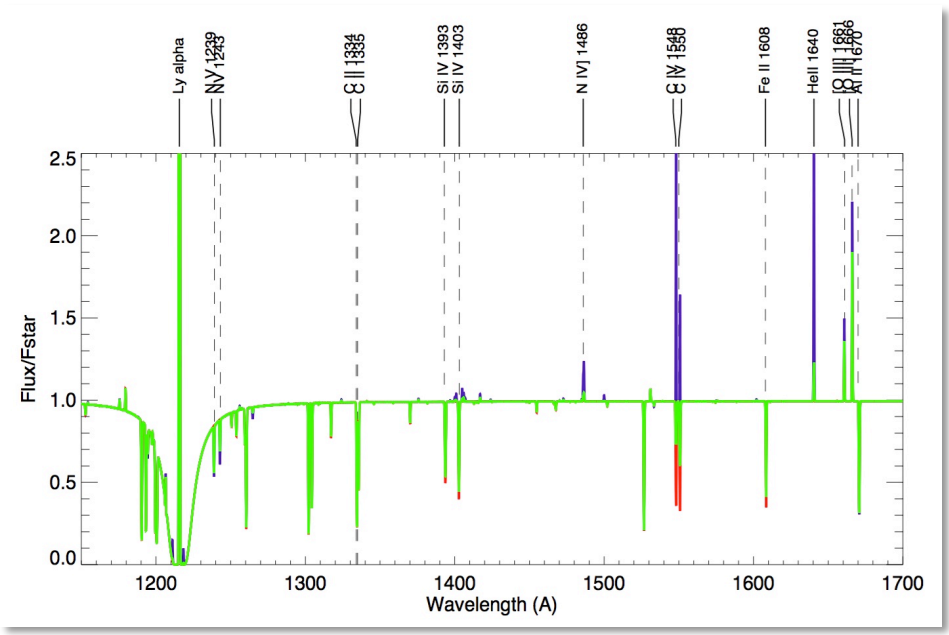
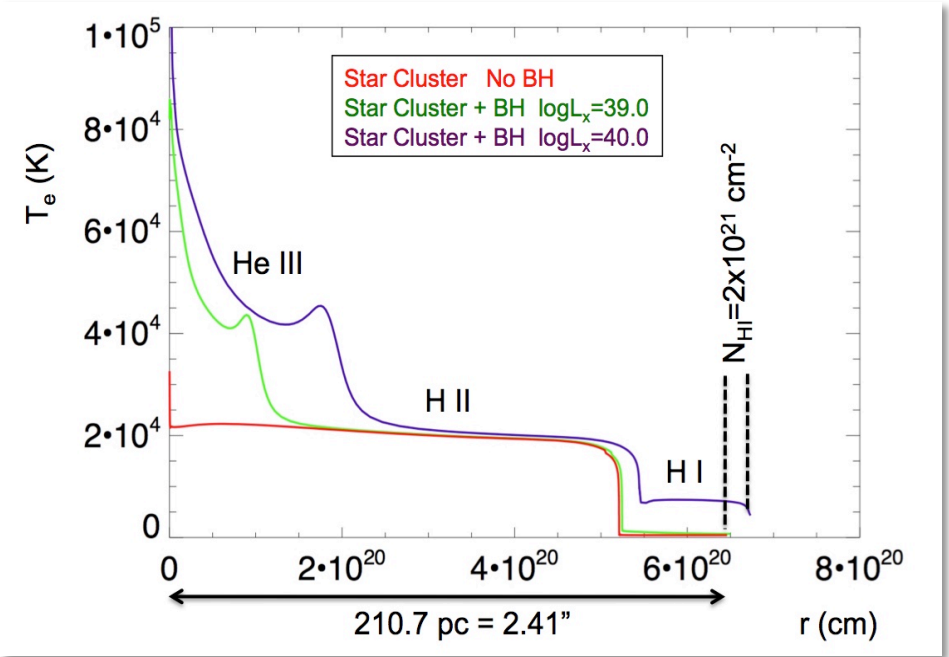
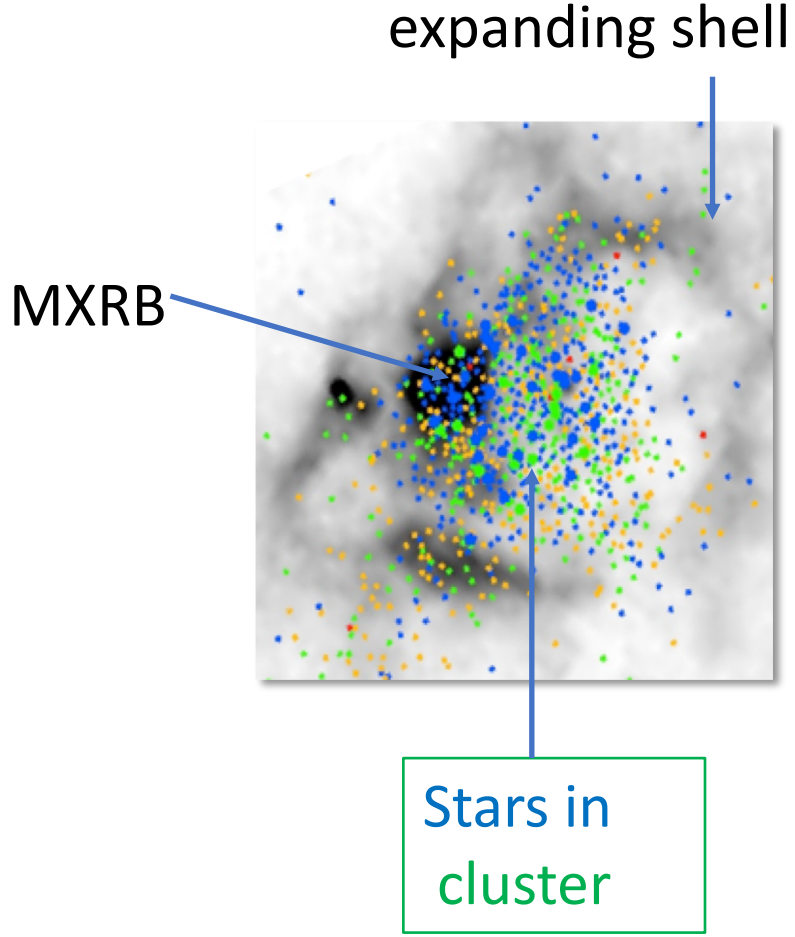


# An Ultra-Luminous X-ray Source (ULX) in I Zw 18-NW

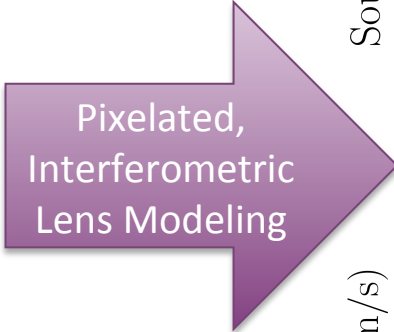
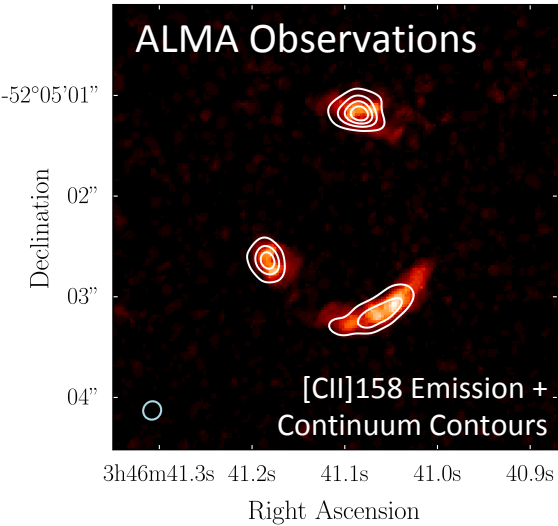
## Sally Heap



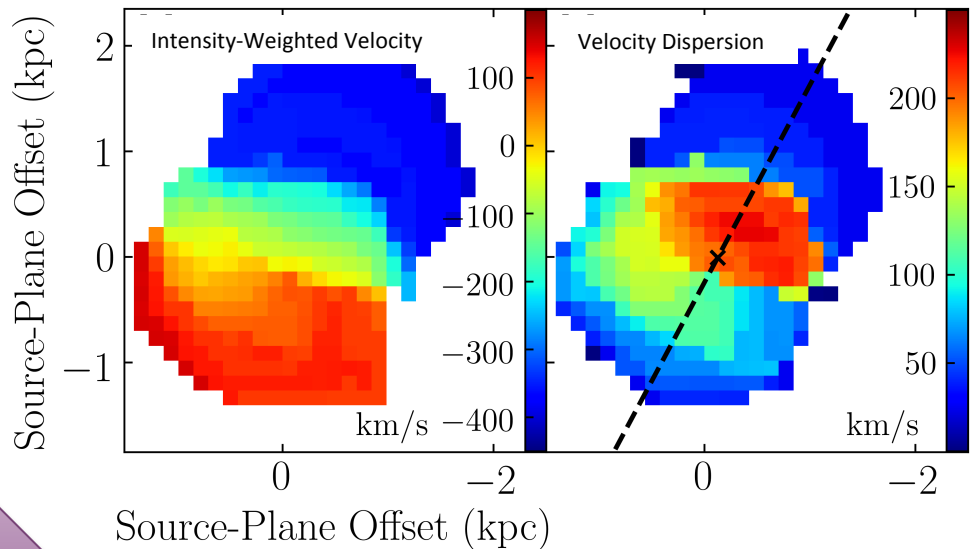
# SPT0346-52: a z=5.7 Hyper-Starburst Galaxy Merger

Katrina Litke, University of Arizona

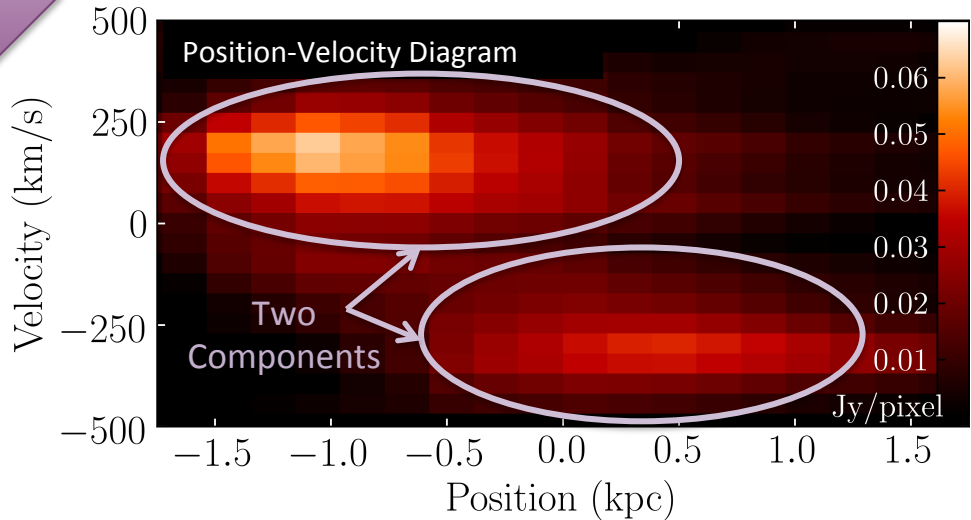
- $L_{\text{FIR}} \sim 2 \times 10^{13} L_{\odot}$  (intrinsic)
- $\Sigma_{\text{SFR}} \sim 4200 M_{\odot}/\text{yr}/\text{kpc}^2$
- No AGN
- Merger-driven star formation



“De-lensed” [CII]158 emission



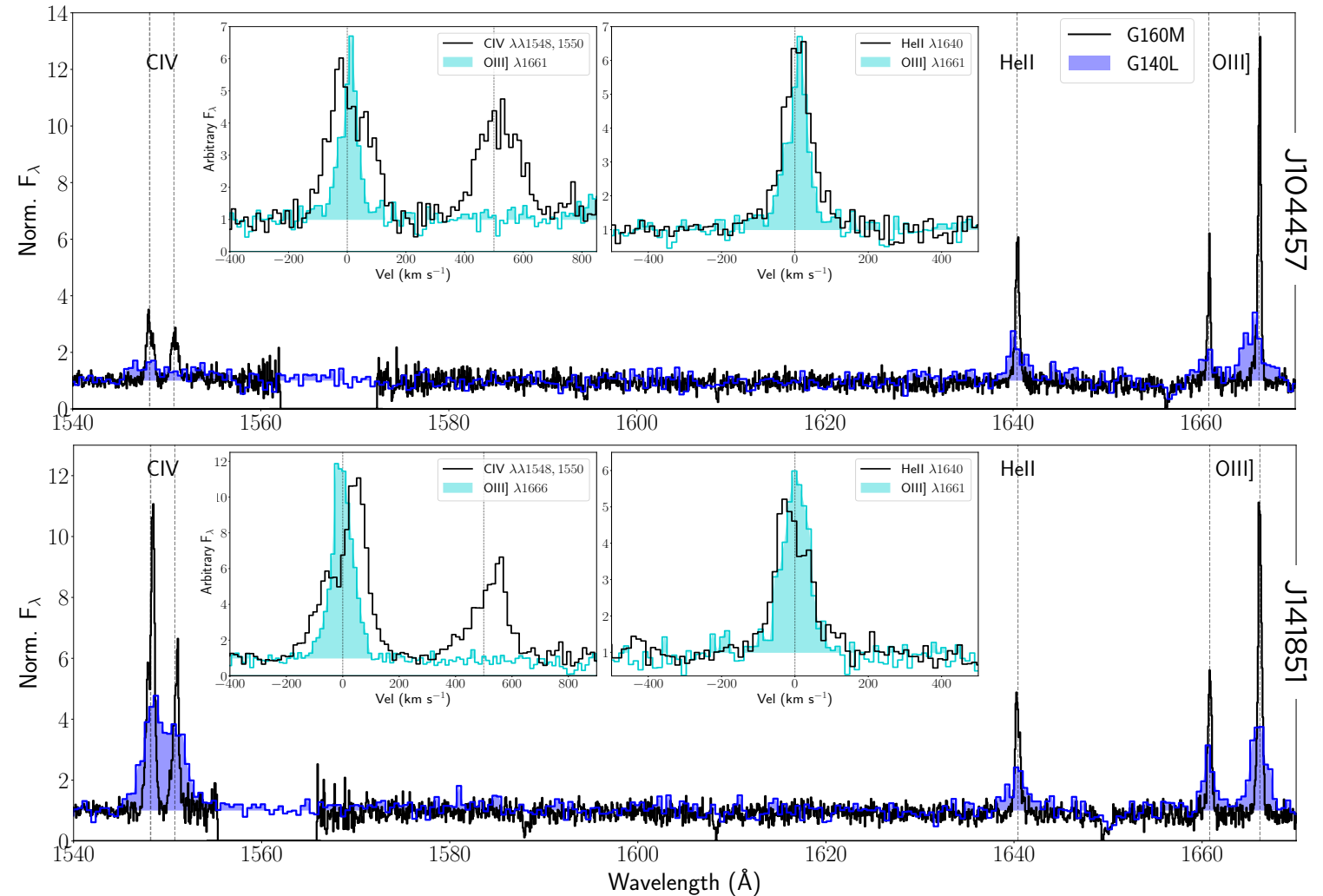
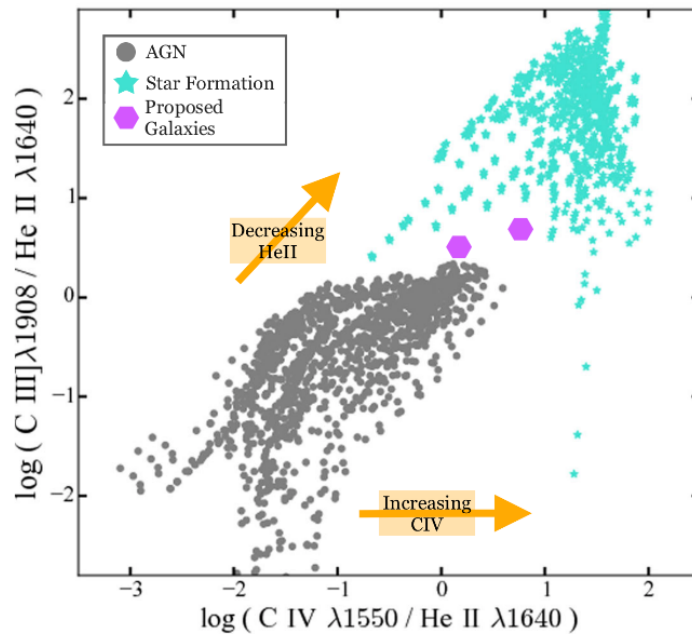
Next Steps:  
[NII]205, [NII]122,  
[OI]145, [OI]63



# Extreme UV Emission in Local Analogues of Reionization-Era Galaxies

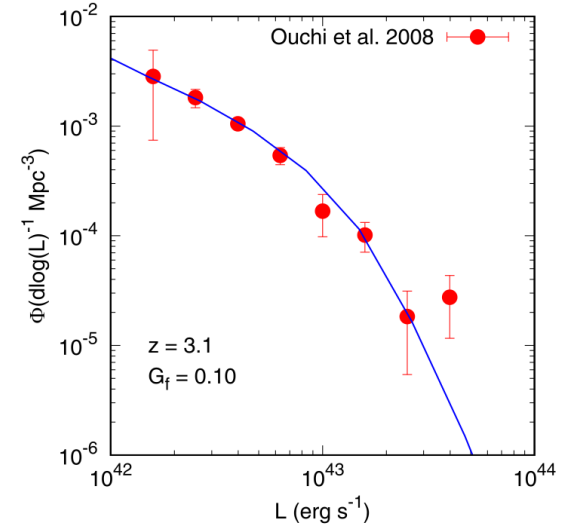
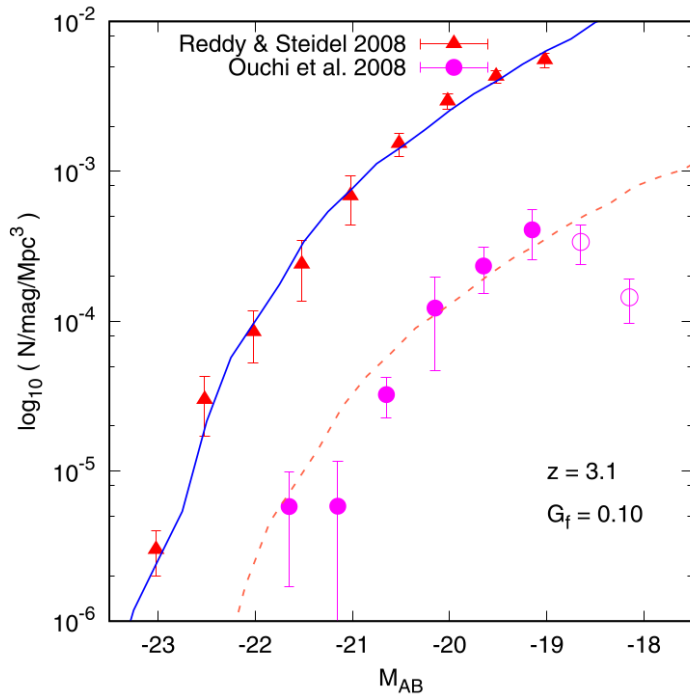
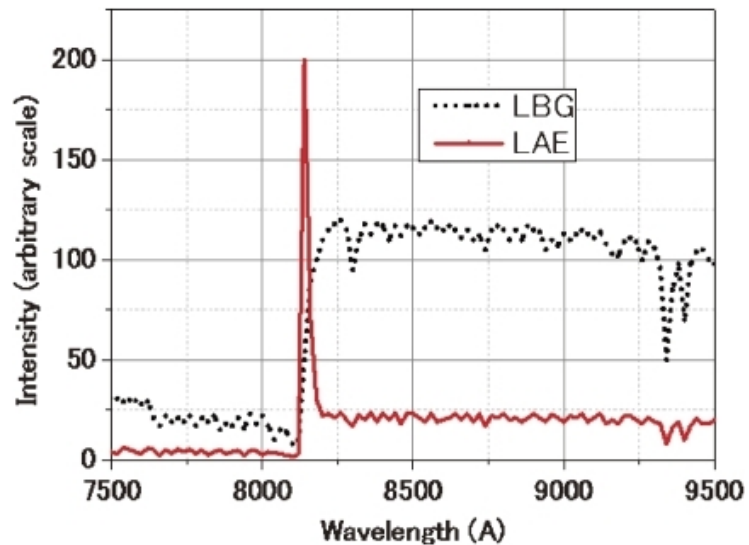
Grace M. Olivier

- Two  $z \sim 0.1$  galaxies
- Intense nebular He II emission
- Double-peaked C IV emission
- Suggests significant number of  $E > 47.89$  eV photons produced in and possibly escaping from these galaxies



# On Lyman- $\alpha$ Emitting galaxies

- Arnab Sarkar (UK)



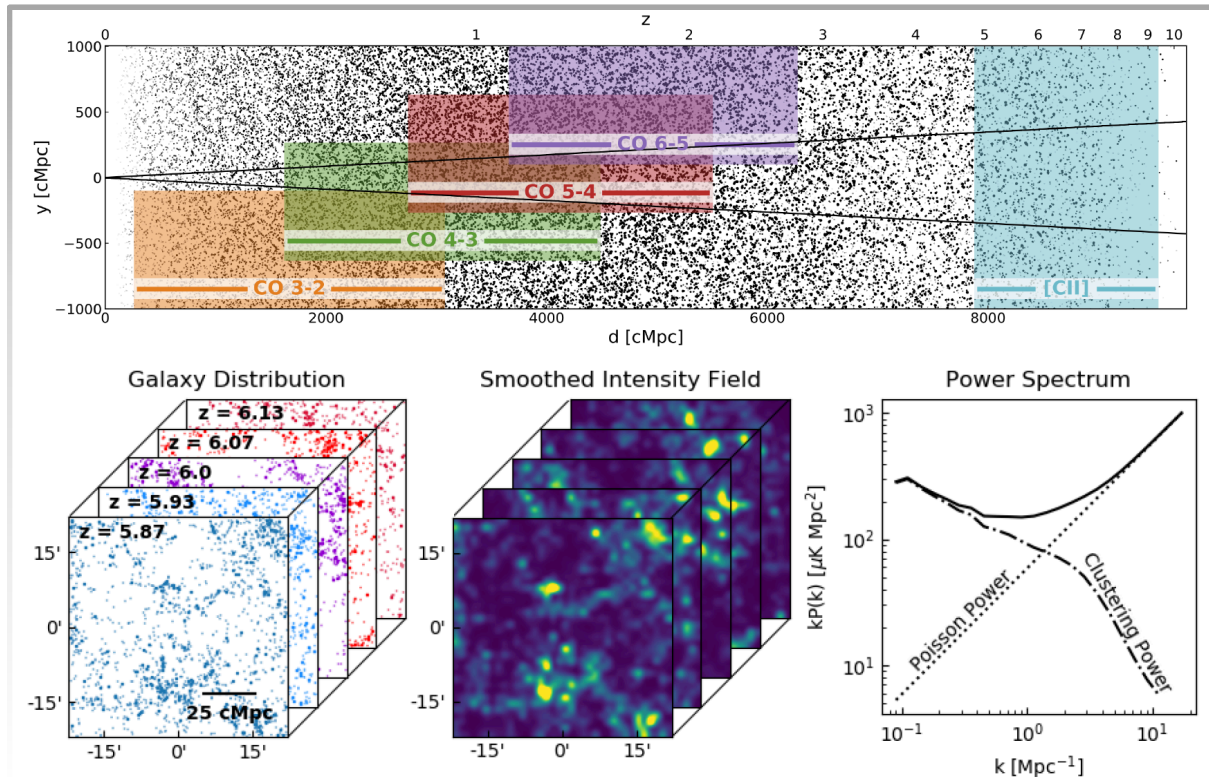
$f_{esc}$  = Escape fraction of ionizing photons

$f^*$  = Star formation efficiency

$f_{esc}^{Ly\alpha}$  = Lyman-alpha escape fraction

# Line Intensity Mapping of [CII] Emission in the Early Universe

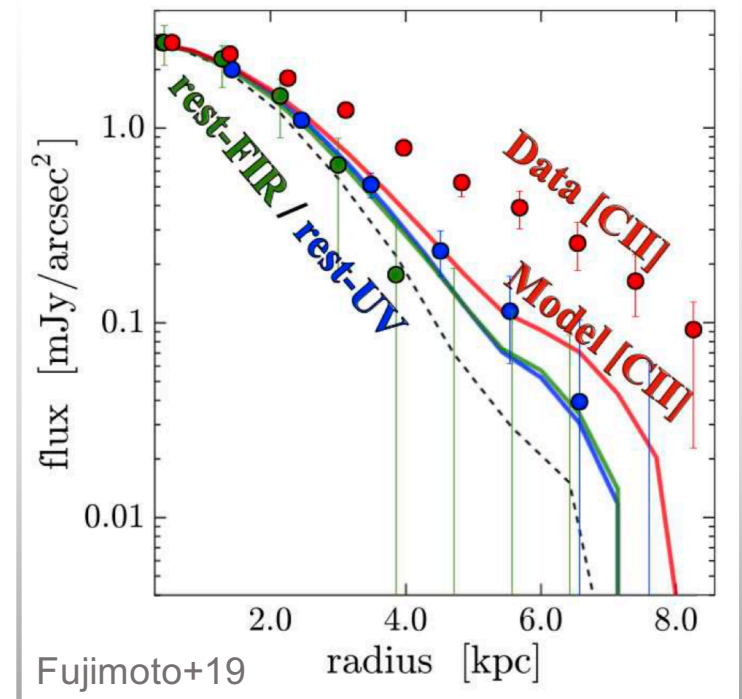
Guochao (Jason) Sun



- LIM: **3D analogy** of CMB measurements, but with redshift information!
- A method to probe large-scale structure **complementary** to galaxy surveys
- Study **multi-phase ISM** with **multi-tracer LIM**

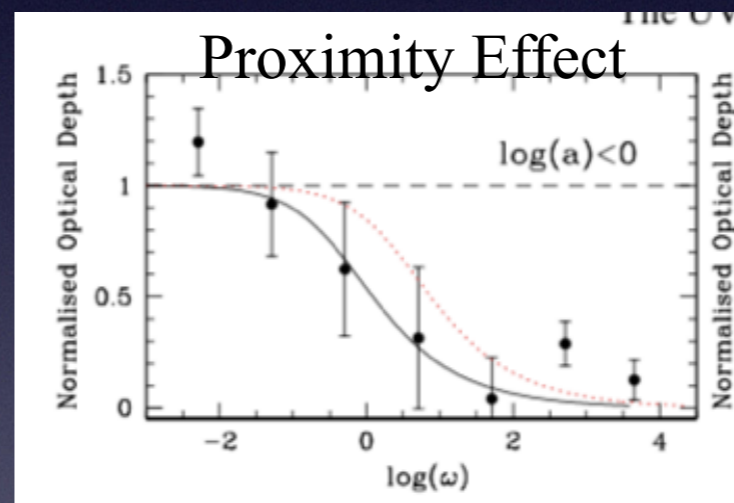
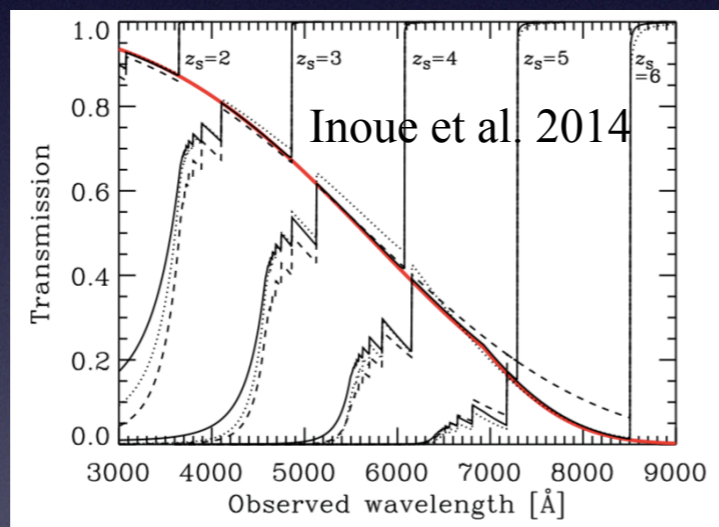
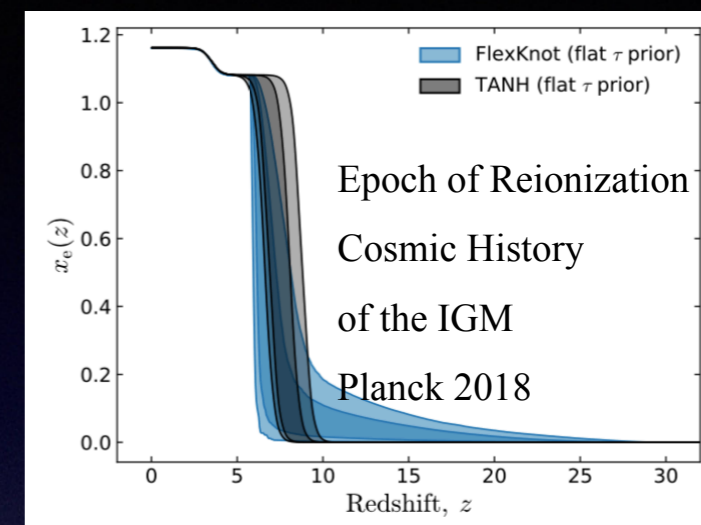
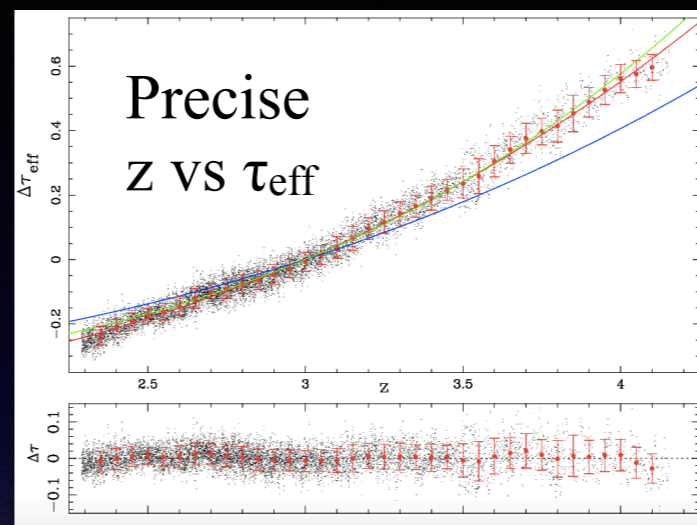
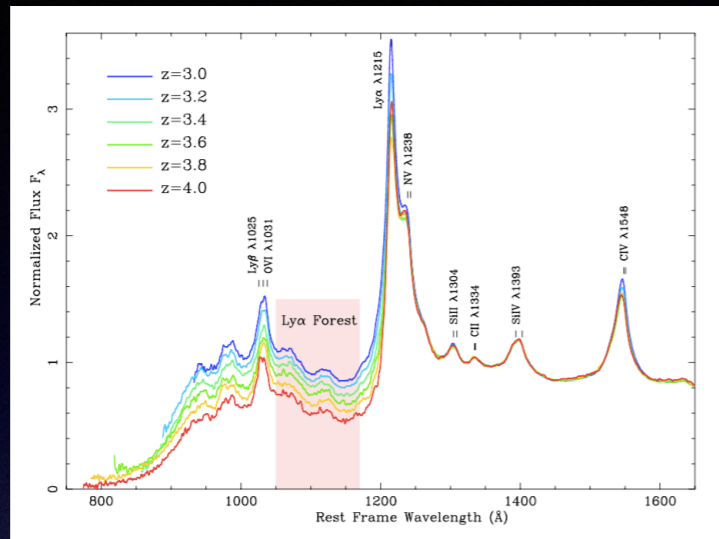
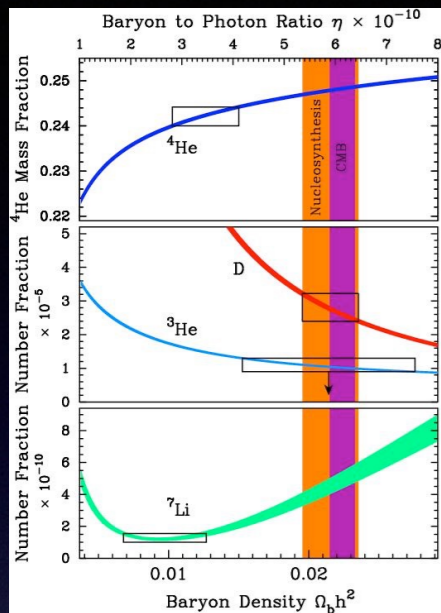
## Mysterious [CII] halos at $z \sim 6$

- How to better model them? (**CLOUDY**)
- Insights intensity mapping can offer?
  - Small-scale physics

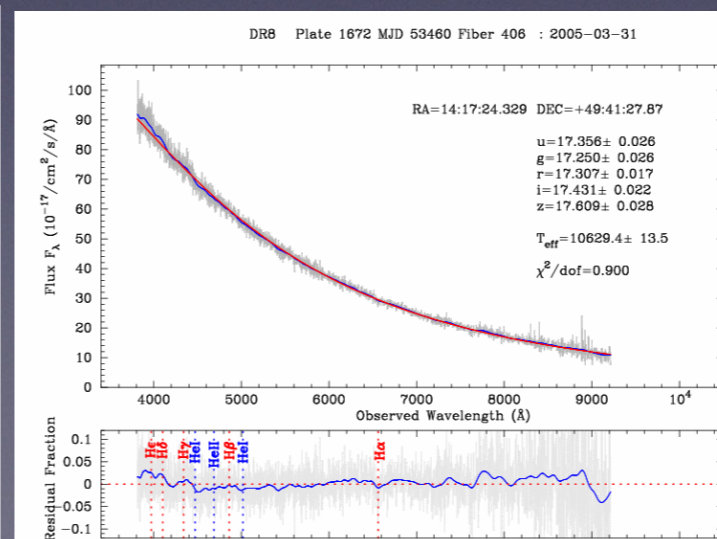
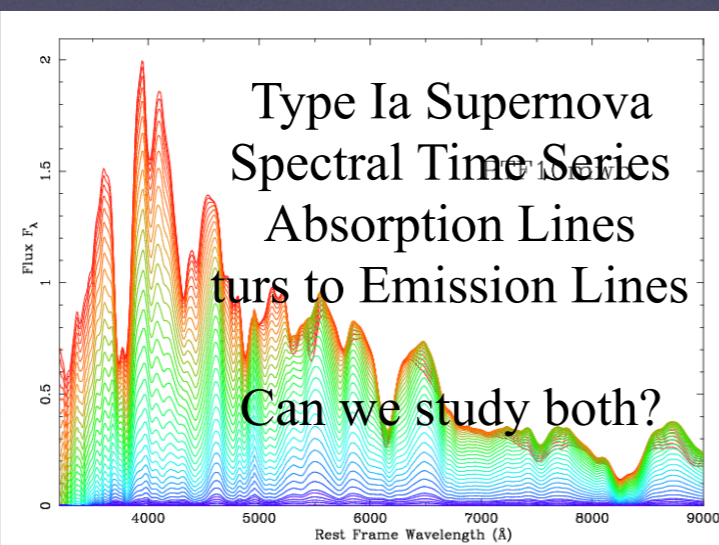


# Precision Cosmology through the Intergalactic Clouds (IGM)

Nao Suzuki (Kavli IPMU, Univ of Tokyo) :  $\Omega_b$   $\tau$   $\sigma_8$   $\Lambda$



Wish to probe the Ionization history of the universe using Quasar Spectra and Lyman Series



Mysterious Blackbody Stars are identified (Suzuki & Fukugita 2018) We can use it as a calibrator but what is the physics behind this?!