

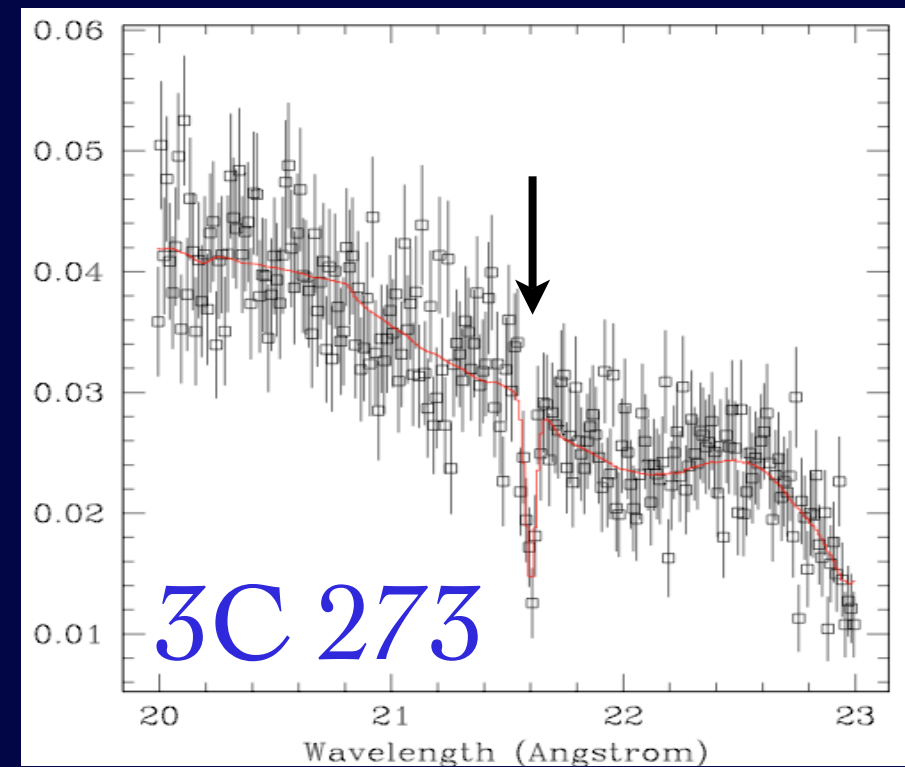
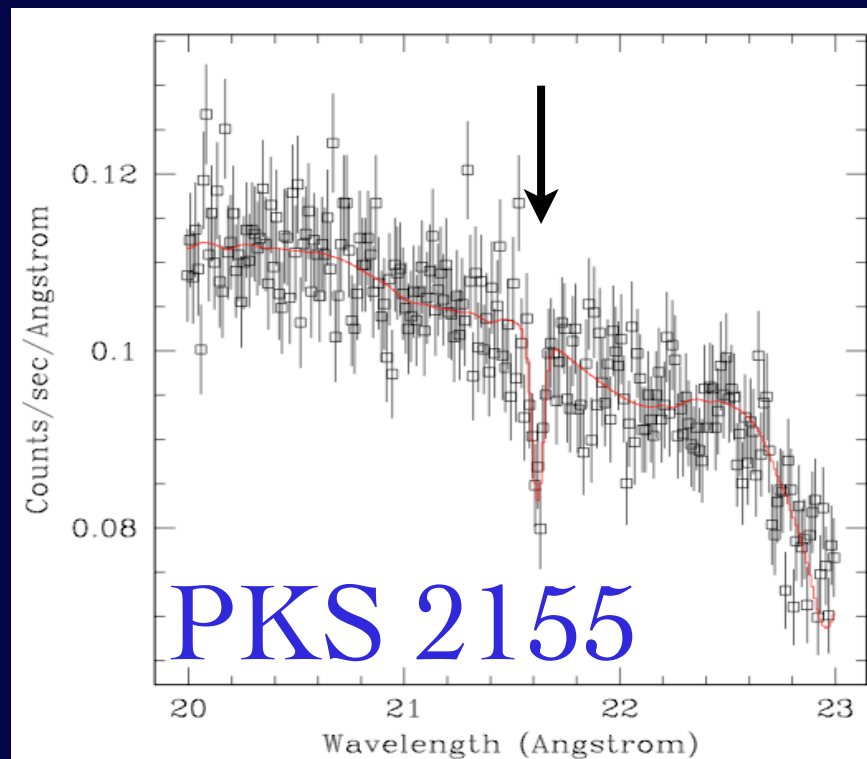
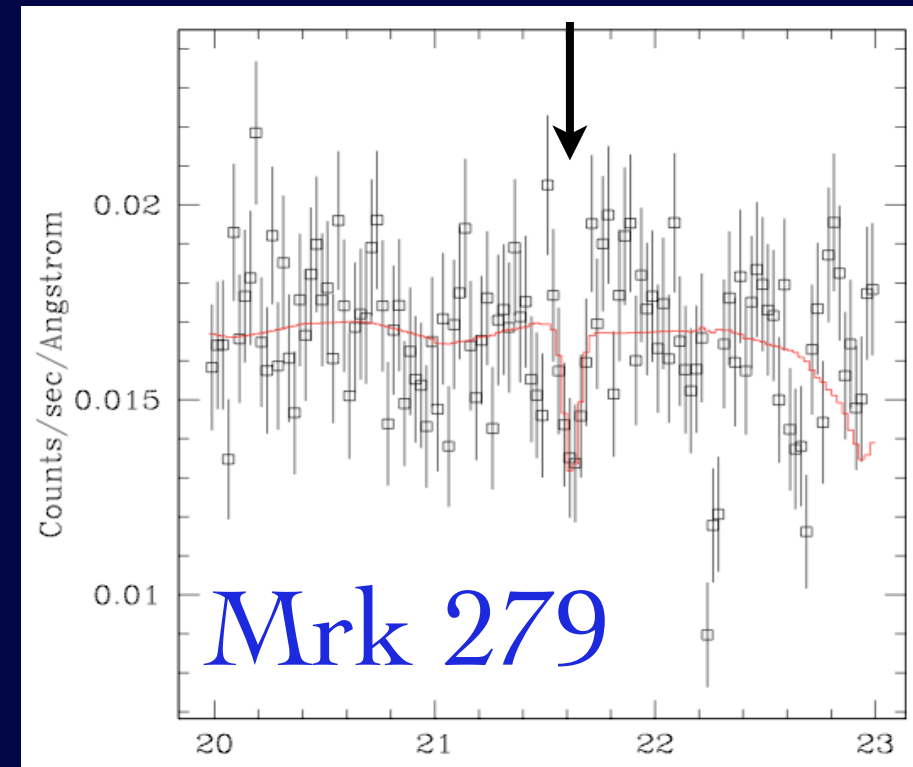
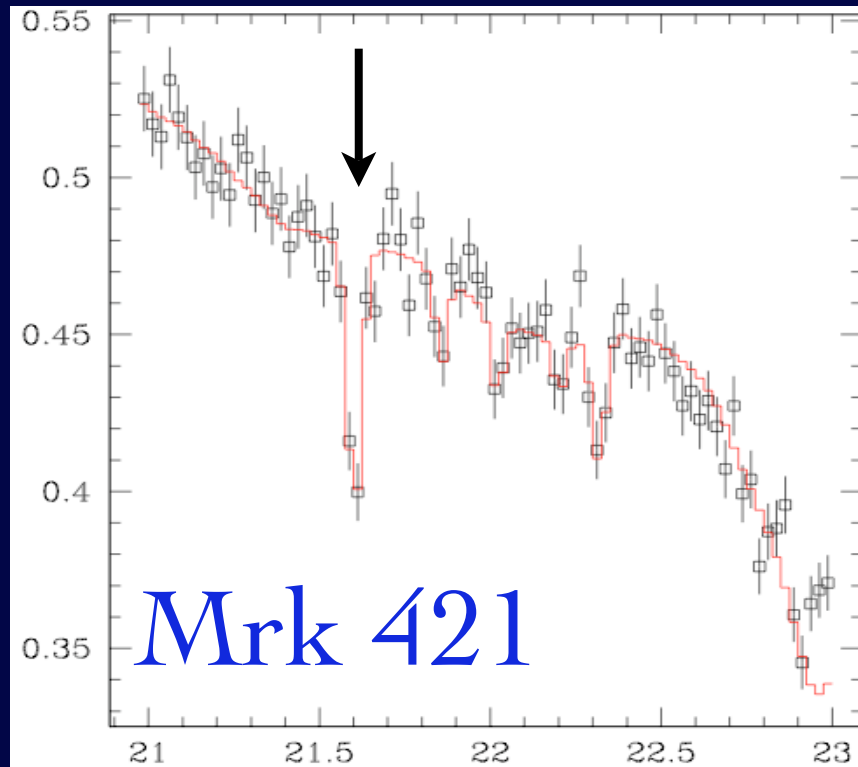
Local X-ray Absorption: Galactic Corona or IGM?

Rik Williams
Leiden Observatory

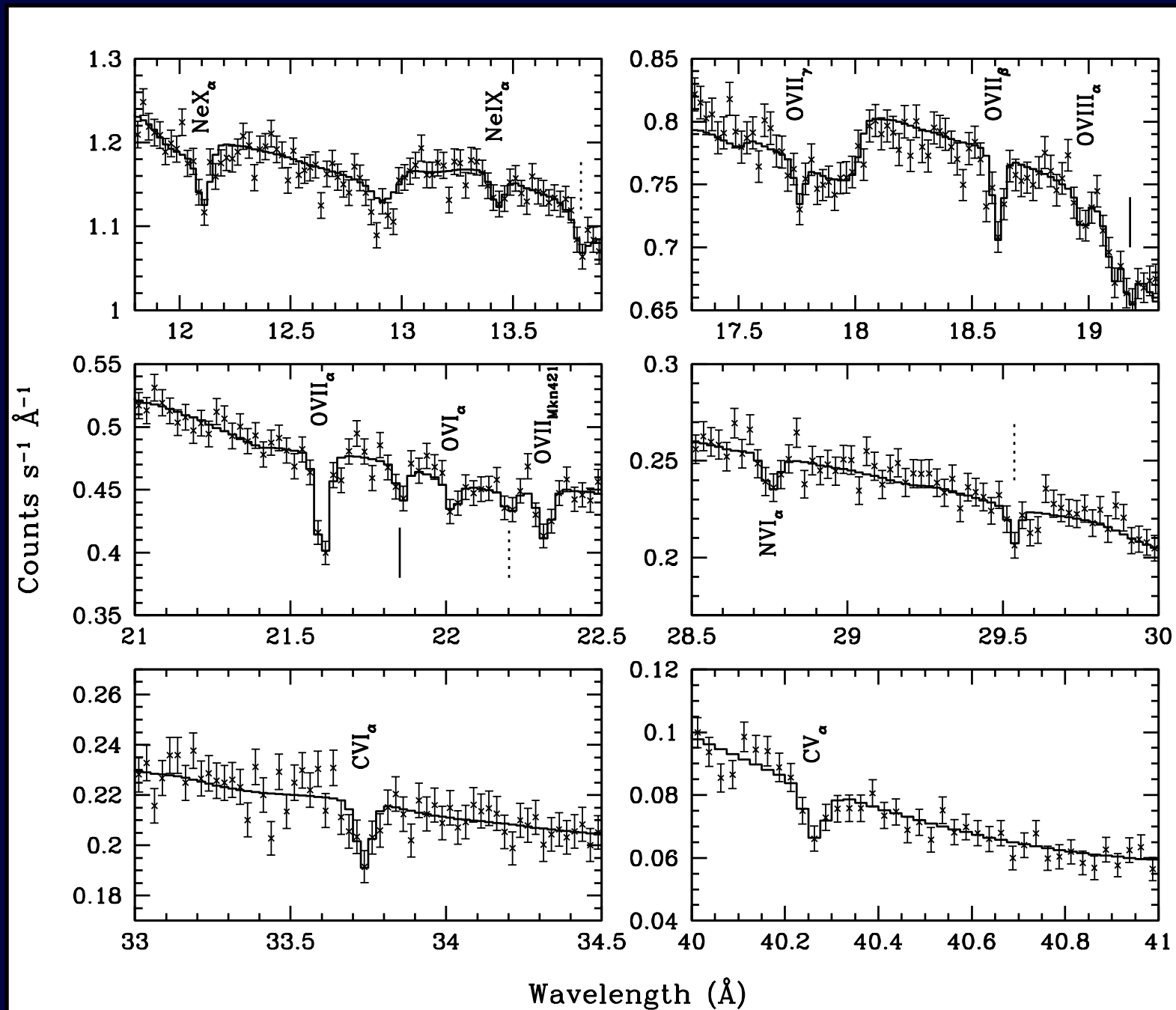
WITH:

Smita Mathur (Ohio State), Fabrizio Nicastro (Rome),
Martin Elvis (Harvard/CfA)

Local OVII Absorption Everywhere



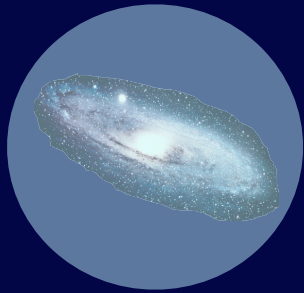
Many local lines, in fact...



Where is this 10^6K gas?

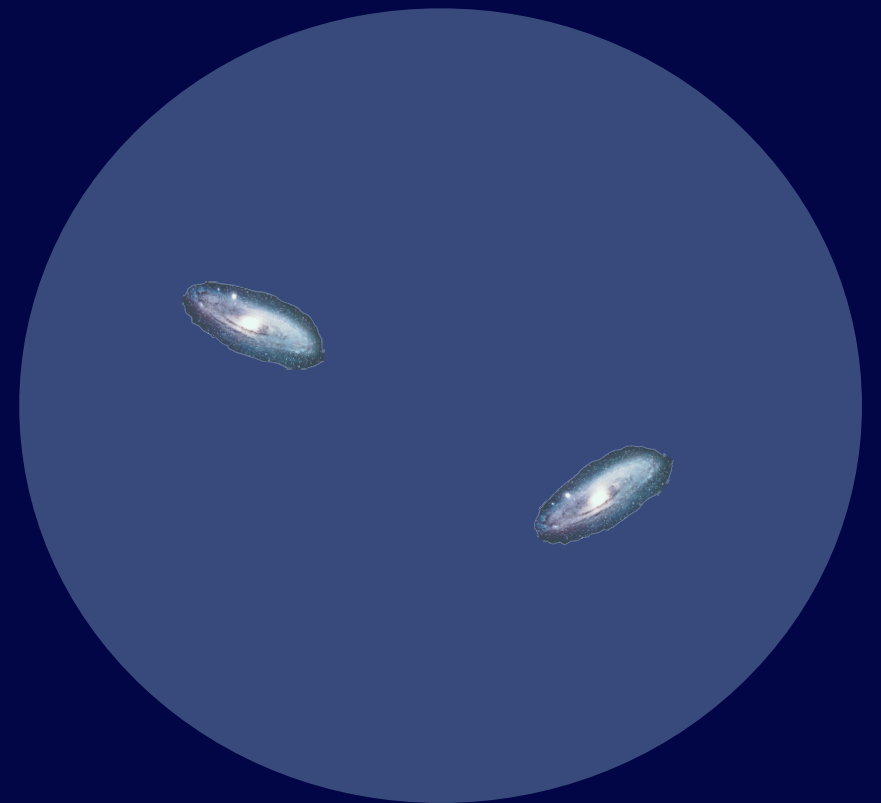
Where is this 10^6K gas?

Galactic?



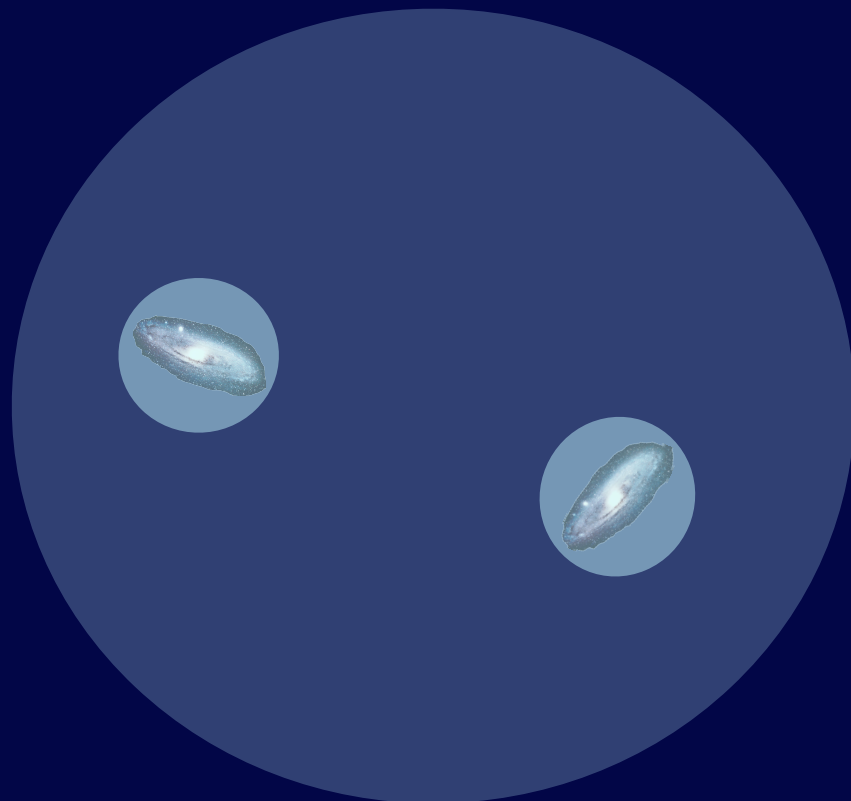
Where is this 10^6K gas?

Local Group?



Where is this 10^6K gas?

Both?

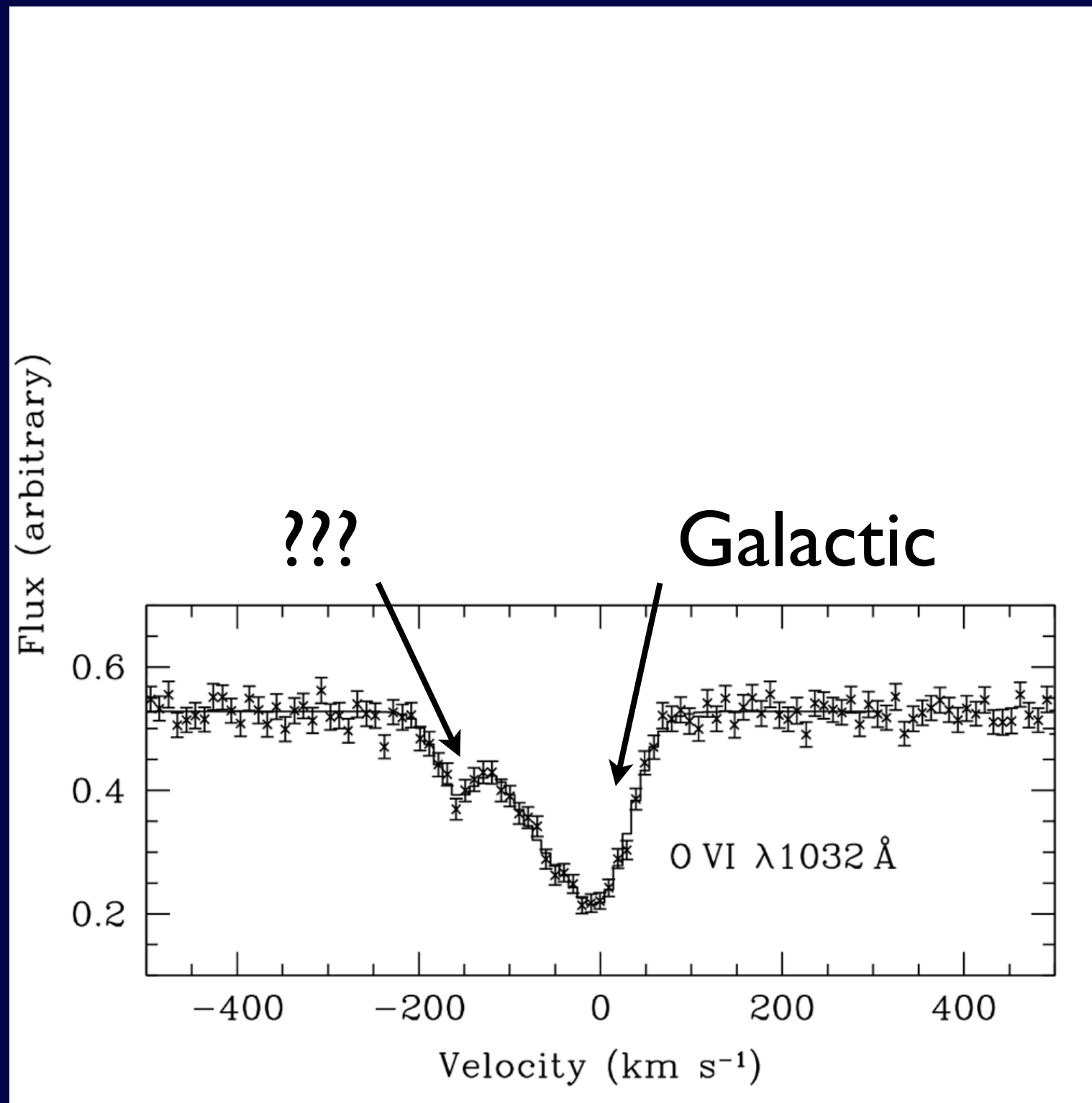


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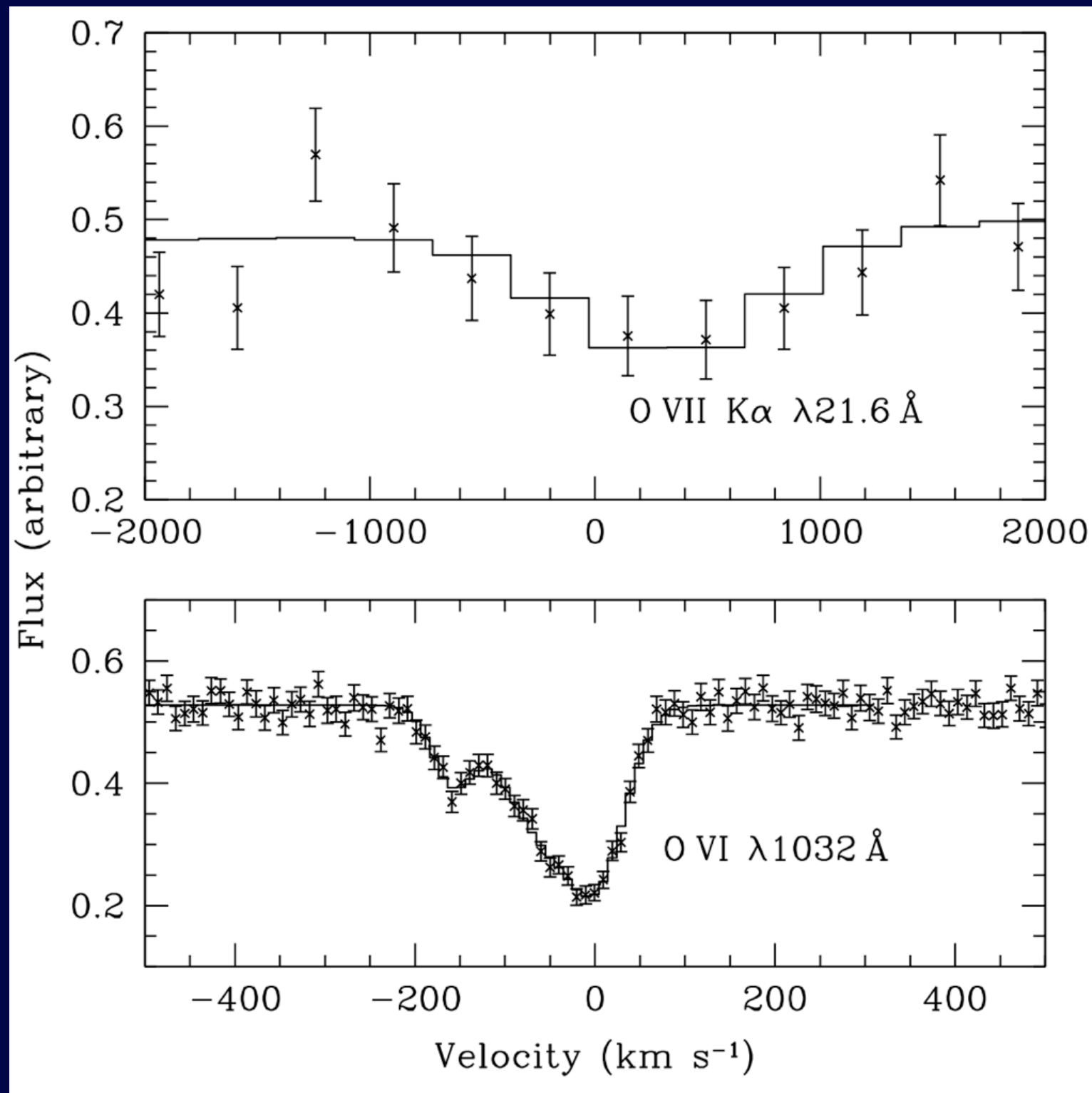
Implications for local baryon
budget and Galactic
feedback processes

Components may have
different velocities,
dispersions, temperatures

Inferring physical properties

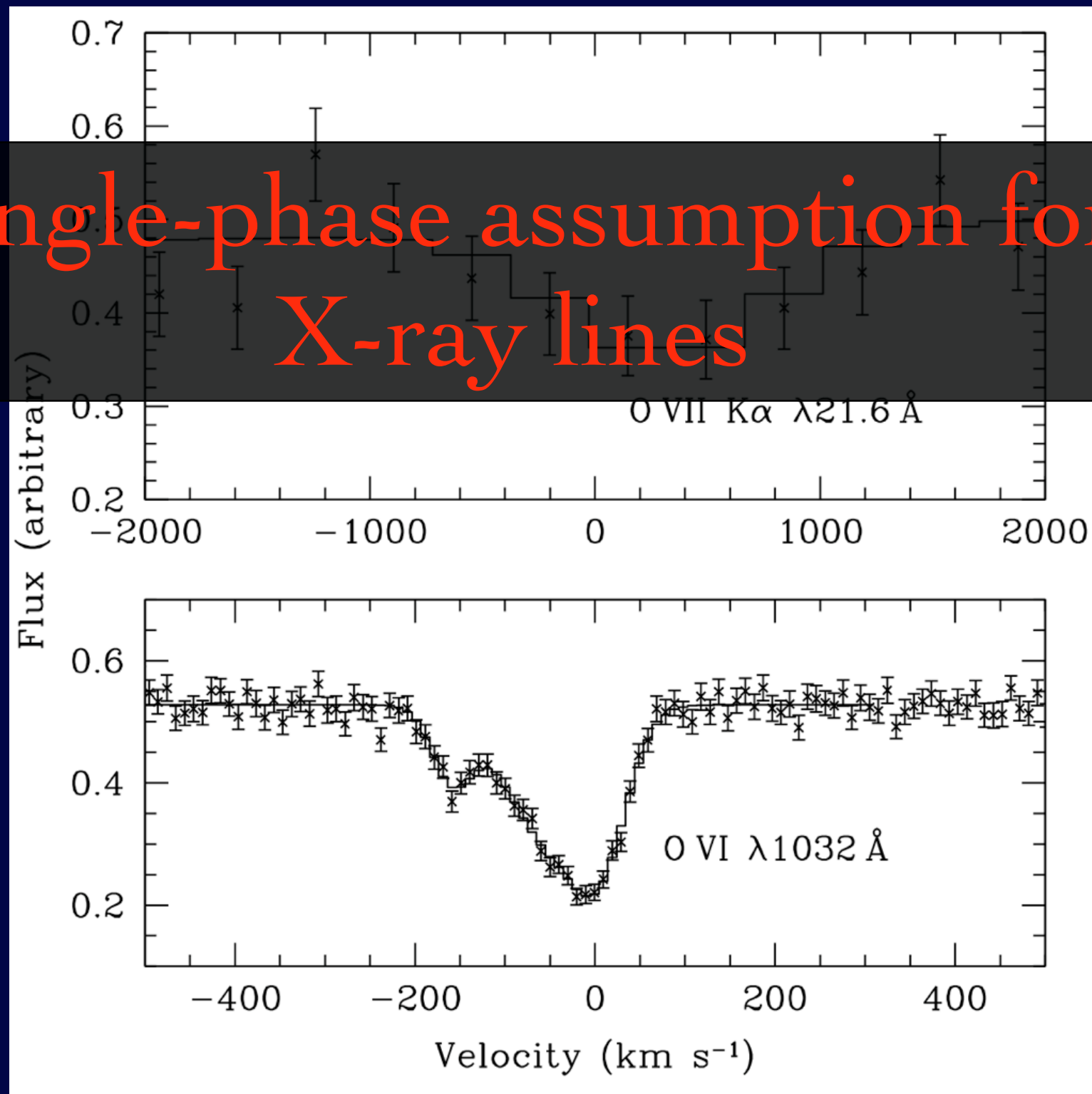


Inferring physical properties



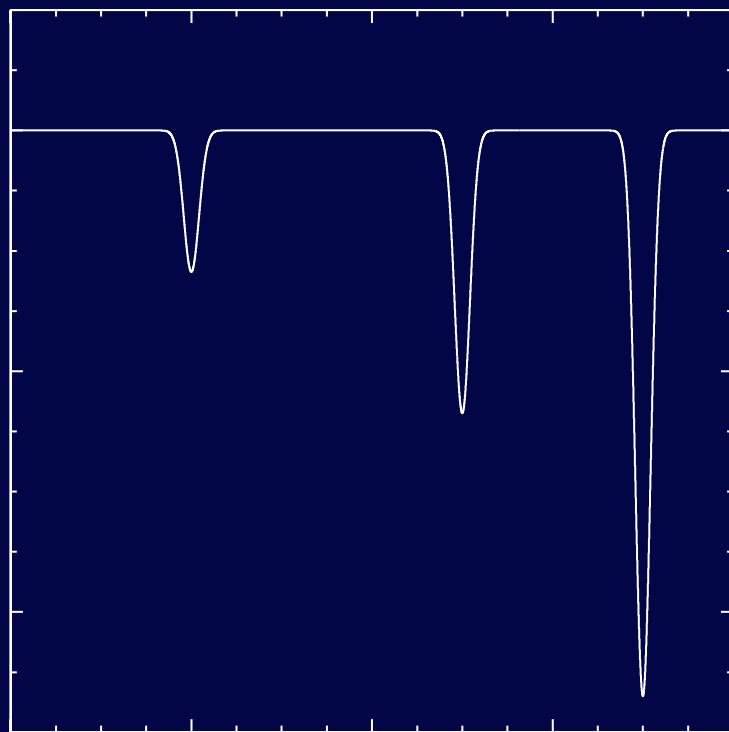
Inferring physical properties

Single-phase assumption for
X-ray lines

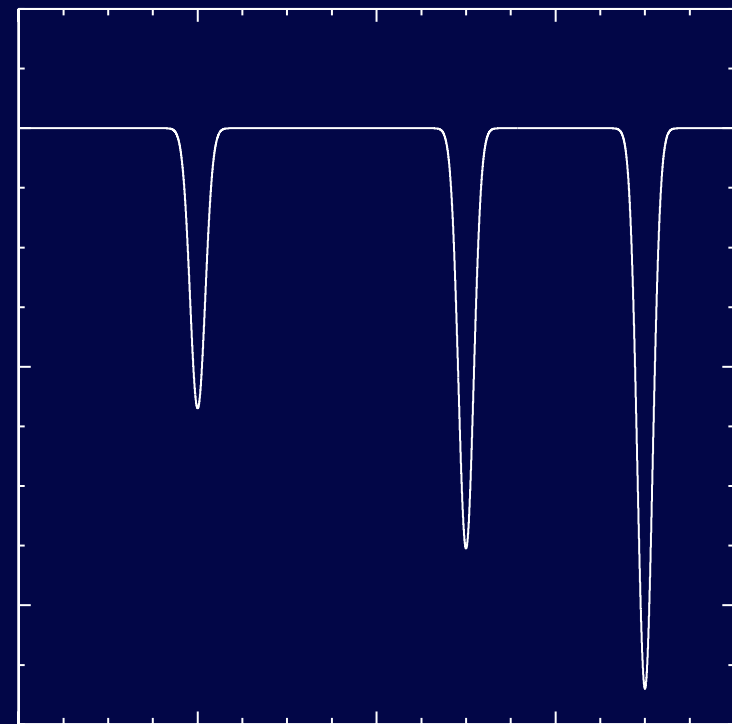


Velocity dispersion constraints

Compare OVII line strengths to “unsaturated” values to simultaneously constrain b , N

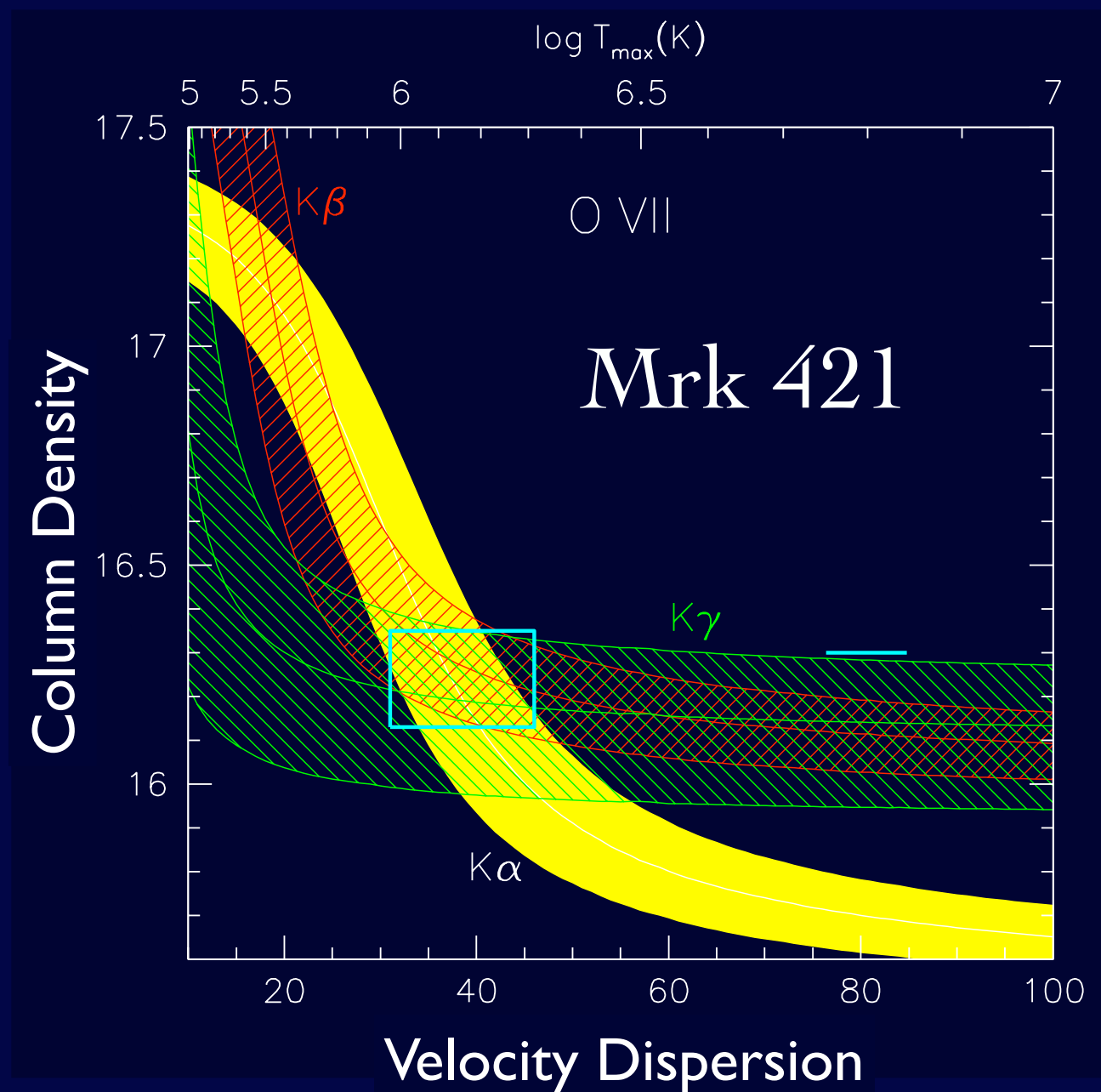


low N , high b

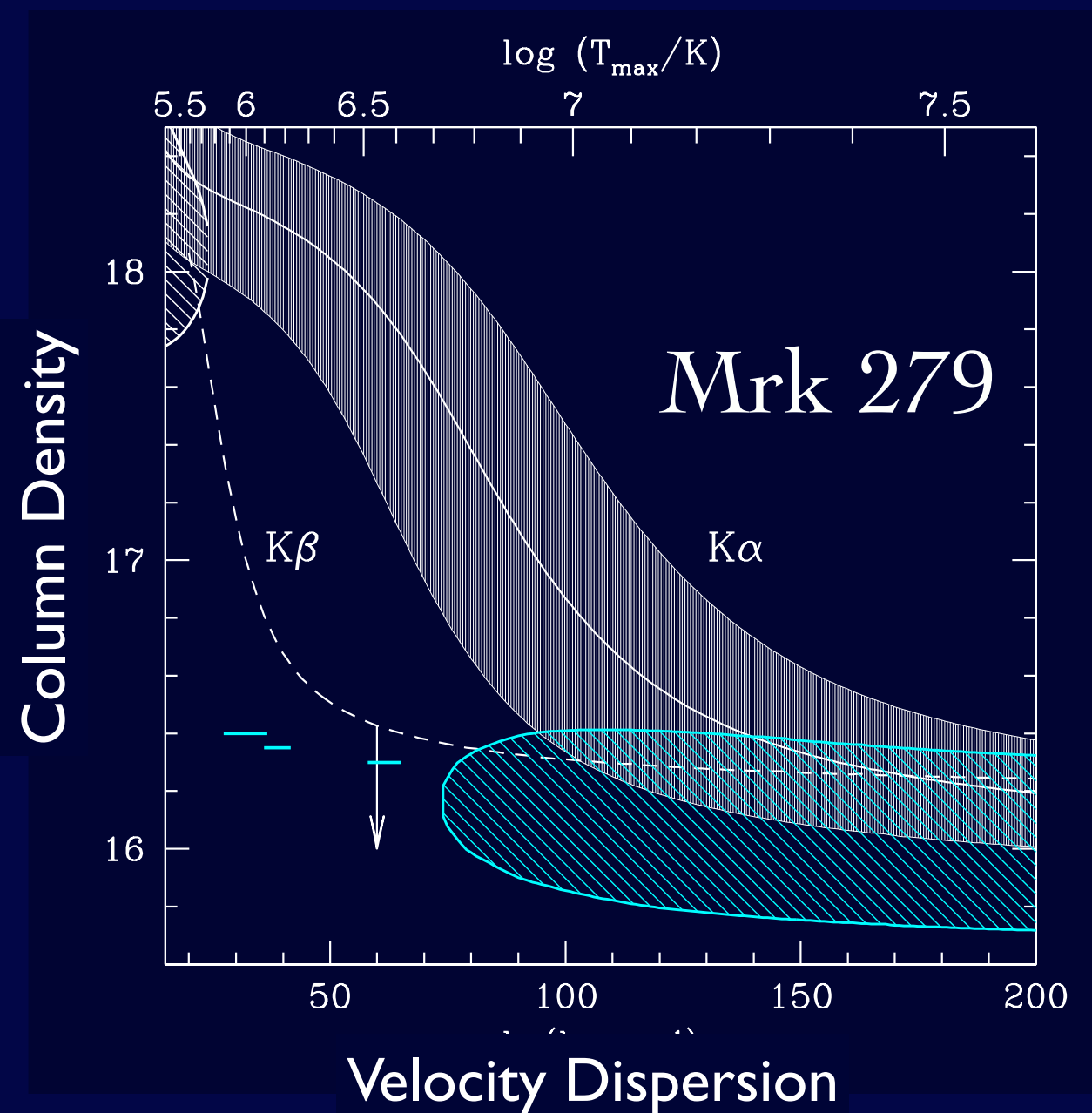


high N , low b

Velocity dispersion constraints

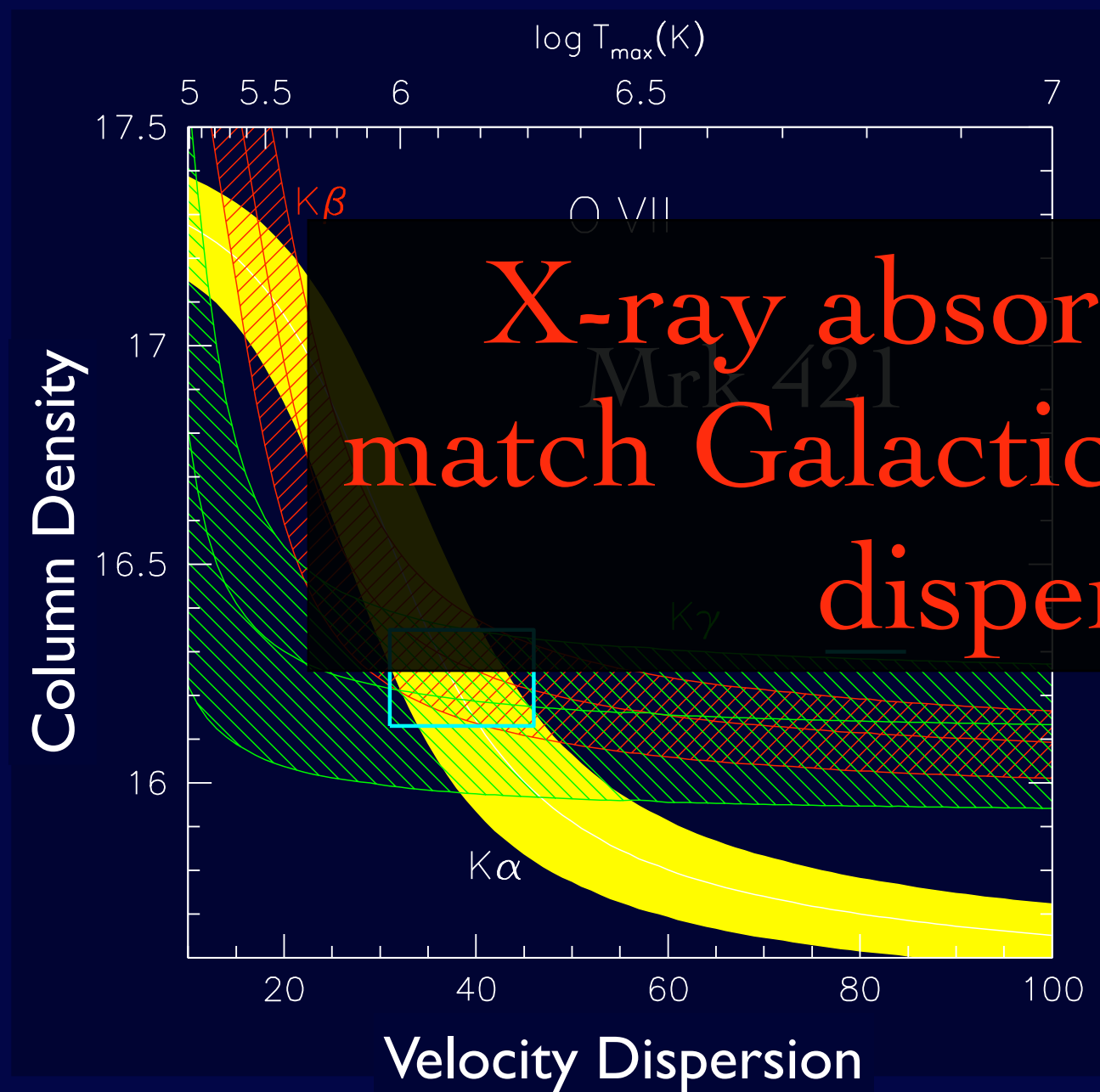


Williams et al. 2005, ApJ, 631, 856

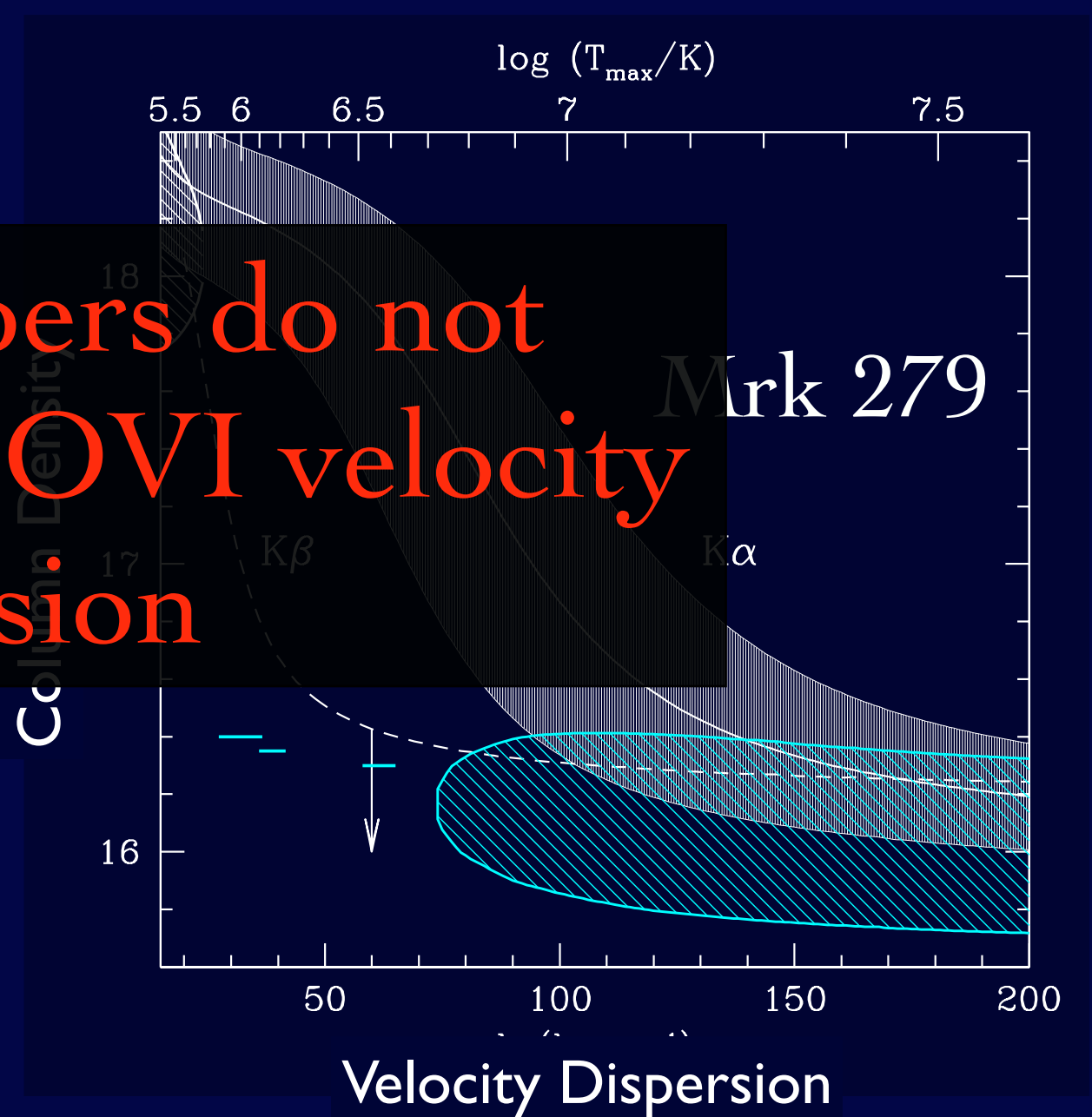


Williams et al. 2006, ApJ, 645, 179

Velocity dispersion constraints



Williams et al. 2005, ApJ, 631, 856



Williams et al. 2006, ApJ, 645, 179

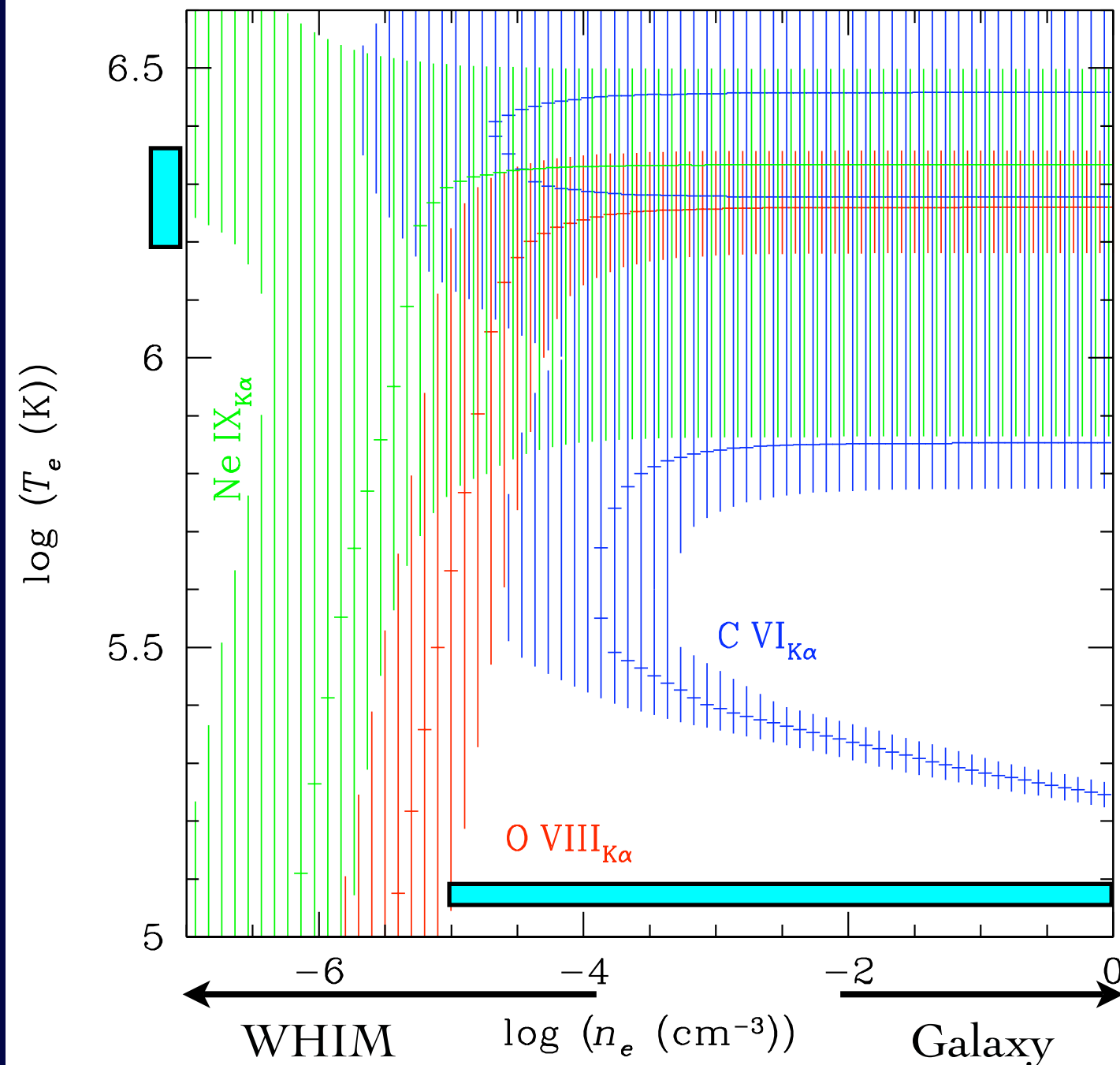
Temperature and Density

Cloudy models:

- Collisional ionization -- constrain T
- Photoionization -- constrain U
- Invert measured line ratios to constrain T, U
- Assume constant extragalactic background, estimate n from U

Then radial extent $R \sim N/n$

Temperature and Density



For 3 sightlines:
 $\log T \sim 6.1\text{-}6.3$
 $N_{\text{OVII}} \sim 10^{16} \text{ cm}^{-2}$
 $\log n_e > -5$
 $R < 1 \text{ Mpc}$
 $M < \text{few} \times 10^{12} M_{\text{sun}}$

Consistent with
IGM or Galactic
origin!

Temperature and Density

Cannot rule out either a Galactic or IGM origin with the present data

For 3 sightlines:

$$\log T \sim 6.1-6.3$$

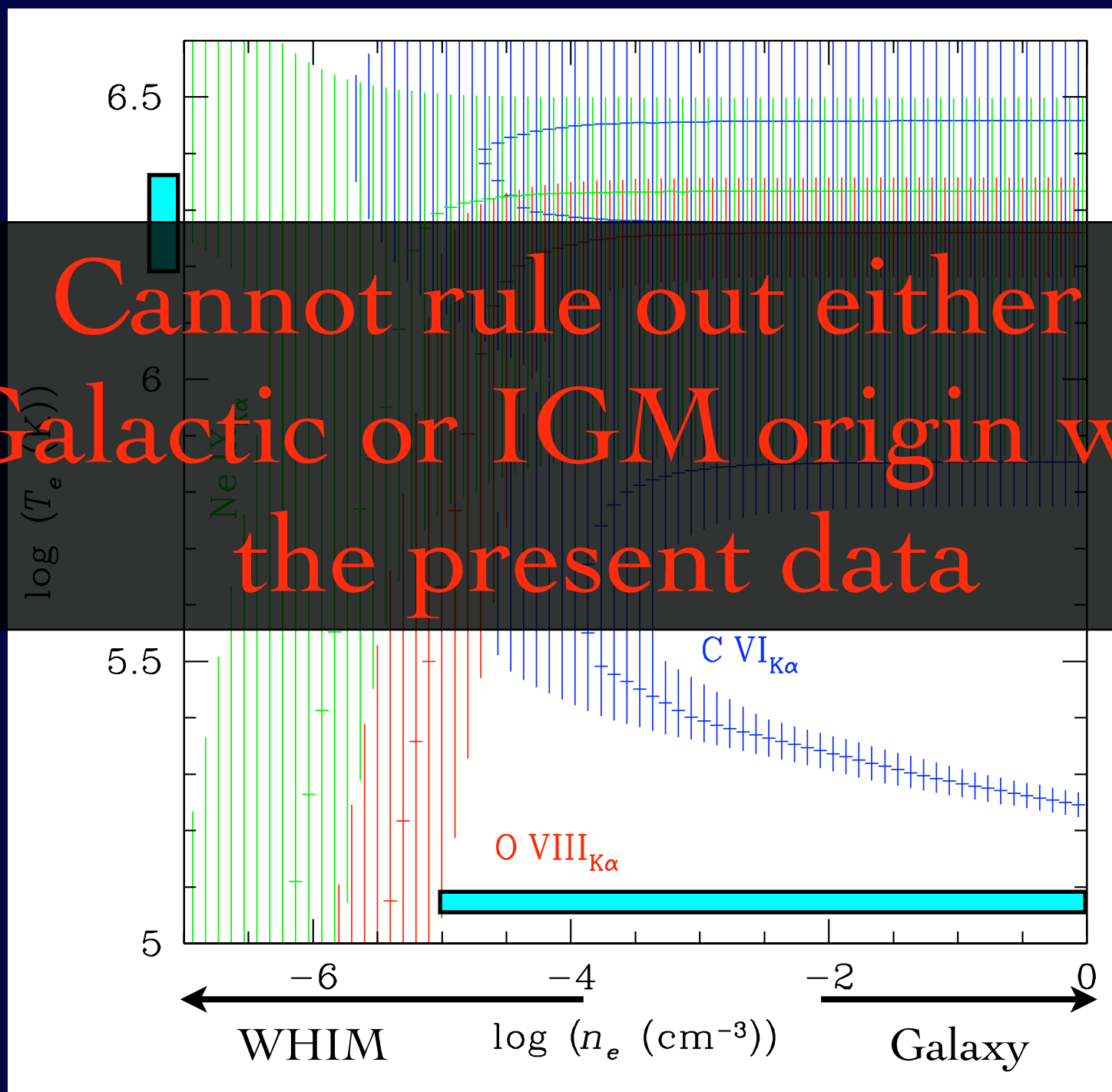
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Consistent with IGM or Galactic origin!



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Start with all AGN...

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minus faint ones (more than ~ 500 ksec needed)

minus those with strong intrinsic absorption

minus those at low Galactic latitude/near SNRs

~ 3 (Mrk 421, PKS2155-304, Mrk 279)

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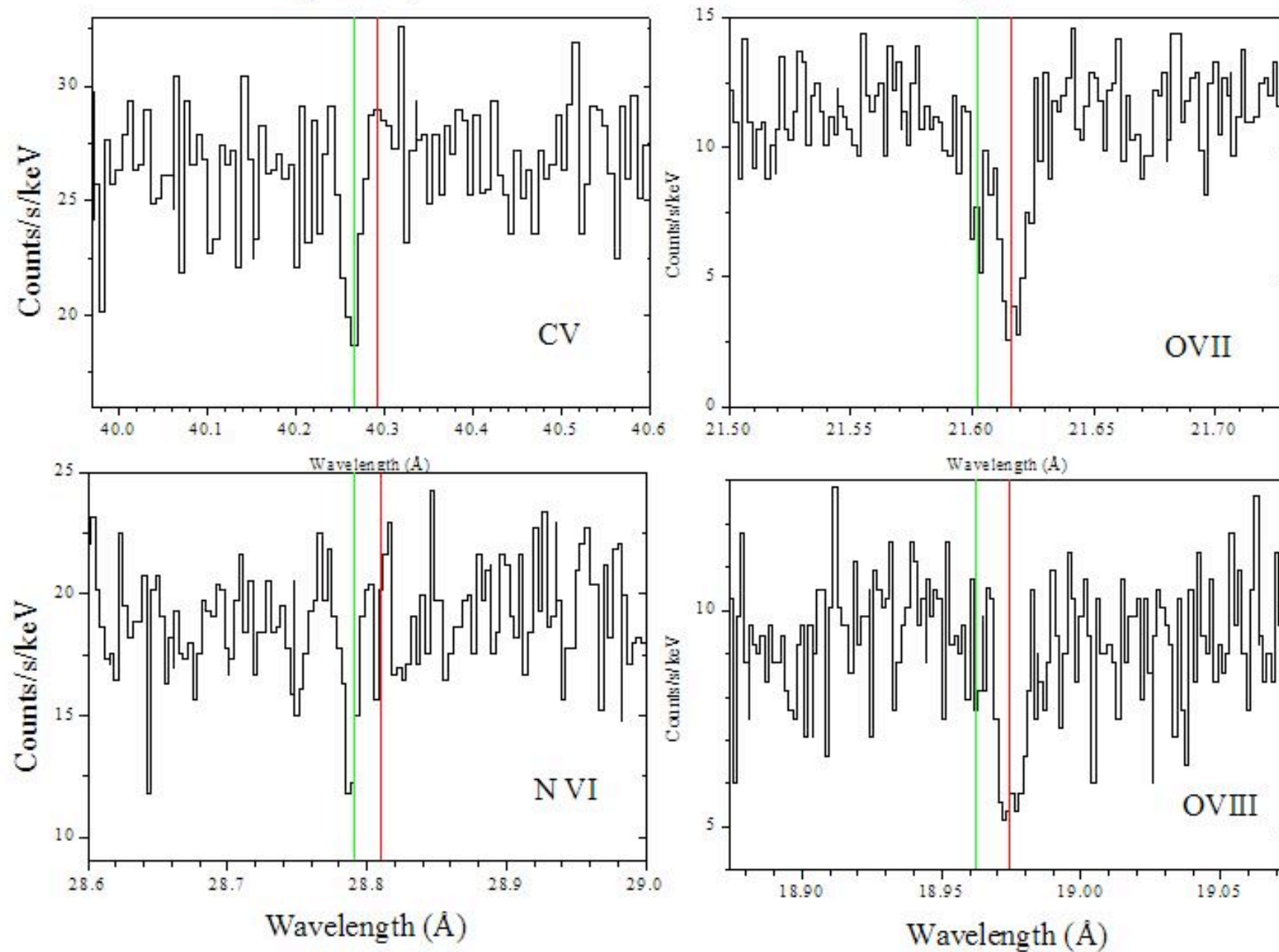
minus those at low Galactic latitude/near SNRs

equals 3 (Mrk 421, PKS2155-304, Mrk 279)

10x more needed for decent statistics.

Prospects with IXO

Absorption by a Galactic Halo Plus a Local Group Medium



Summary

$z=0$ X-ray absorption along 3 sightlines is **inconsistent** with lower-ionization gas

Represents either a **Local Group medium** or a **previously undetected Galactic phase**

Velocity dispersion, temperature, density can be estimated, but **higher resolution is needed to test our assumptions**

IXO: potential to definitively solve this problem!