

Metallicity and morphology of the cool circumgalactic medium

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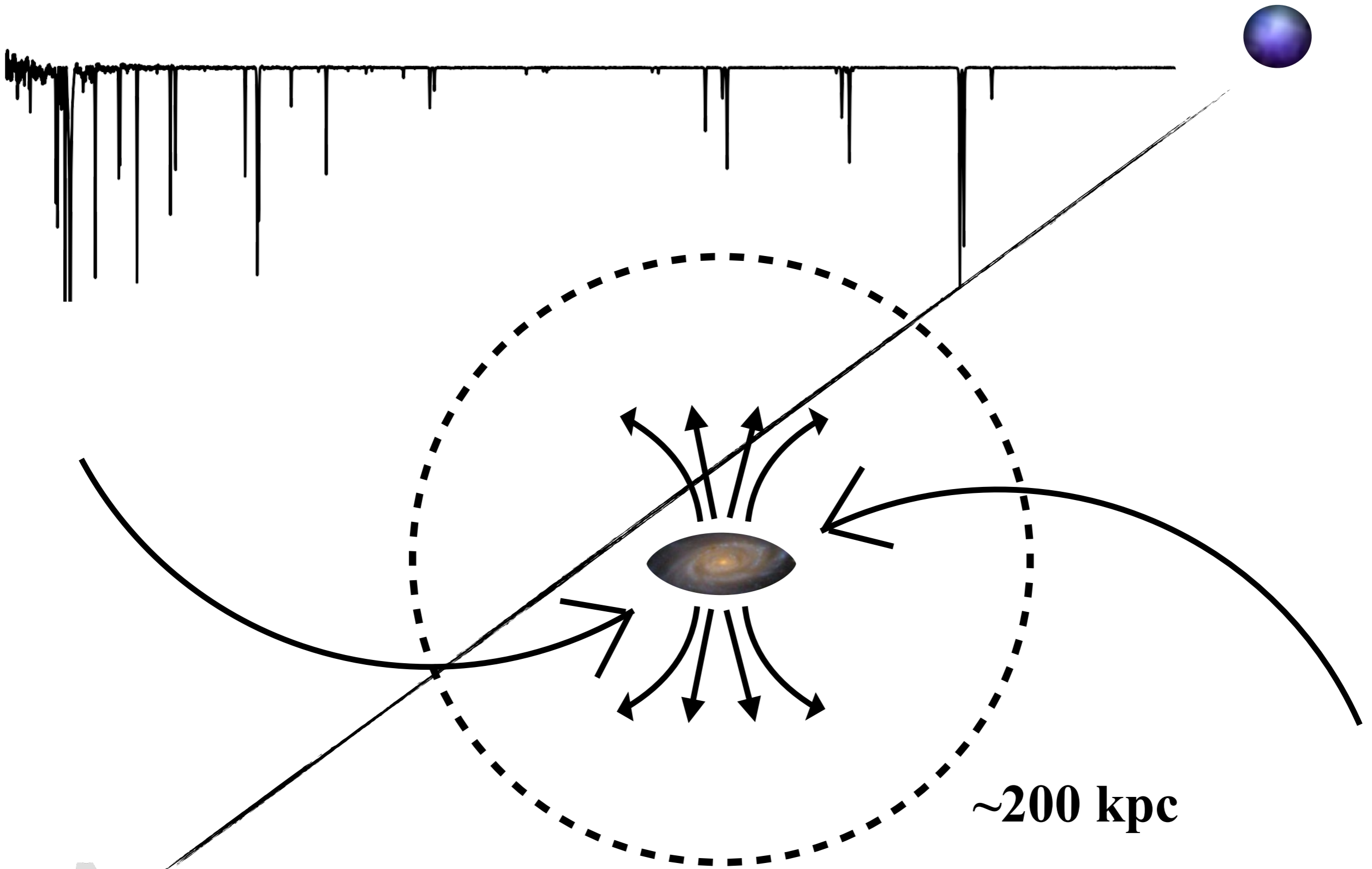
Kavli Fellow

In collaboration with Masataka Fukugita

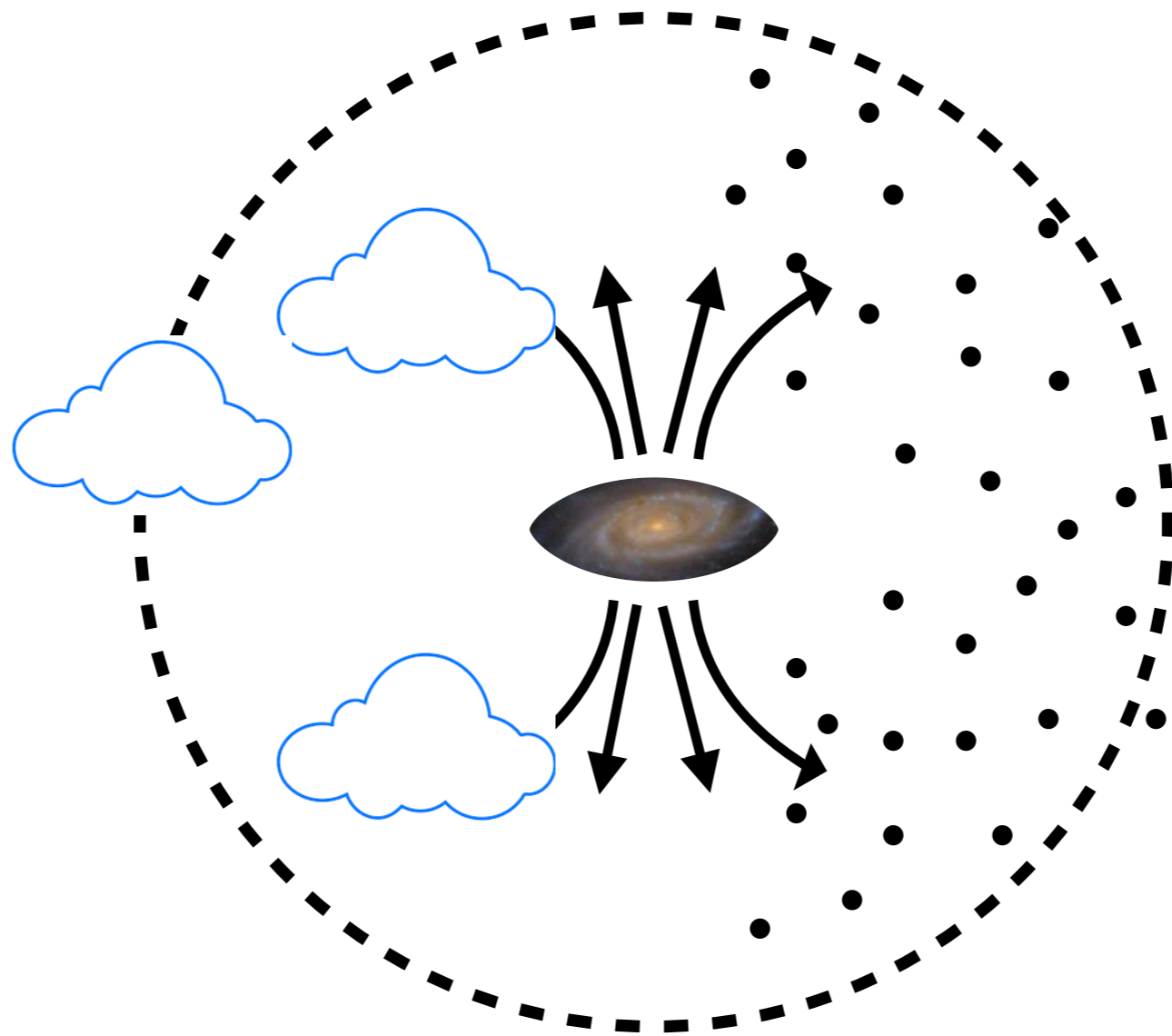


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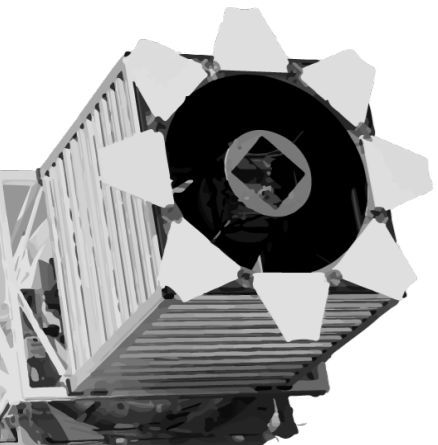


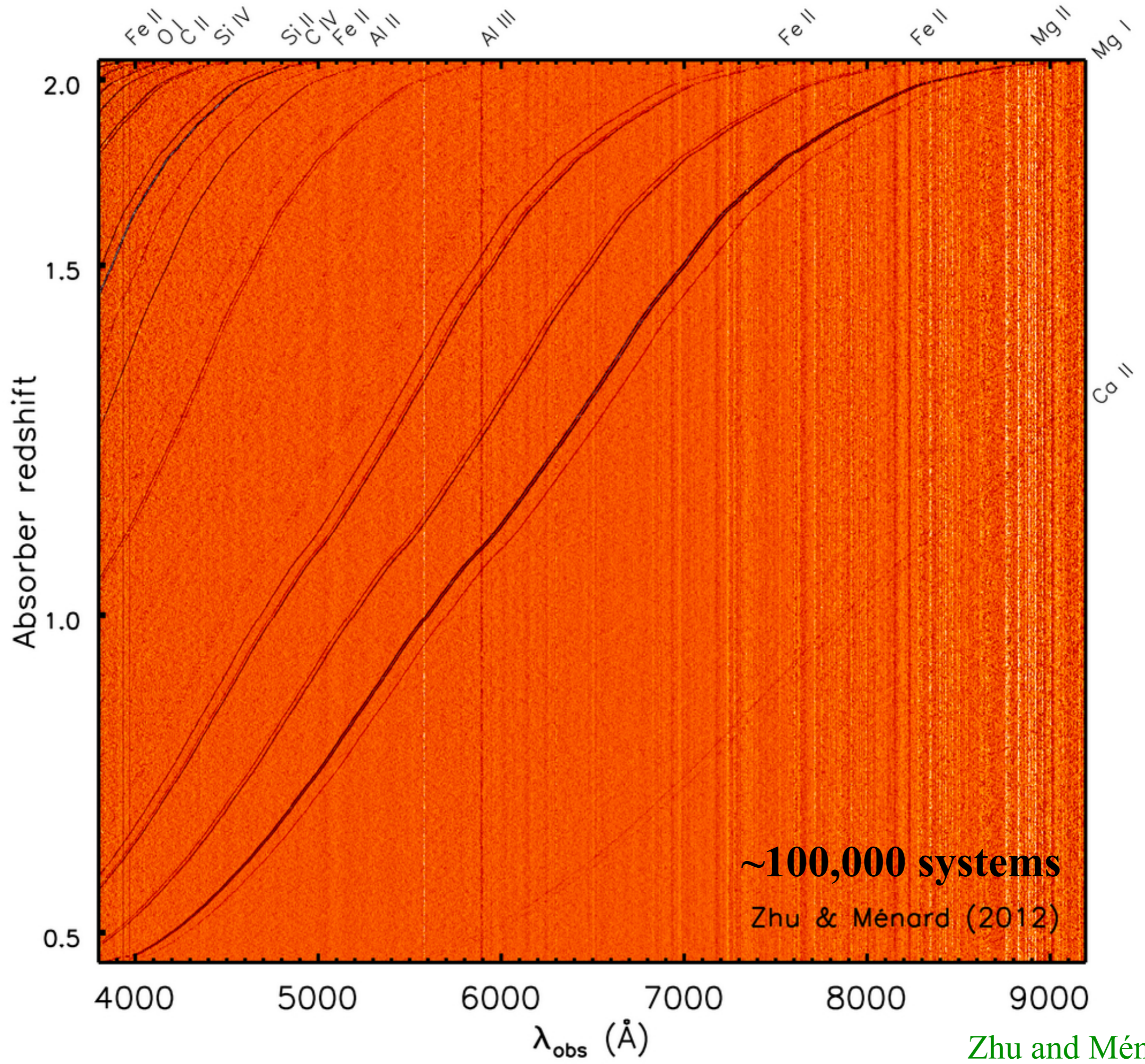
Circum-Galactic Medium (CGM)



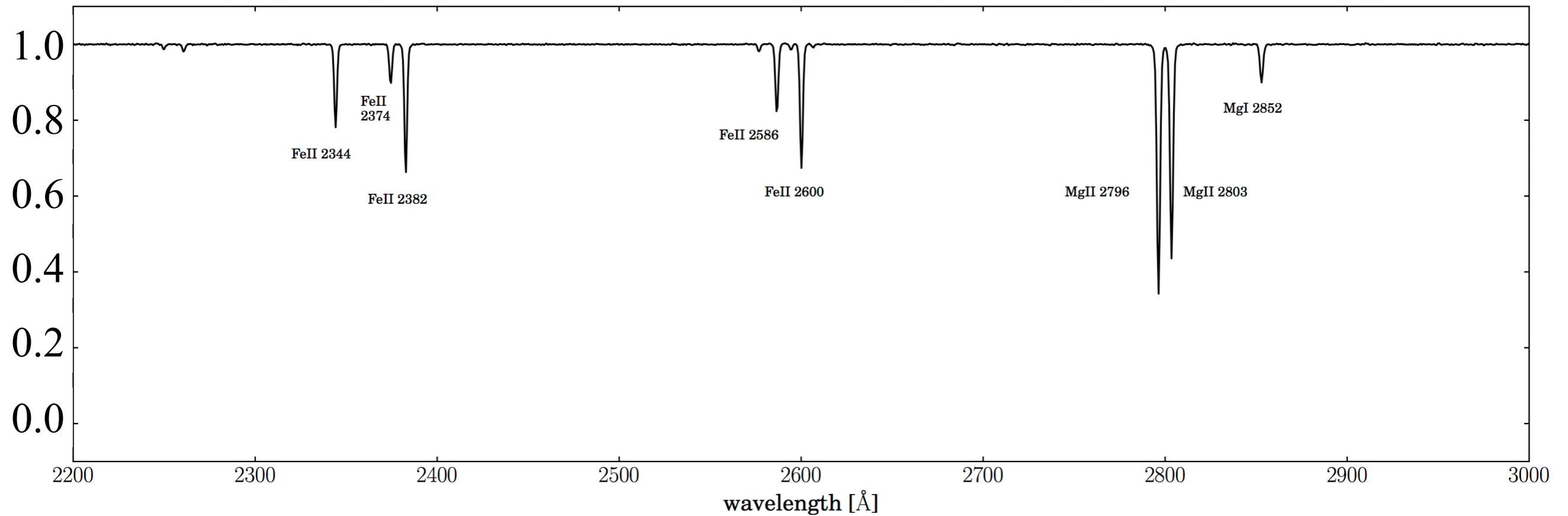
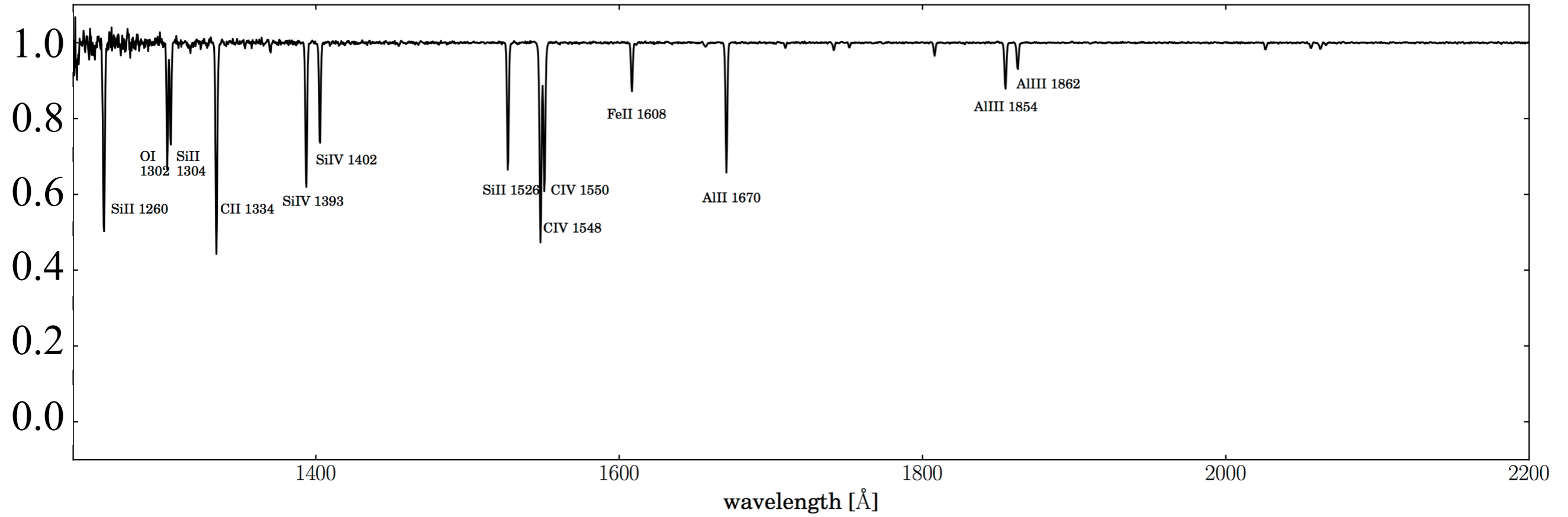
How does the metallicity of the CGM evolve?

What is the morphology of the CGM?

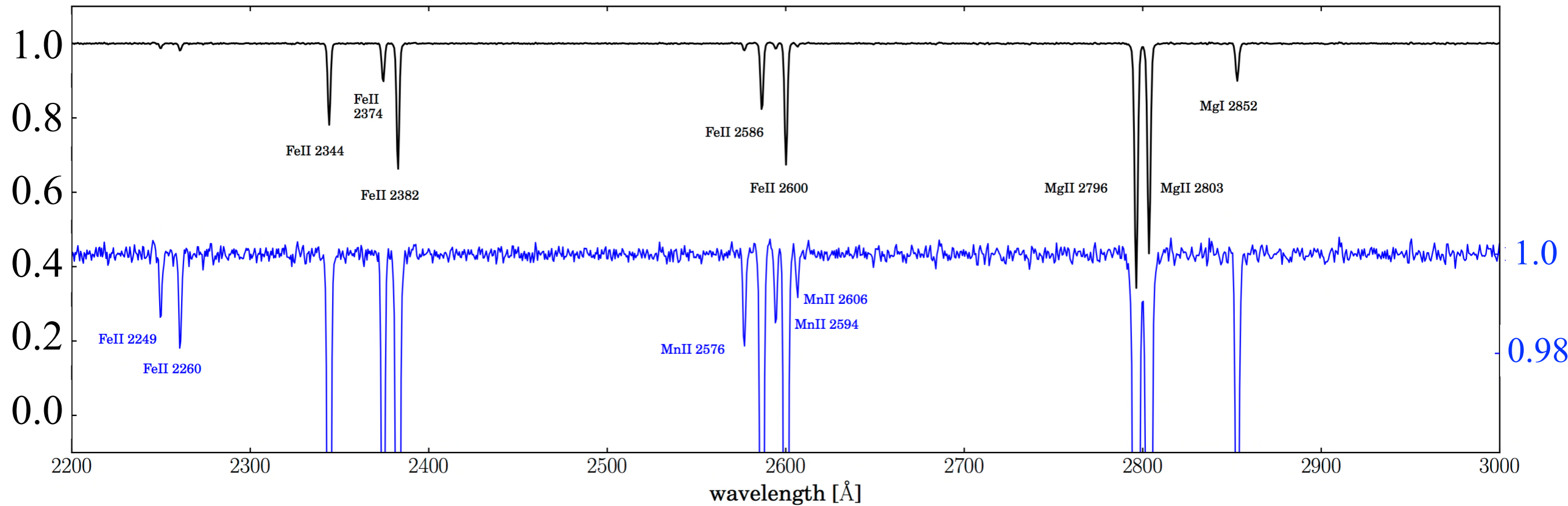
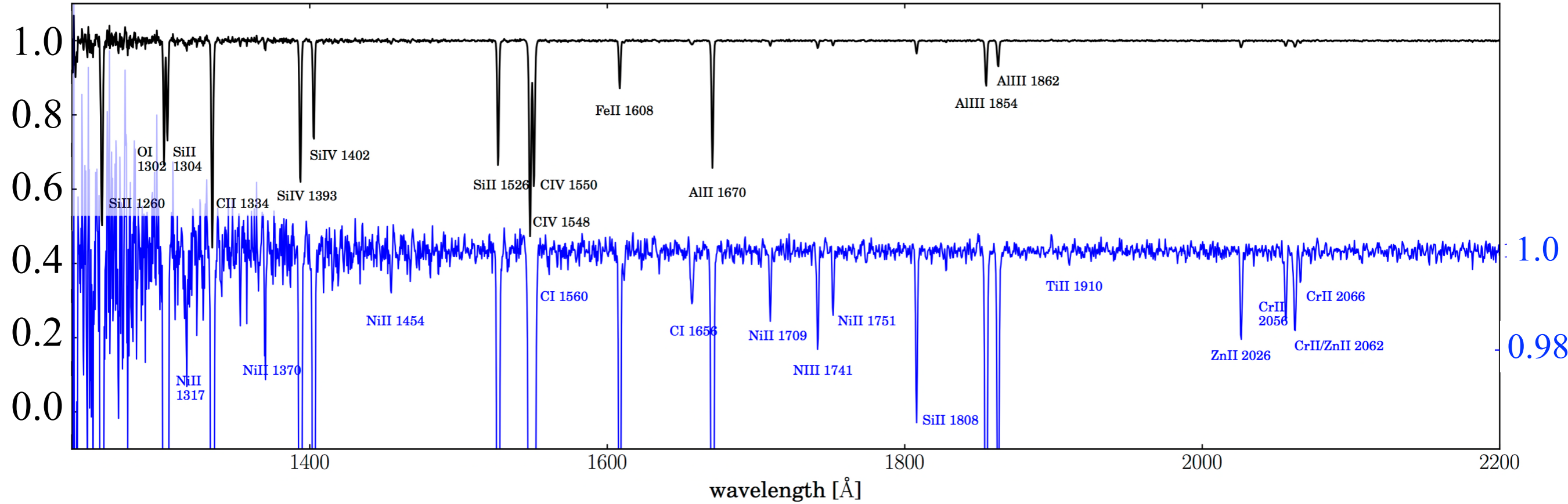




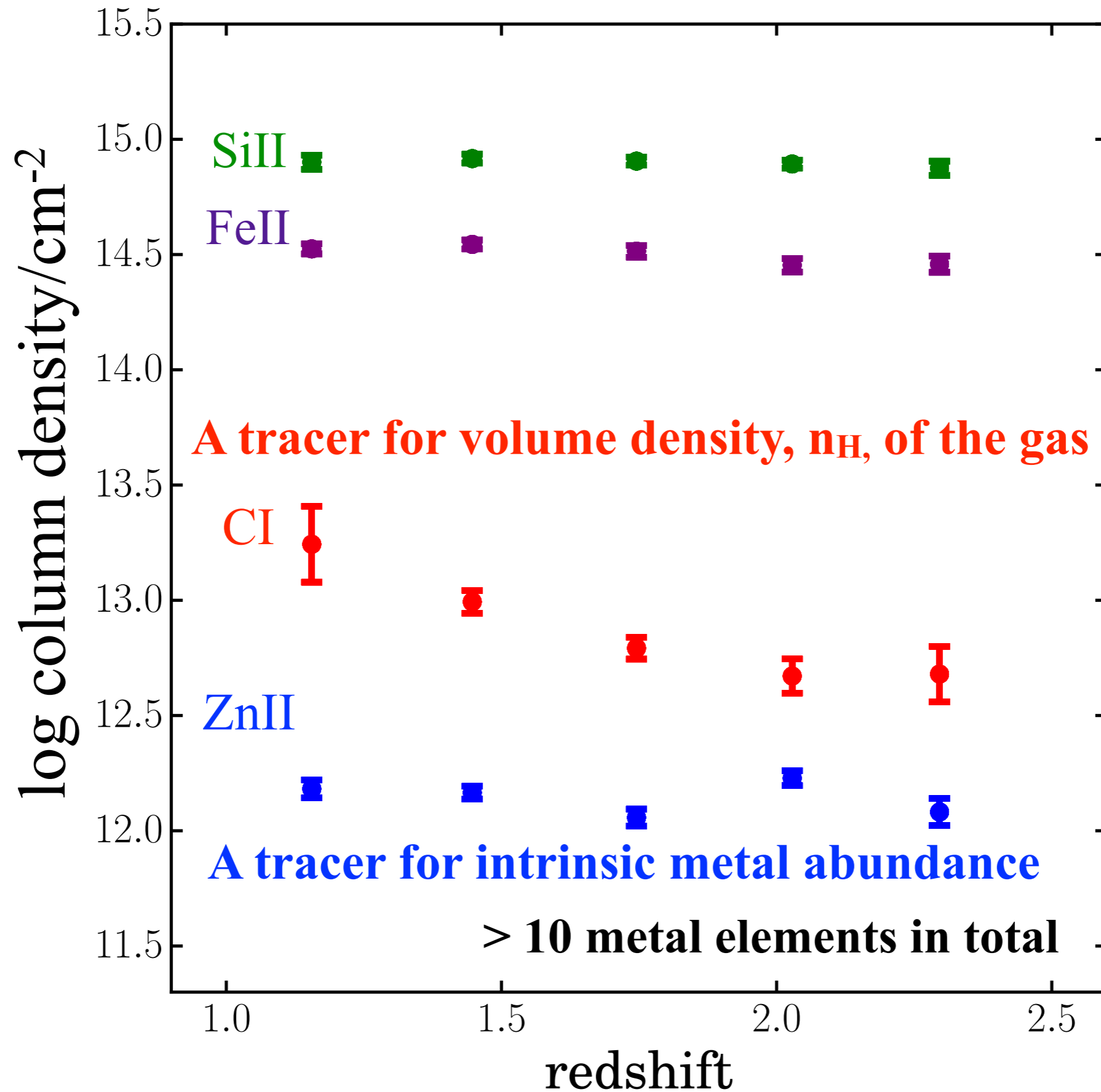
Metal composite spectrum



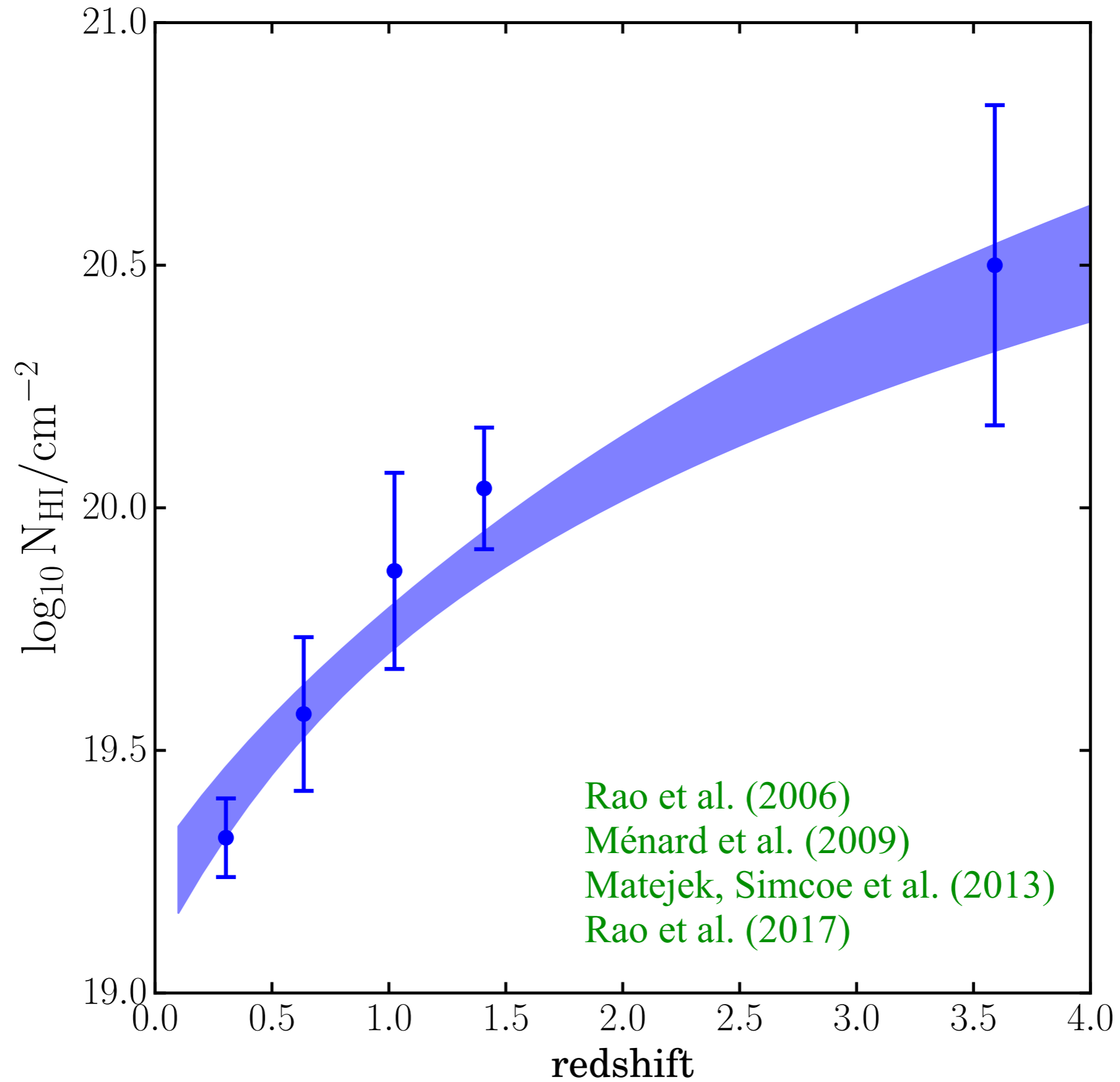
Metal composite spectrum



Metal column densities as a function of redshift



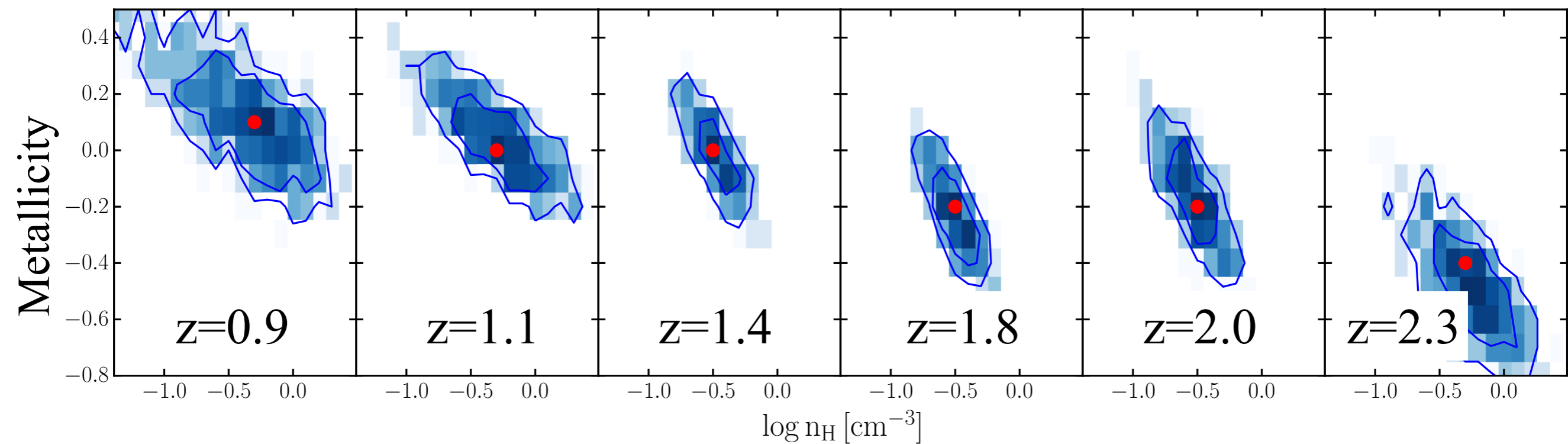
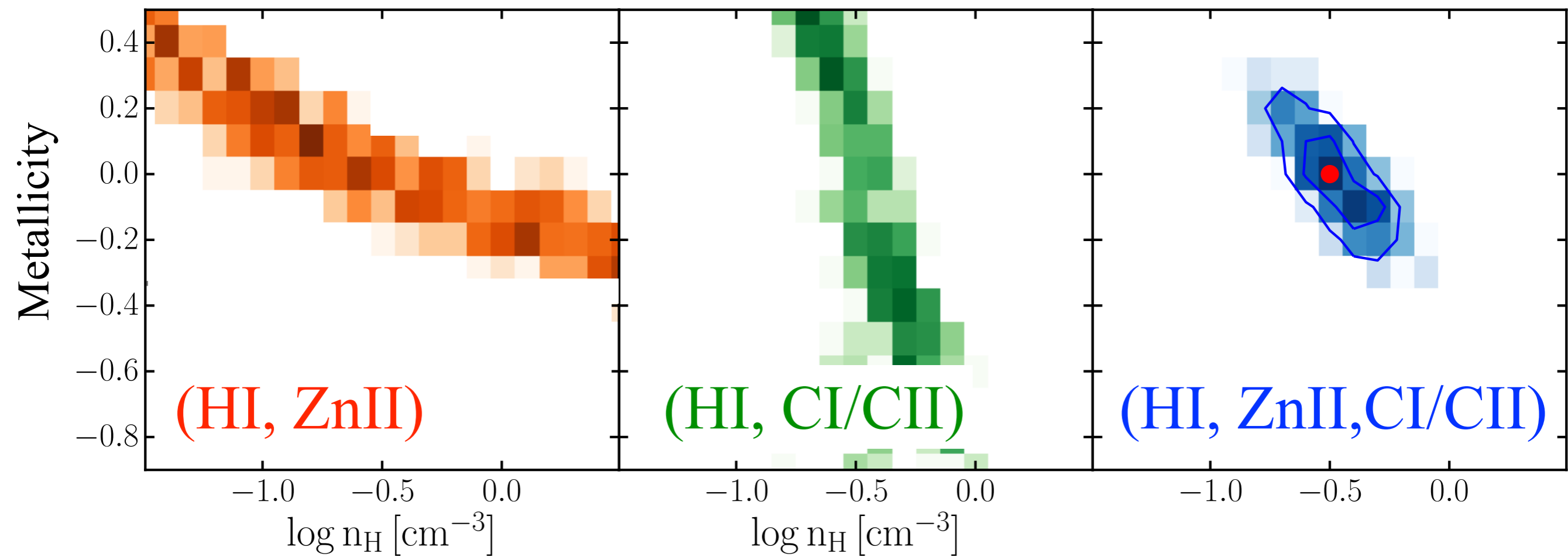
Neutral hydrogen column densities as a function of redshift



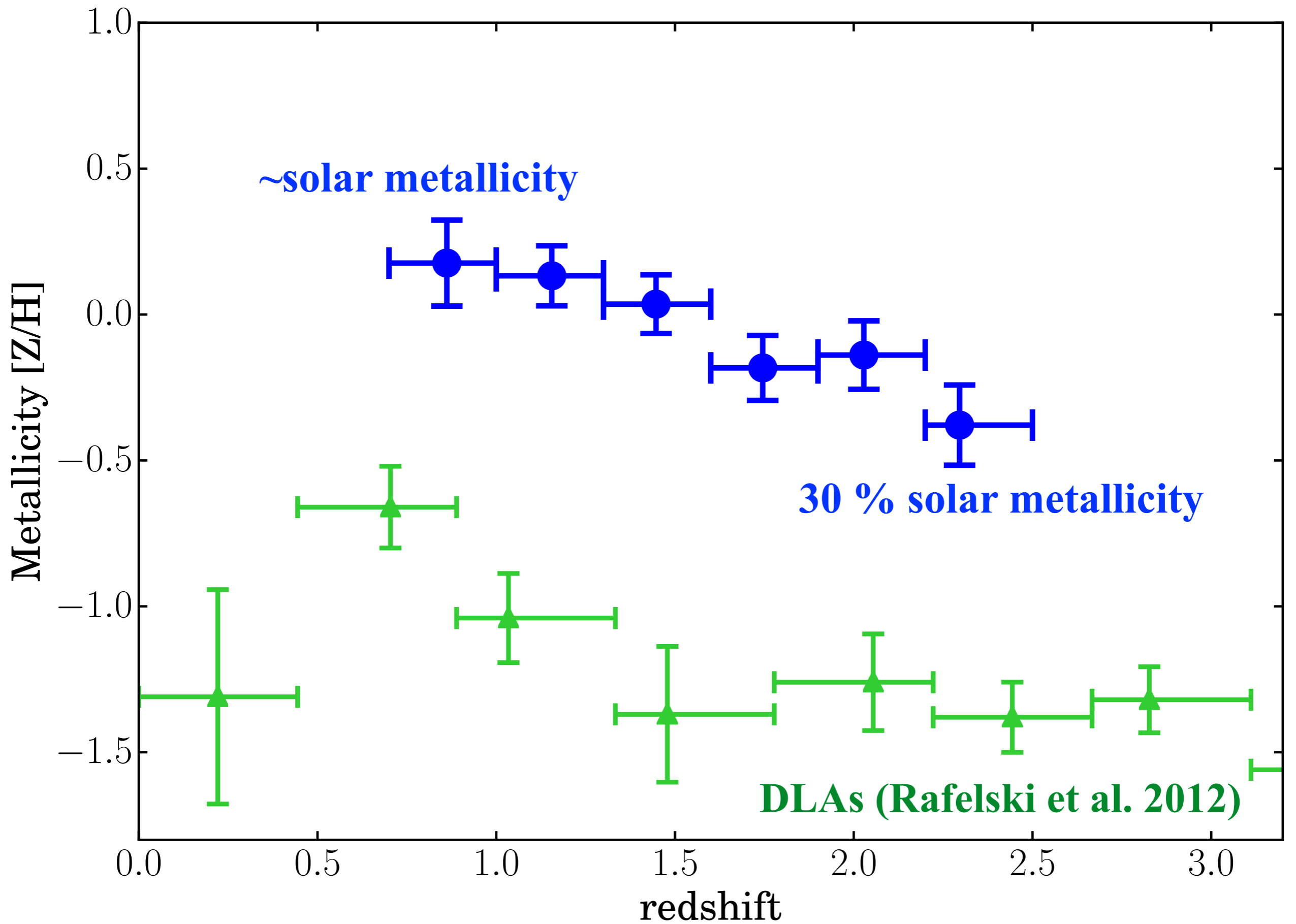
Rao et al. (2006)
Ménard et al. (2009)
Matejek, Simcoe et al. (2013)
Rao et al. (2017)

See also Matejek, Simcoe et al. (2013)

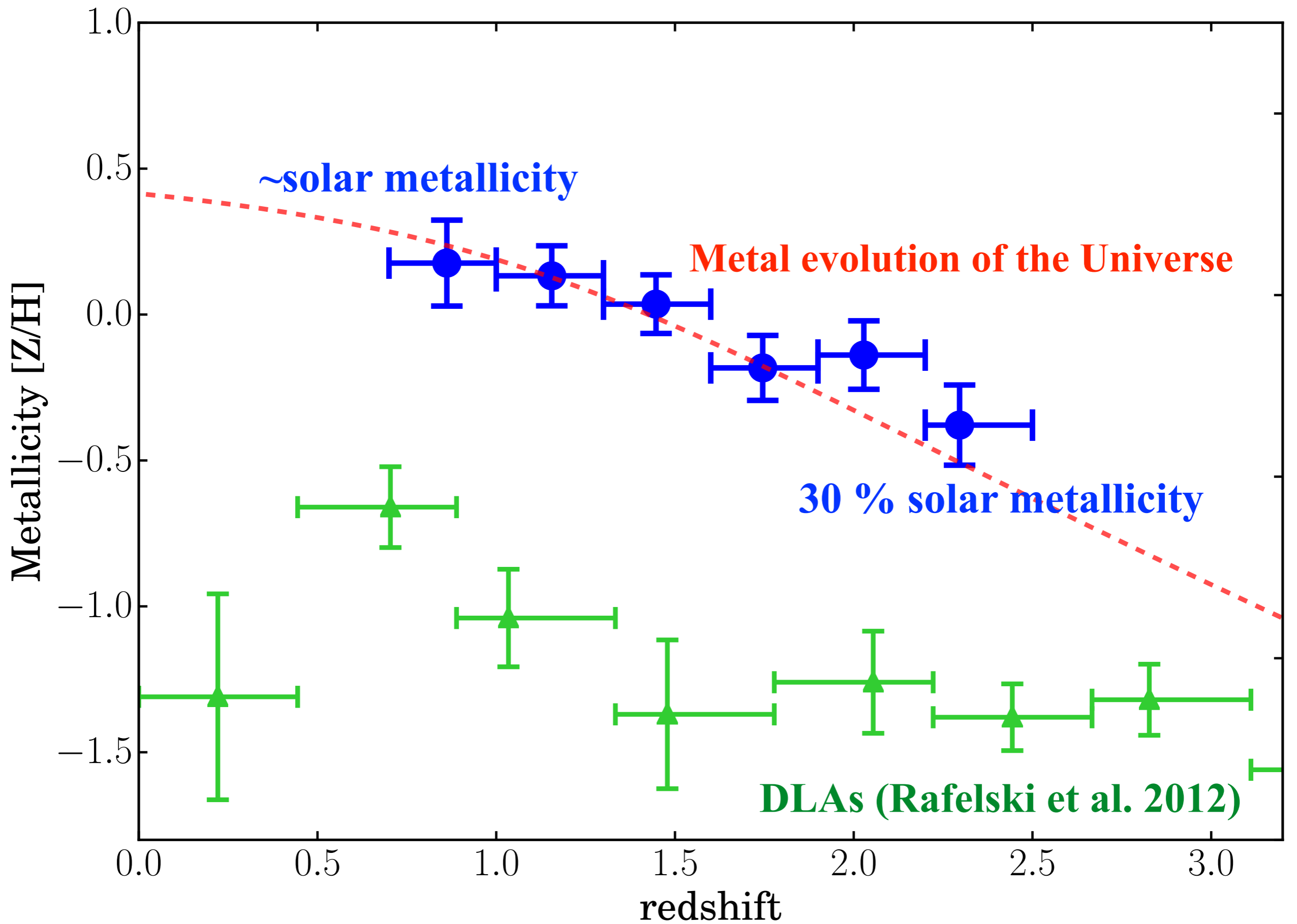
Constraining the physical properties of gas with CLOUDY



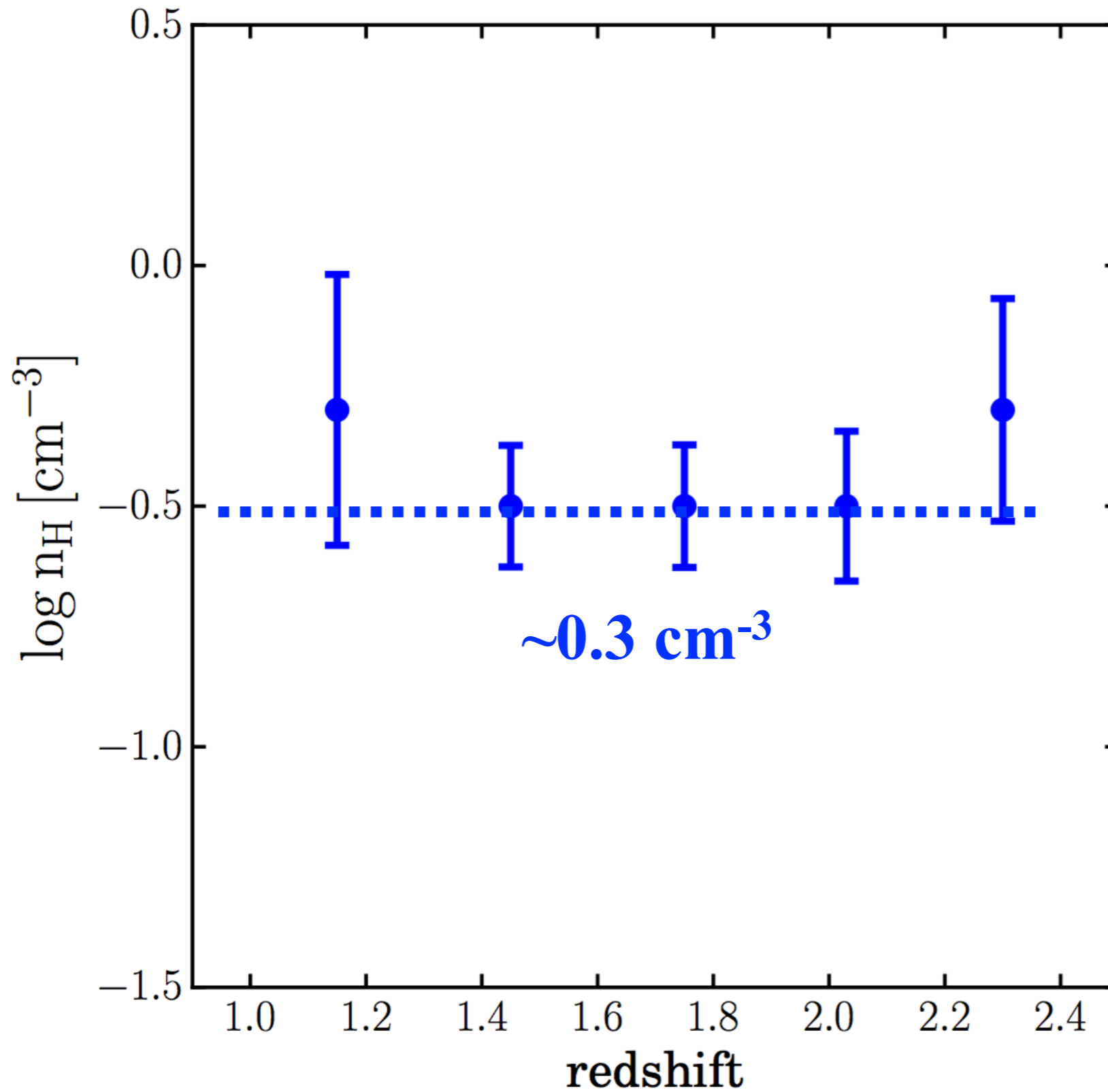
Metallicity evolution



Metallicity evolution

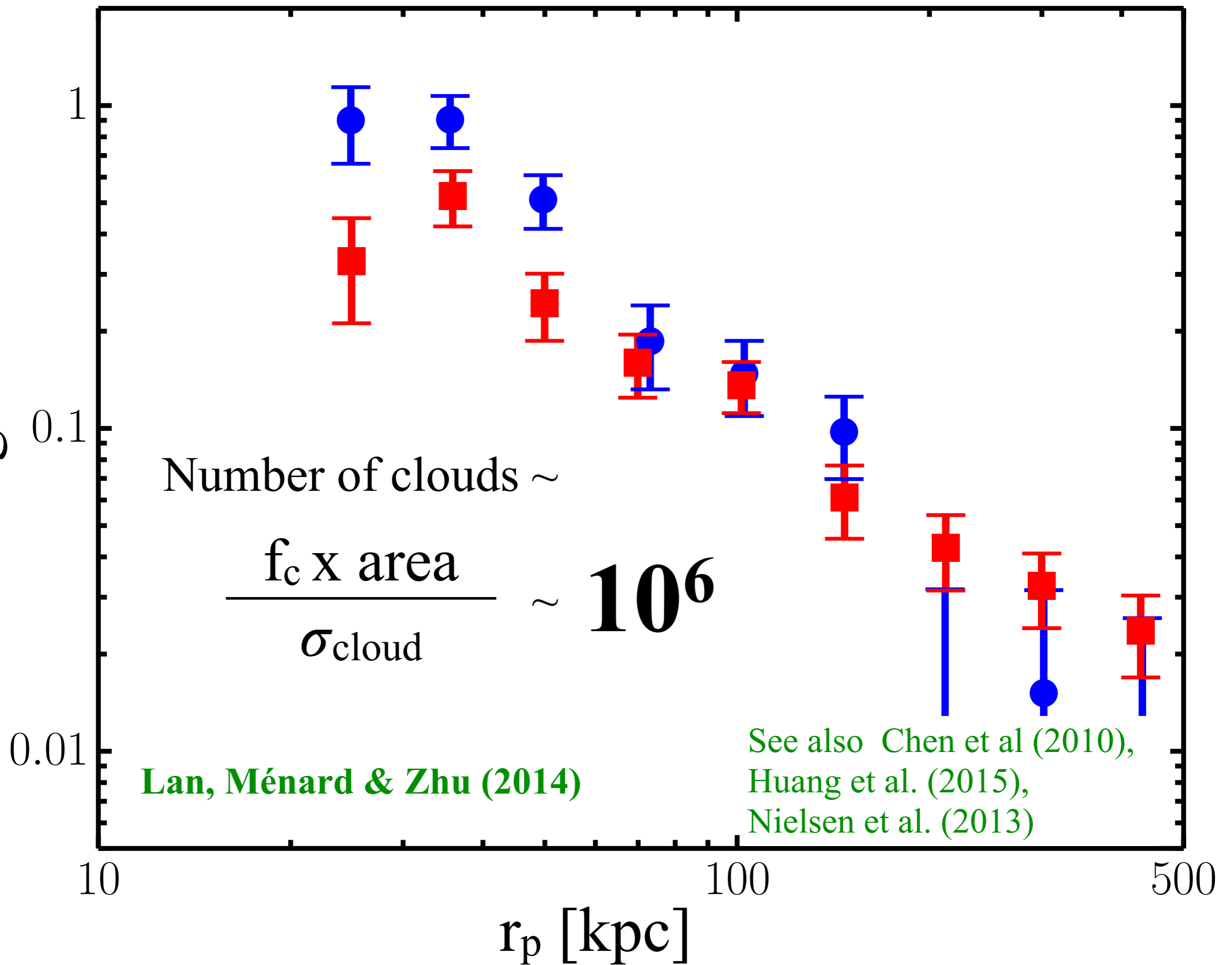


Gas cloud volume density



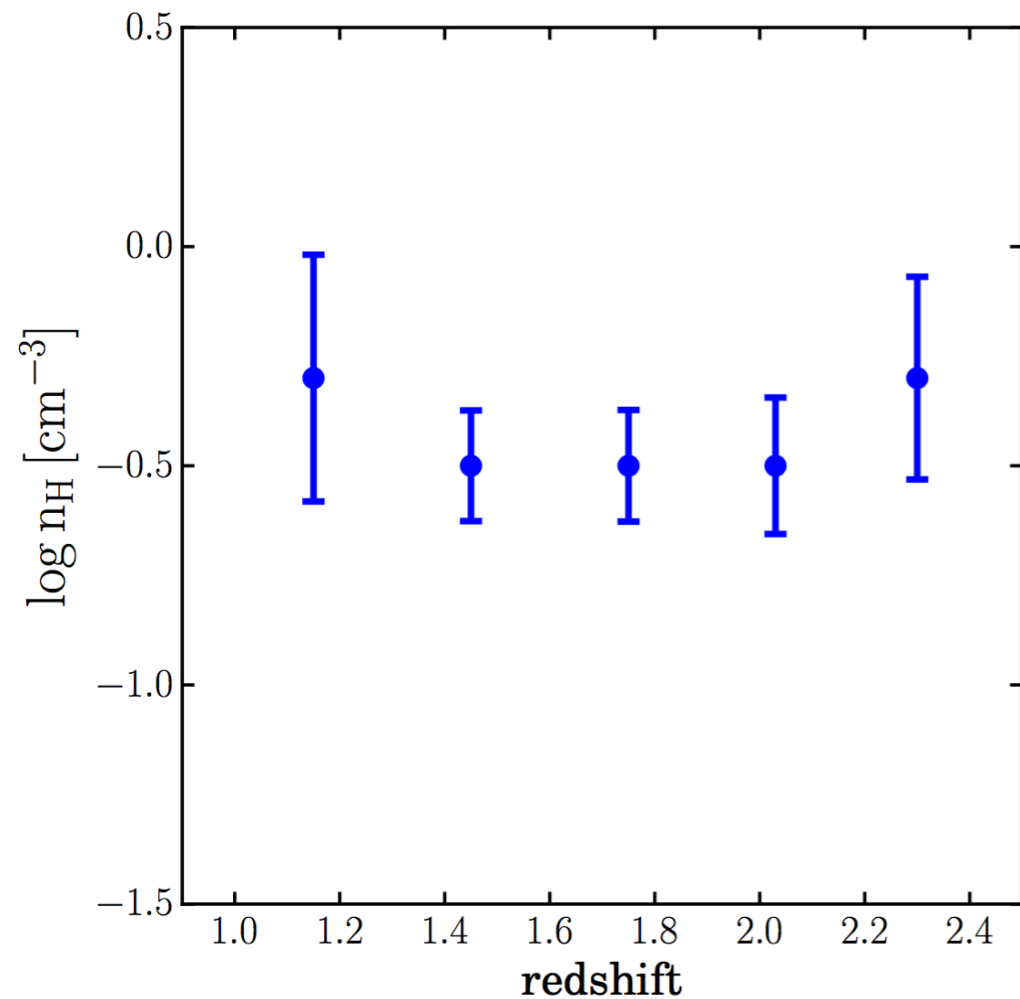
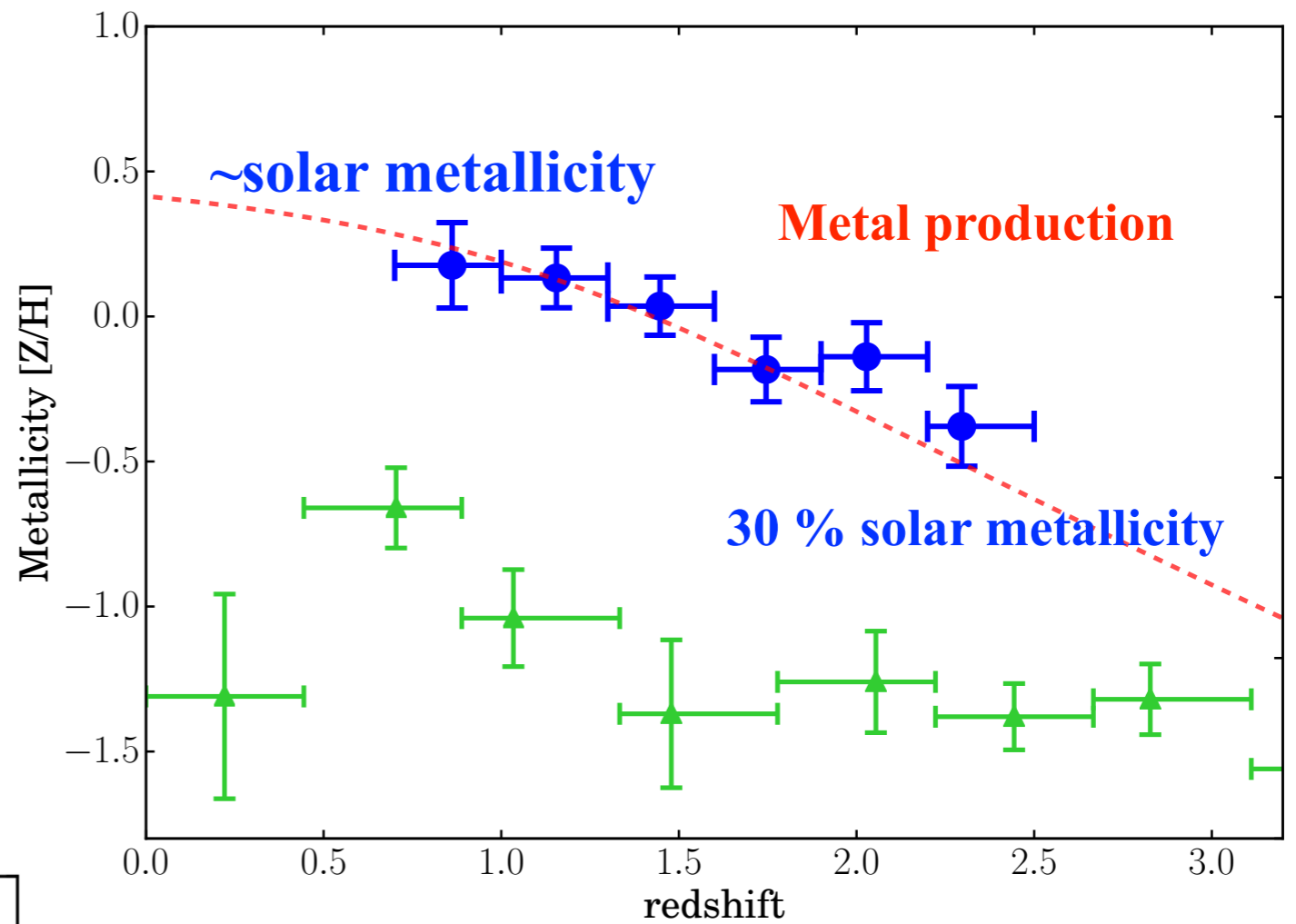
size of clouds $\sim N_{\text{H}} / n_{\text{H}} \sim 30 \text{ pc}$

Covering fraction

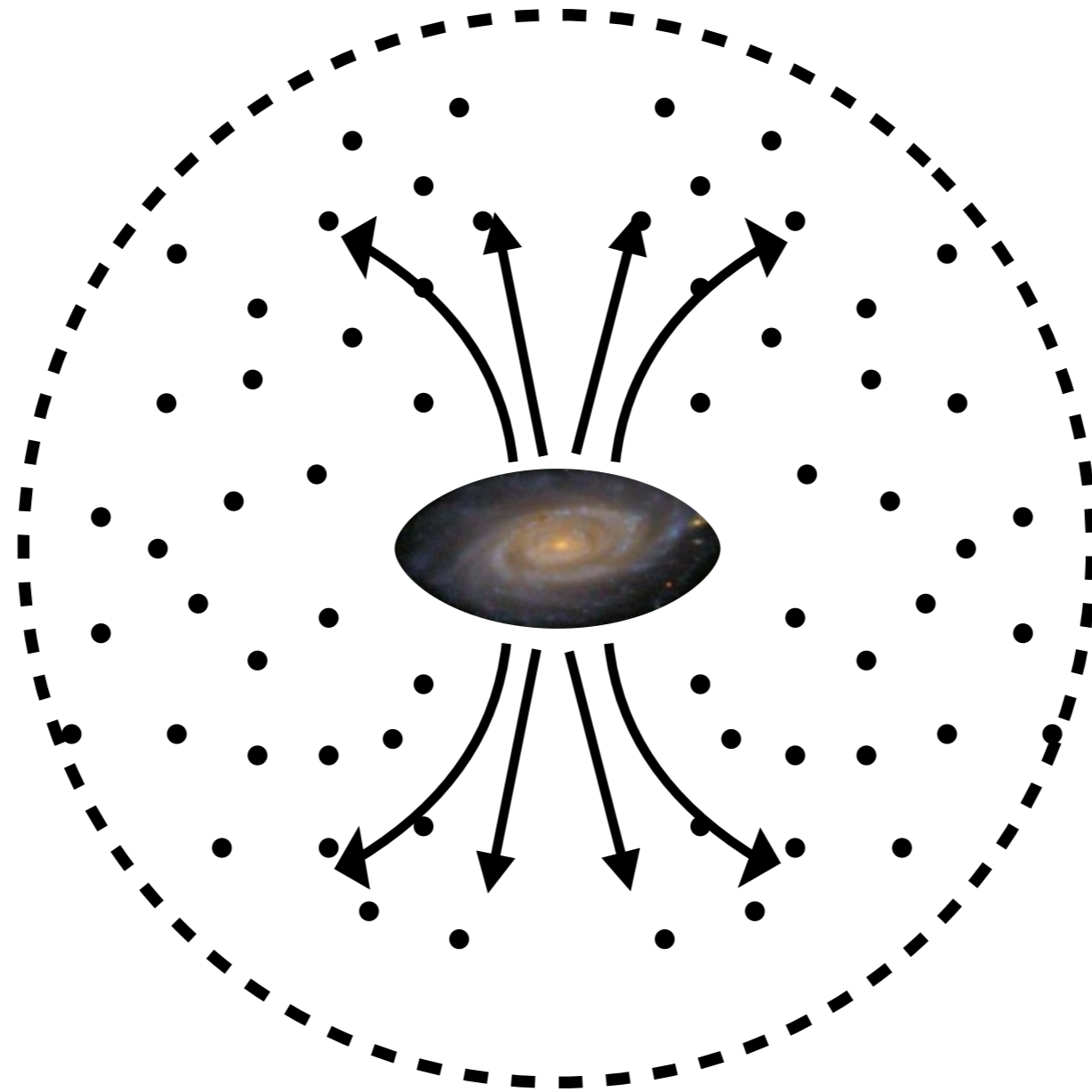


Summary

Metallicity evolution



volume density $\sim 0.3 \text{ cm}^{-3}$
cloud size $\sim 30 \text{ pc}$



The CGM is clumpy,

consisting of $\sim 10^6$ metal-rich clouds.