Mass and Column Densities of Galactic Gaseous Halo

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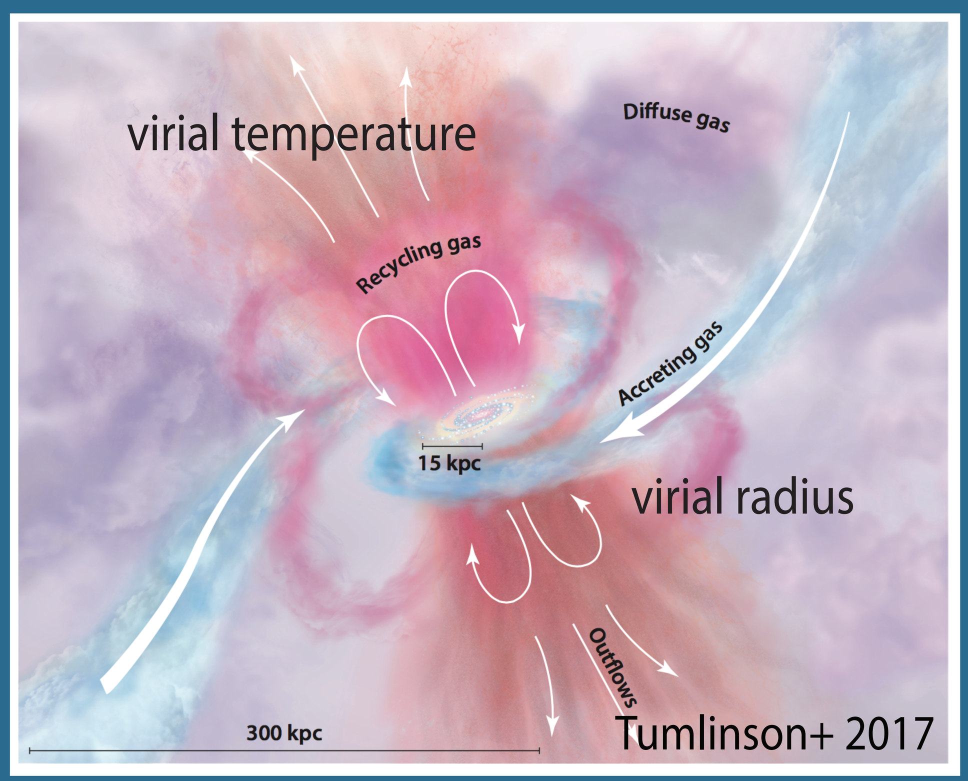
Galactic Gaseous Halo

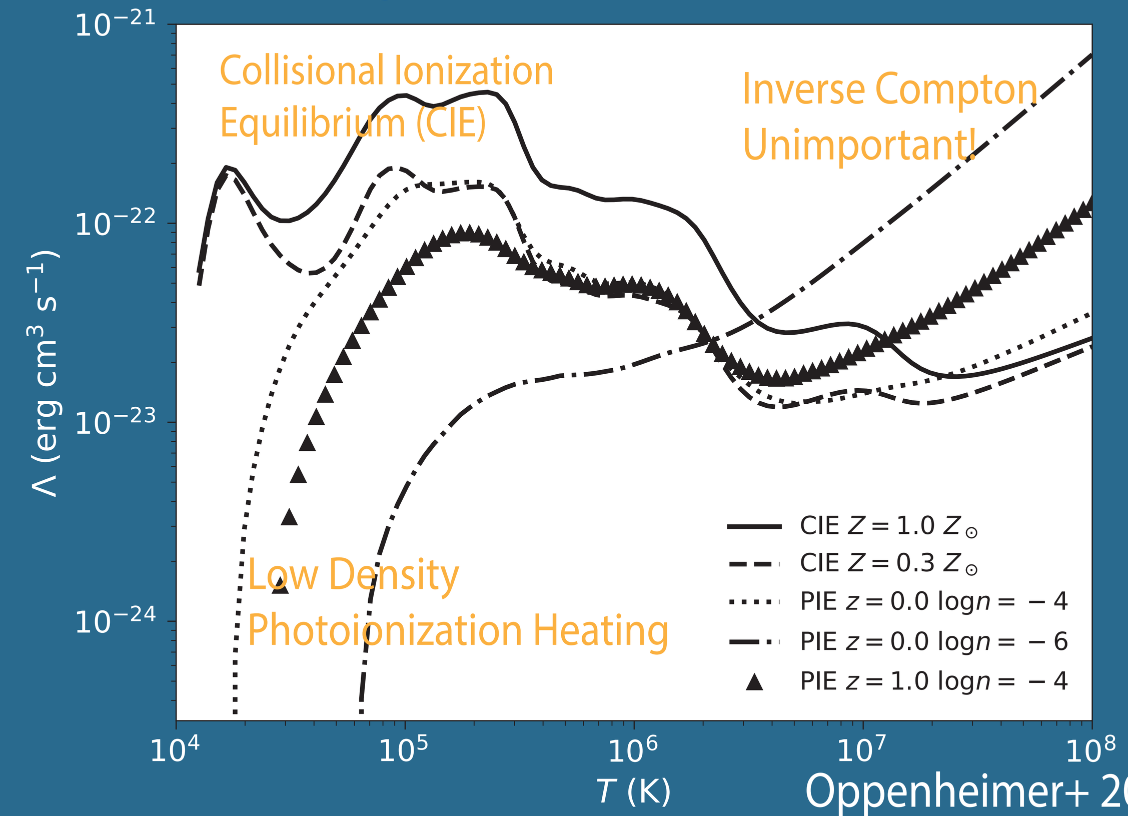


Hydrostatic Halo With Feedback & Cooling

- SFR is proportional to the radiative cooling rate of gaseous halo modified by the stellar feedback (galactic wind)
- Spherical symmetry
- Hydrostatic equilibrium
- β model for density profile (power law)
- Uniform temperature distribution
- Ionization equilibrium
- Pressure balance

Photoionization (PI) Modification

PI Reduces the cooling rate in low T or low n situations



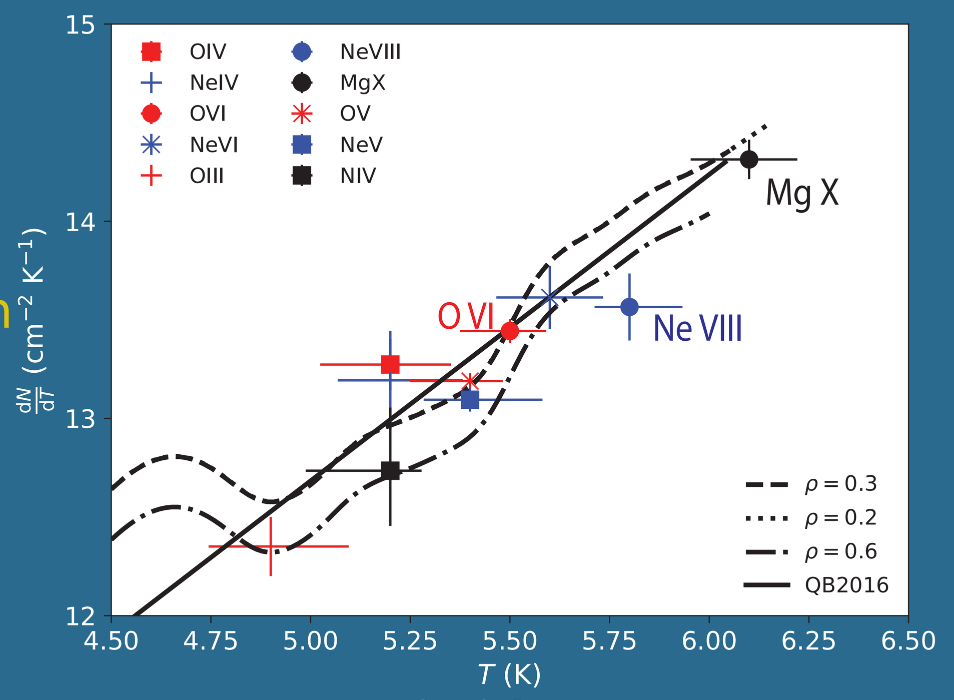
Multi-phase Absorbing Medium Reproduced

Assumption -- Constant Mass Cooling Rate over Temperature

LBQS 1435-0134
Up to Mg X

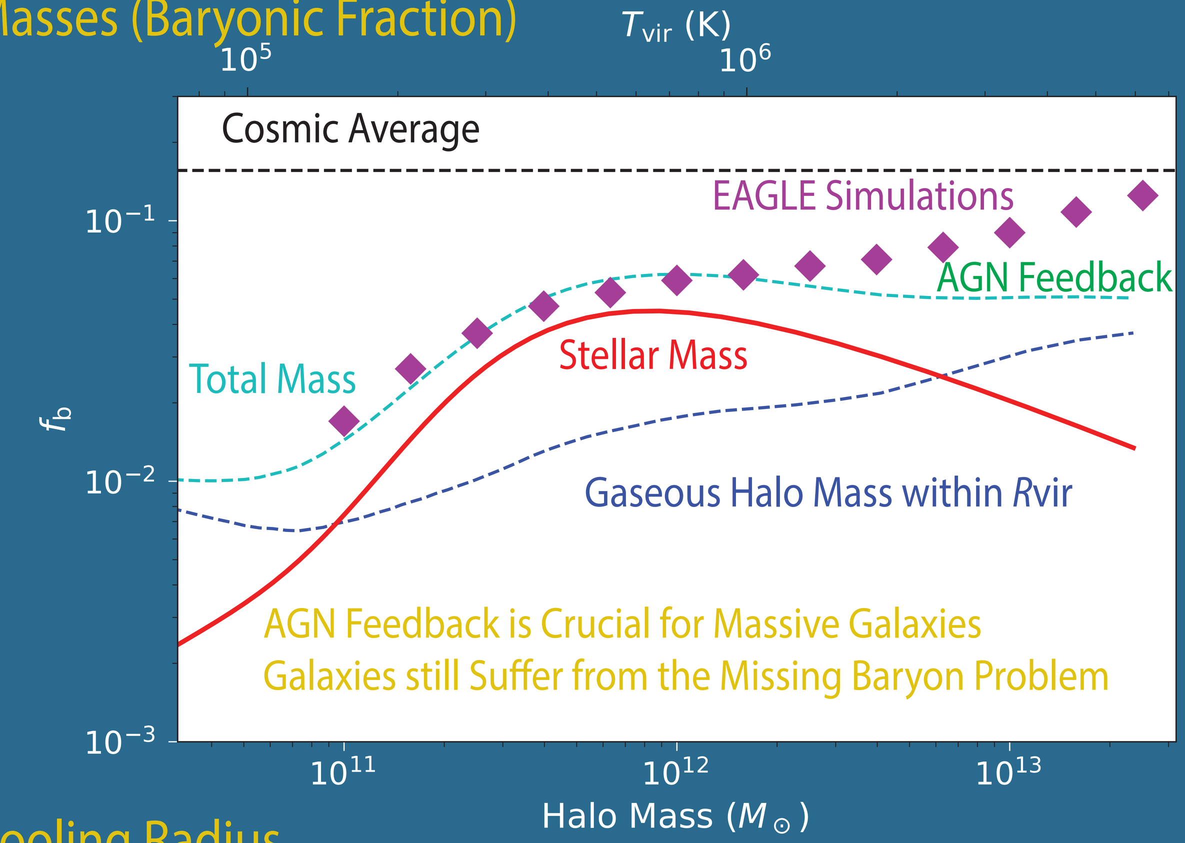
A power law with index of 1.55

Universal M(T) propto T/Λ(T)

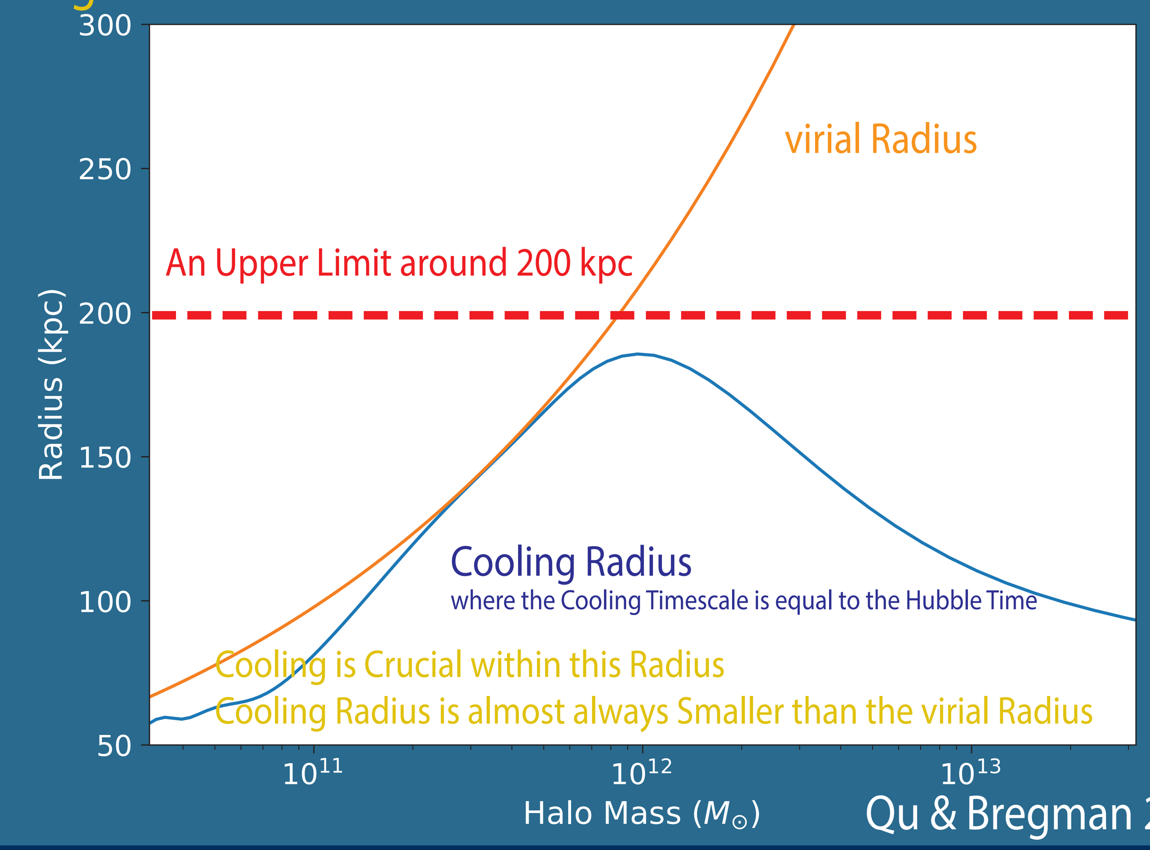


Gaseous Halo Model (with PI and Cooling)

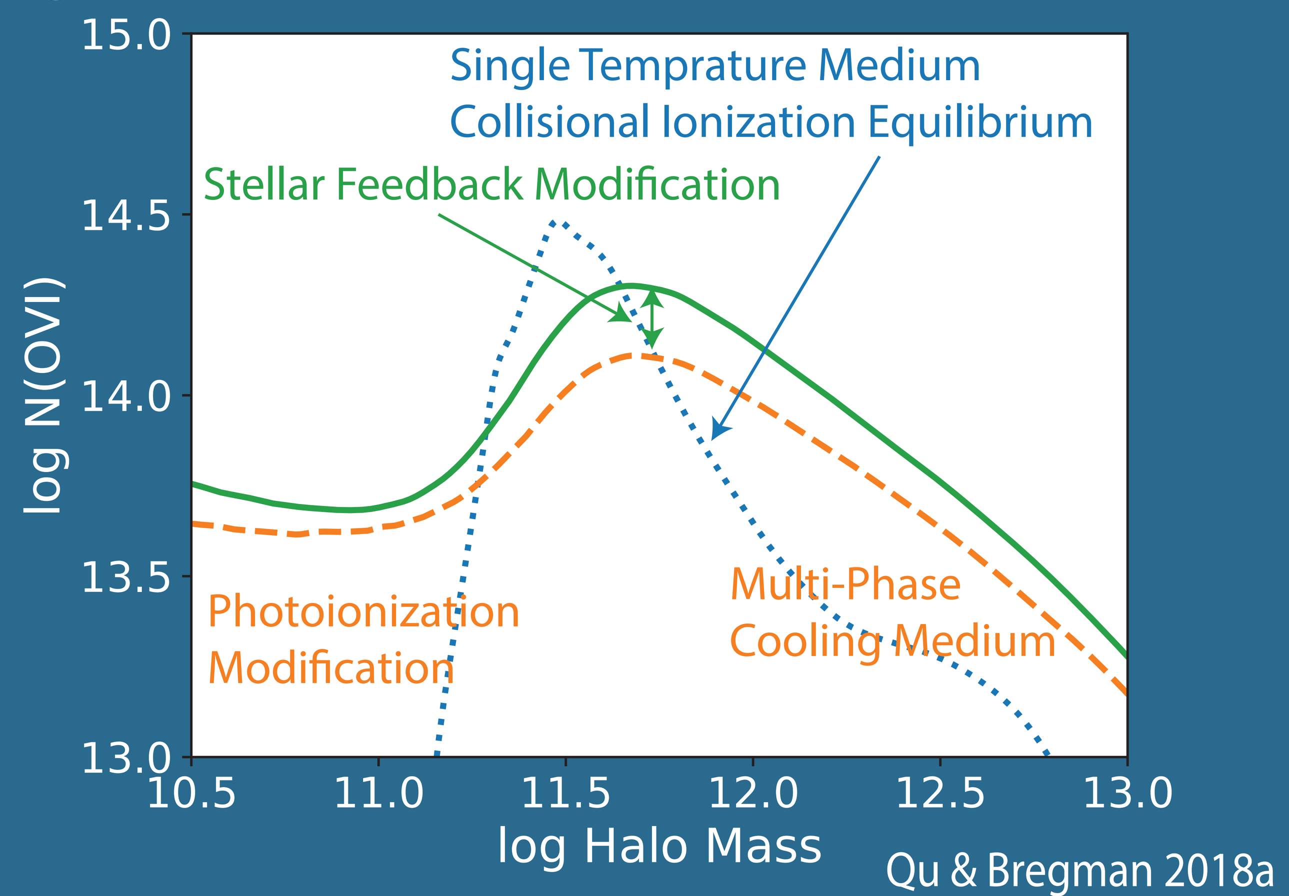
Masses (Baryonic Fraction)



Cooling Radius

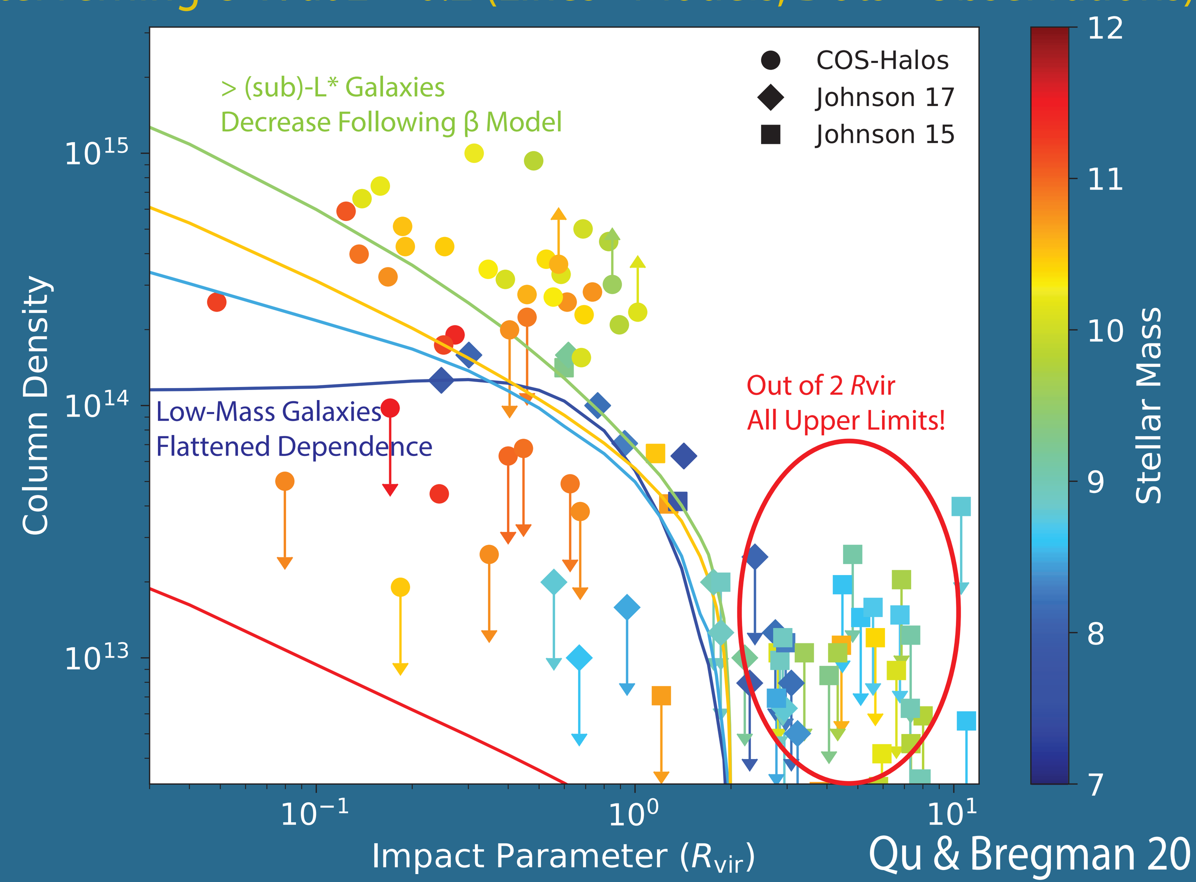


High Ionization State Ions (O VI at 0.3 Rvir)



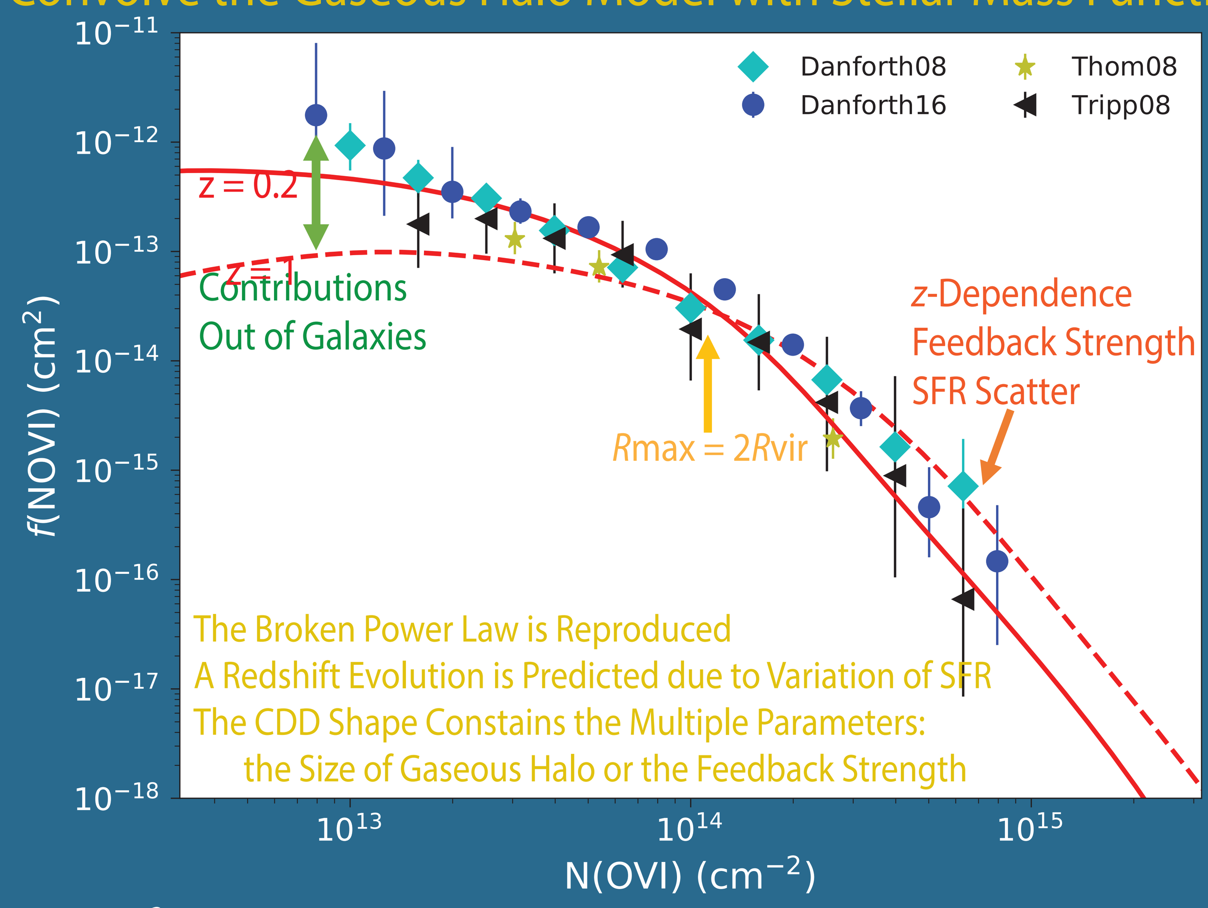
Impact Parameter Dependence

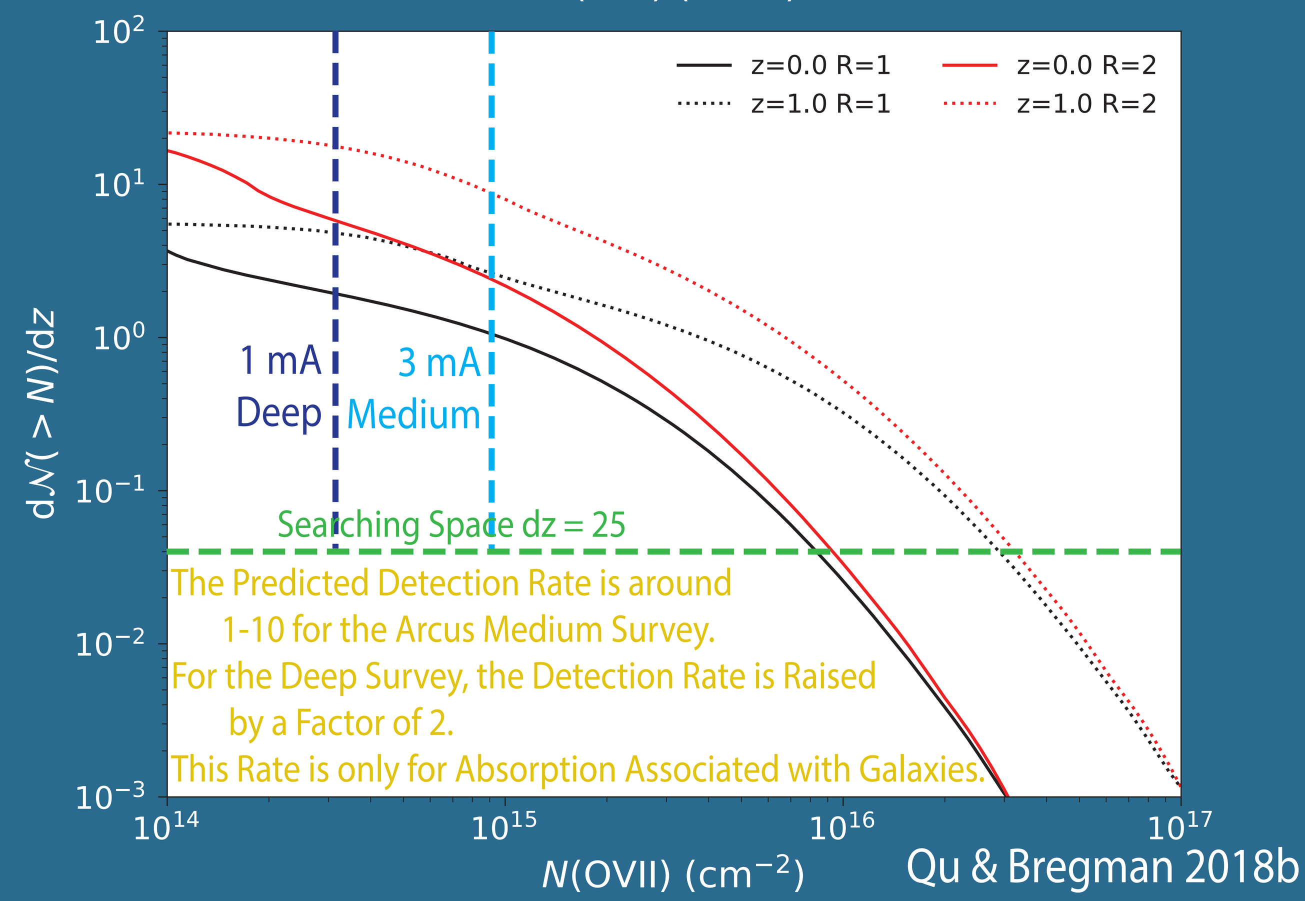
Intervening O VI at z = 0.2 (Lines - Models; Dots - Observations)



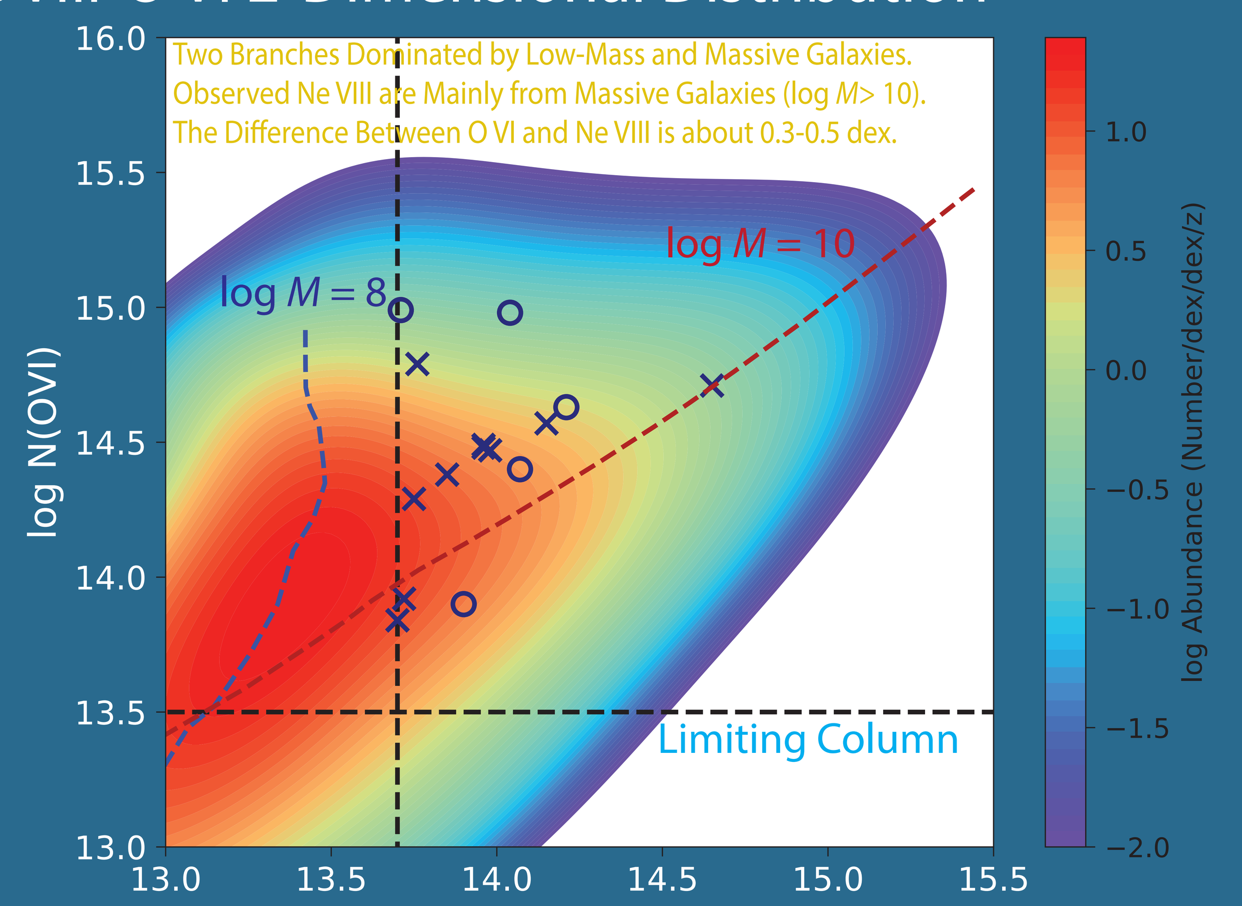
O VI/O VII Column Density Distribution (CDD)

Convolve the Gaseous Halo Model with Stellar Mass Function





Ne VIII-O VI 2-Dimensional Distribution



Summary

SFR is Important to Understand the Gaseous Halos.
Photoionization and Cooling are Crucial for the High Ionization State Ions.
Feedback Processes Affect the Energy Balance.

High Ionization State Ions Have Different Ionization Mechanisms over Stellar Masses – Photoionization (Low-Mass Galaxies), Virial Temperature Medium (Tvir~Tion), and Cooling Medium (Massive Galaxies).

Constraints from O VI Cosmic Column Density Distribution:
The Size of the Gasoeus Halo is around Twice the Virial Radius.
There is a Rredicted Redshift Dependence of the CDD.
The Shape of CDD Constrains the Feedback Strength.

Reference

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