



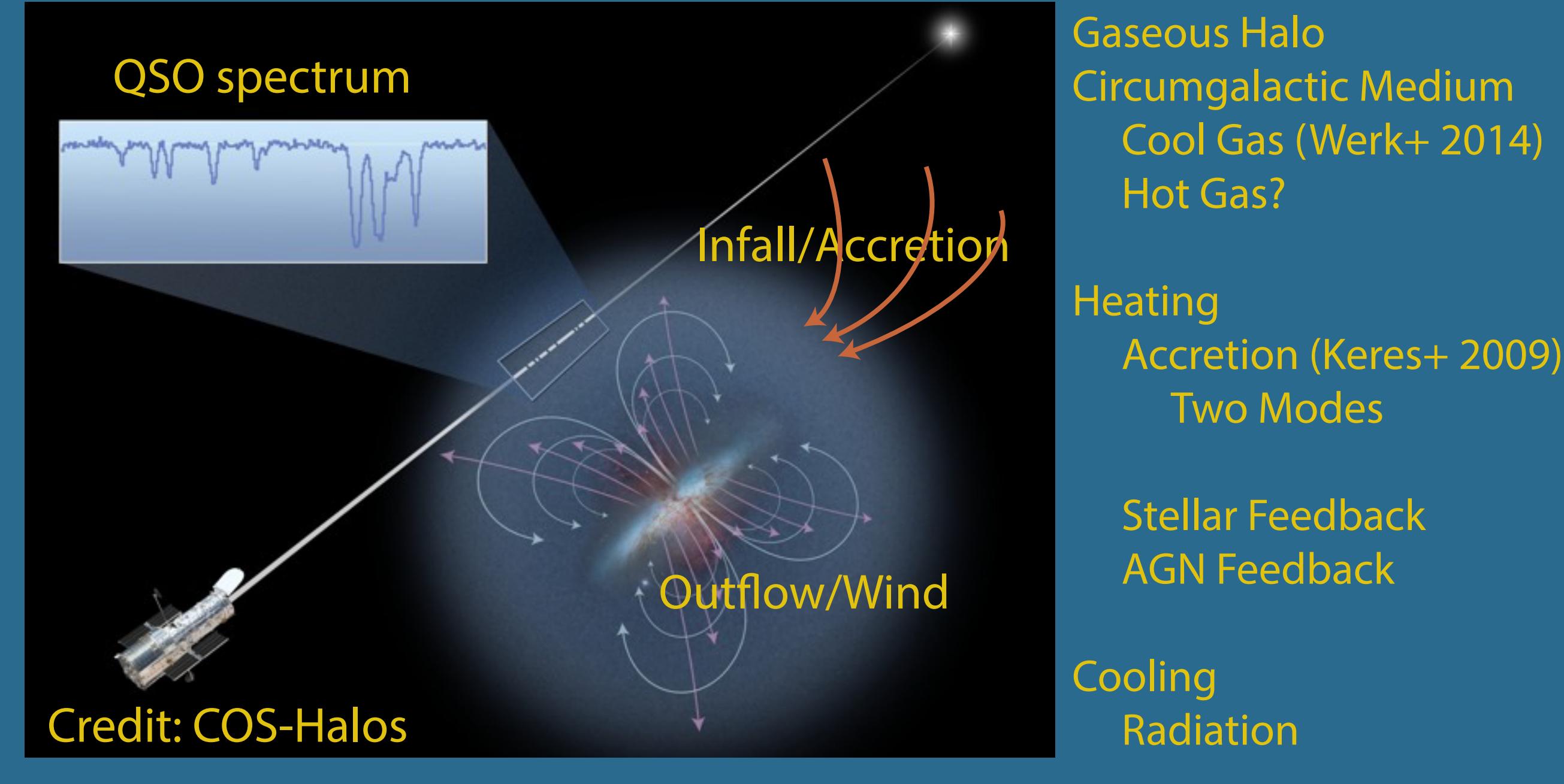
A Hot Gaseous Galaxy Halo Candidate with Detected Mg X Absorption

UNIVERSITY OF
MICHIGAN

Zhijie Qu (quzhijie@umich.edu) and Joel N. Bregman (jbregman@umich.edu)
University of Michigan, Ann Arbor

Galaxies may store a significant fraction of baryonic material in their hot halos, which can be traced by high ionization absorption systems in spectra toward background QSOs. A hot halo of an L* galaxy has a virial temperature around one million Kelvin, corresponding to the peak ionization fraction for Mg X. We discovered a Mg X absorption system, in the sightline towards LBQS 1435-0134, which also contains Ne VIII, Ne VI, O VI, Ne V, O V, Ne IV, O IV, N IV, O III, and H I. This absorption system is modeled by the collisional ionization model with temperature higher than one million Kelvin, and could be a hot gaseous halo of an L* galaxy, which could be a solution to the galaxy missing baryon problem.

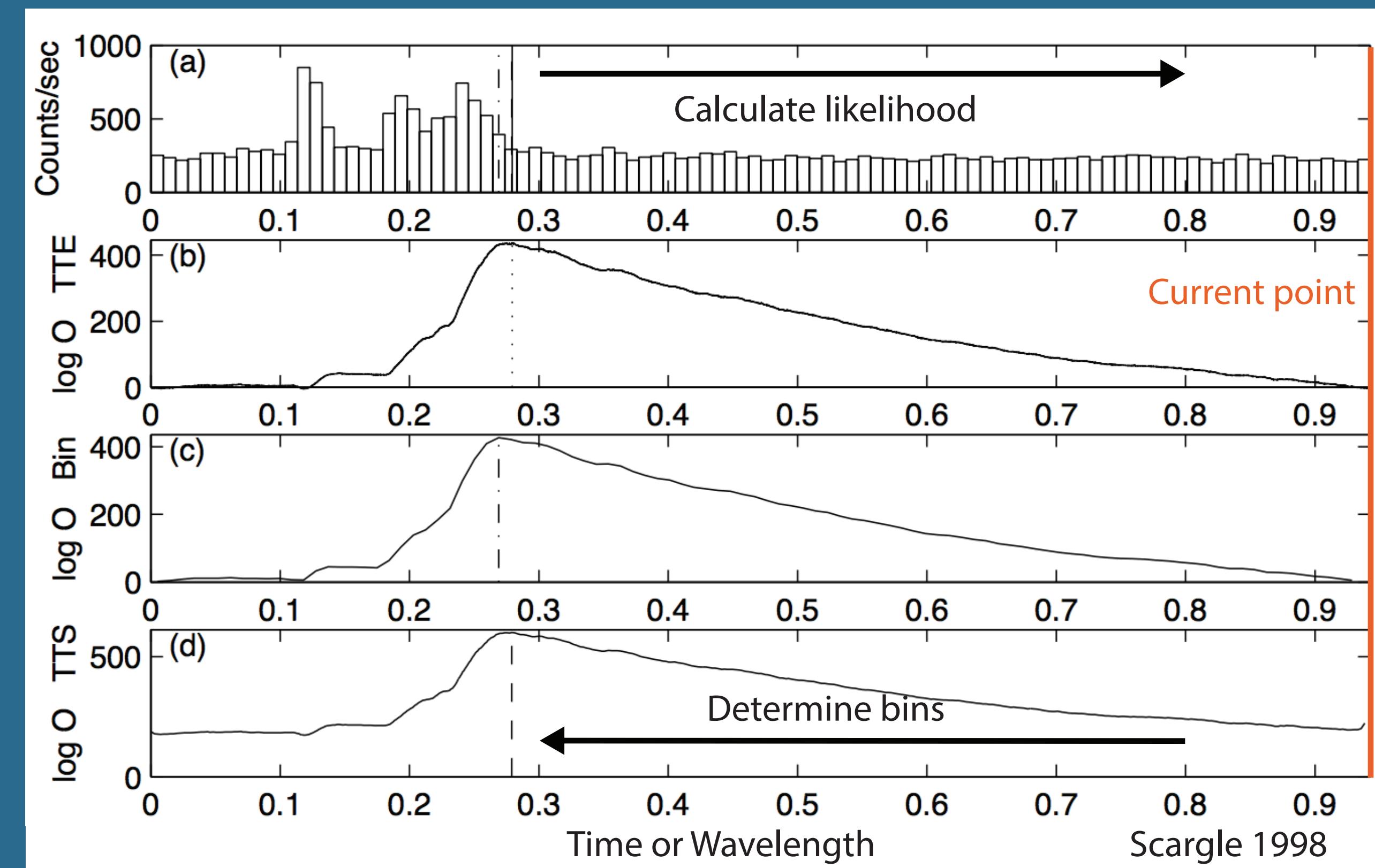
What's in Galaxy Halo? Any Hot Gas?



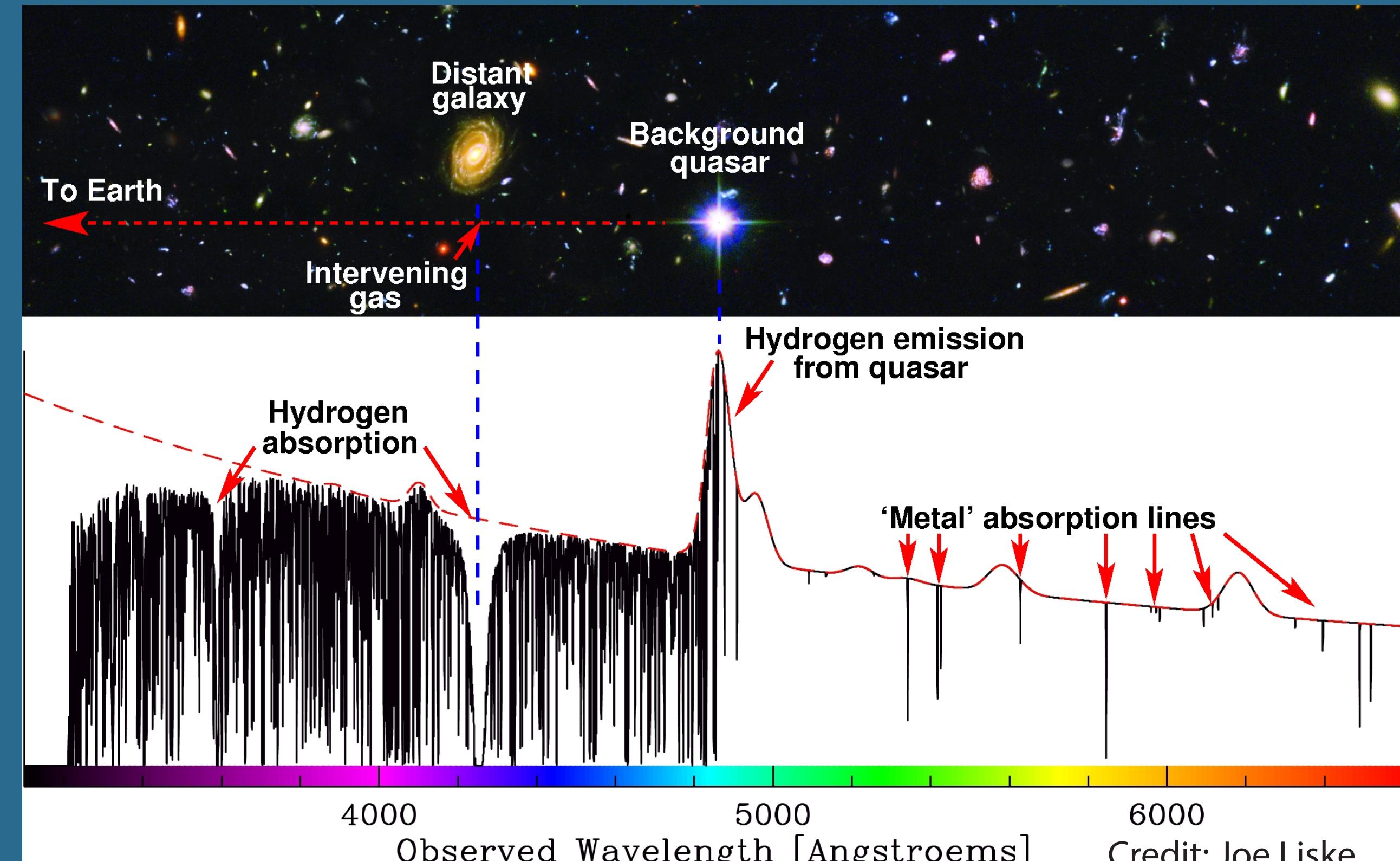
Bayesian Blocks Algorithm (Scargle+ 2013)

Bayesian Blocks is a nonparametric method that optimizes the likelihood functions to determine an optimal binning for data, where the widths are not normally uniform.

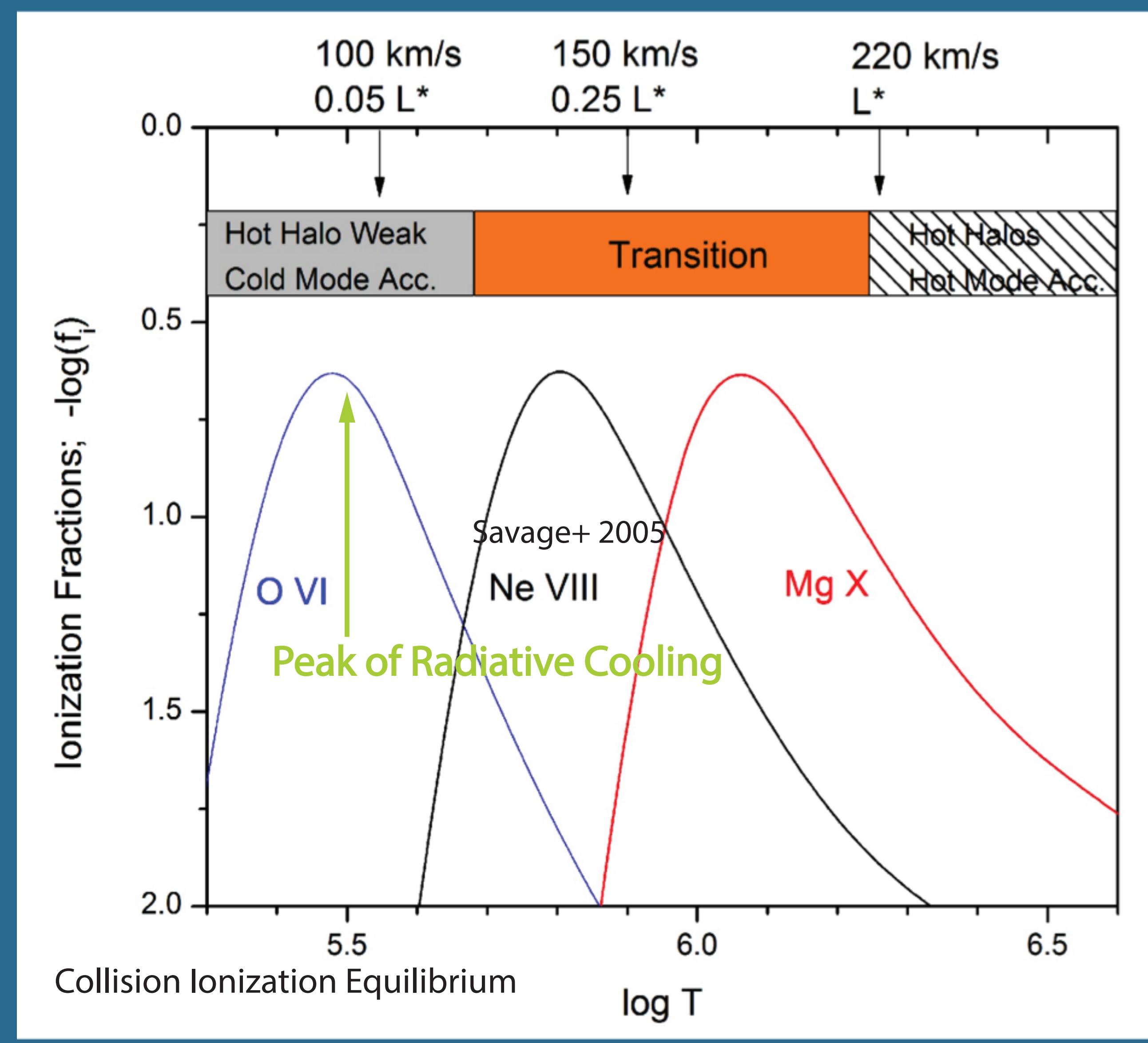
How does it work?



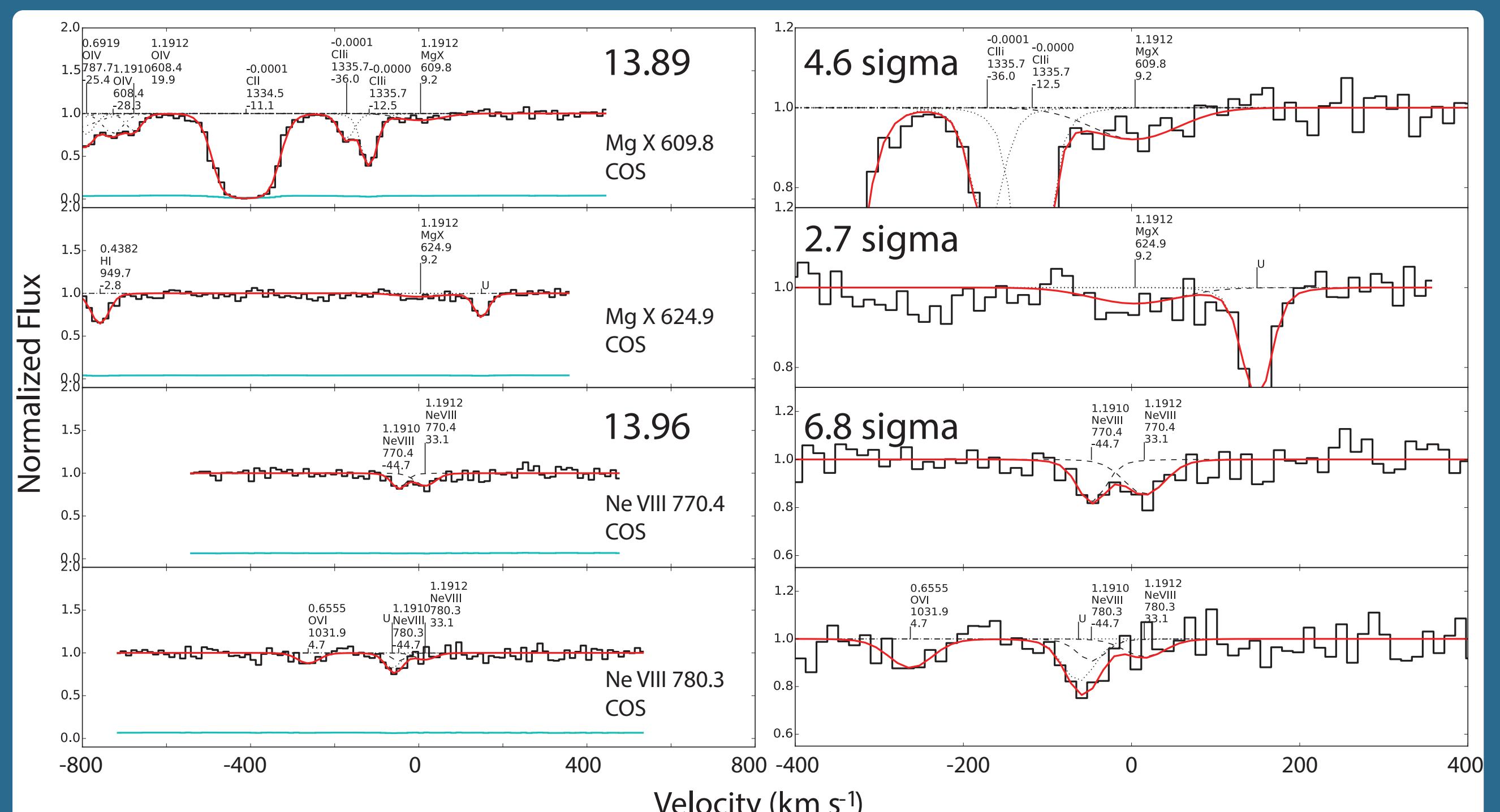
How to Measure?



Intervening galaxy absorption against the QSO continuum.



High Ionization Ions (Mg X -- 5.8 sigma)

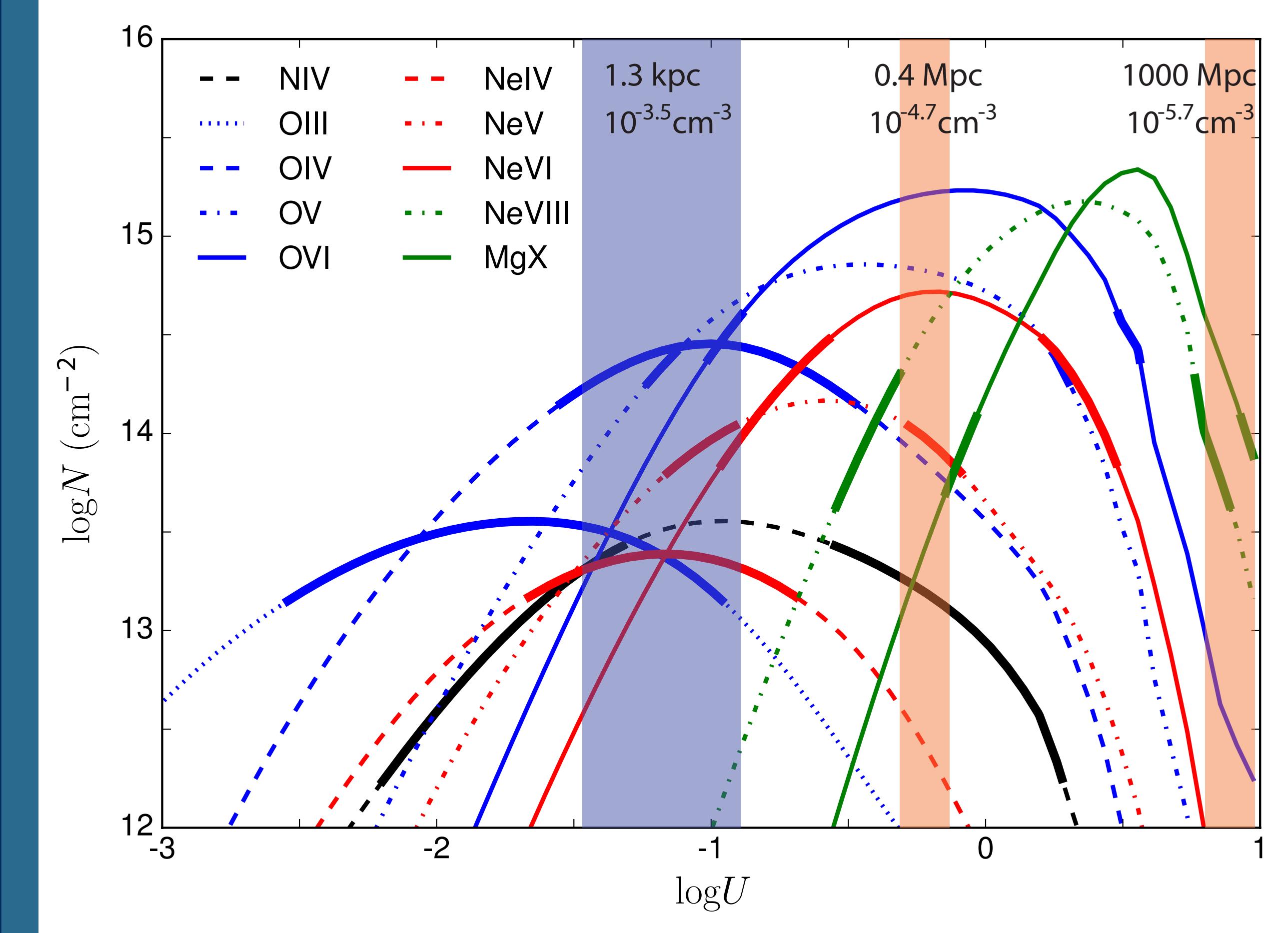


Qu & Bregman 2017

Reference

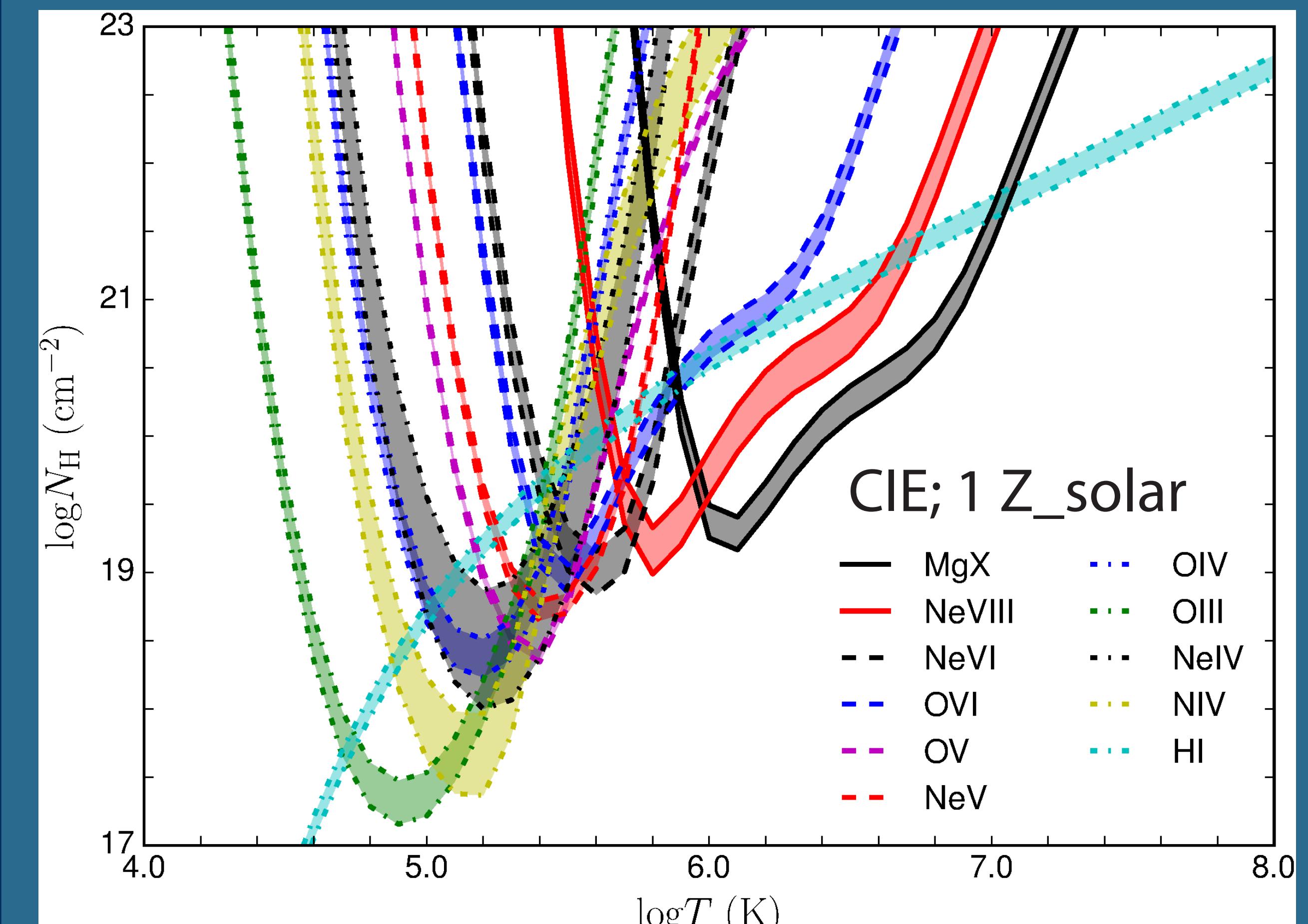
- Hussain+, 2017, 466, 3133, MNRAS
- Keres+, 2009, 396, 2332, MNRAS
- Pachat+, 2017, ArXiv: 1706.04325
- Qu & Bregman, 2016, 832, 189, ApJ
- Savage+, 2005, 626, 776, ApJ
- Scargle+, 2013, 764, 167, ApJ
- Scargle, 1998, 504, 405, ApJ
- Werk+, 2014, 792, 8, ApJ

Photoionization (PI) Model



Most of reported Ne VIII systems are not PI, since the lengthscales are too large (Pachat+ 2017, and reference herein). This may be solved by updated ultraviolet background (Hussain+ 2017). However, the uncertainty of UVB is large.

Collisional ionization model



Multiple phase medium is required.

Conclusion & Future

We reported the first intervening Mg X candidate. The Mg X and Ne VIII cannot be produced by a PI model. The temperature goes up to one million Kelvin. The system is consistent with the galaxy hot halo scenario. The hot halo might be a solution to the galaxy missing baryon.

Need to find the host galaxy...

