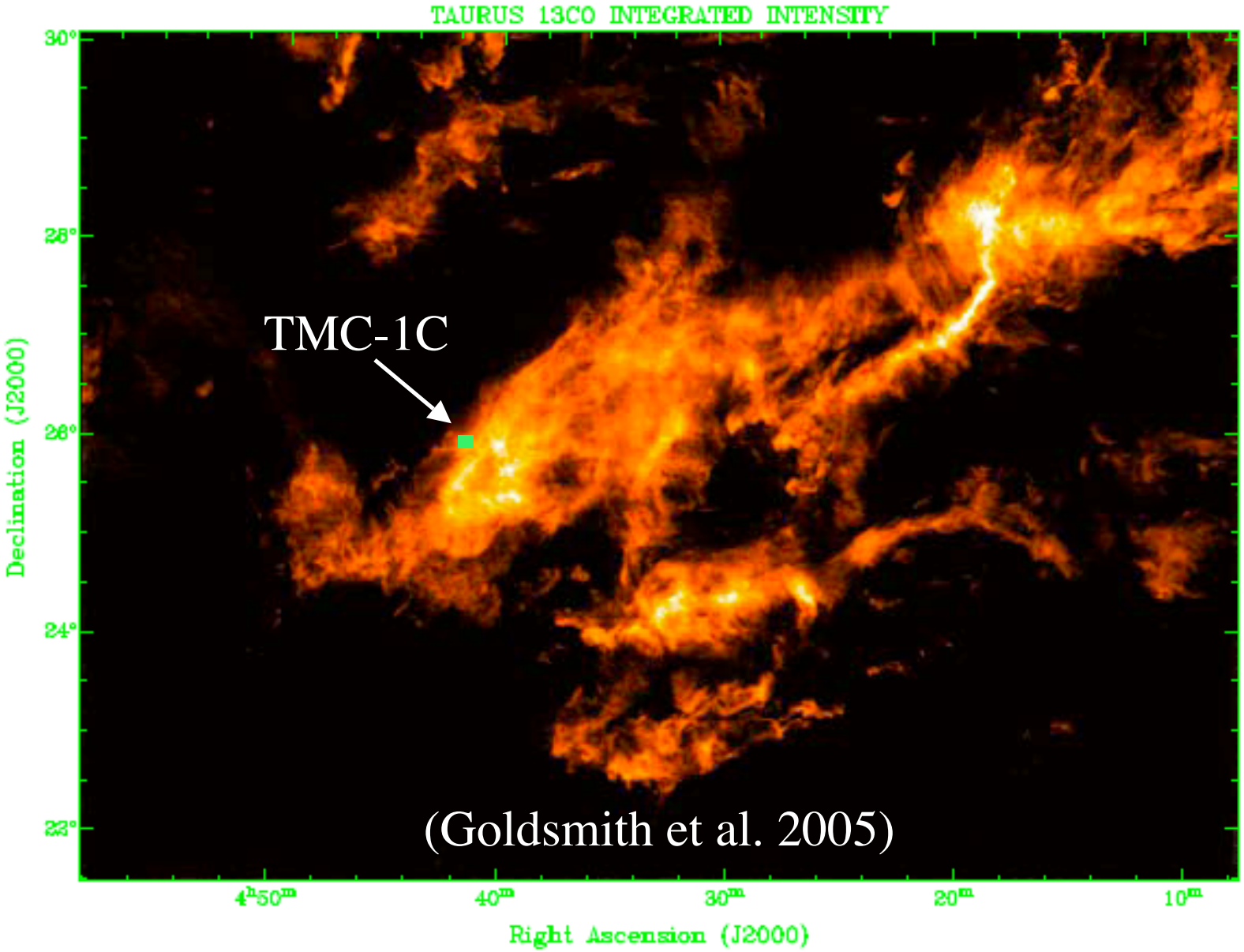
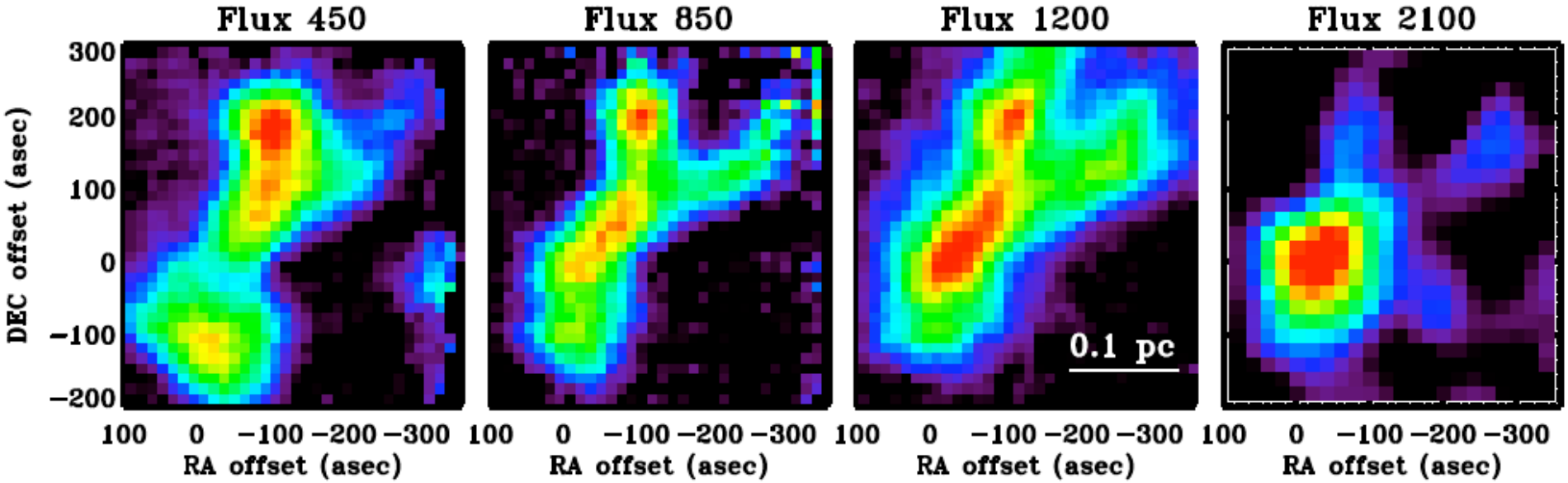
Taurus in ^{13}CO (1-0)



(Goldsmith et al. 2005)

TMC-1C Dust Emission

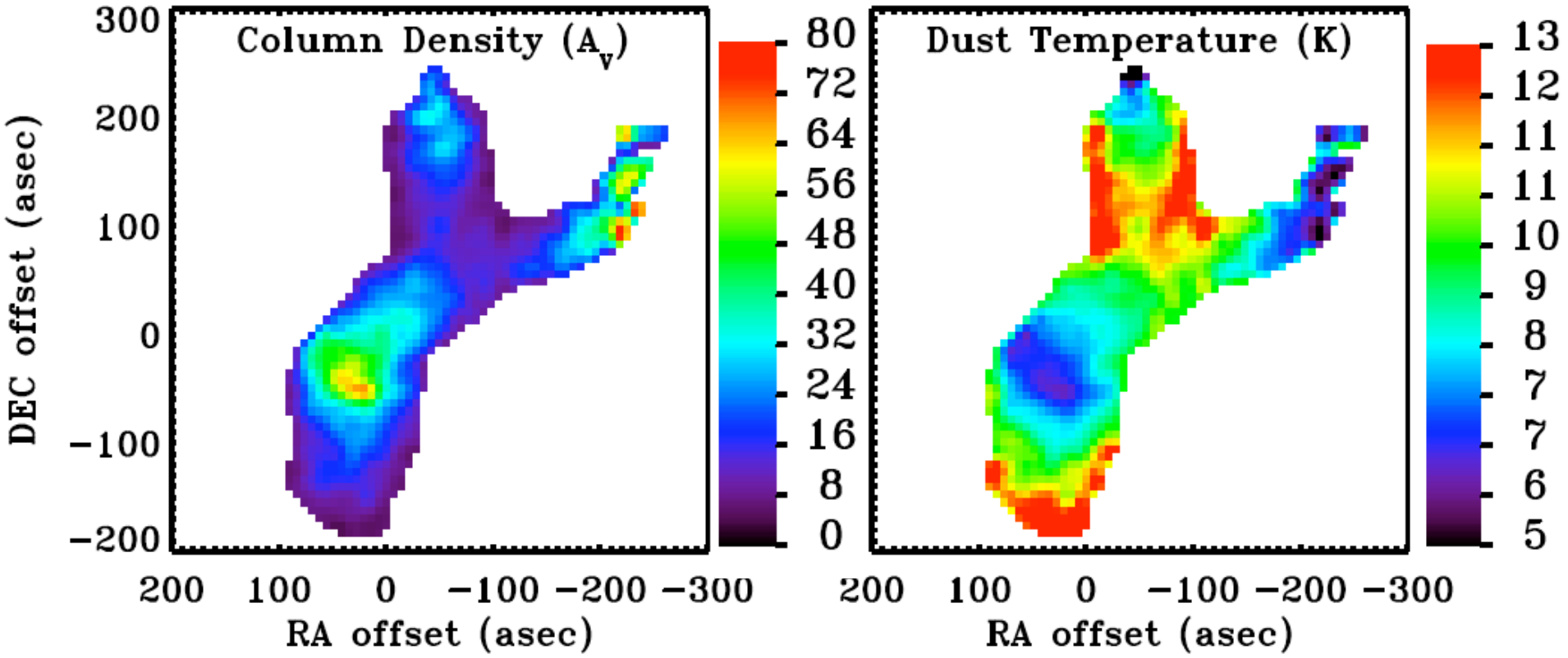


SCUBA	SCUBA	MAMBO	SHARC-II
JCMT	JCMT	IRAM	CSO

$$S_\lambda \propto N_H B_\lambda(T_d)\lambda^{-\beta}$$

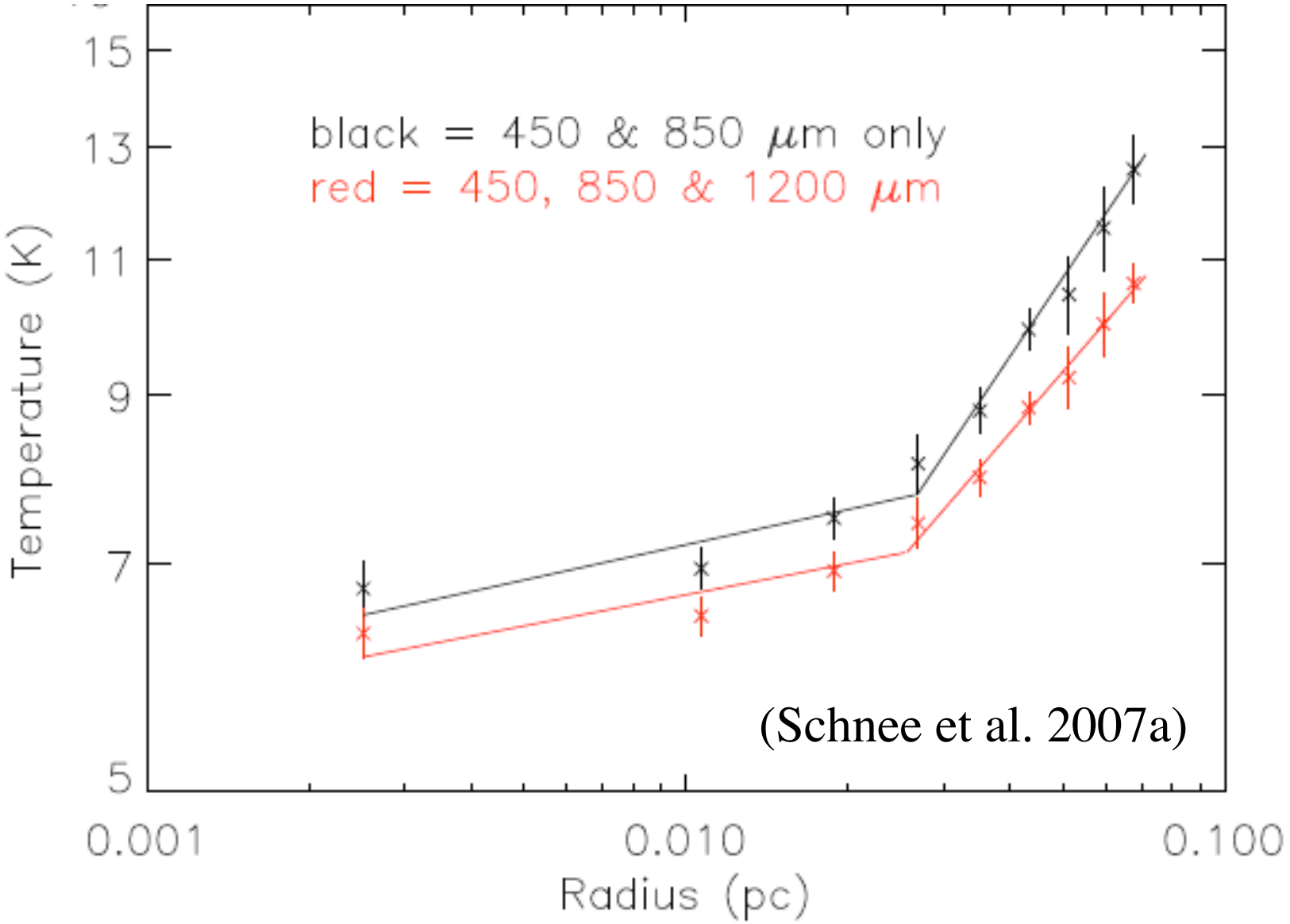
Column Density & Temperature

$\beta = 1.75$



(Schnee et al. 2007a)

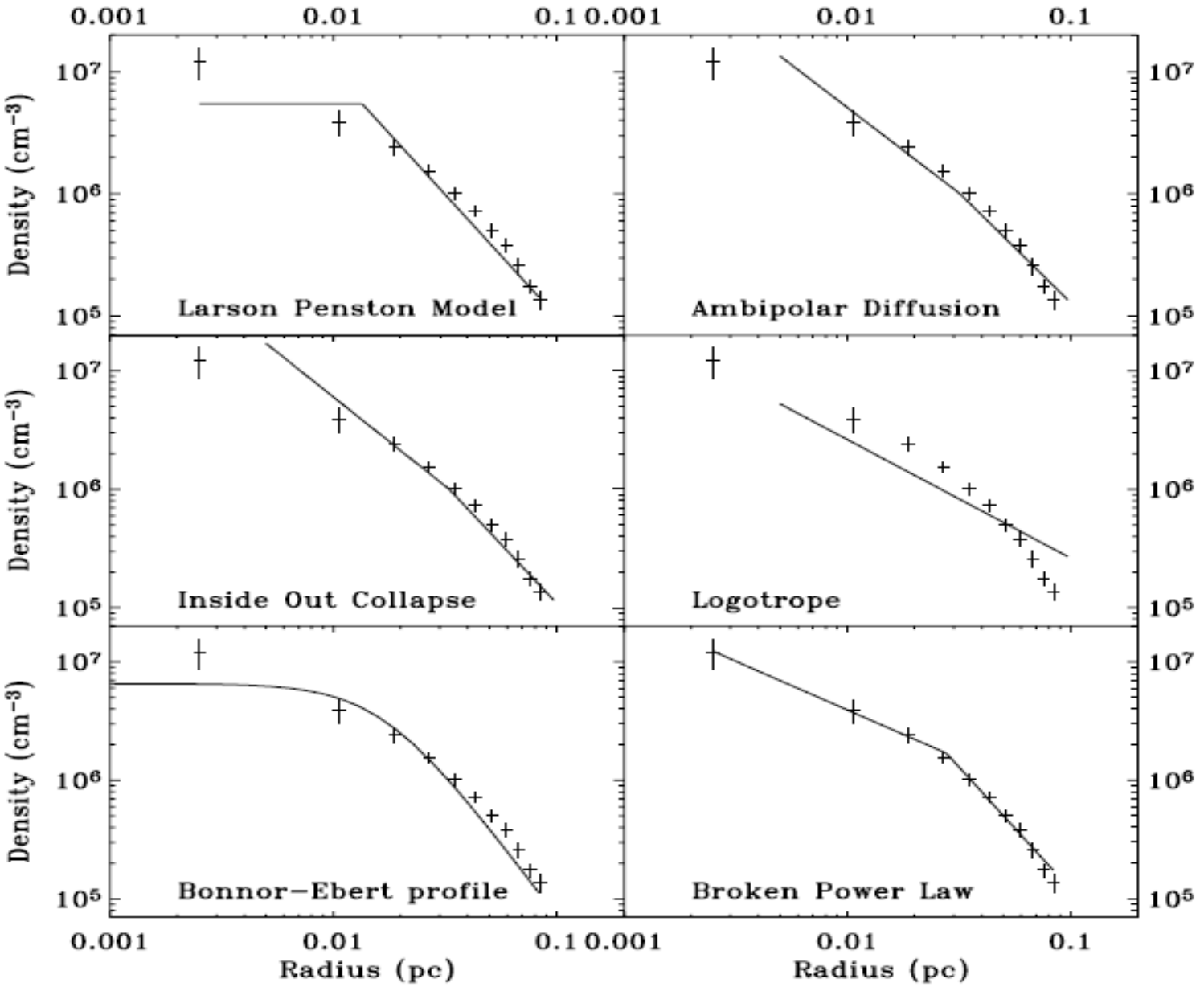
TMC-1C Temperature Profile



(Schnee et al. 2007a)

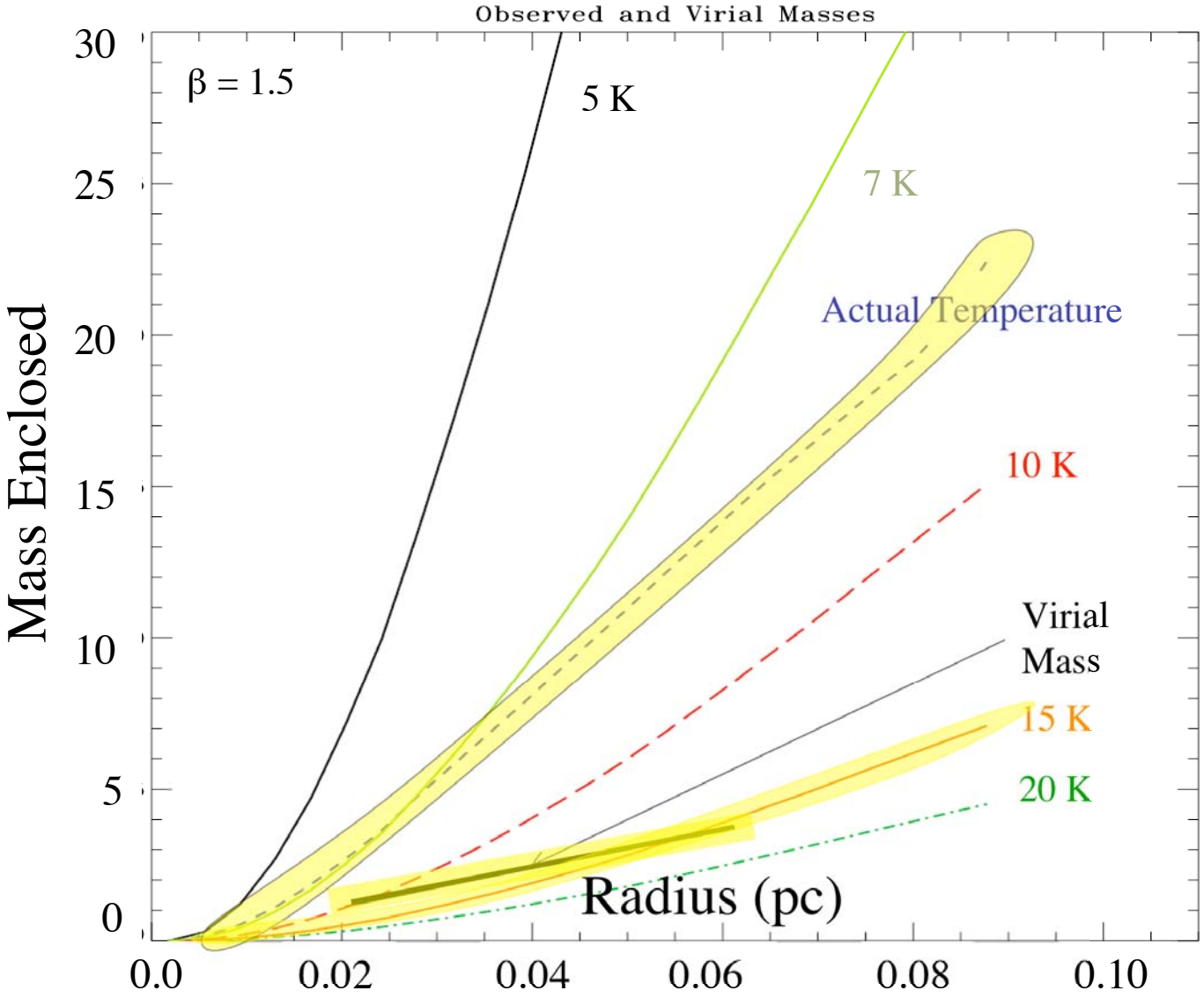
Density From Dust Emission

(Schnee & Goodman 2005)



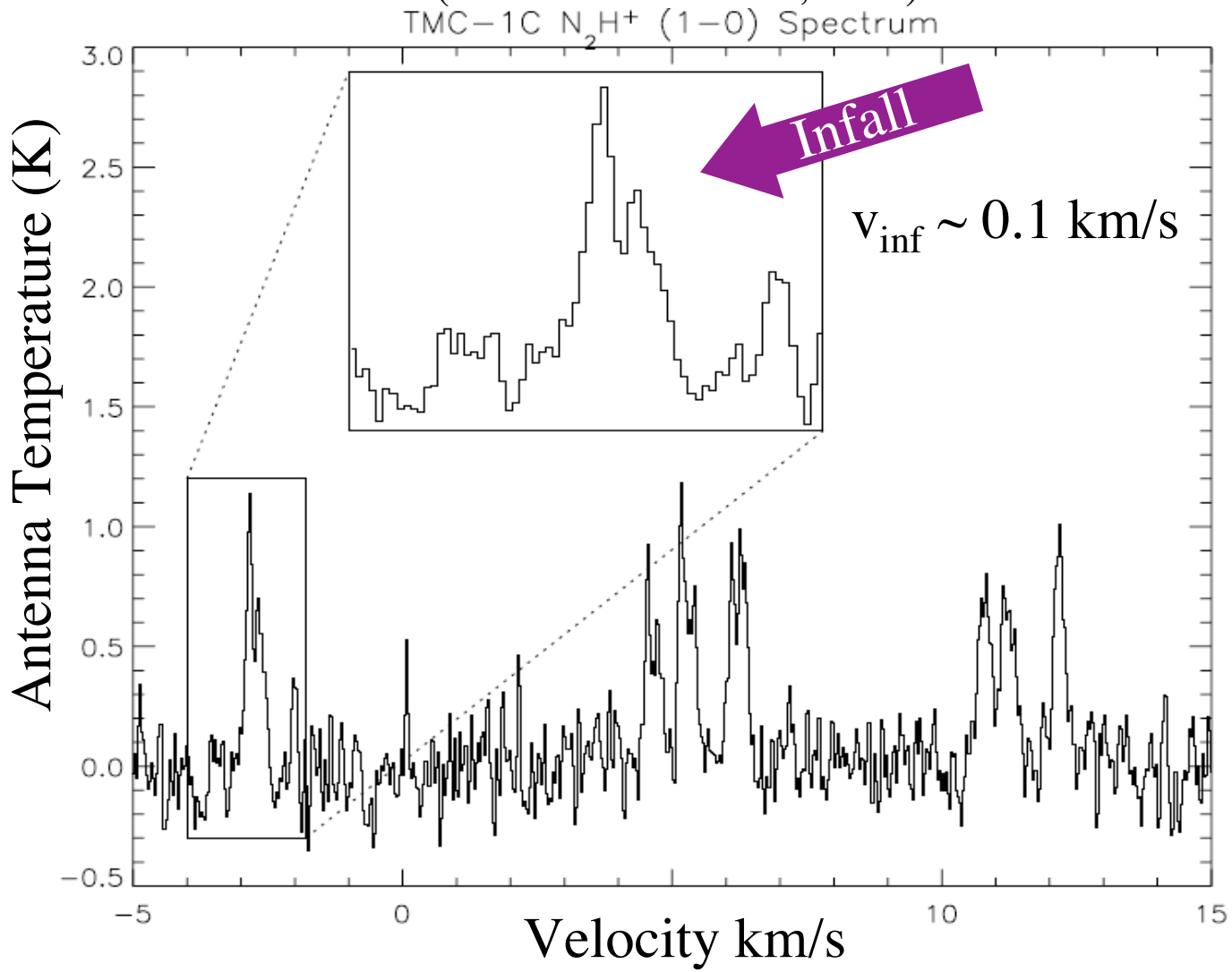
Mass From Dust Emission

(Schnee & Goodman 2005)

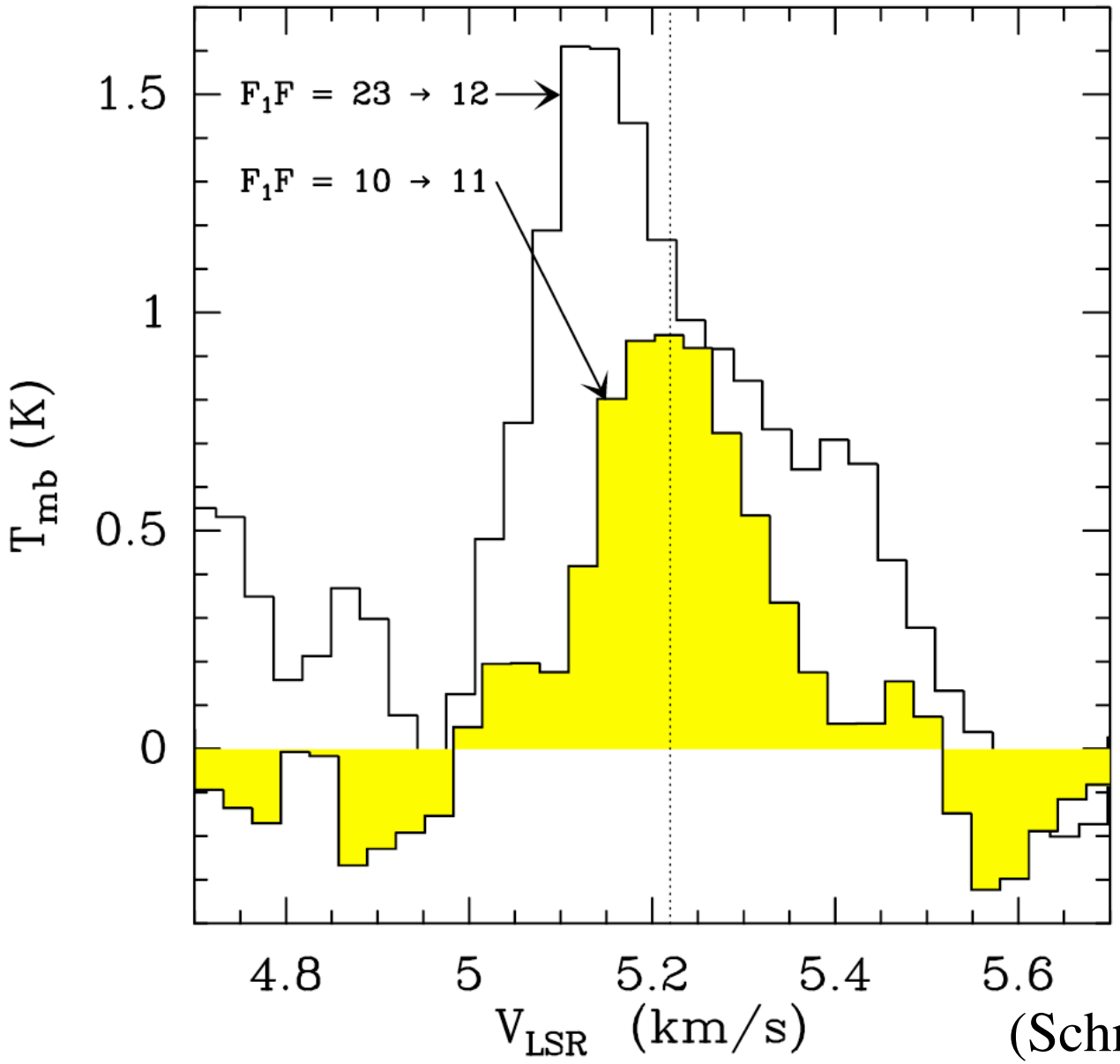


N_2H^+ Spectrum

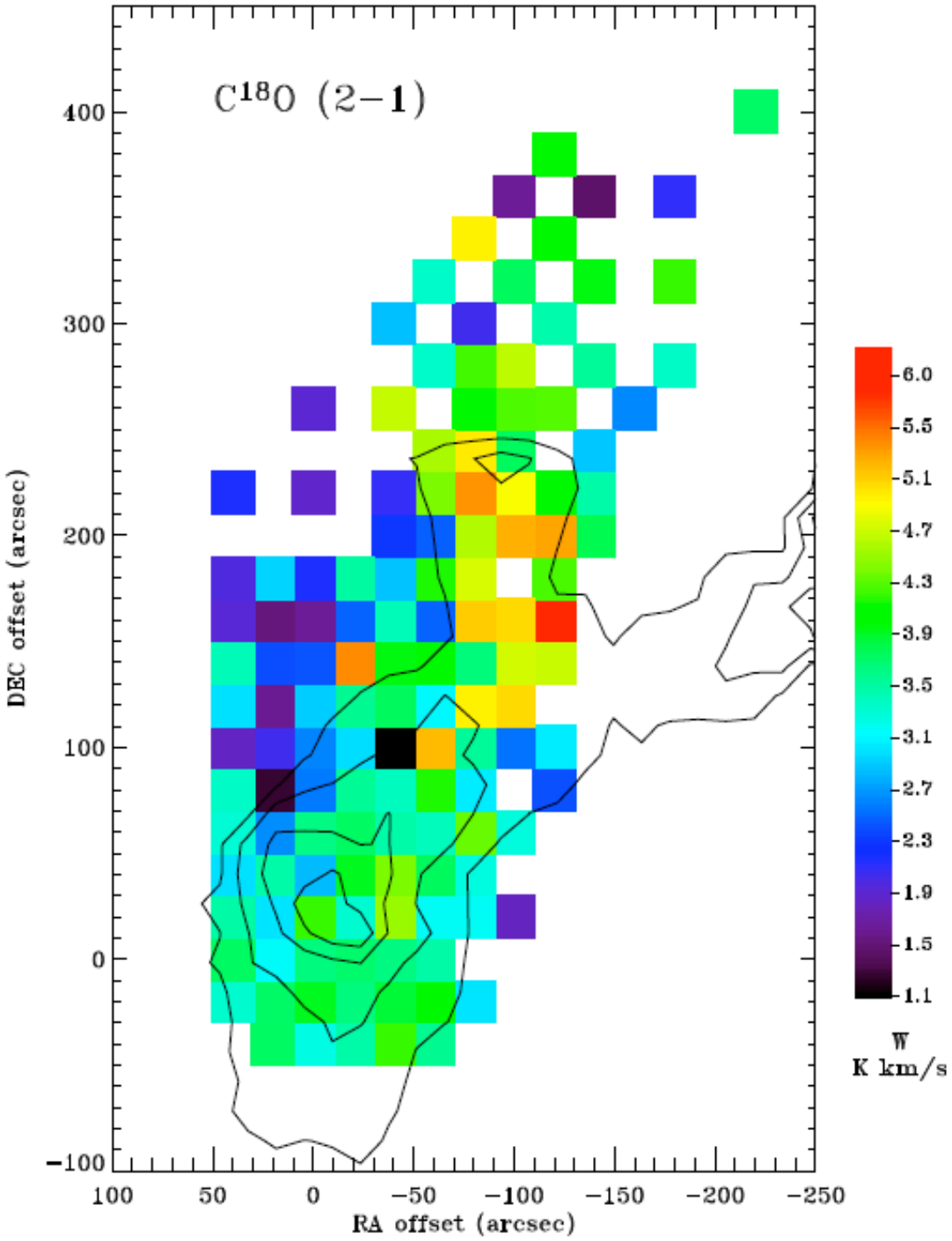
(Schnee & Goodman, 2005)



N_2H^+ Infall



(Schnee et al. 2007b)

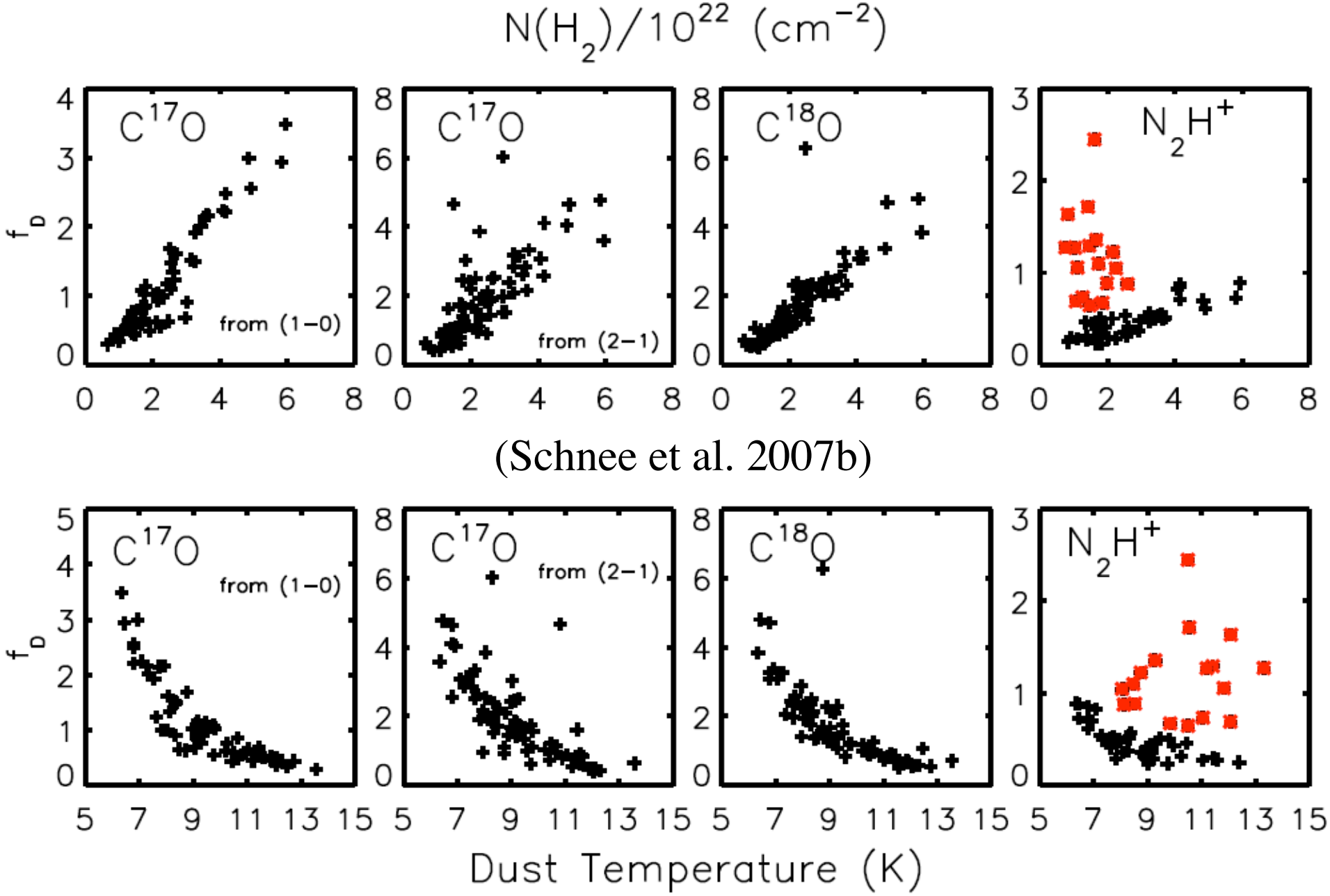


Gas Depletion

Contours = dust column
Colors = $C^{18}O$ emission

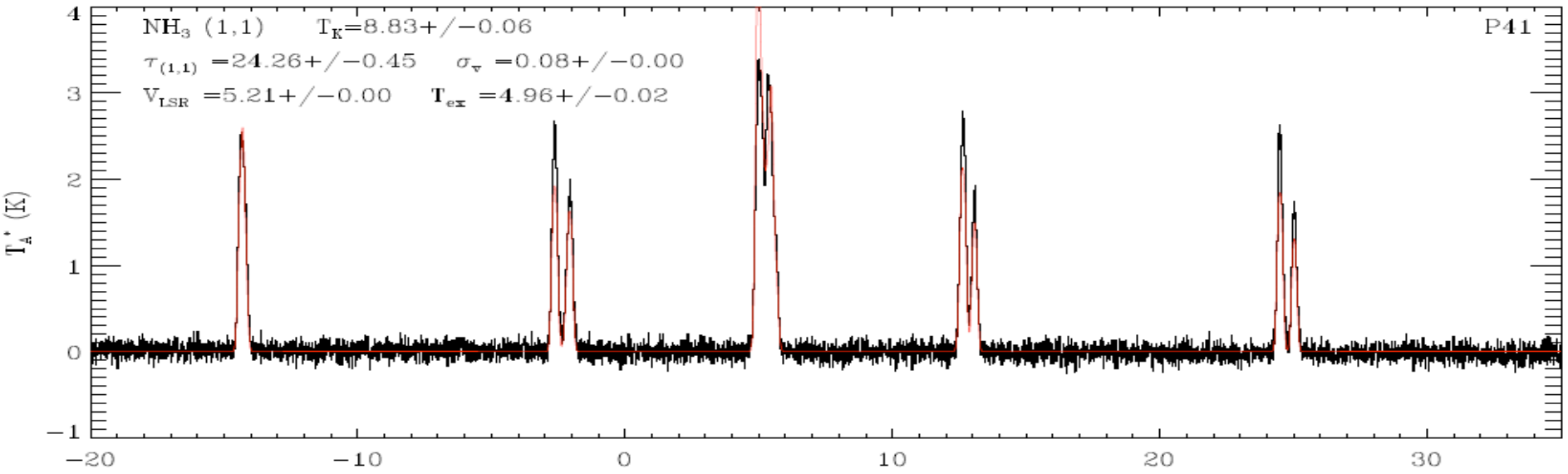
(Schnee et al. 2007b)

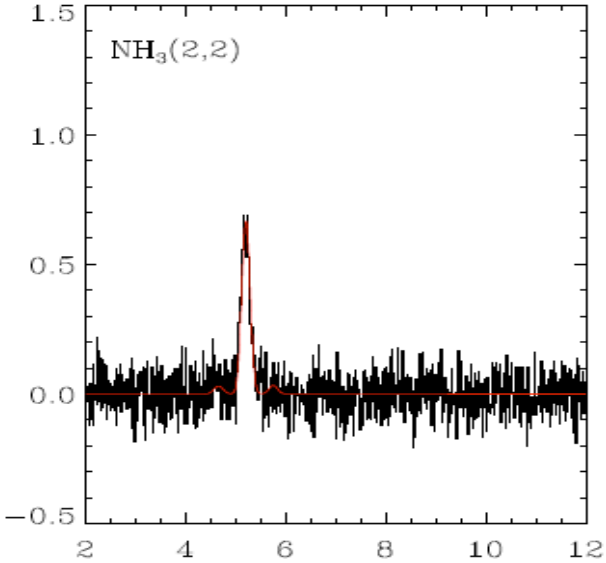
Depletion vs. N_H and T_d



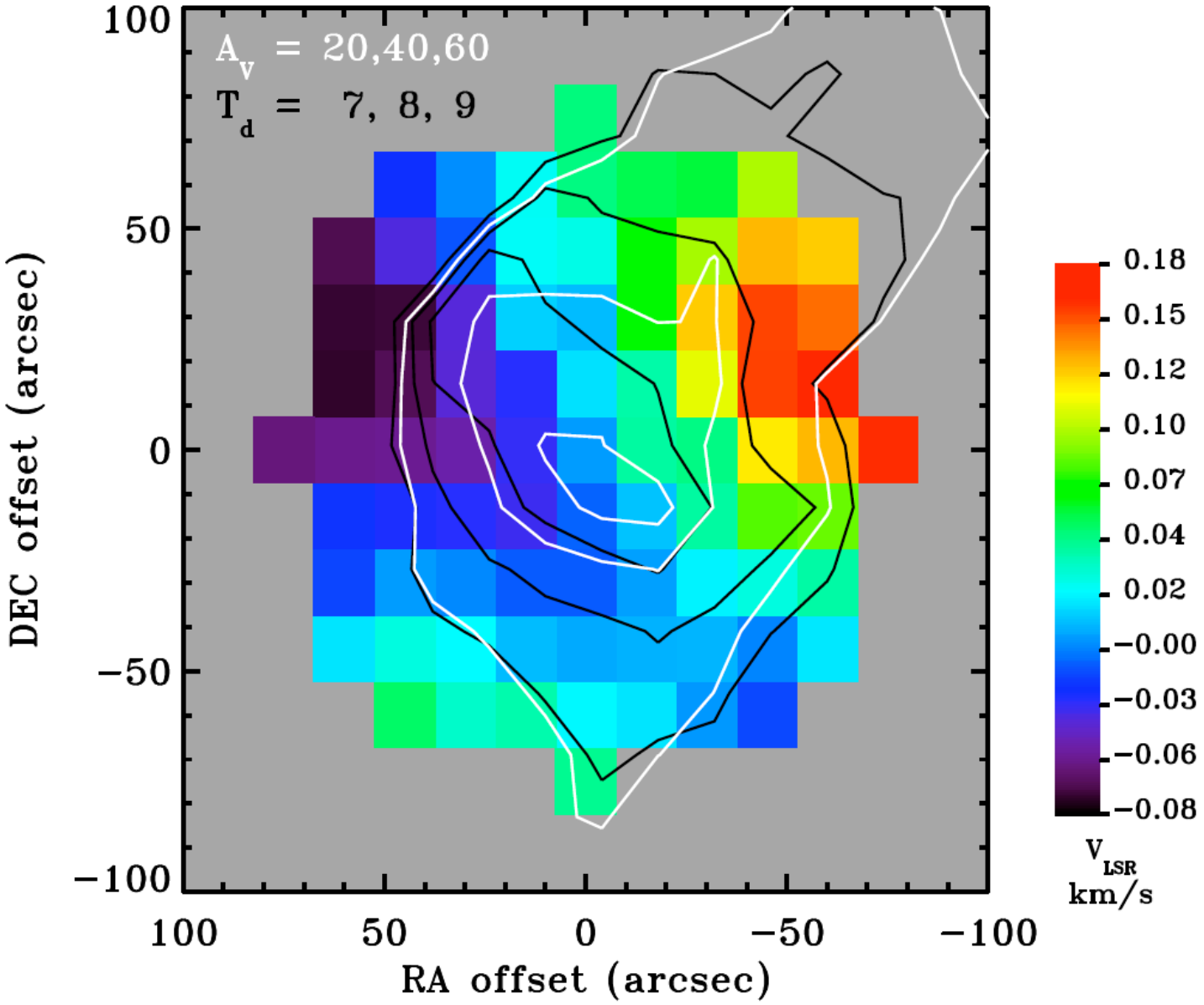
(Schnee et al. 2007b)

NH_3 Spectrum - GBT

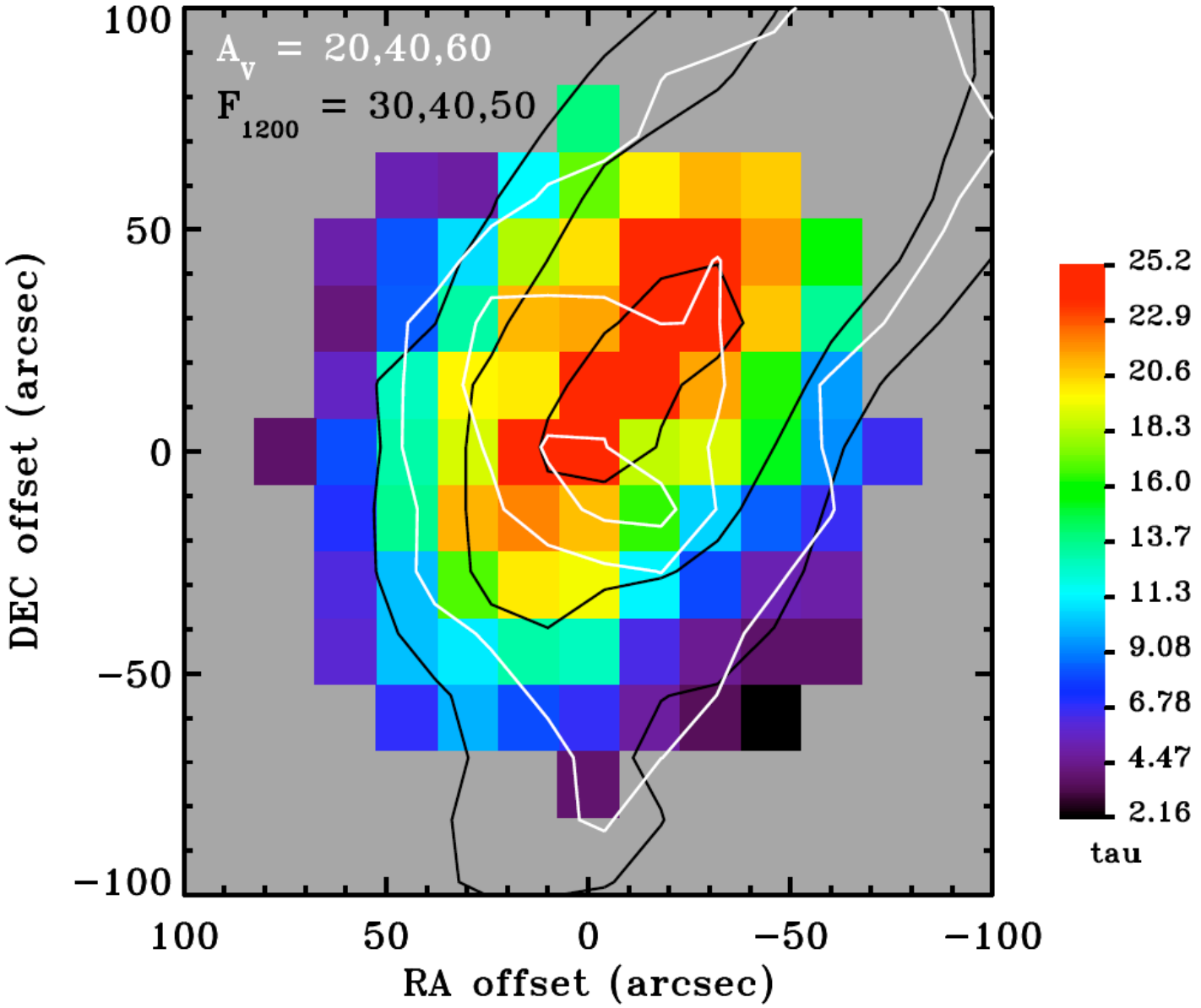




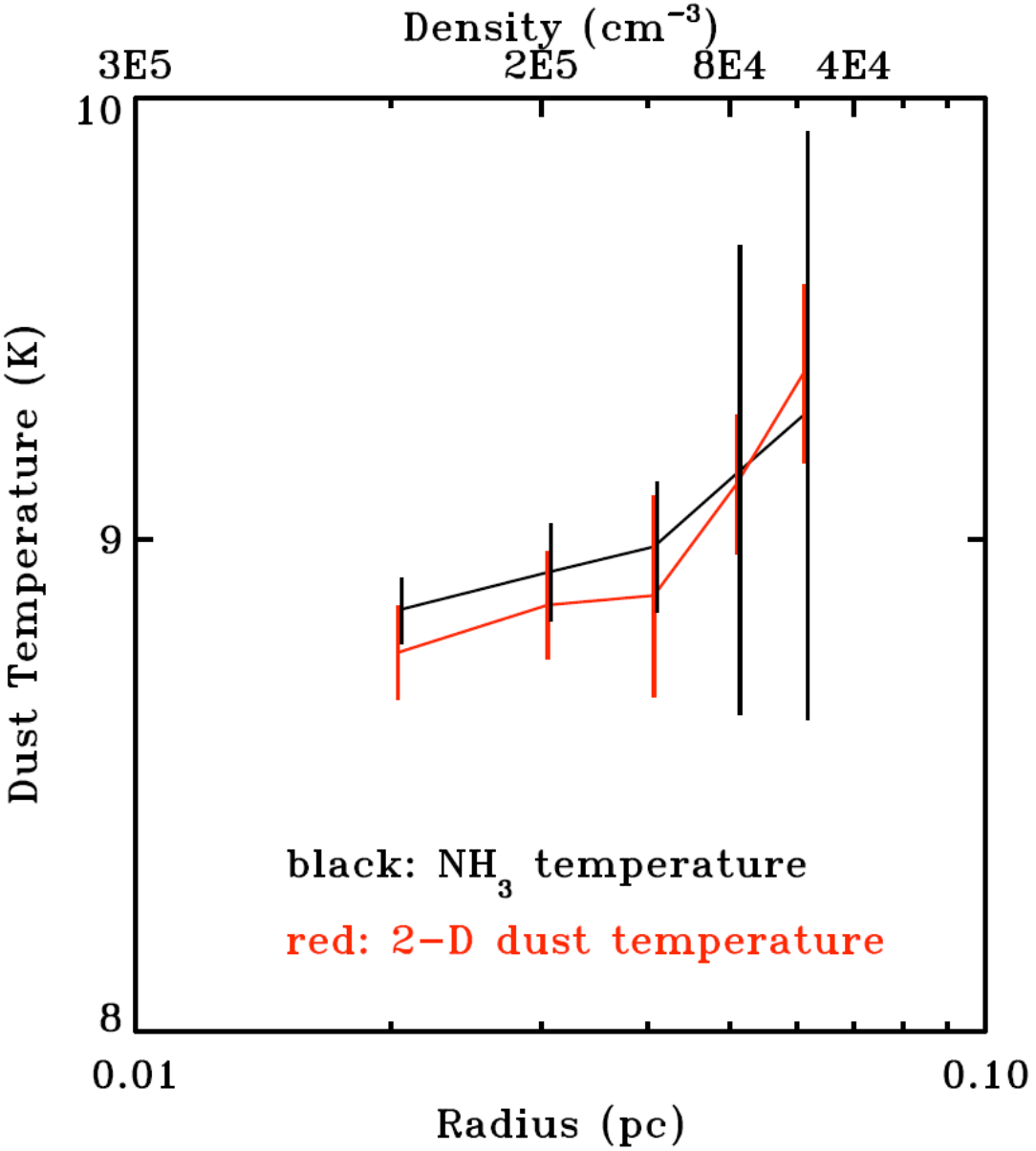
NH_3 Velocity Map - GBT



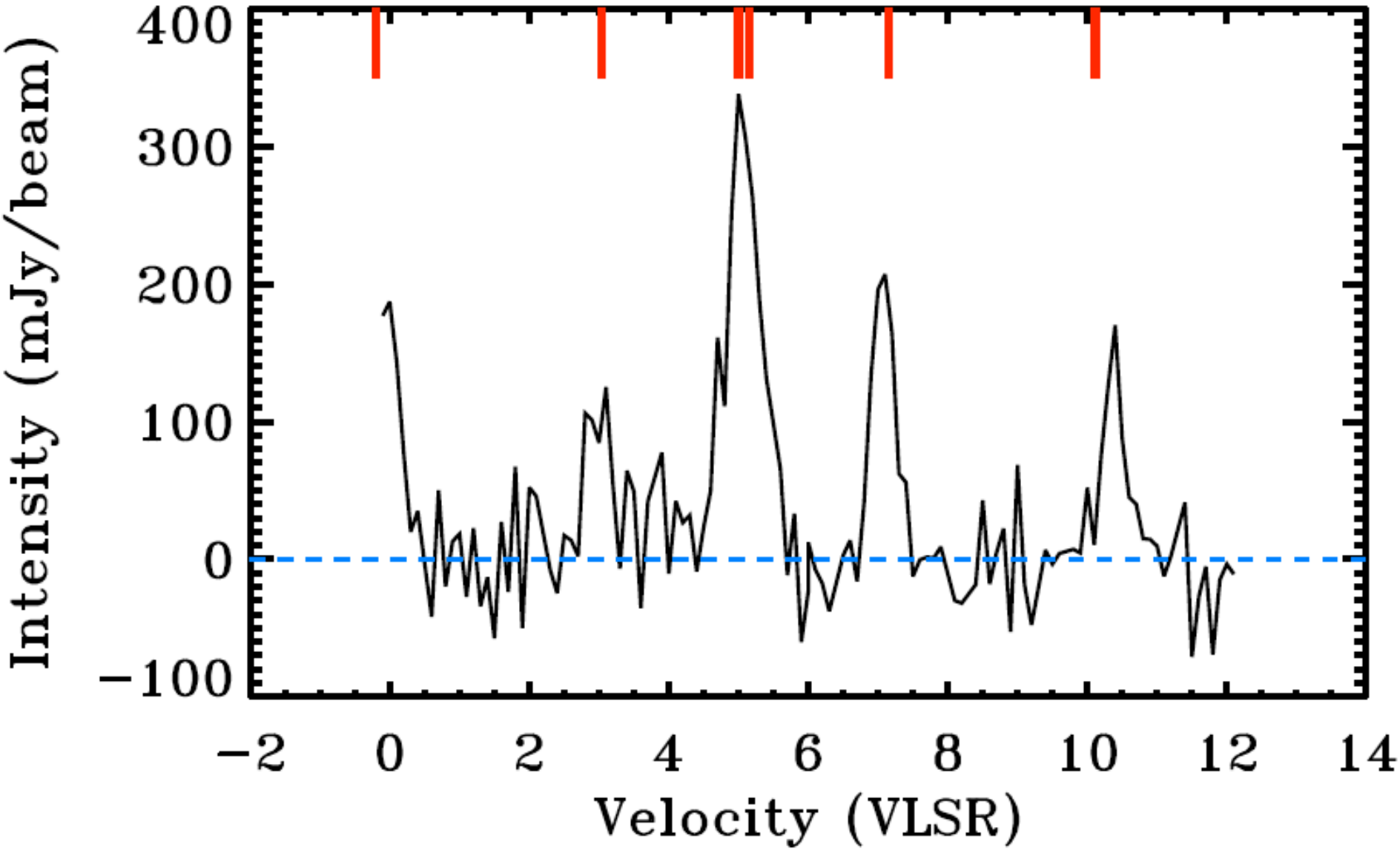
NH_3 Optical Depth Map - GBT



NH_3 & T_d Temperature Profiles



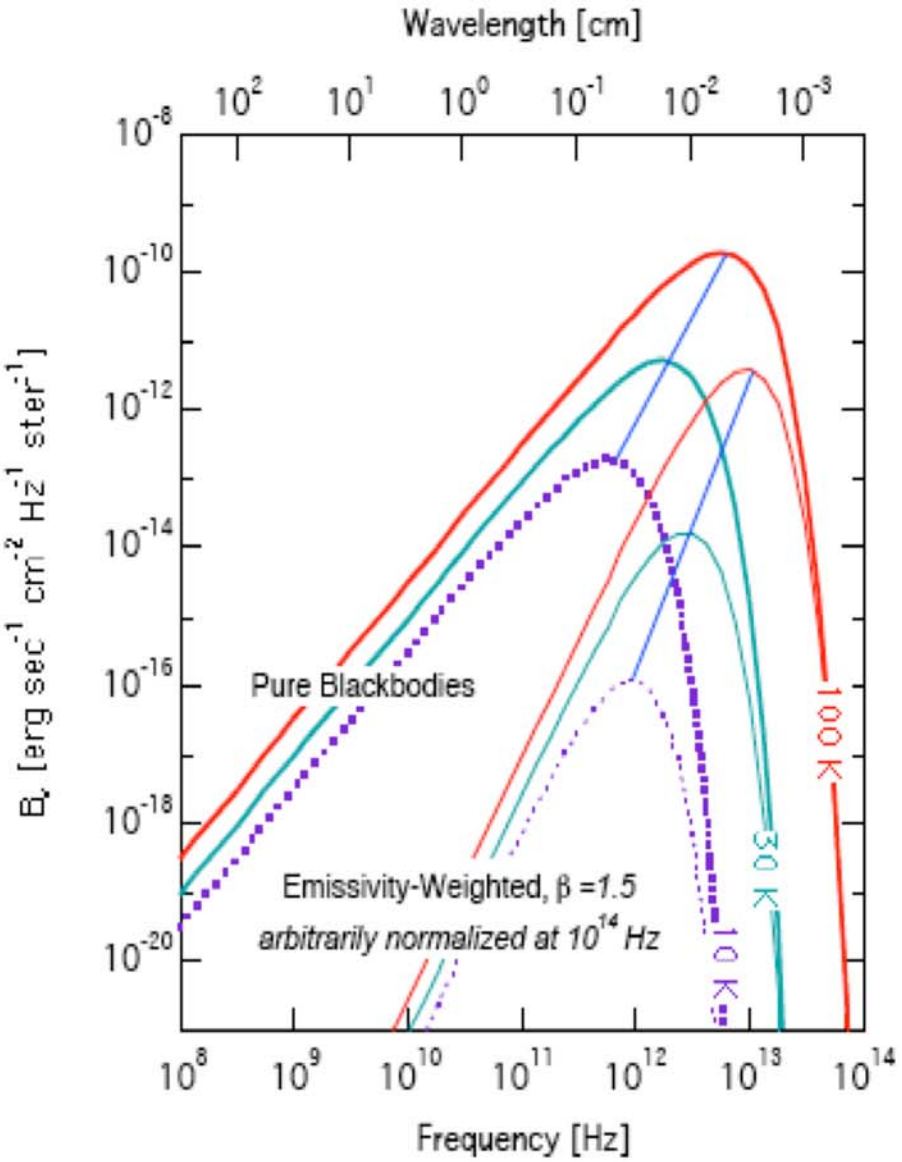
NH_2D Spectrum - CARMA



TMC-1C Results

- Combine dust and gas observations to determine dynamical state
  - Out of virial equilibrium
  - Infall speed of ~0.1 km/s
- Every observed tracer is depleted
  - Haven't yet checked NH_3 and NH_2D
- The velocity field is ordered, but more complicated than pure rotation
- Future work: NH_3 analysis and deuteration study

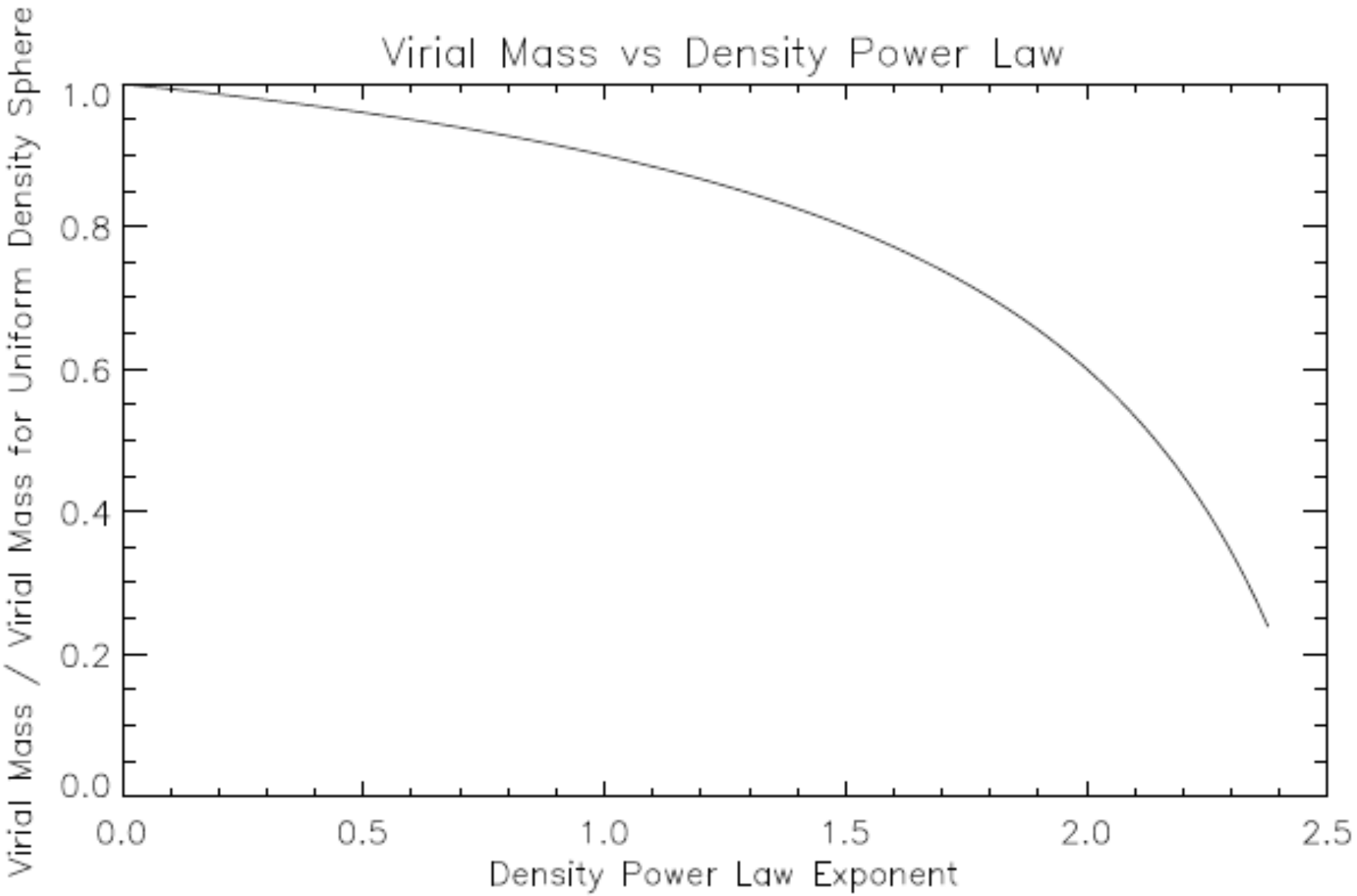
What Is Beta?



- Maximum emissivity is for pure blackbody, $\beta=0$
- SED peaks move to longer λ for smaller β
- Decreasing β gives you more flux at any λ, so...

  overestimating β will mean more mass required to produce observed flux
- **WARNING:** *In theory, β is only a property of individual grains, but in "practice" it has come to include size distribution*

Virial Mass Estimates



Virial Mass Estimates