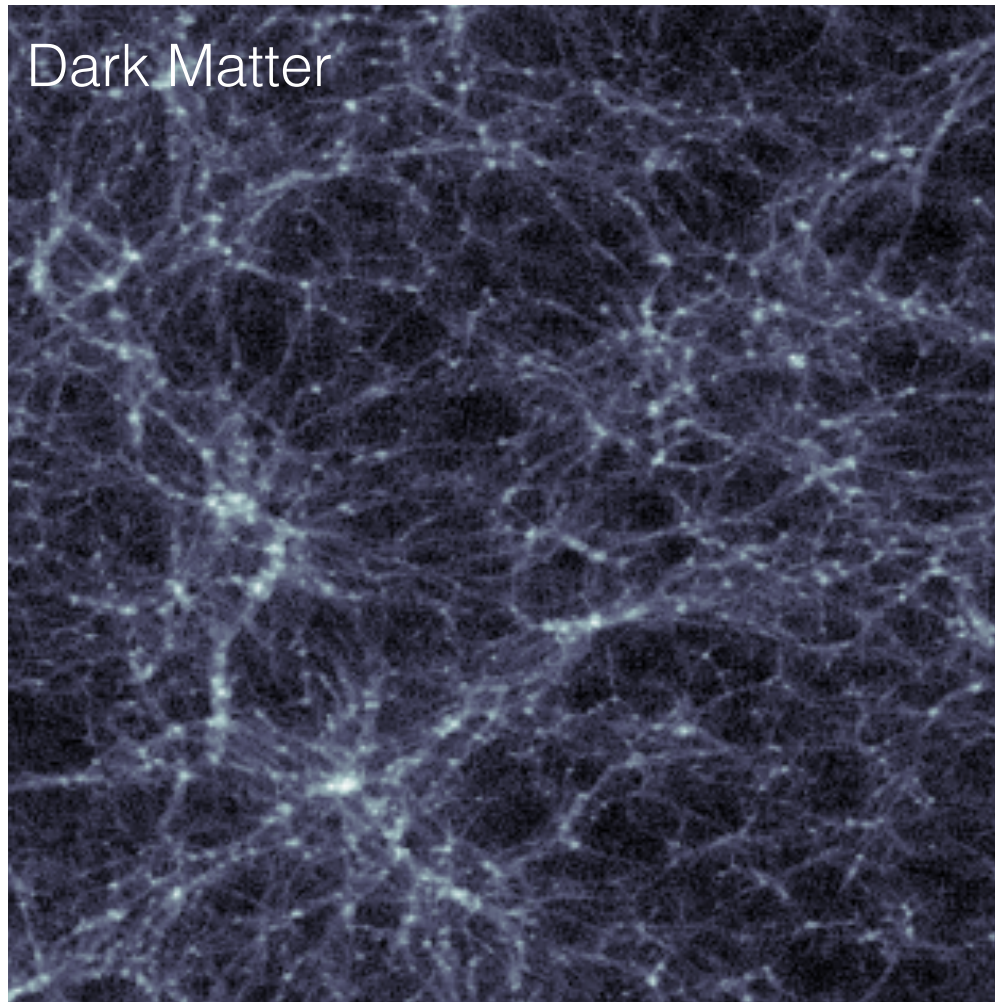
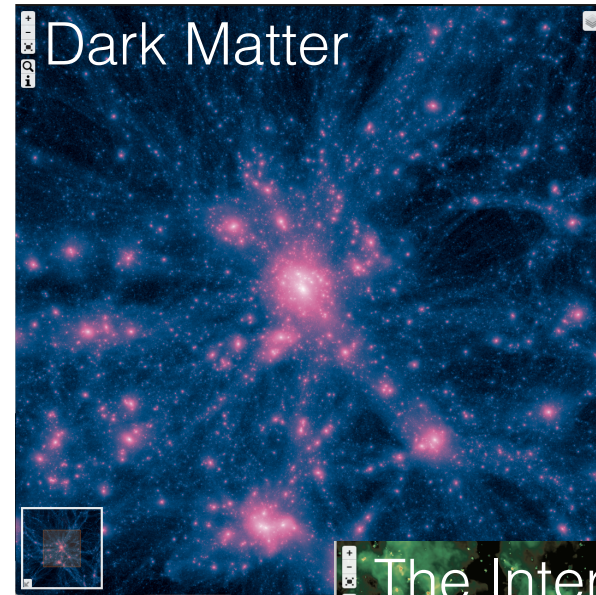


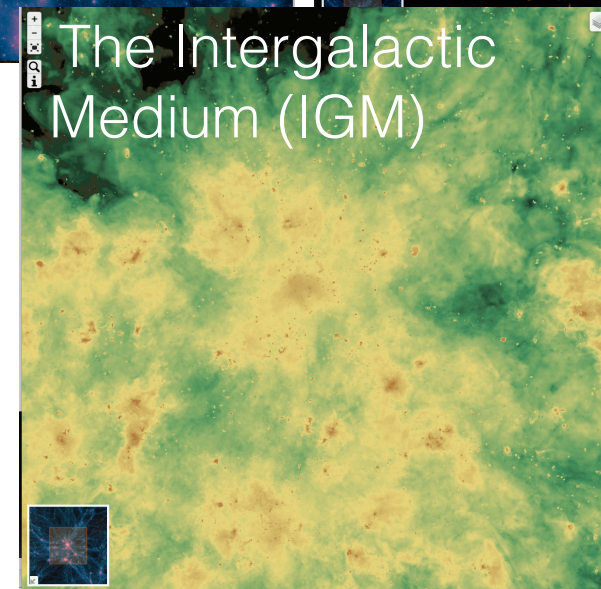
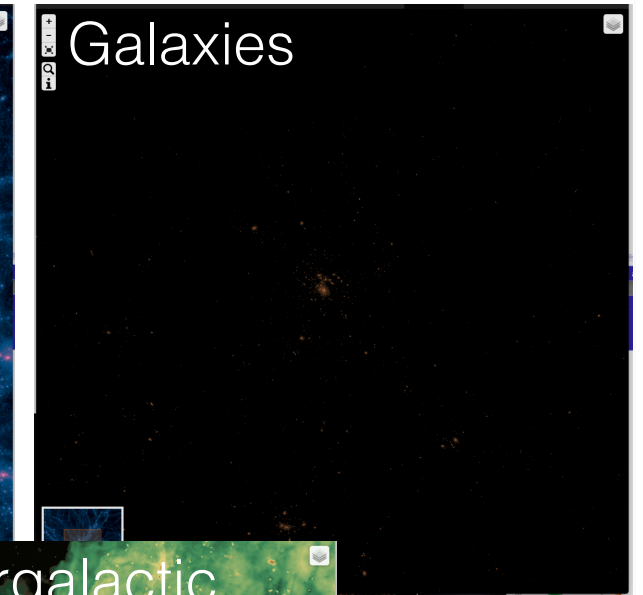


100 Mpc

Illustris



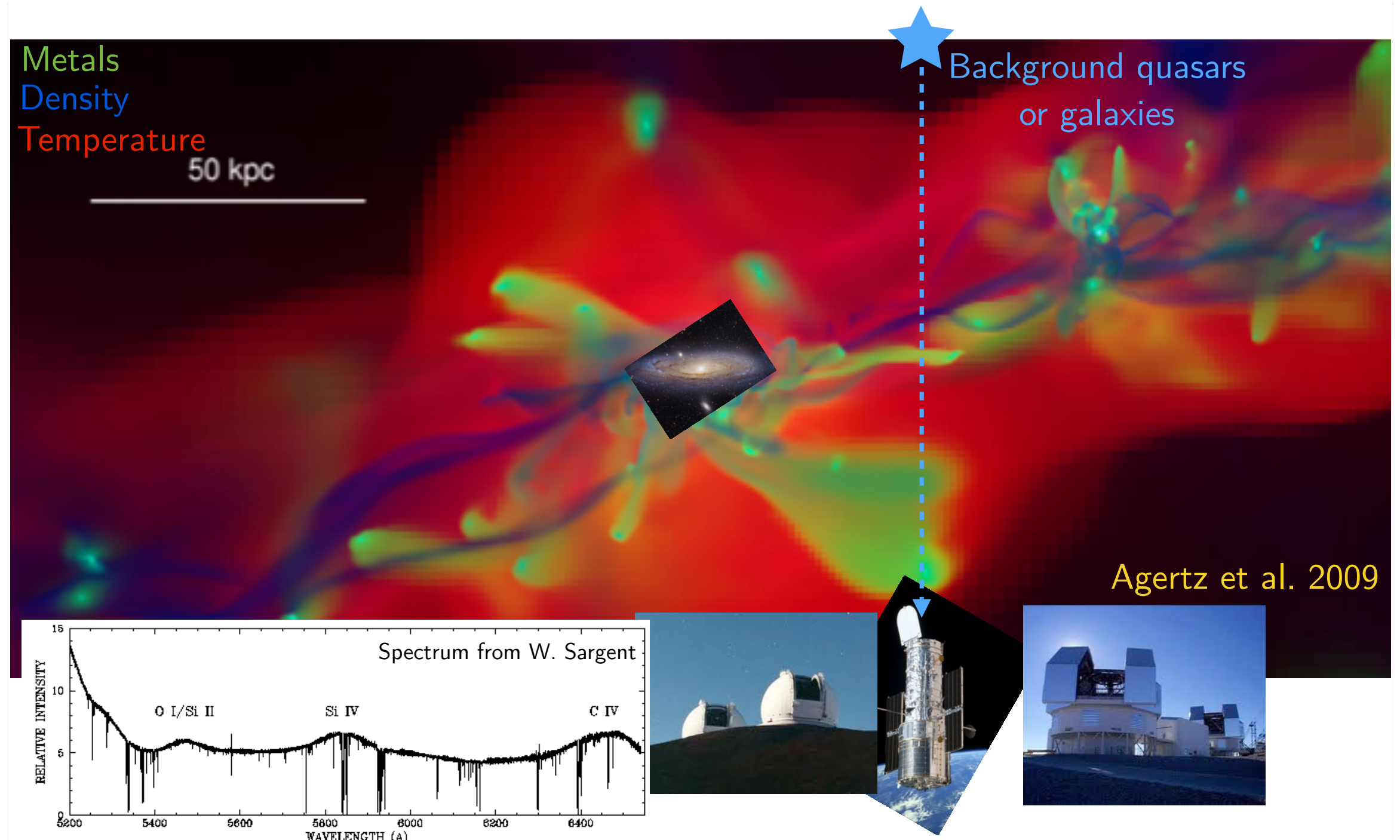
Vogelsberger et al. 2014



The intergalactic medium - galaxy connection: environment and AGN

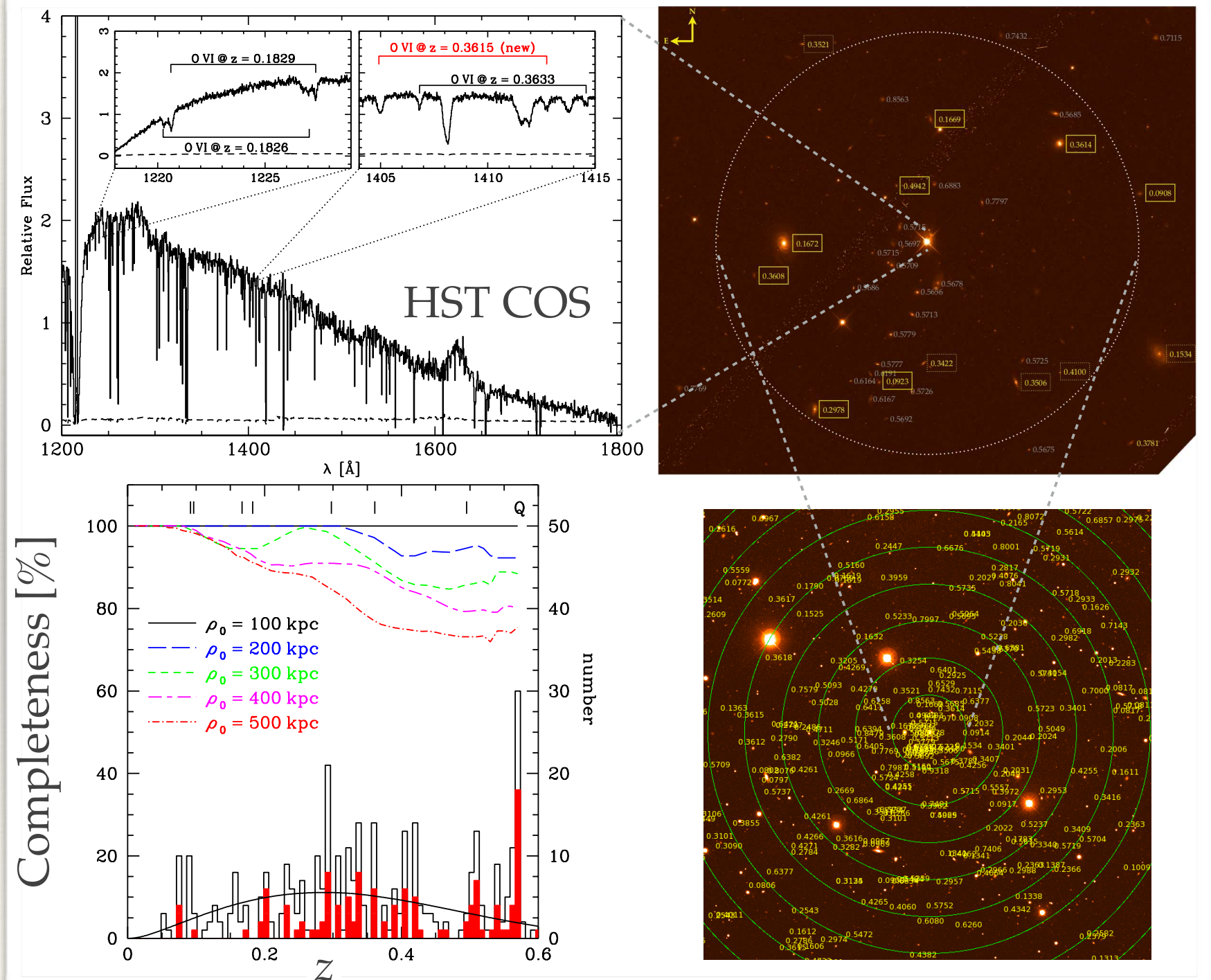
Sean D. Johnson
NSF Graduate Research Fellow
The University of Chicago
Advisors: Hsiao-Wen Chen
(and John Mulchaey)

Observing the physical processes that govern galaxy evolution

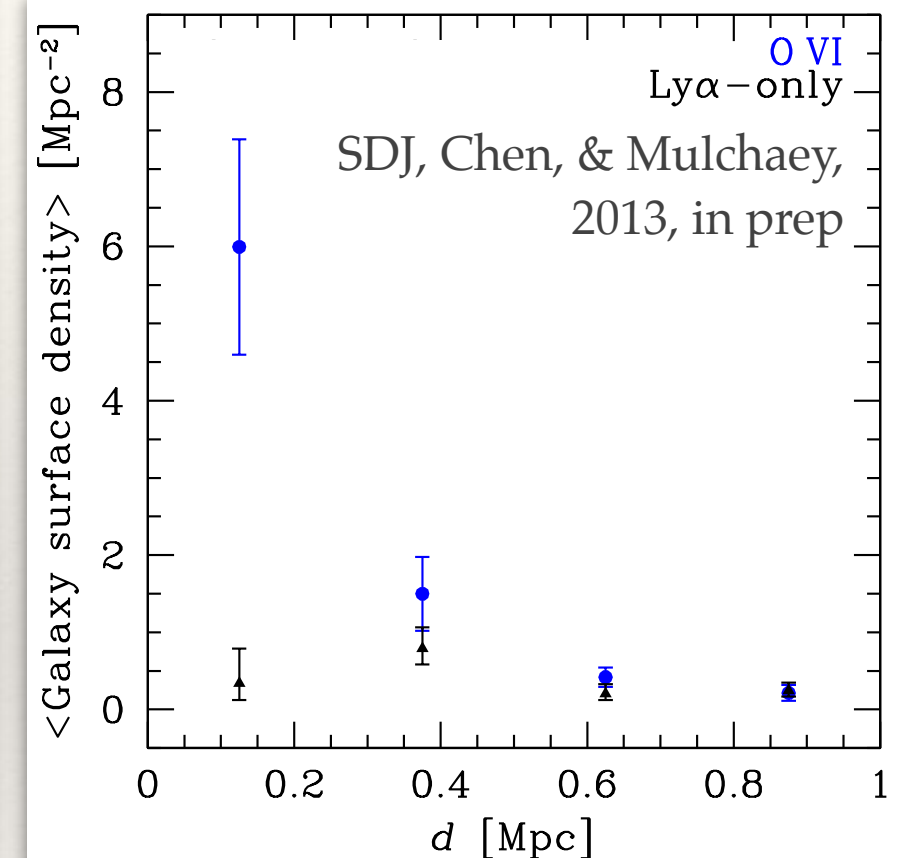
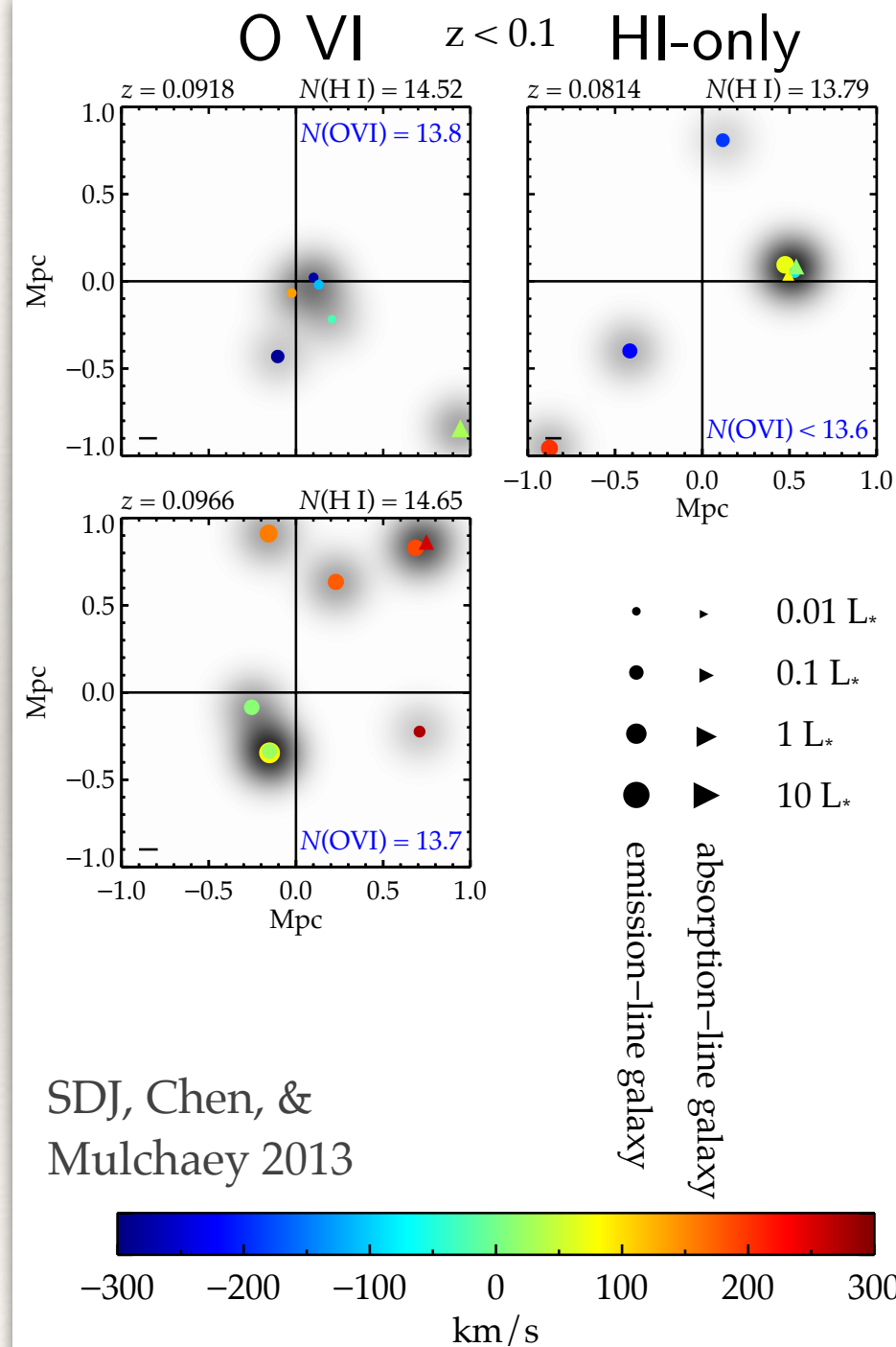
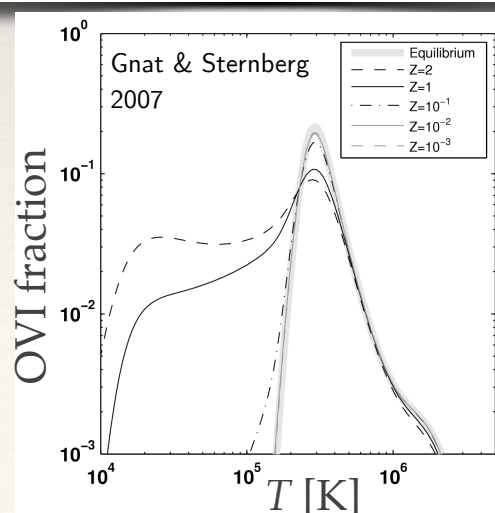
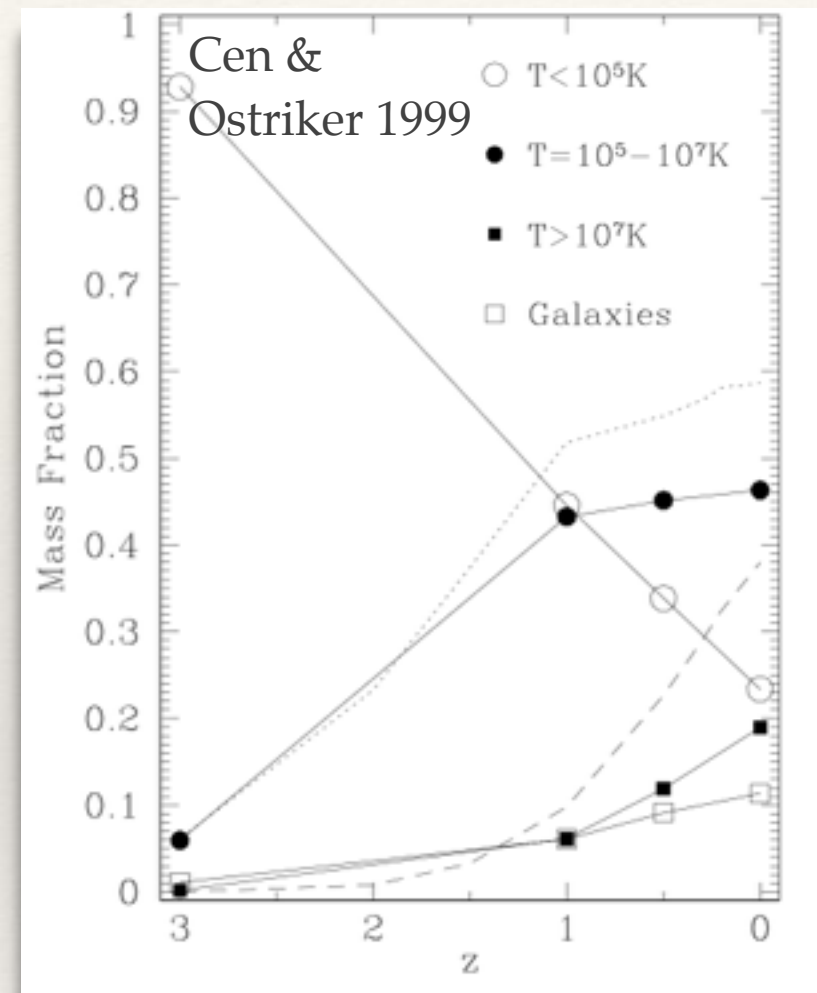


Surveys of the IGM-Galaxy Connection

- ❖ Absorption-blind galaxy surveys near COS sightlines
- ❖ $r < 23$ & $< 10'$ from sightline
- ❖ 500–1000 galaxies / field
- ❖ **$> 80\%$ completeness for $0.1L_*$ galaxies at < 500 kpc**
- ❖ 2 fields published
- ❖ 5 more on the way
- ❖ Full catalogs and gas-galaxy clustering coming in the next year!

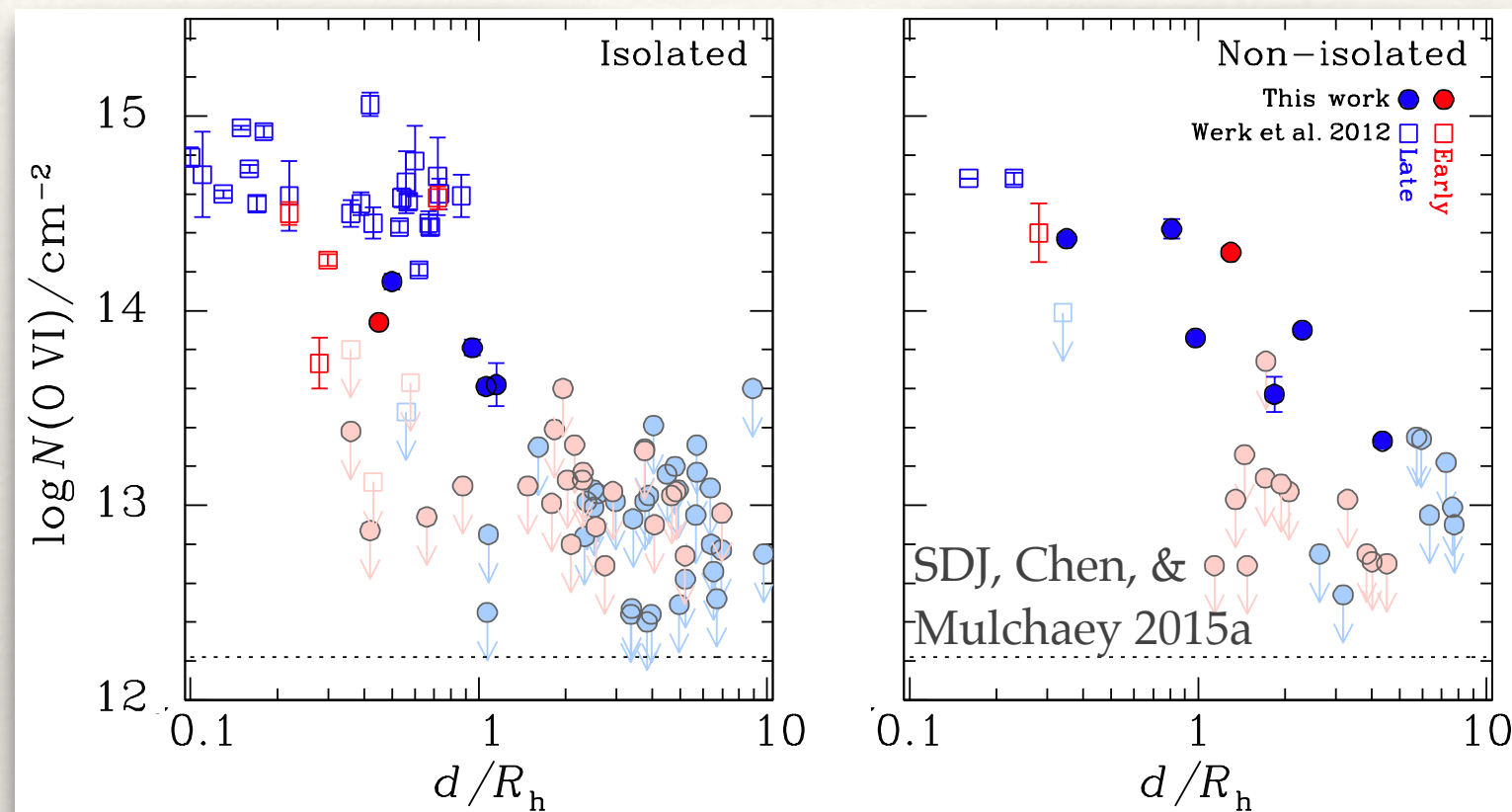
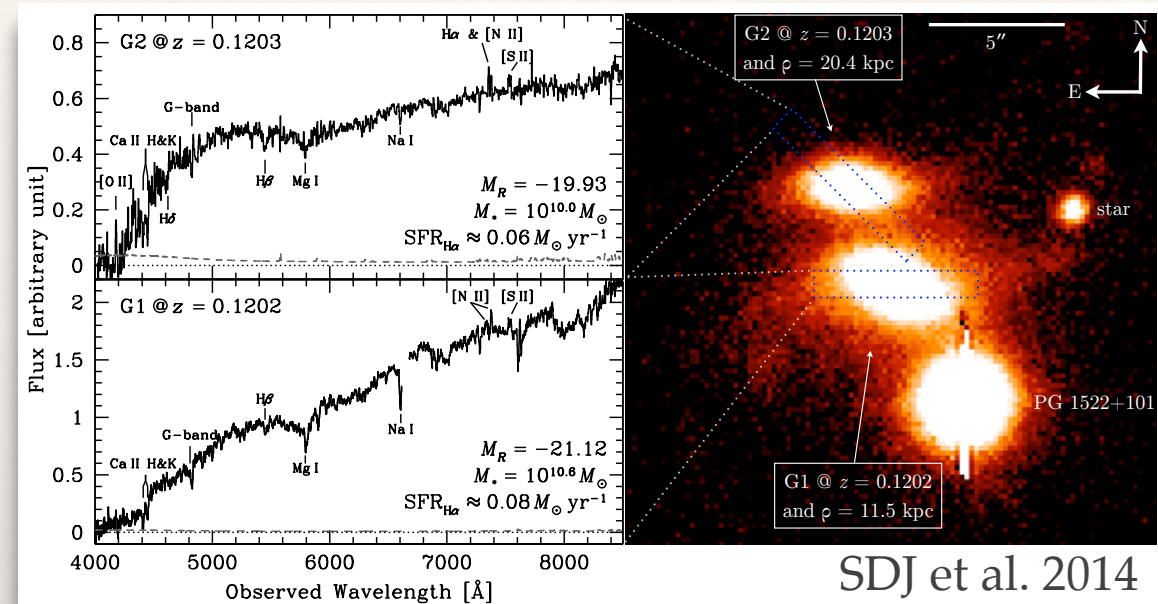


OVI & the Warm-Hot Intergalactic Medium?

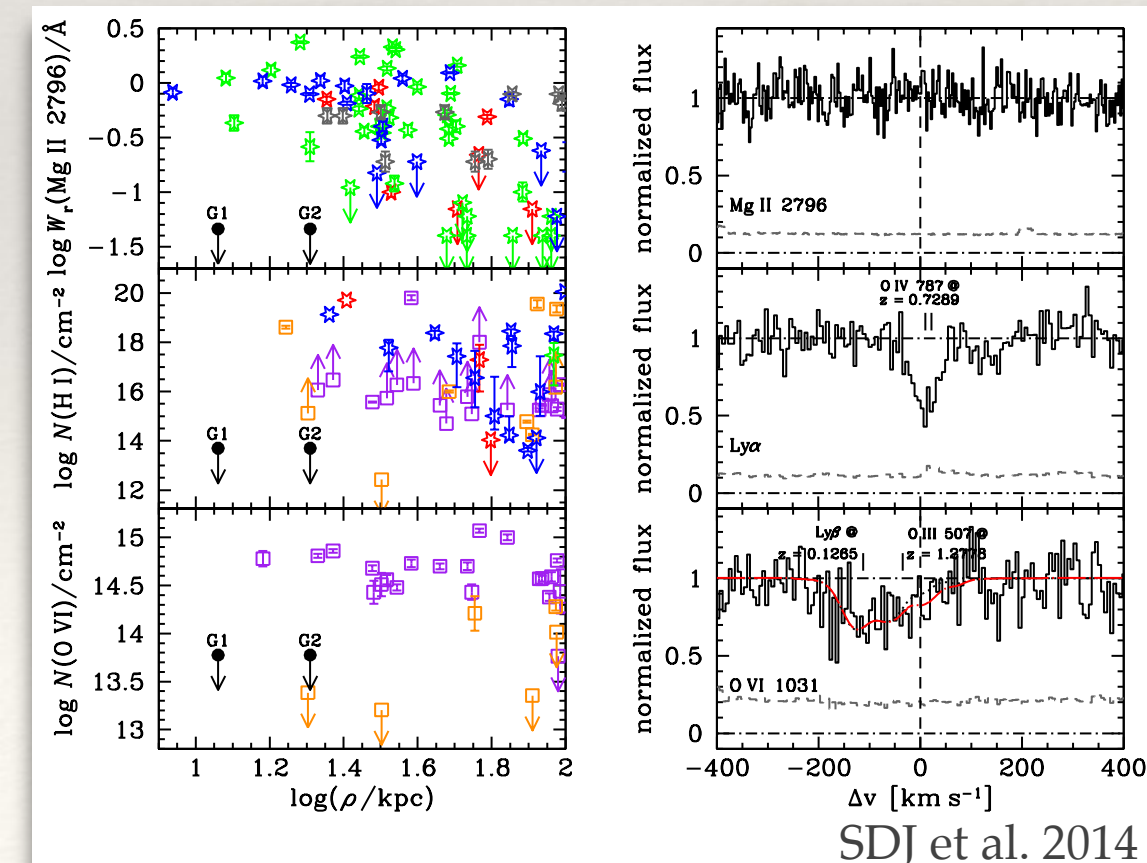


OVI absorptions is not a good tracer of the WHIM. IGM metallicity too low for detection? But galaxy environment looks to be playing a role!

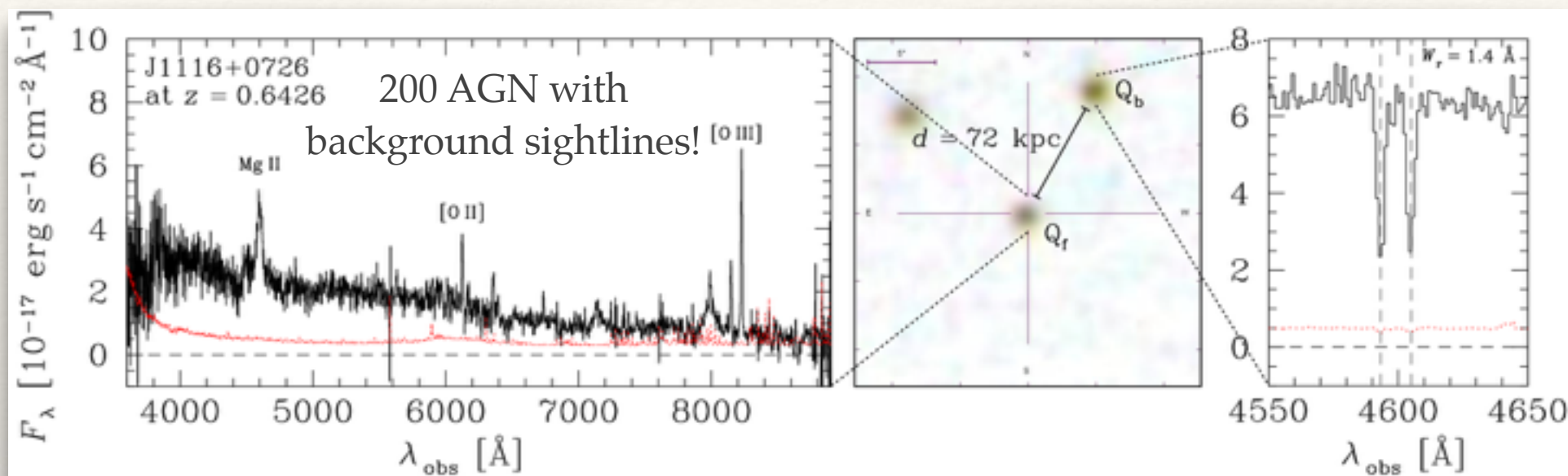
The IGM and Galaxy Environment



Galaxy interactions may strip heavy element enriched halo gas within the galaxy virial radius to larger distances. In the strong interactions, stripping or heating can be extreme.

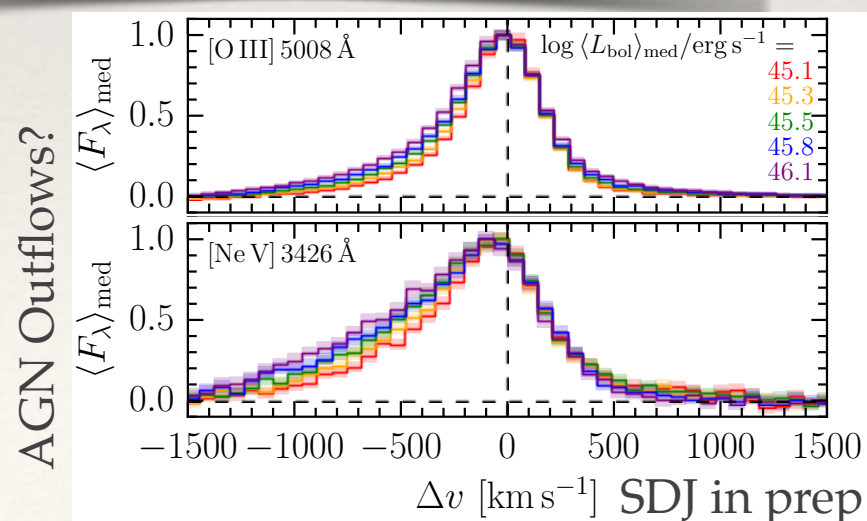
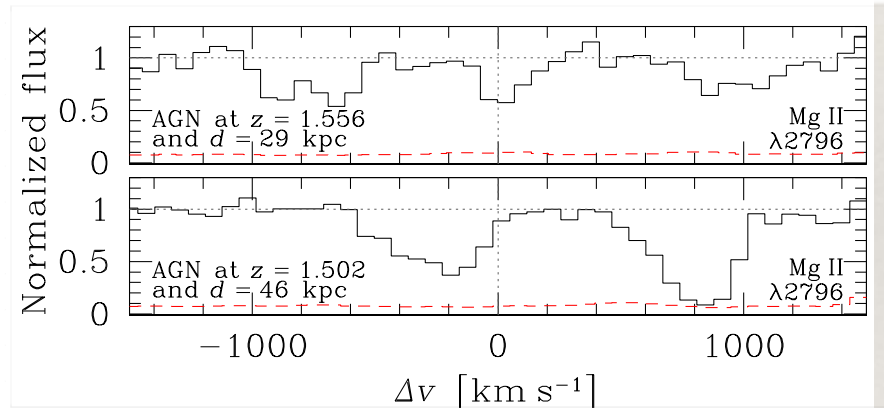
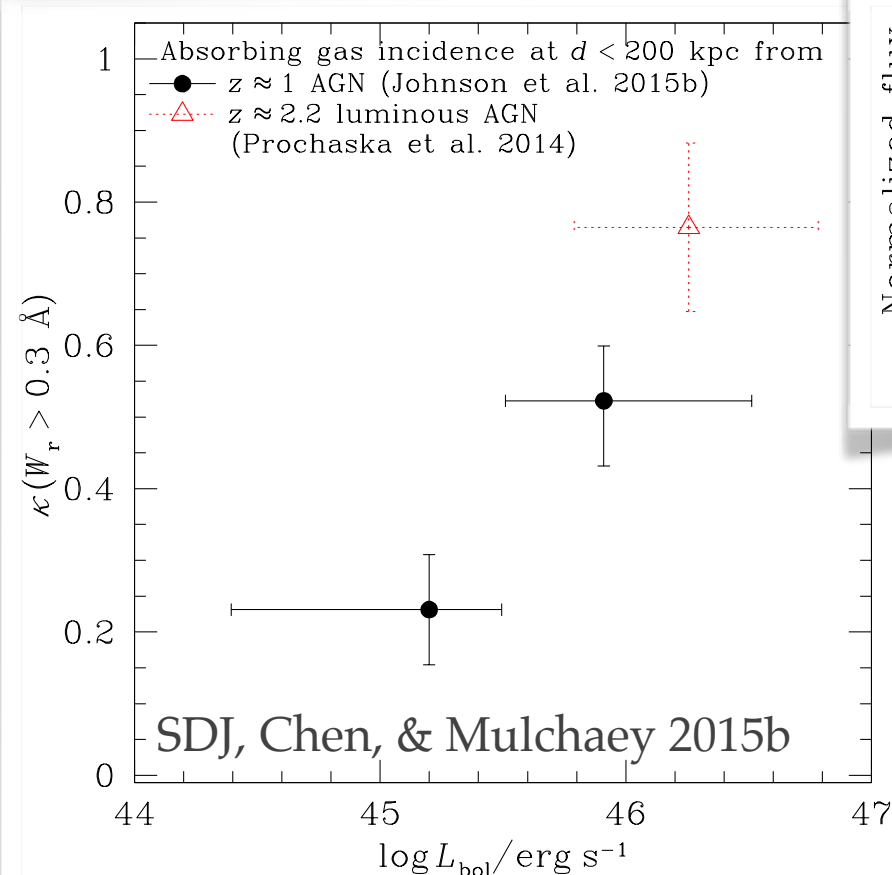


The IGM and AGN

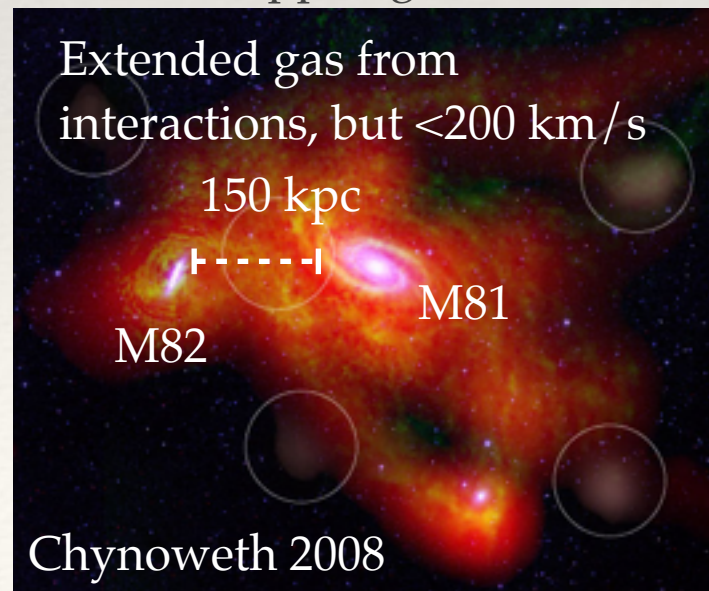


AGN halos have enhanced cool gas compared to inactive galaxies. ~40% of the gas is not bound. Bad proxy for massive galaxy CGM!

Tidal remnants from mergers thought to trigger luminous AGN or AGN driven outflows on ~200 kpc scales?



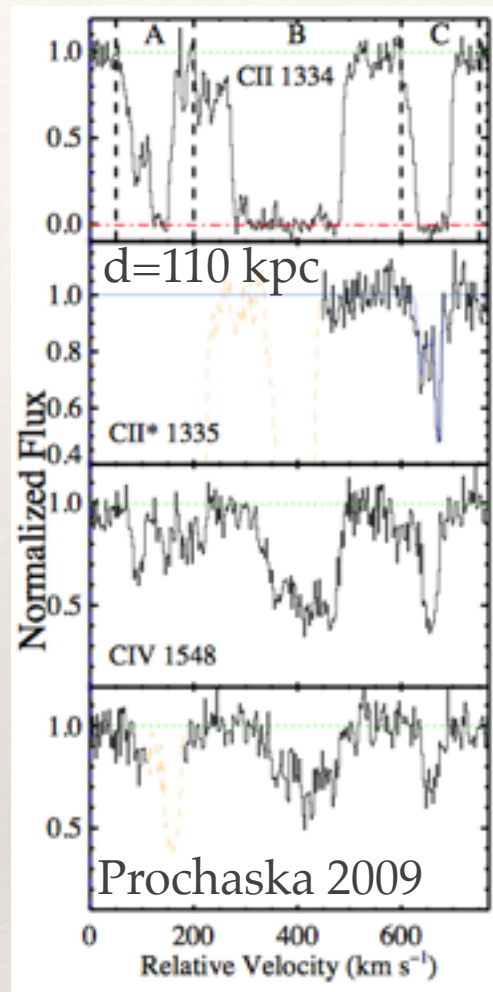
Stripped gas?



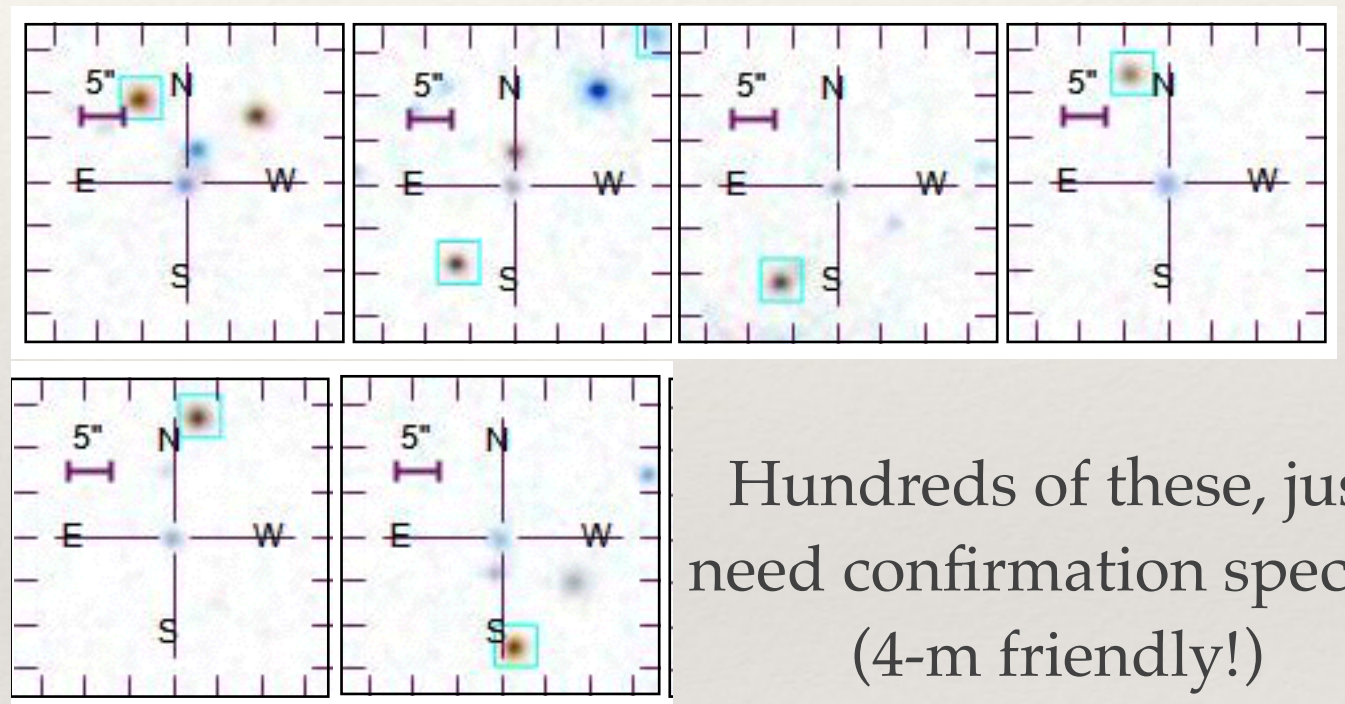
The IGM and AGN: more to come!

Follow-up observations to constrain quantity, ionization state, and origins of the gas using high resolution absorption spectroscopy.

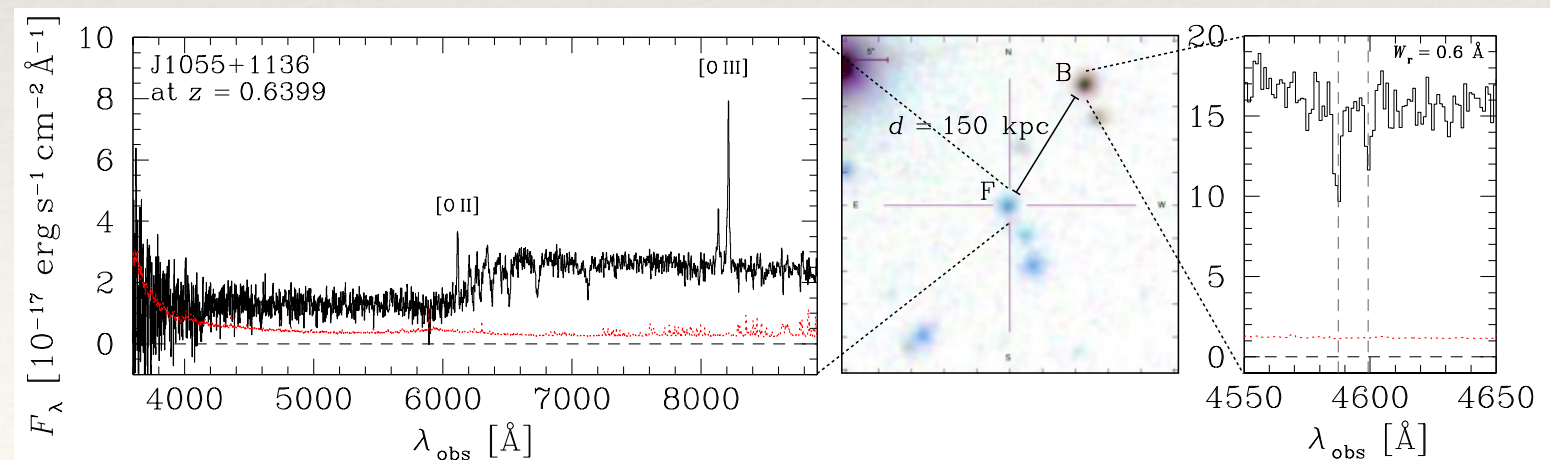
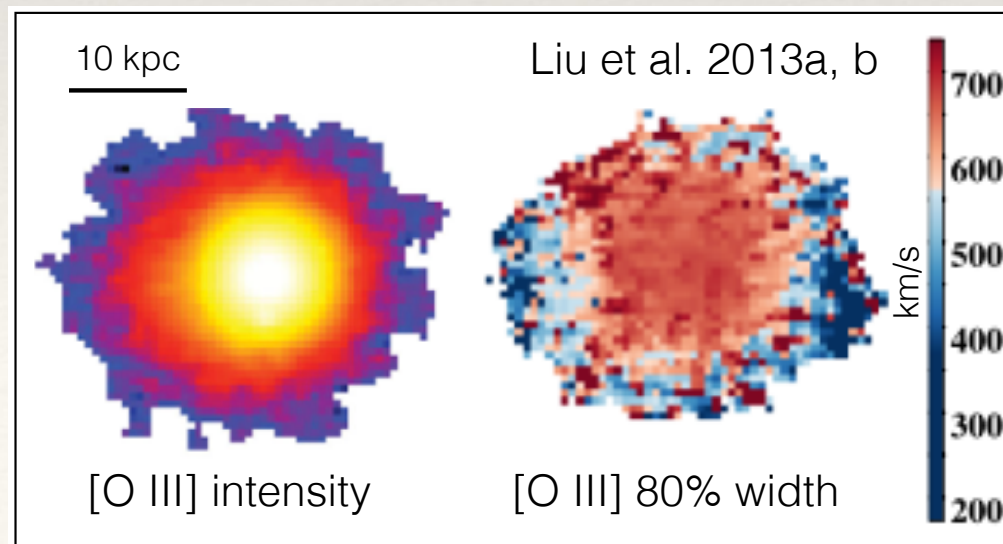
Connections with extended outflows observed in emission?



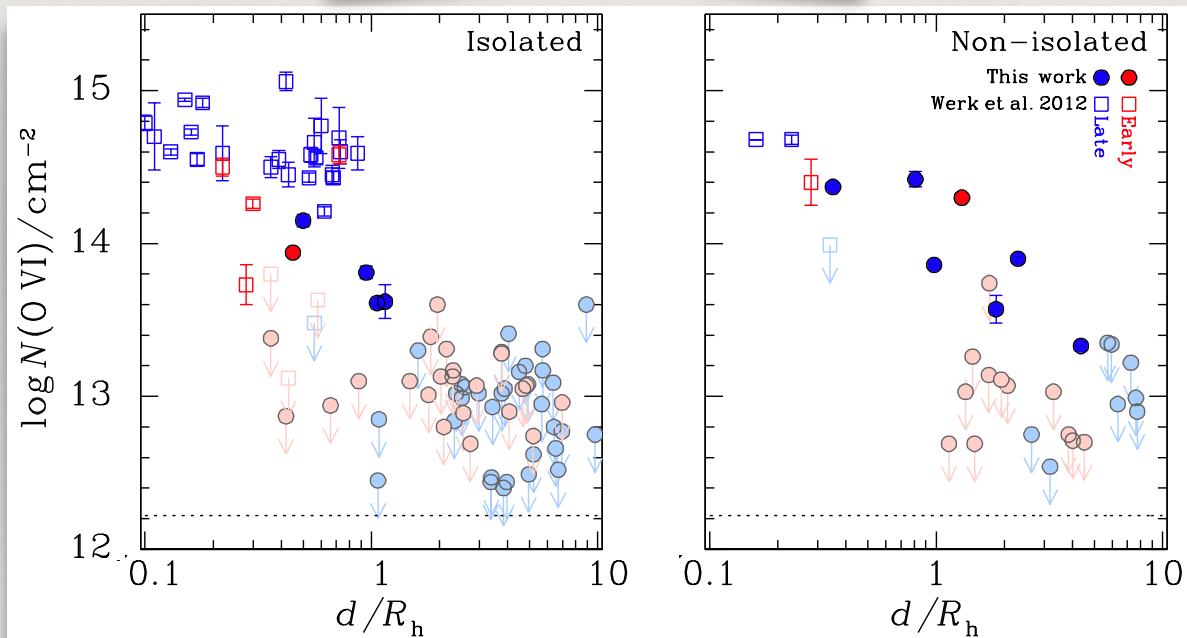
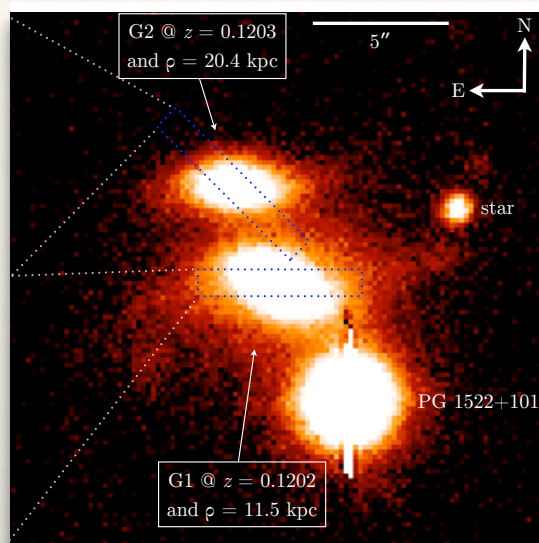
WISE selected obscured AGN with background sightlines to build a representative AGN sample.



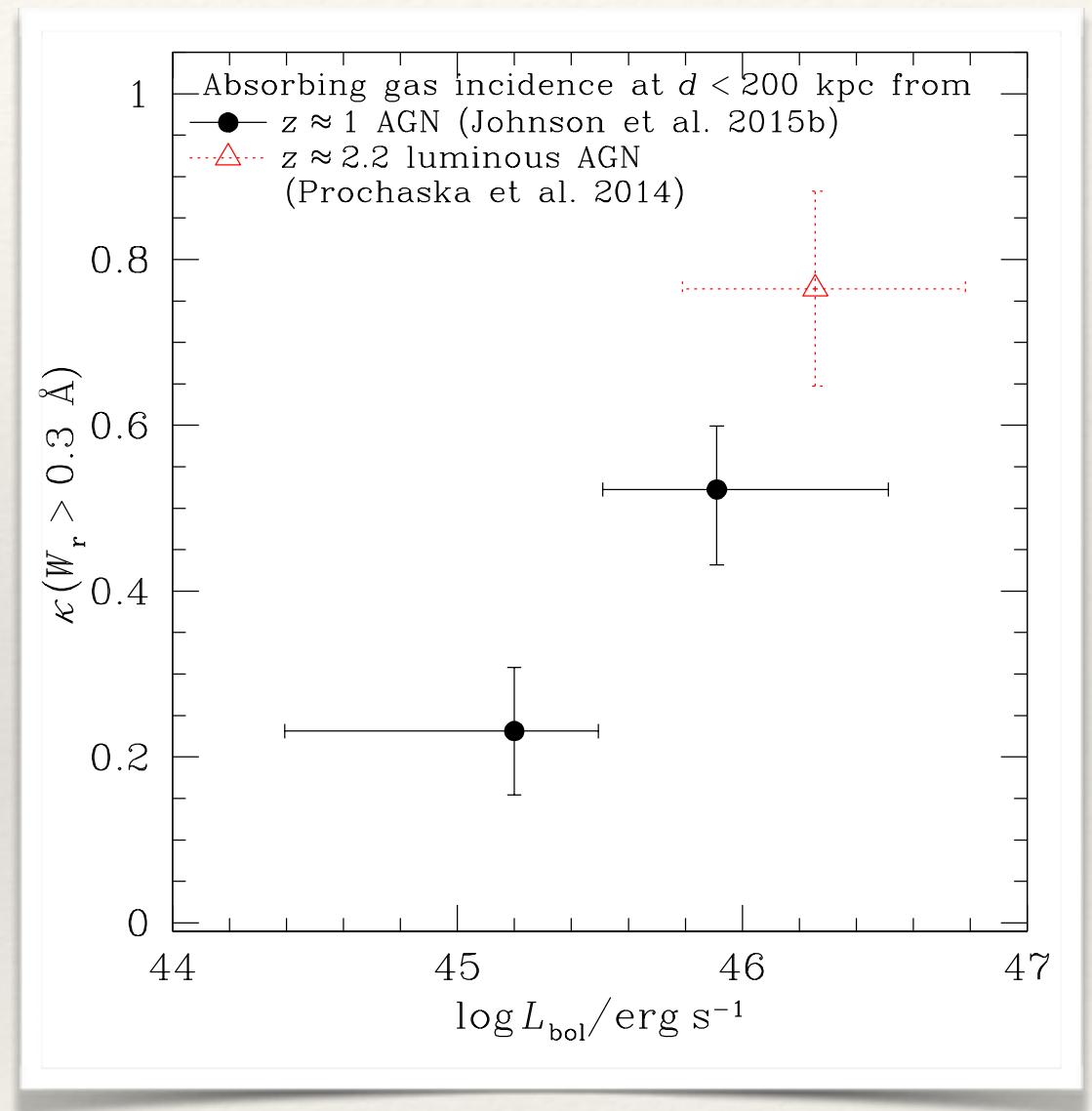
Hundreds of these, just need confirmation spectra (4-m friendly!)



Money plots

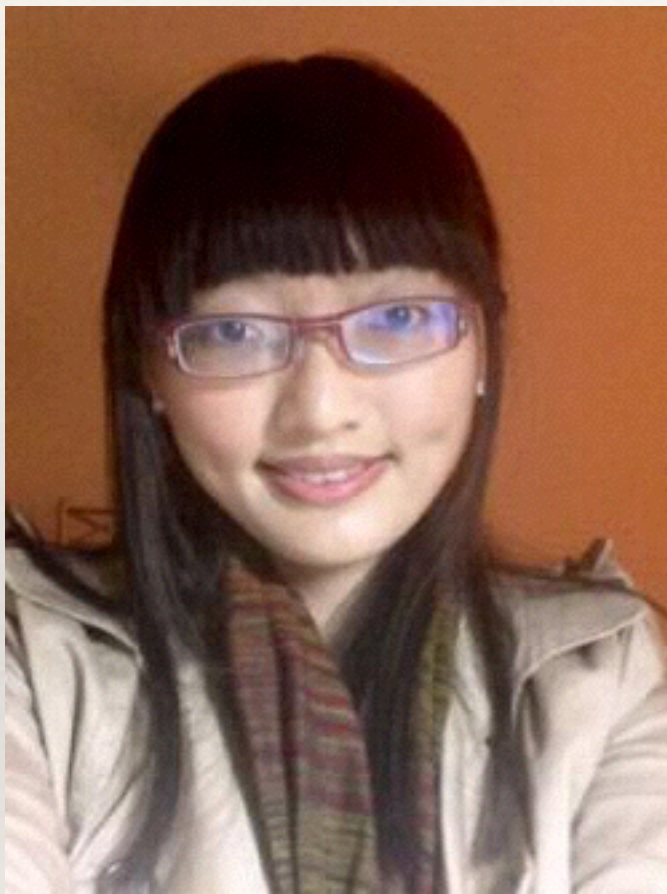


The IGM &
Environment

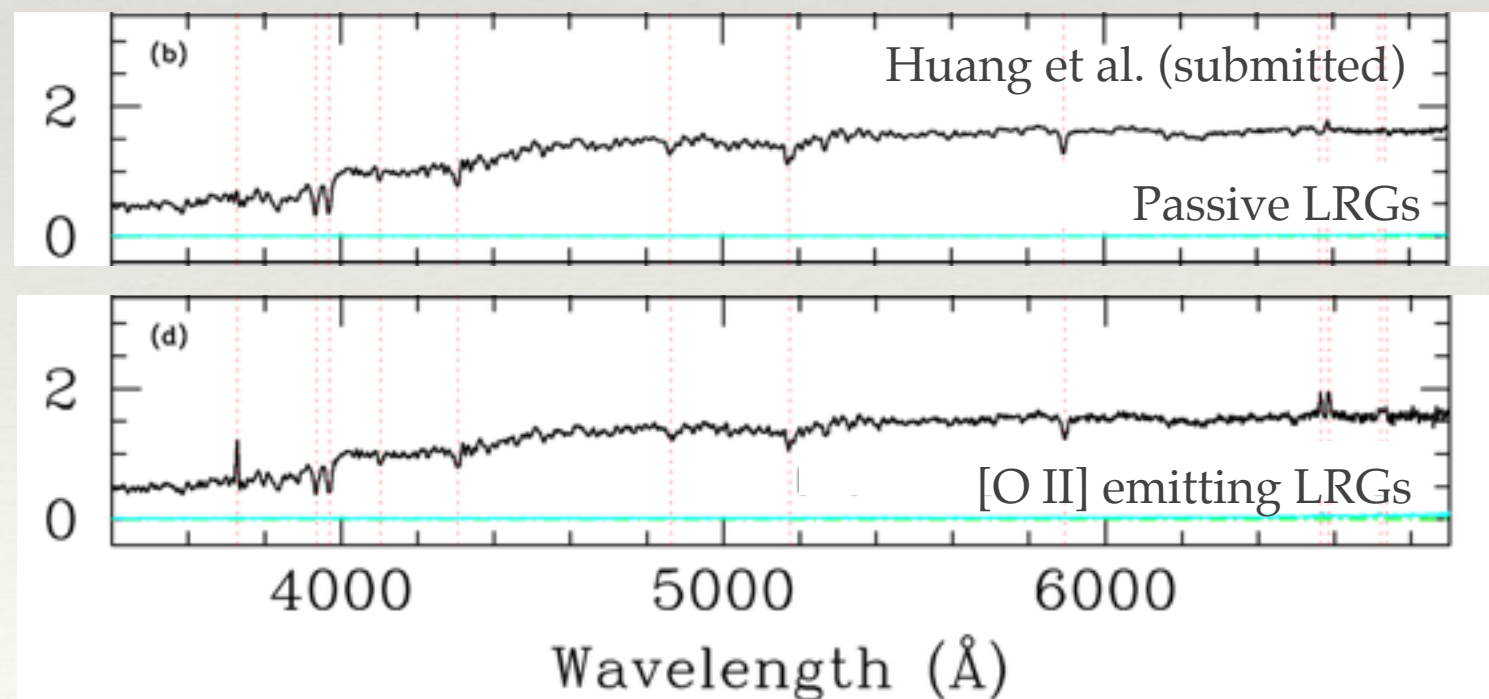
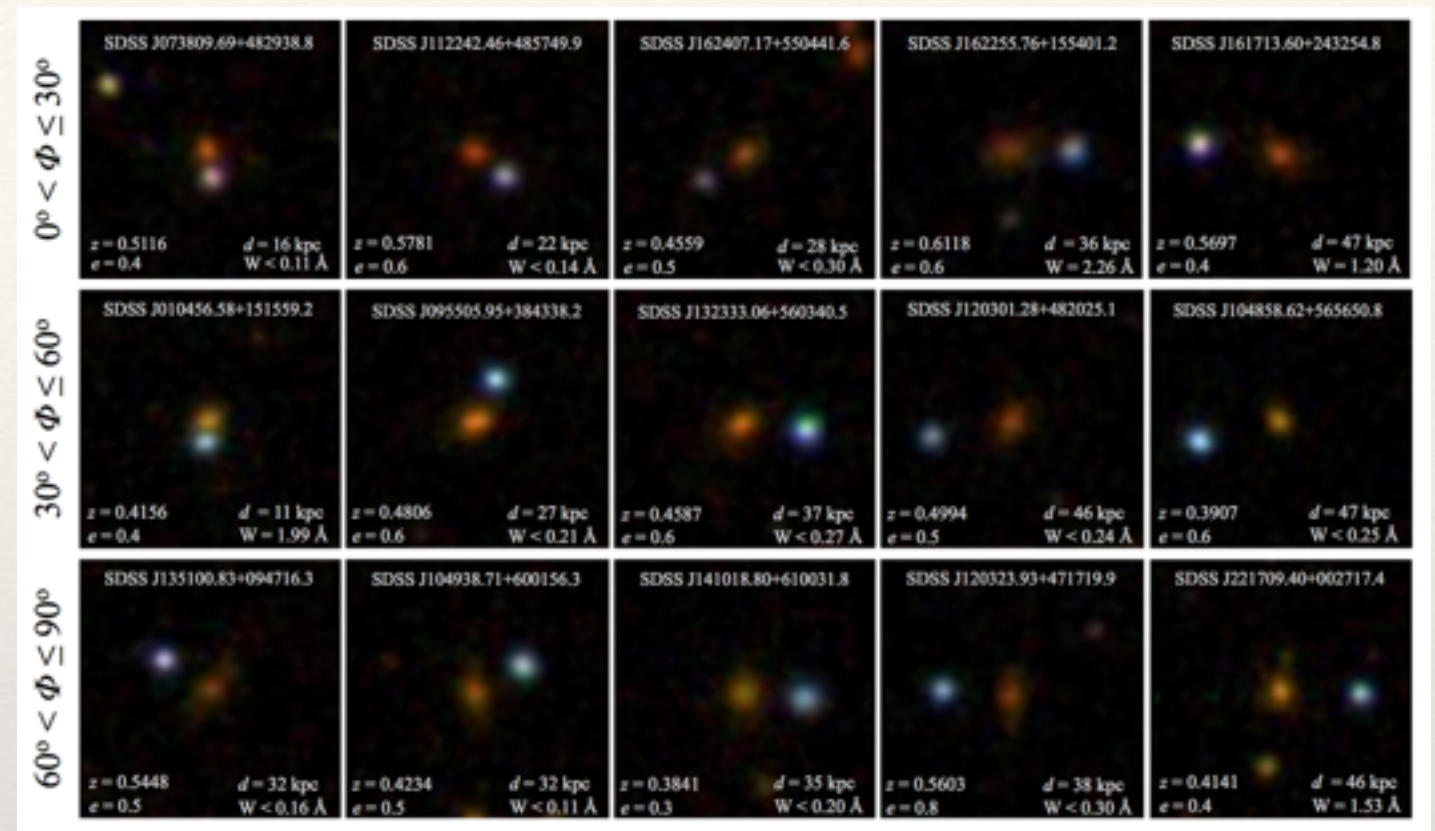


The IGM & AGN

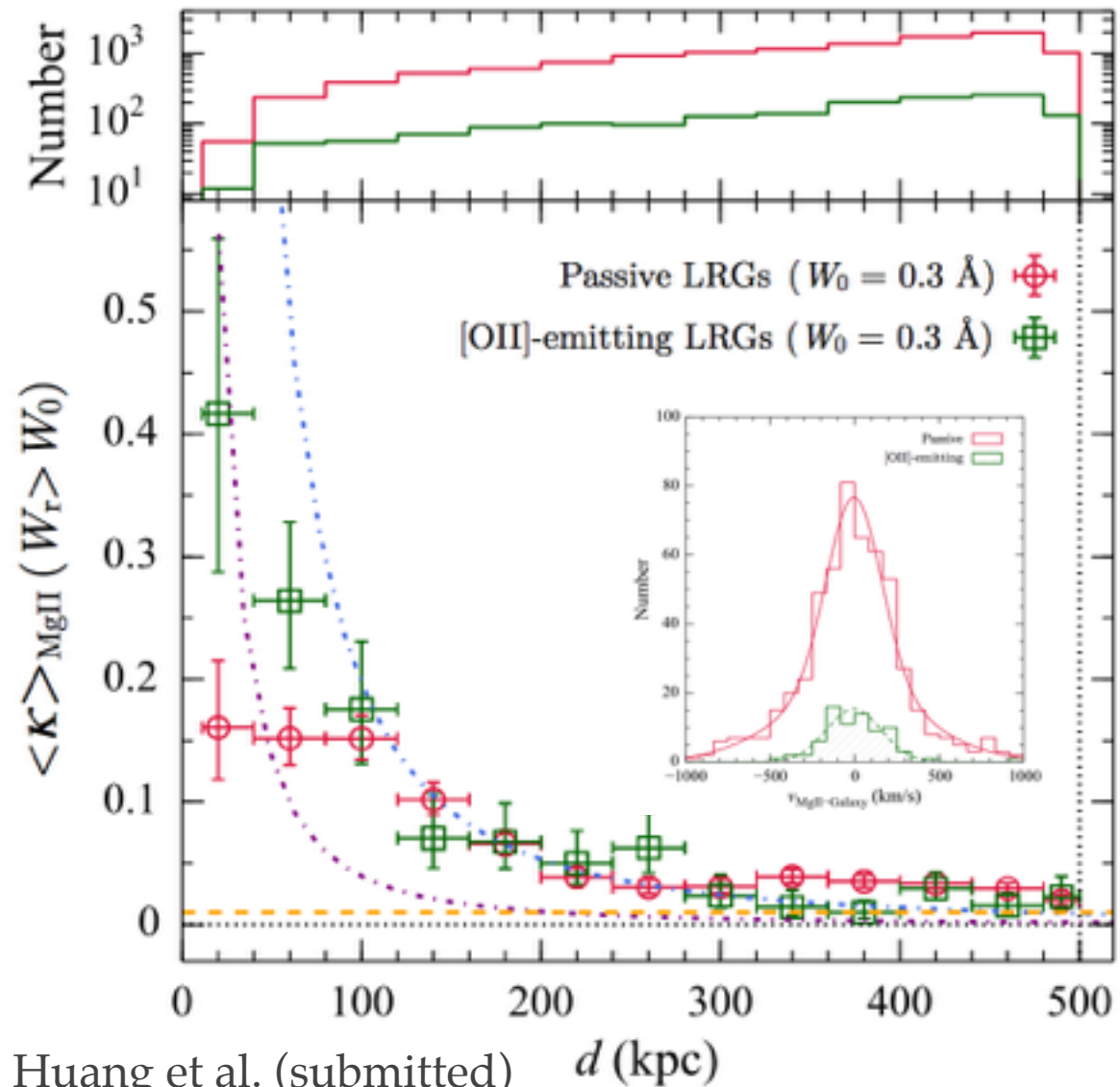
Bonus slides: Cool halo gas in 38000 Luminous Red Galaxies



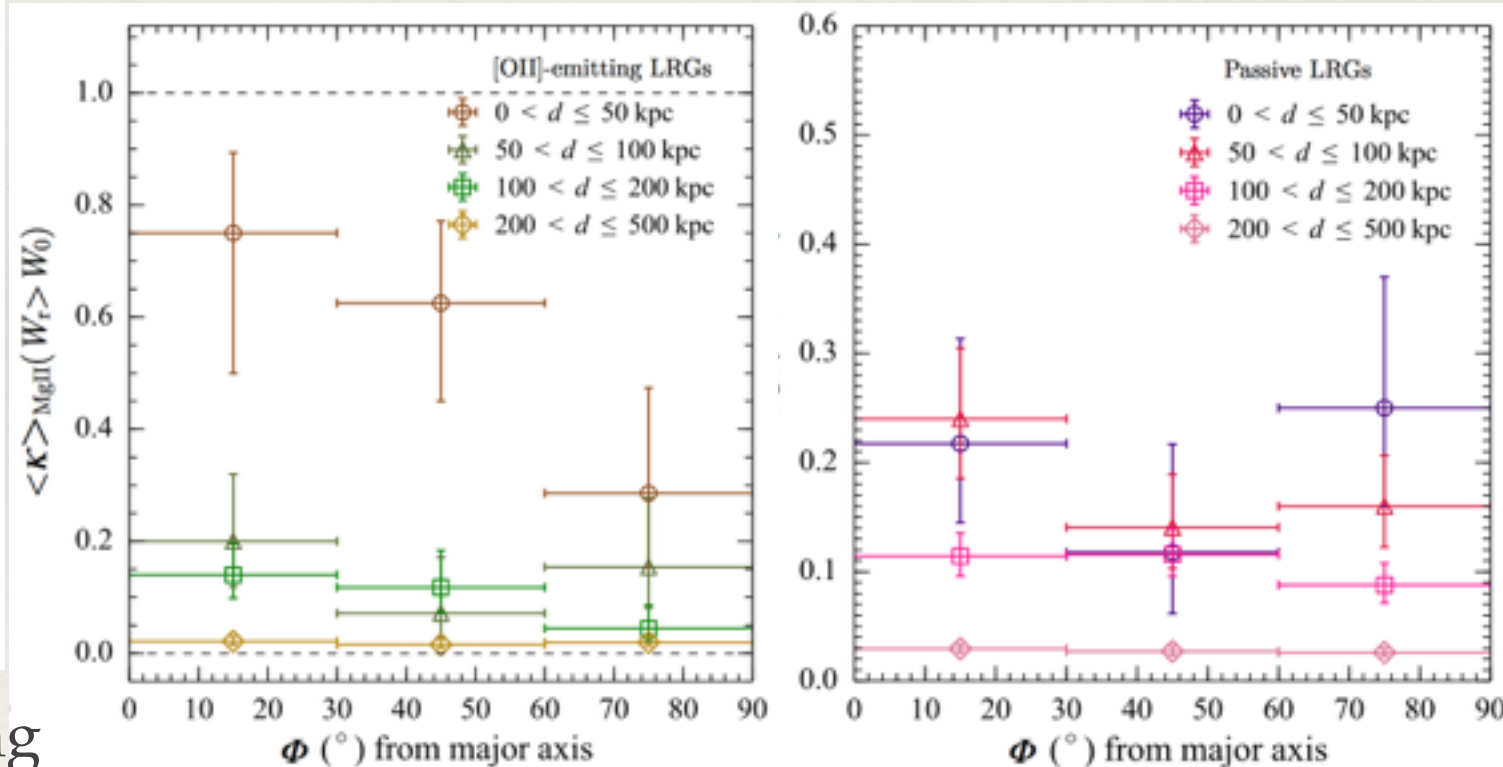
Yun-Hsin Huang
(now at Arizona)



Bonus slides: Cool halo gas in 38000 Luminous Red Galaxies



Excess absorption along major axis from [O II] emitting LRGs but not passive ones.



At small projected distances, [O II] emitting LRGs exhibit enhanced cool gas absorption.

The velocity dispersion of the gas is suppressed to $\sim 40\%$ to of the virial velocity.

Best explained as mix of cool clouds formed in thermally unstable hot halo and gas from satellite accretion through filaments.