

THE CLUSTERING OF BONA-FIDE LOW LUMINOSITY AGN

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Advisor: Michael S. Vogeley

Anca Constantin (James Madison)

James T. Waters, Alex Gray (Georgia Tech)

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(WHERE DO AGN LIVE, AND ARE THEY AWARE OF IT?)

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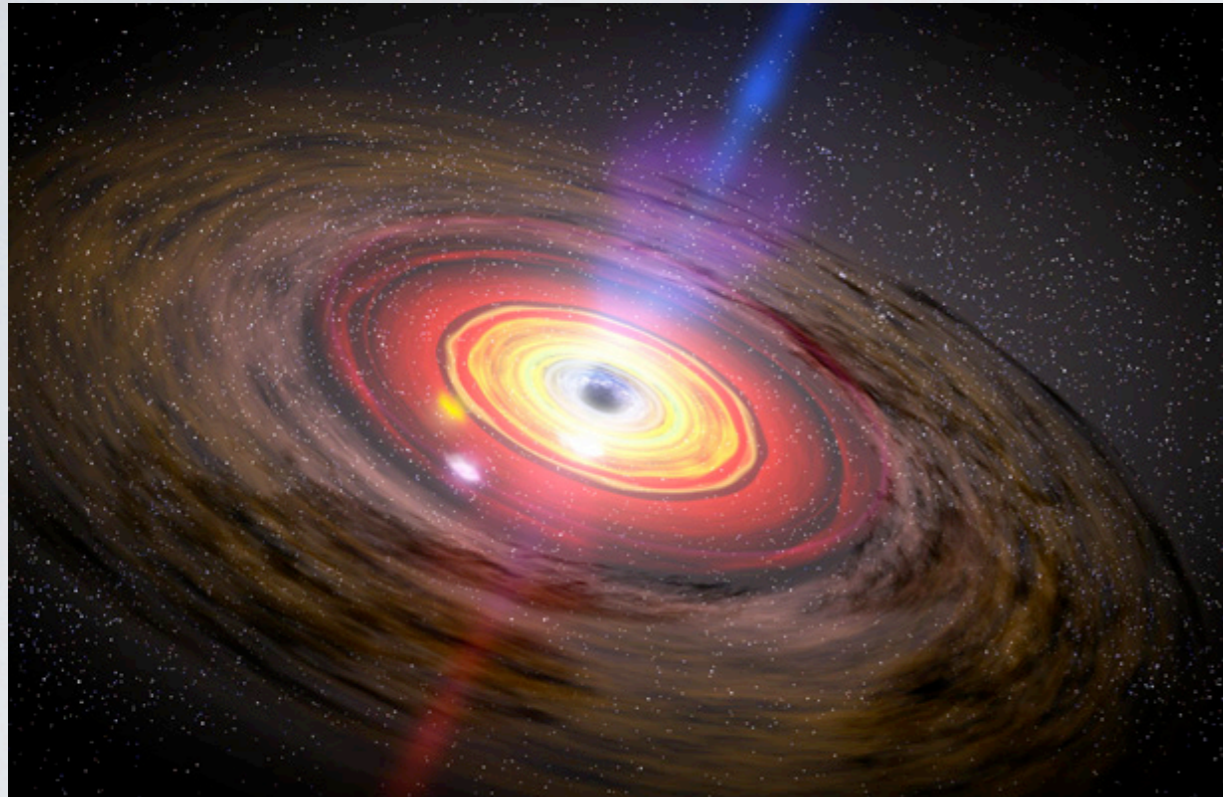
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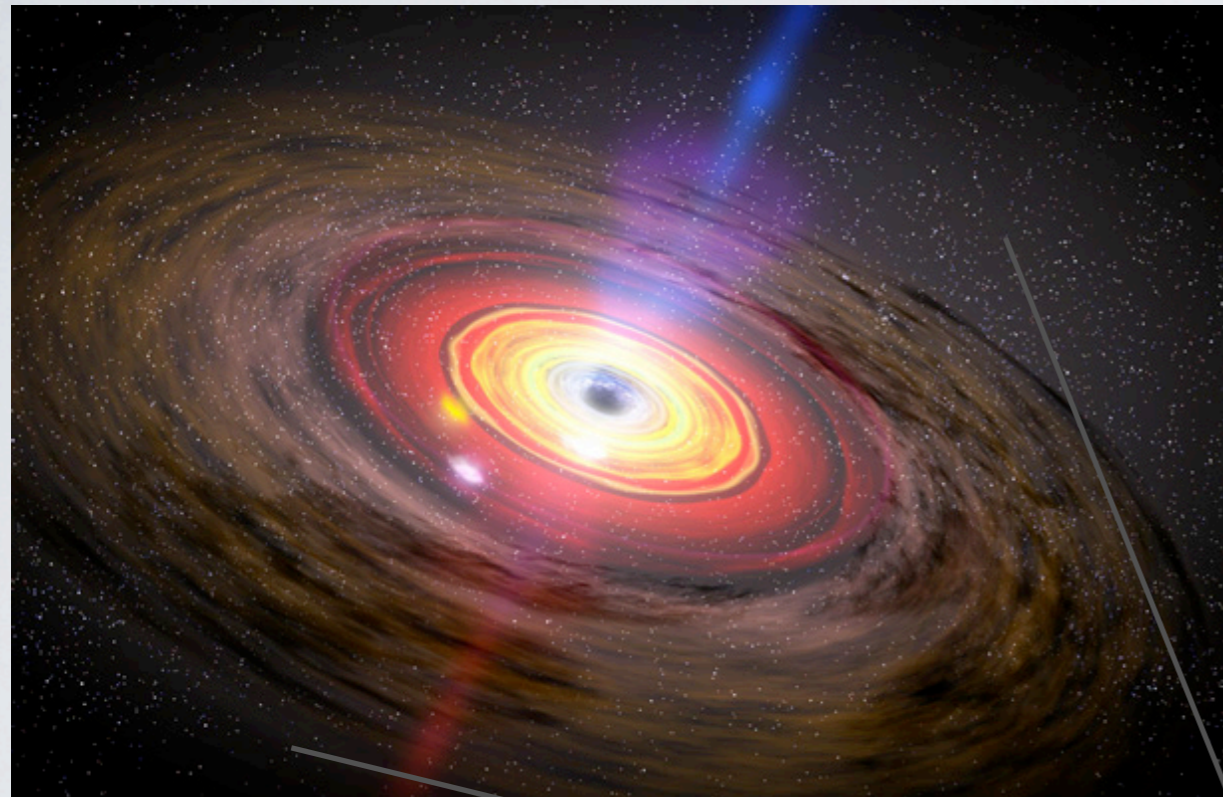
- Do AGN prefer certain neighborhoods?
(galaxy scale effects)
- Do AGN prefer certain zipcodes?
(group/cluster/LSS scale effects)
- Does the galaxy care if it contains an AGN?
(AGN feedback/quenching)

Galaxies and their Black Holes



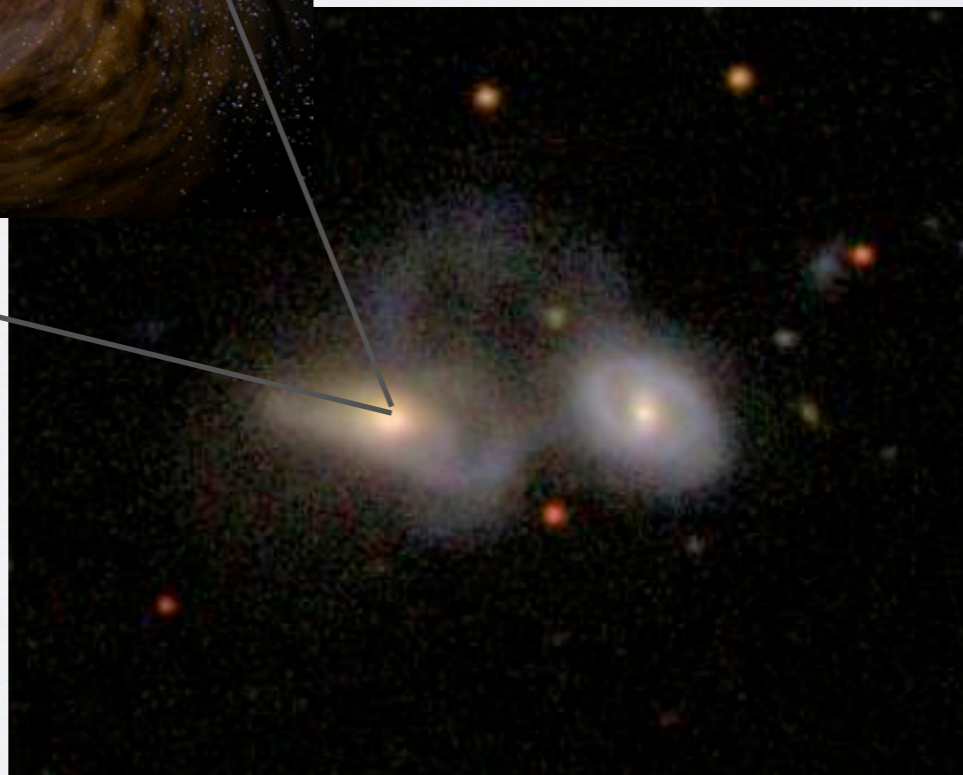
$\ll 1$ parsec

Galaxies and their Black Holes

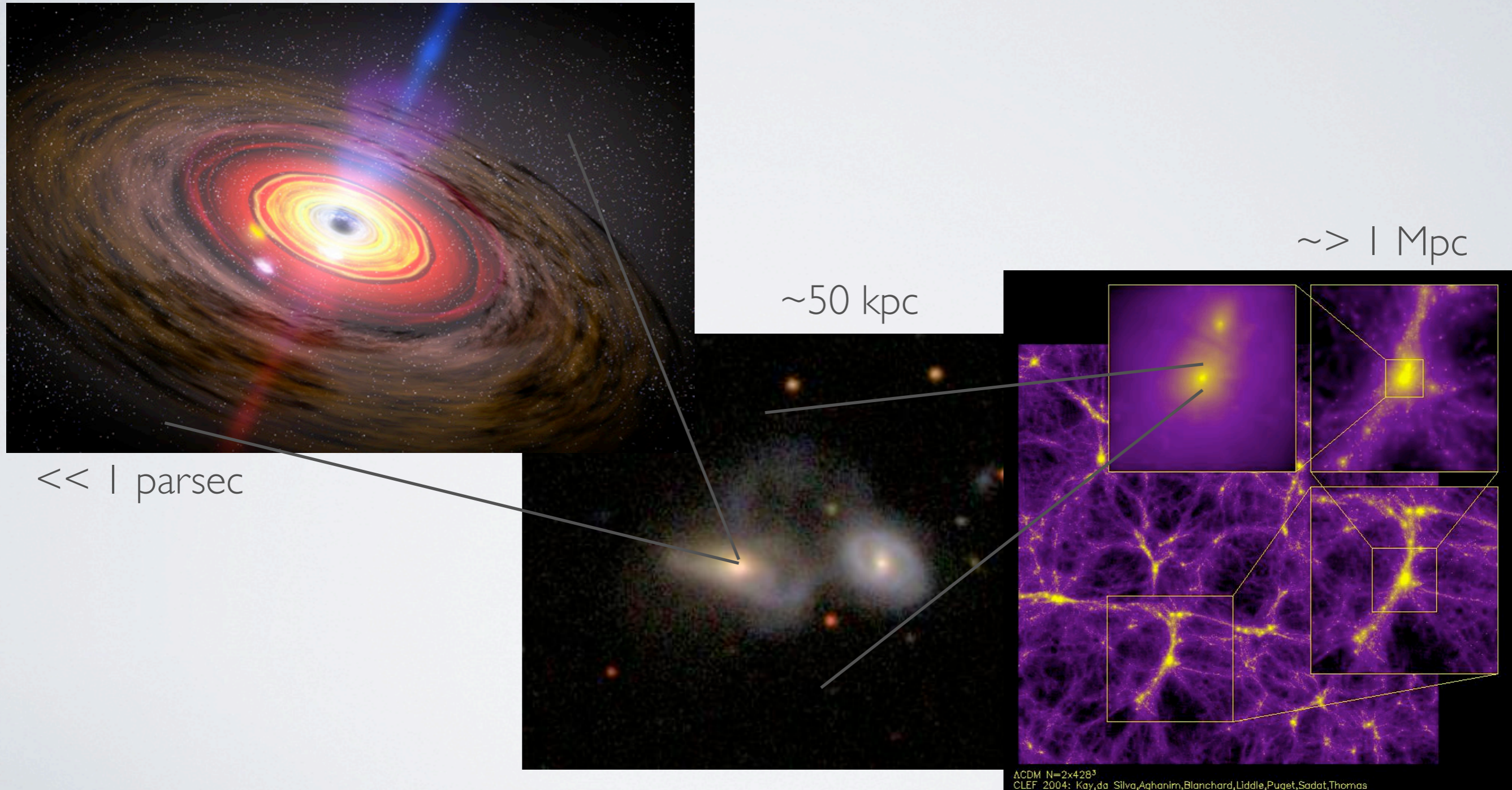


$\ll 1$ parsec

~ 50 kpc



Galaxies and their Black Holes



The (cross) Correlation Function

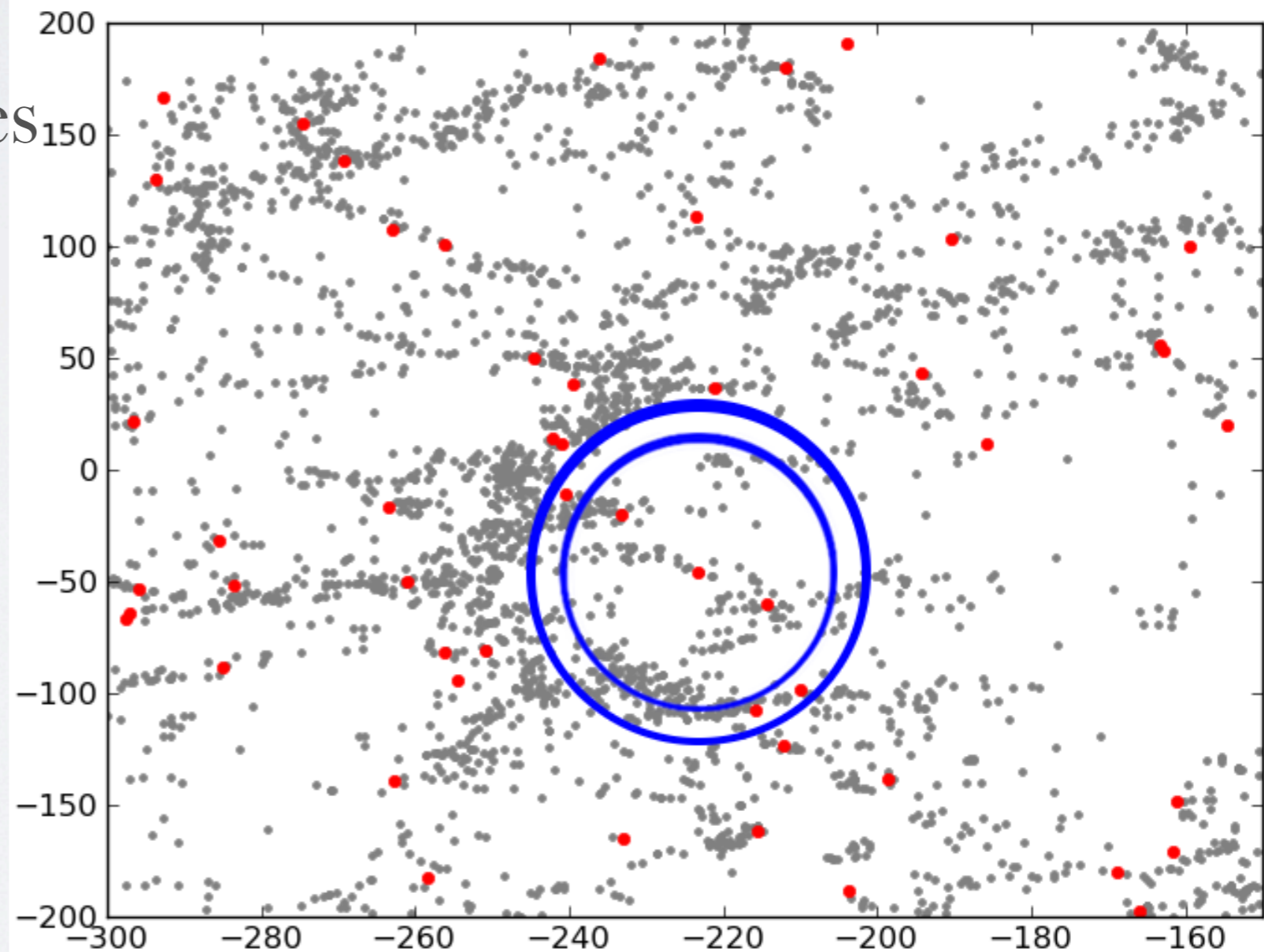
A slice of Sloan

- Red=AGN, Grey=Galaxies

- $N(s) = \bar{n}[1 + \xi(s)]dV$

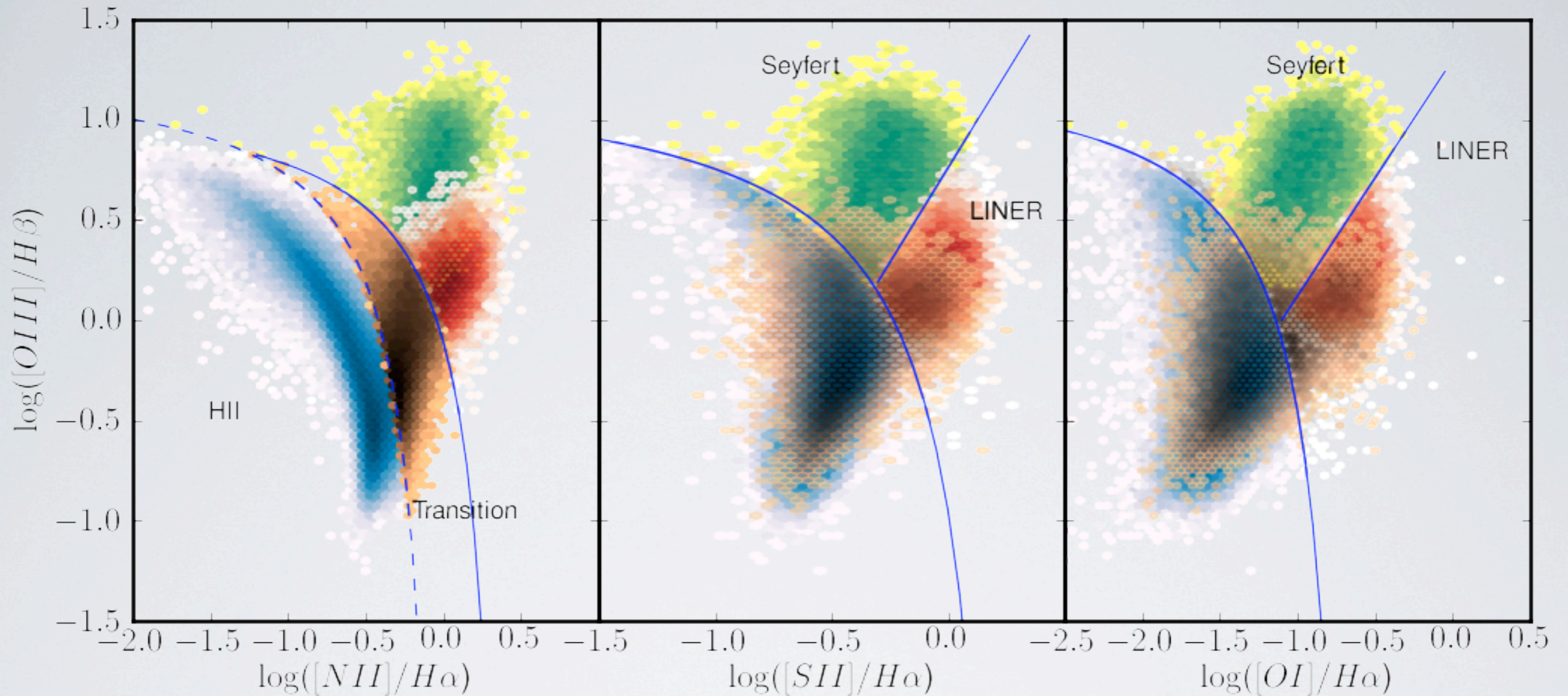
- Fit with power-law:

- $\xi(s) = (s/s_0)^{-\gamma}$



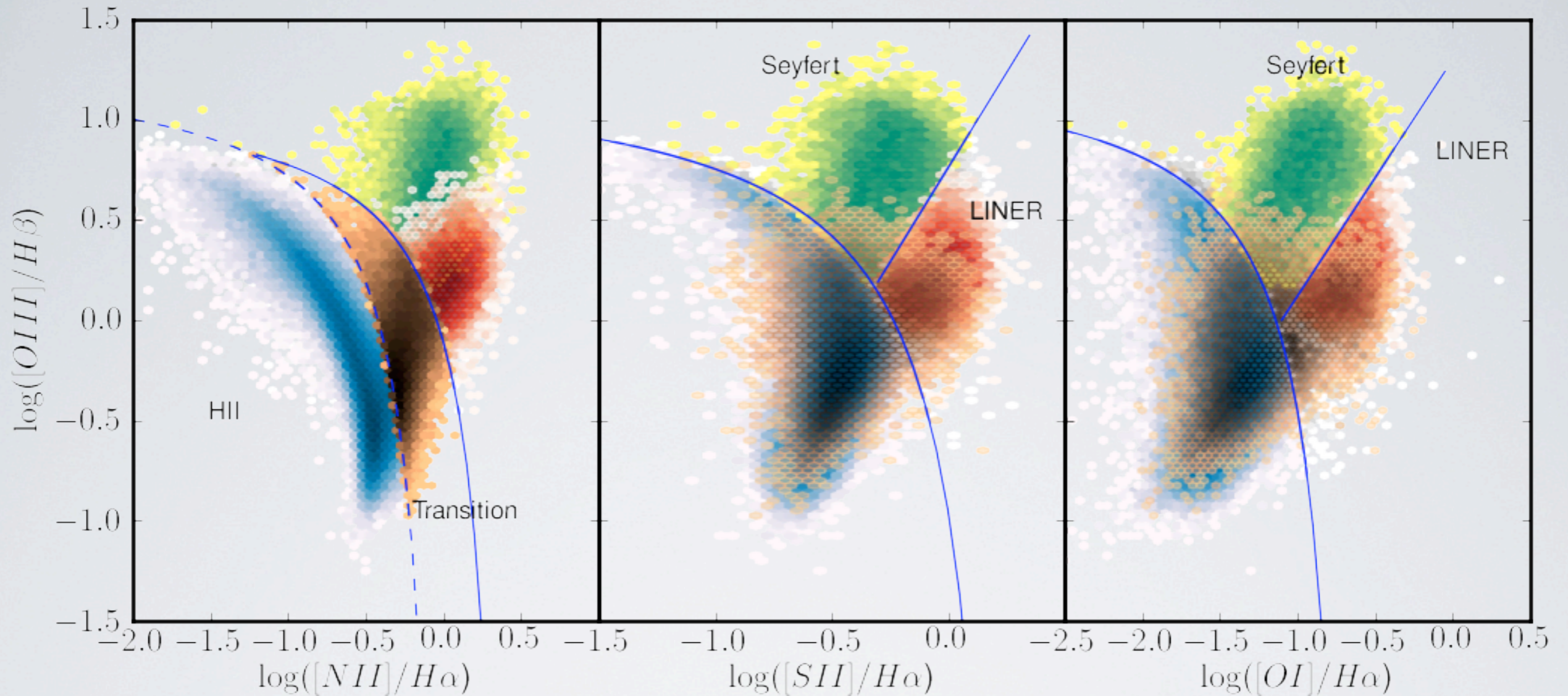
A Huge Sample of Local AGN

- SDSS DR7:
 - spectral fits from MPA/Garching (Tremonti et al., 2004)
 - survey map from NYU-VAGC (Blanton et al., 2005)
- Volume limited sample:
 - $-20.2 > M_r > -21.4$, $0.05 < z < 0.117$
- Emission lines detected at 2σ



Parejko et al, in prep

What Is An “AGN”?



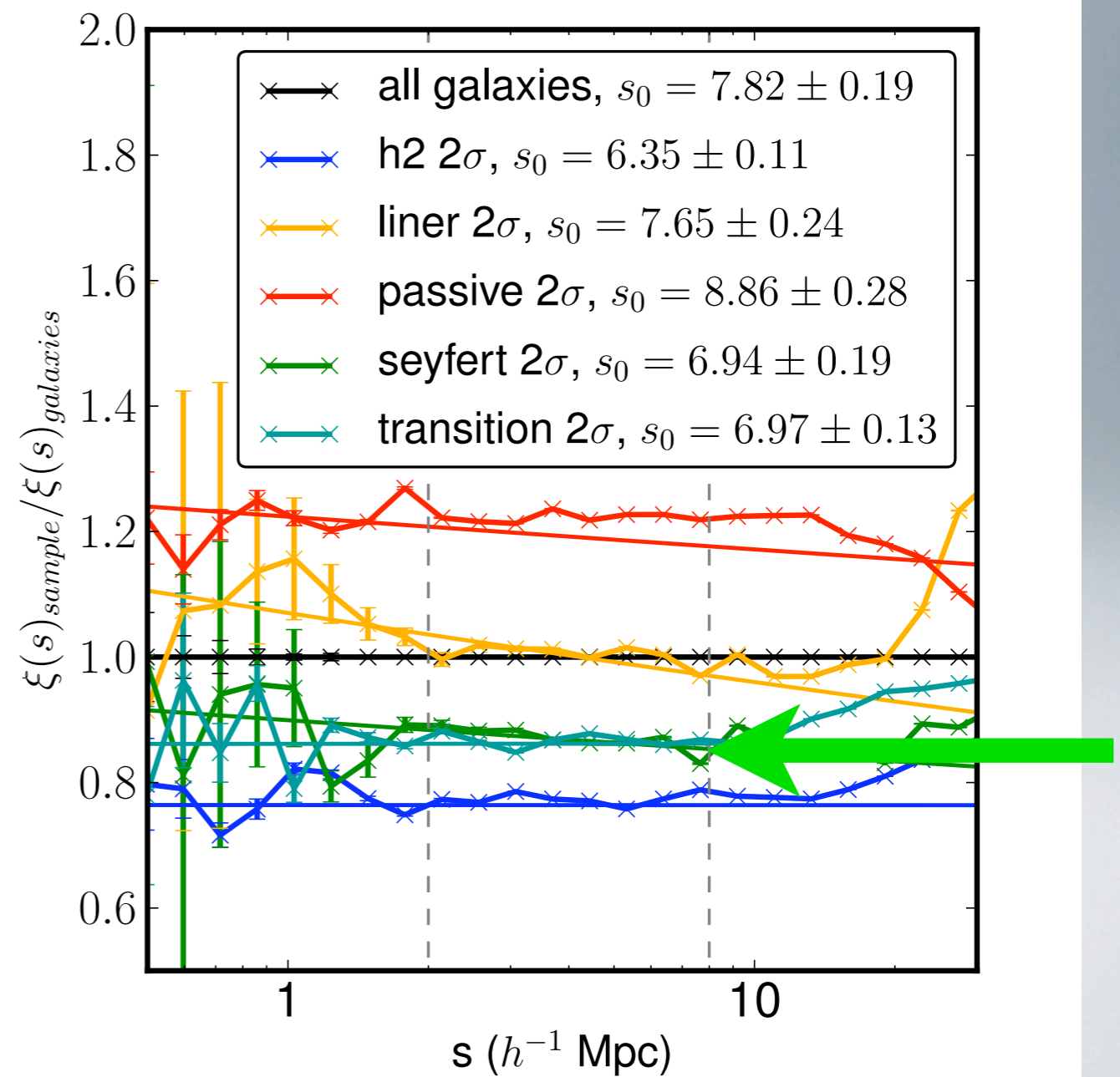
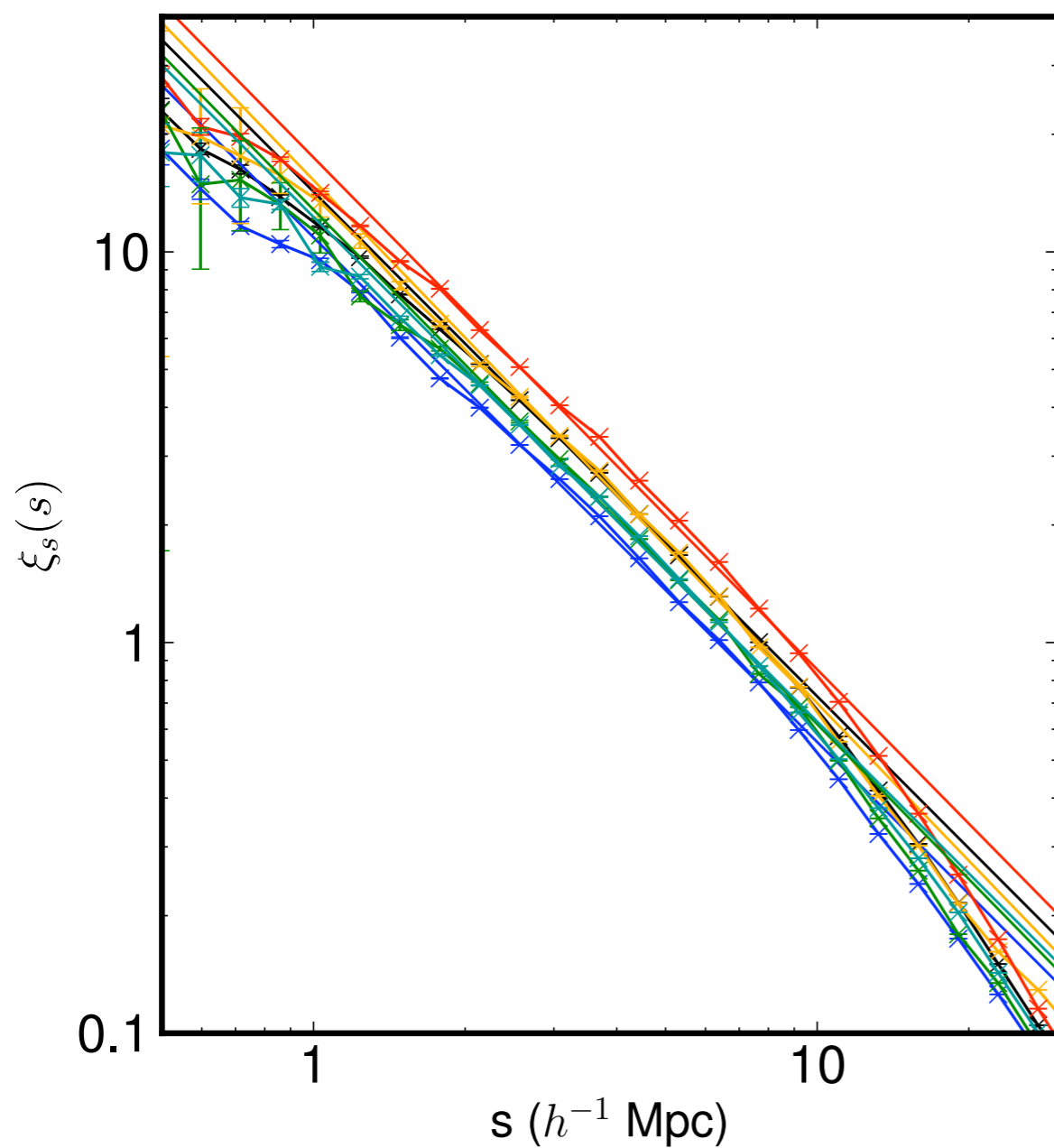
Parejko et al, in prep

What Is An “AGN”?

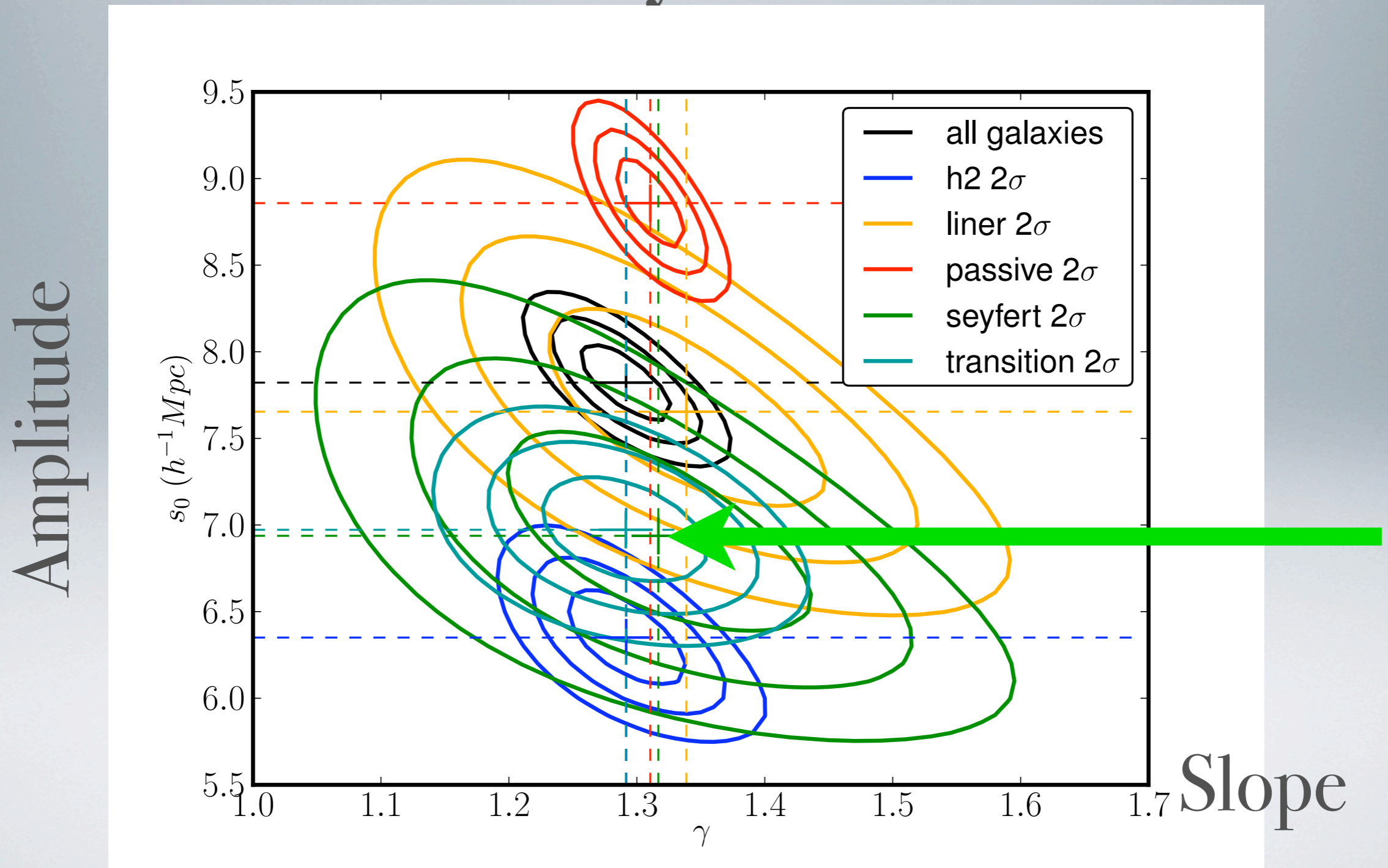
Unless I say otherwise, I mean type-2 Seyfert

AGN Live in Lower Density Environments

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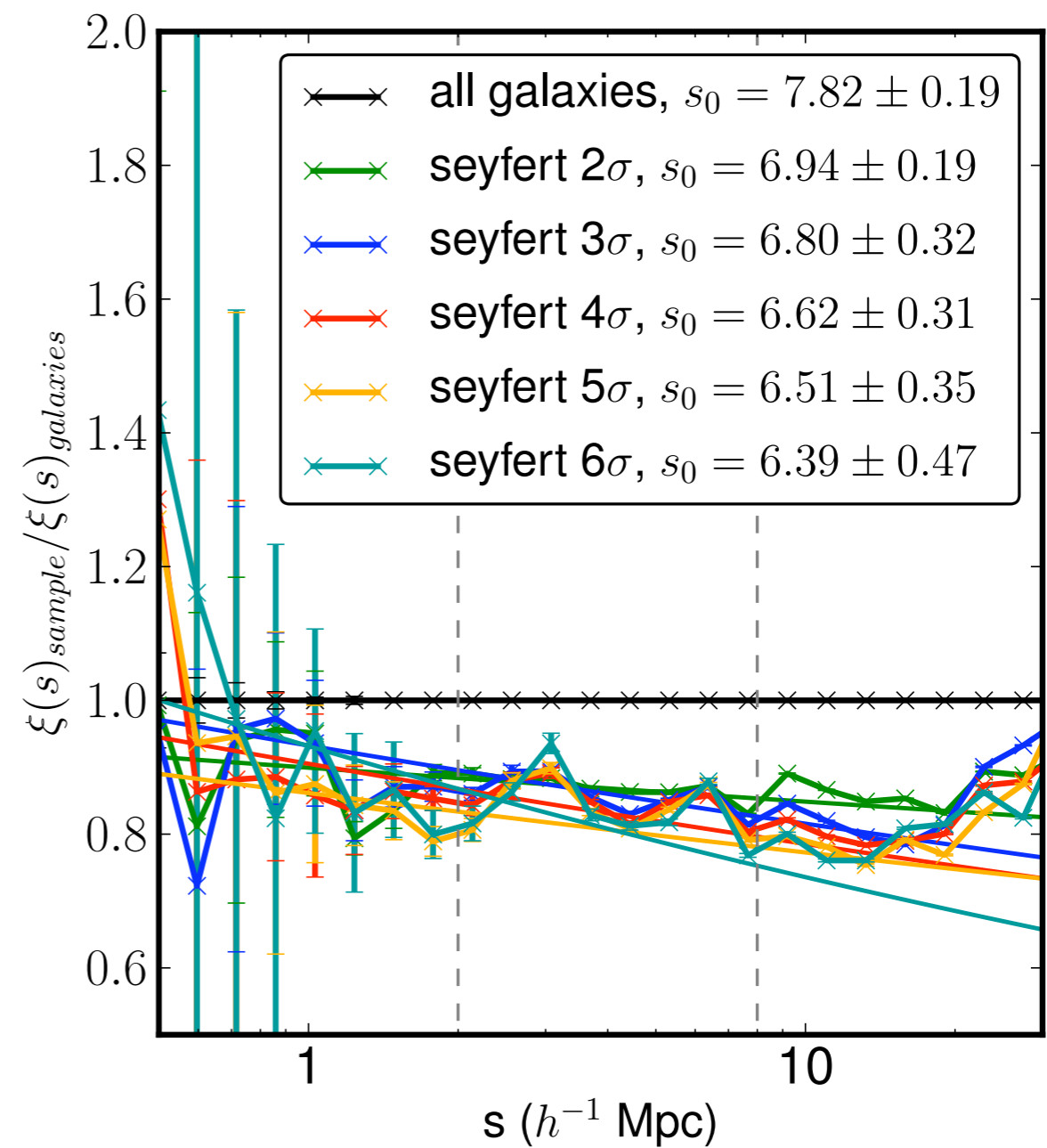
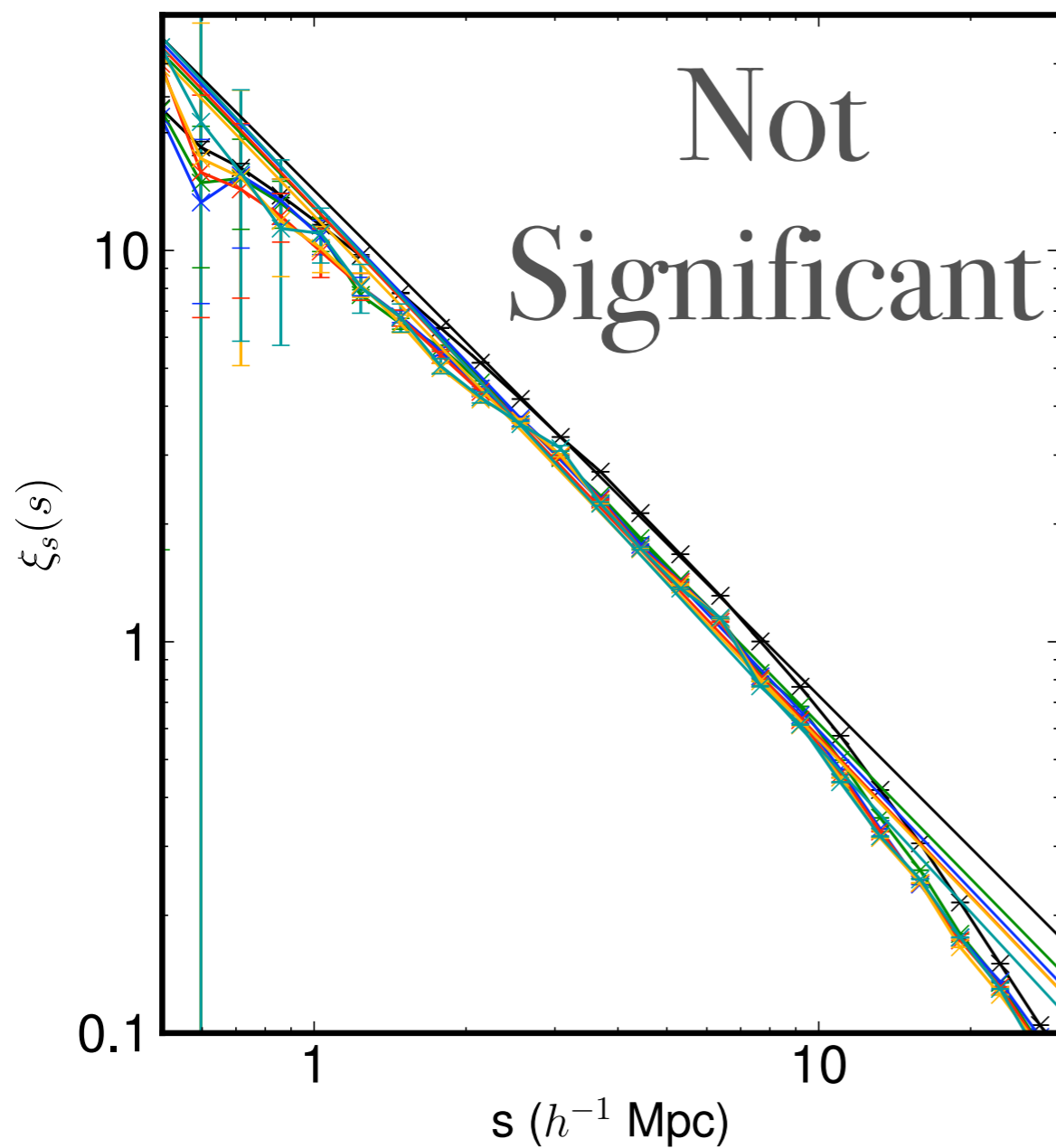


AGN Live in Lower Density Environments



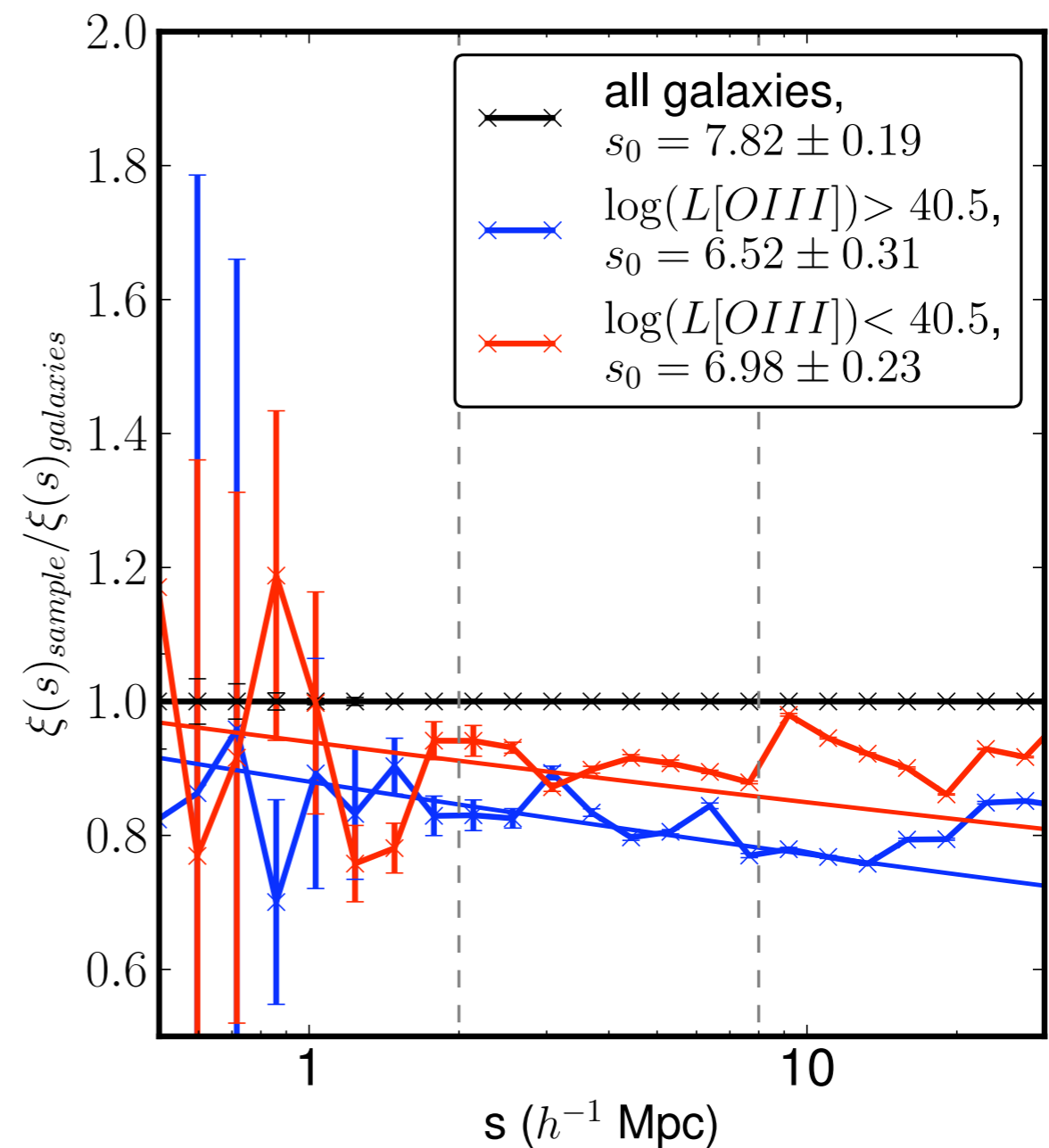
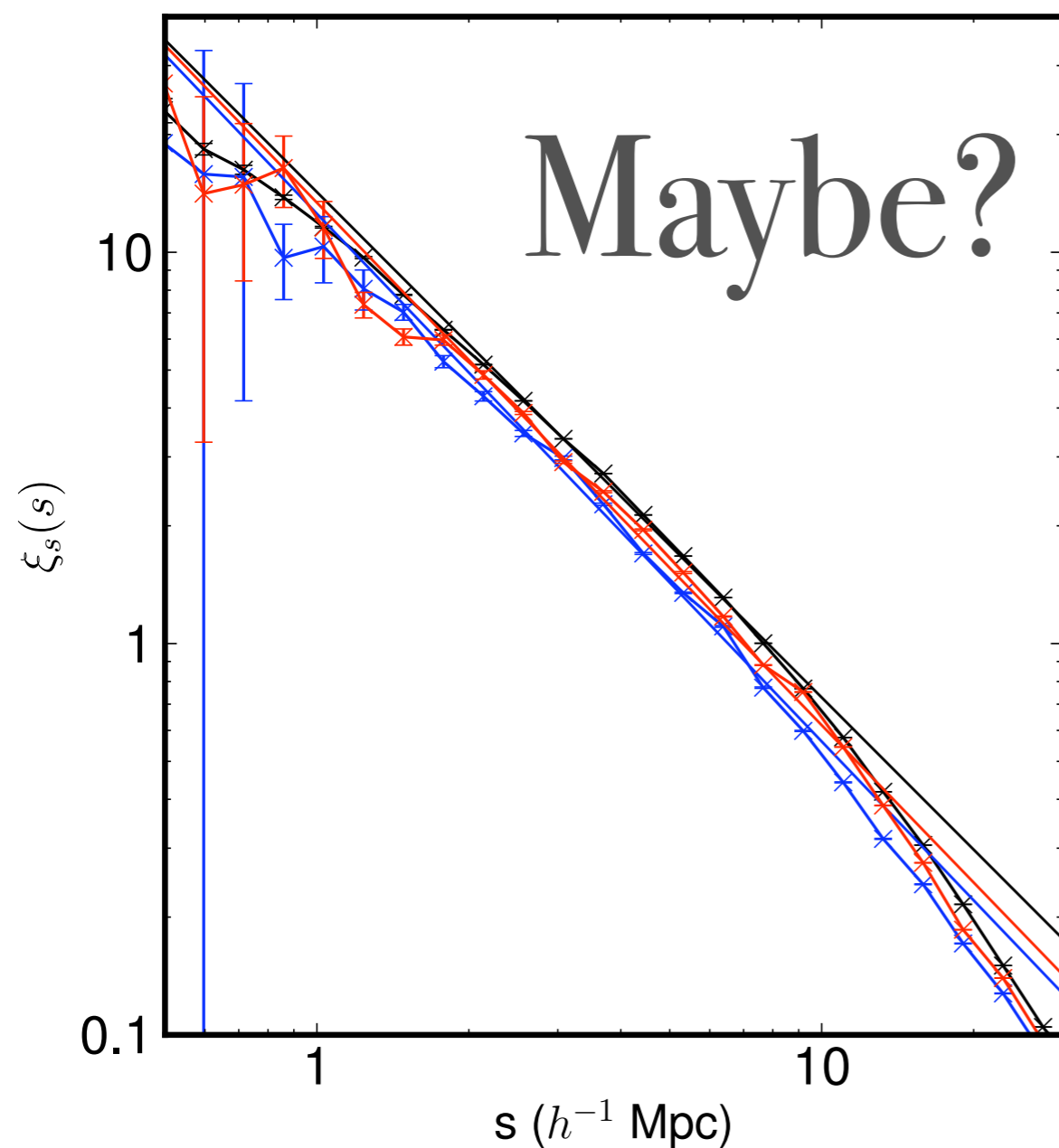
Dependence on: Emission-line Detection Threshold

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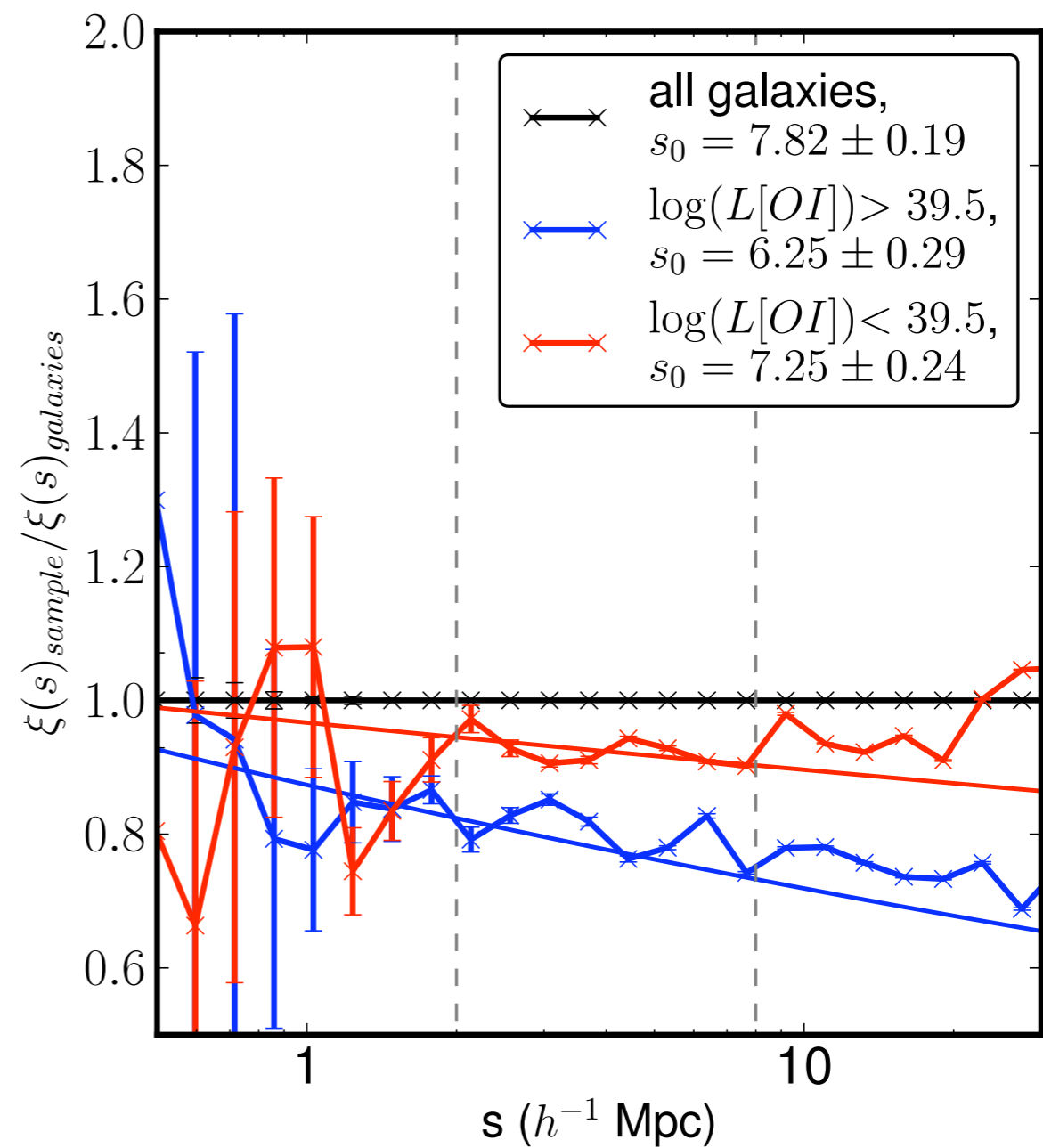
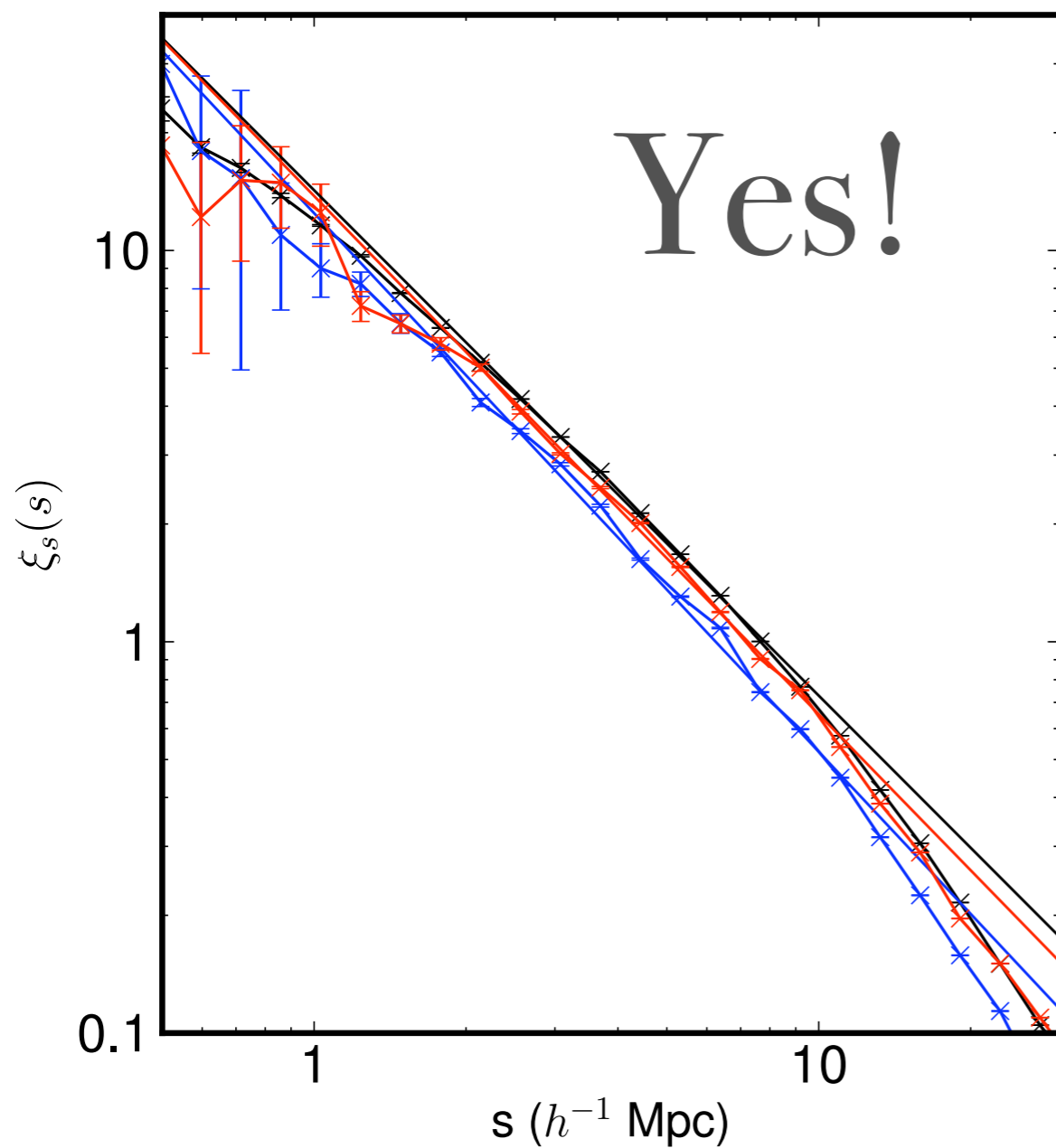
Dependence on: AGN ([OIII]) Luminosity

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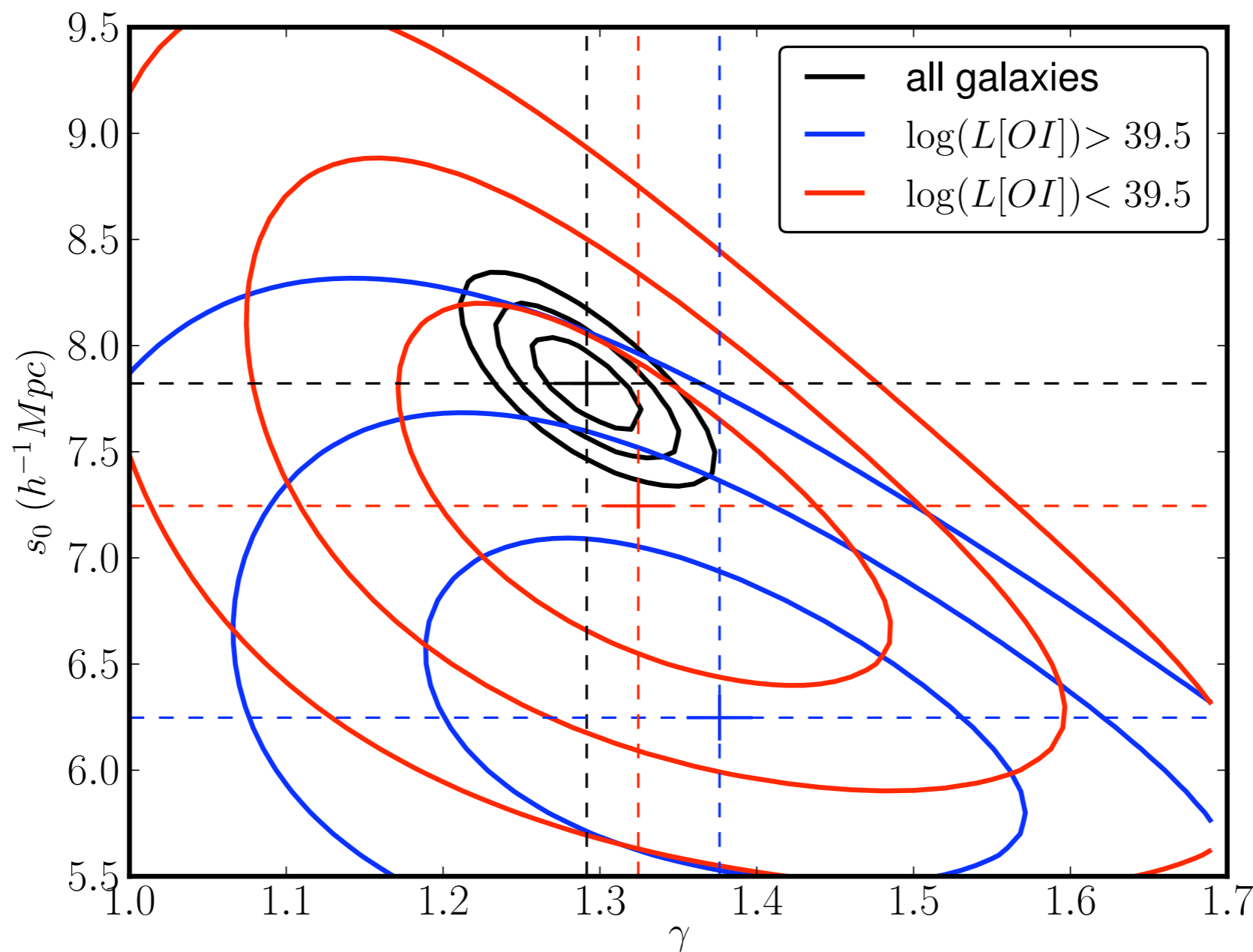
Dependence on: AGN ([OII]) Luminosity

Dependence on: AGN ([OI]) Luminosity



Dependence on: AGN ([OI]) Luminosity

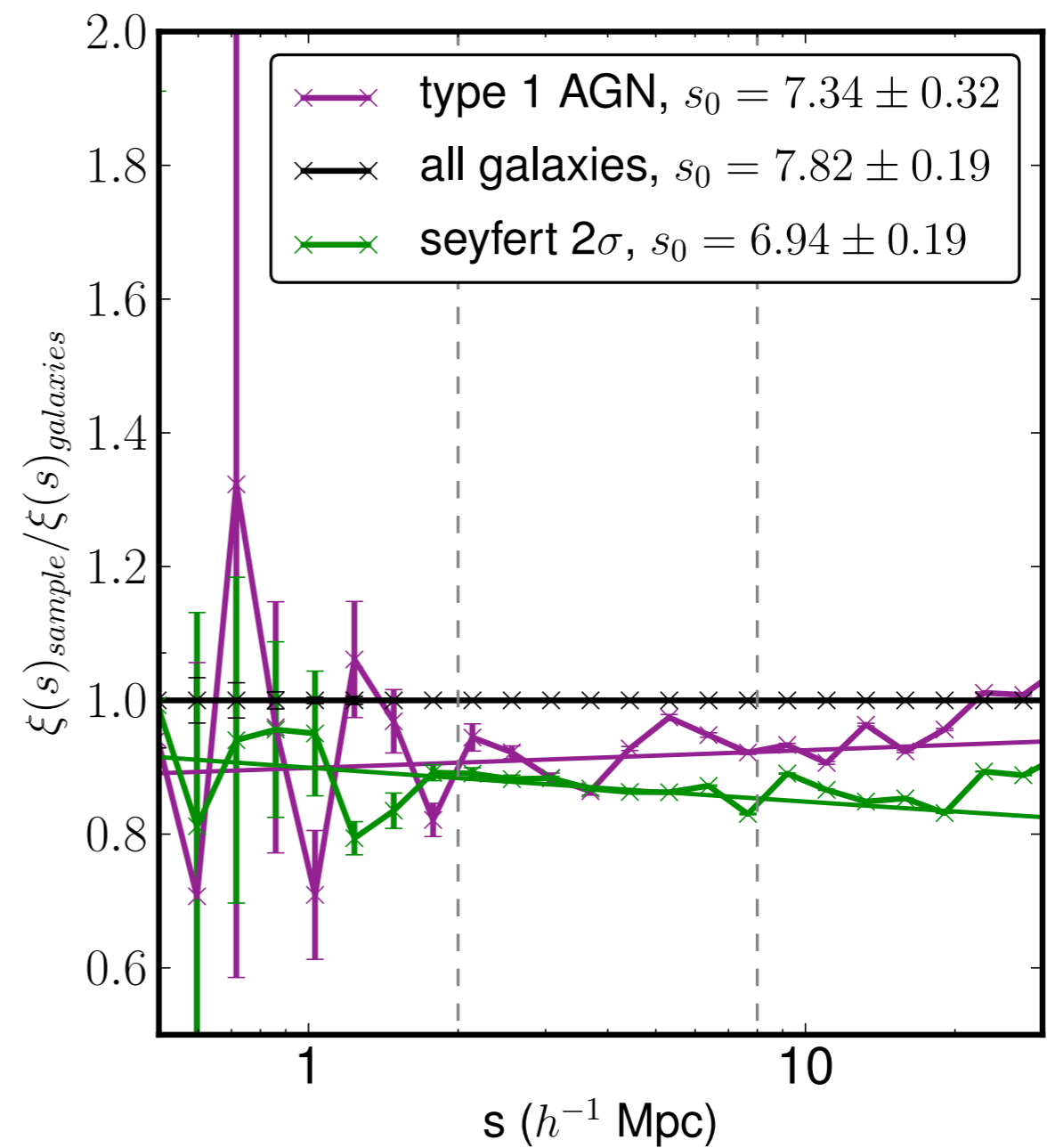
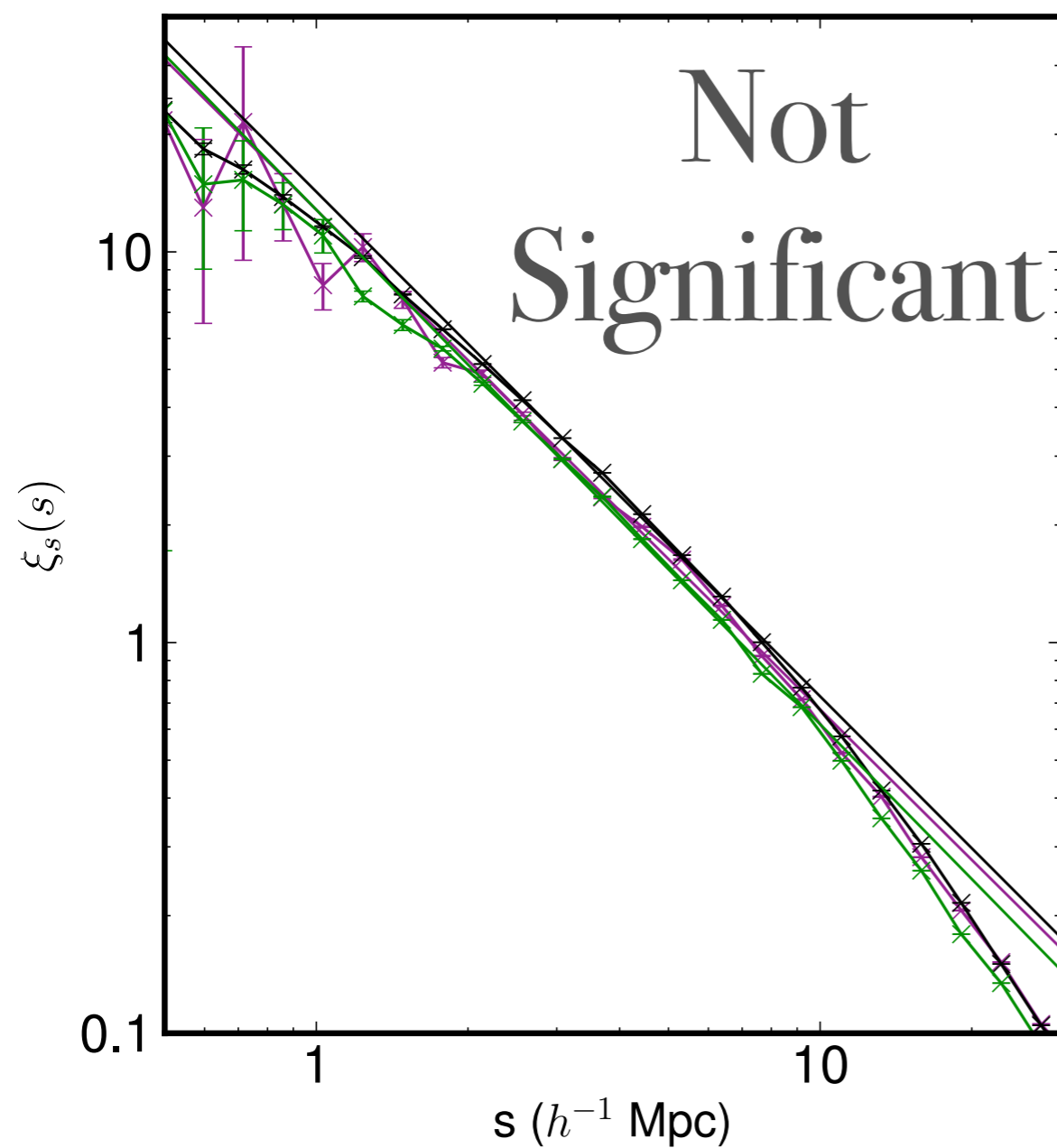
Amplitude



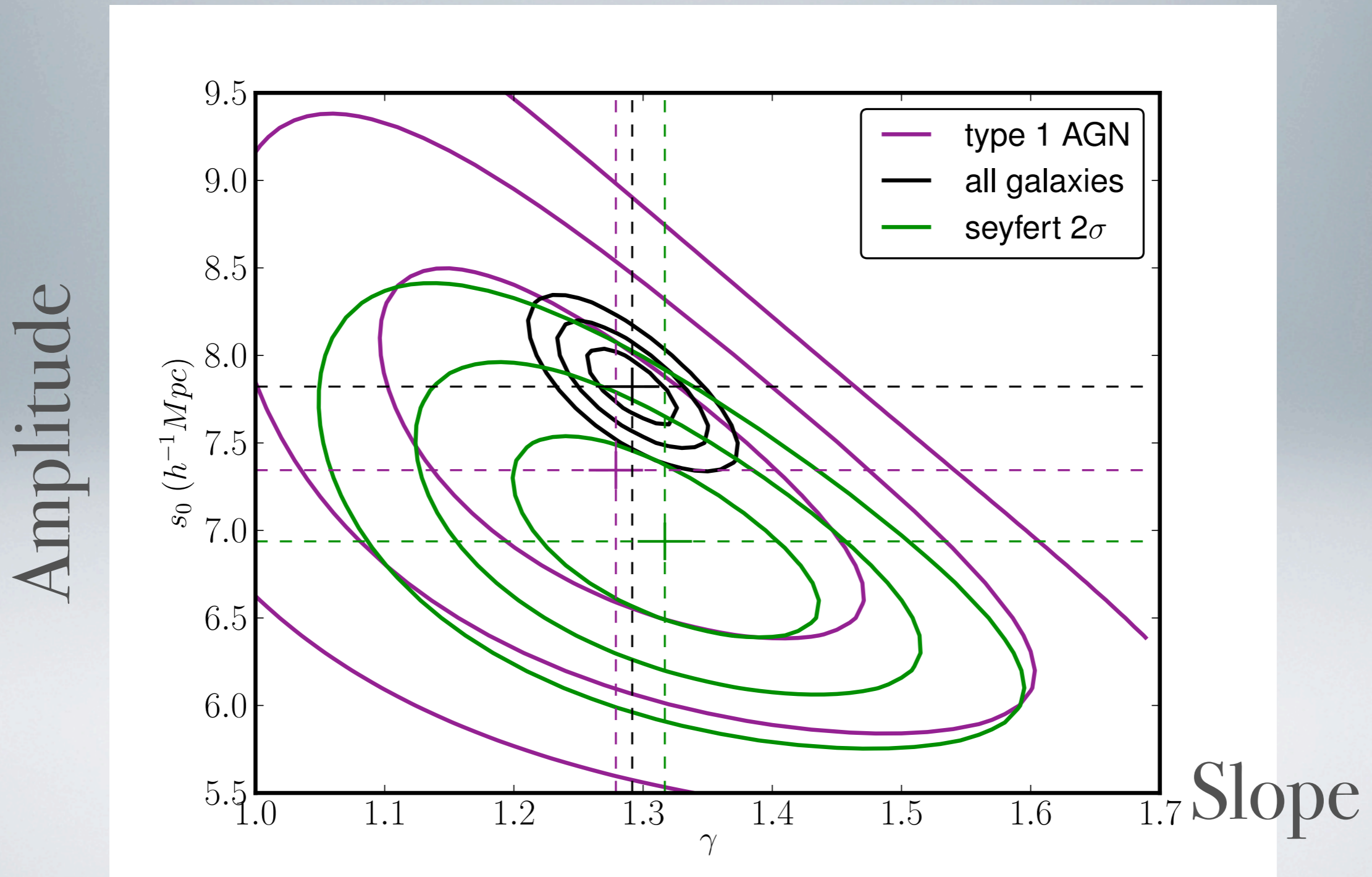
Slope

Dependence on: Broad vs. Narrow Line AGN

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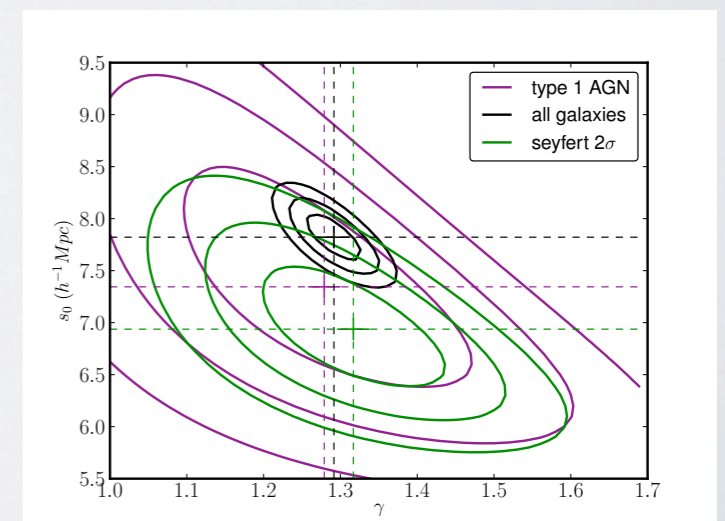
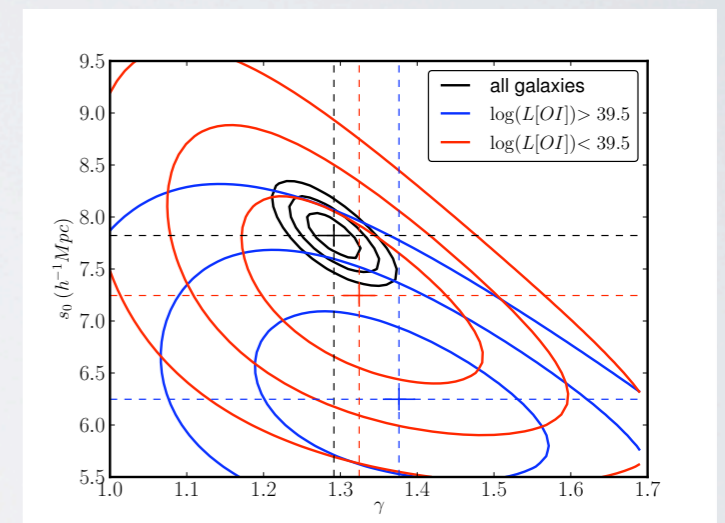
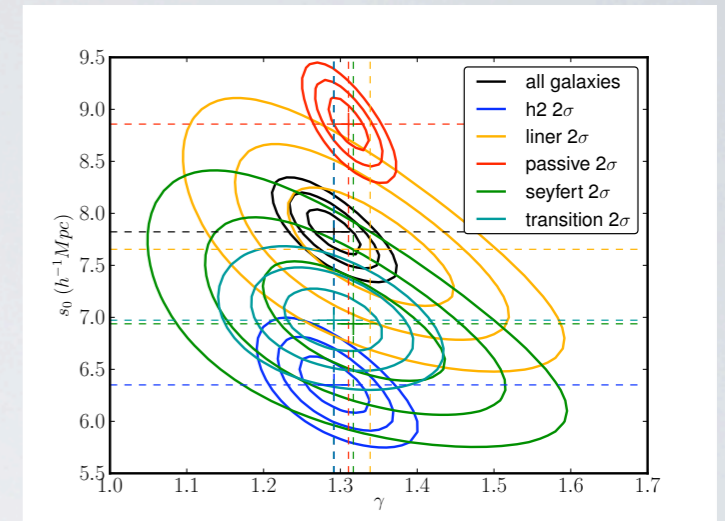


Dependence on: Broad vs. Narrow Line AGN



Recap

- AGN do know their zipcodes
- Higher luminosity AGN are less clustered
- No significant difference between broad and narrow line AGN



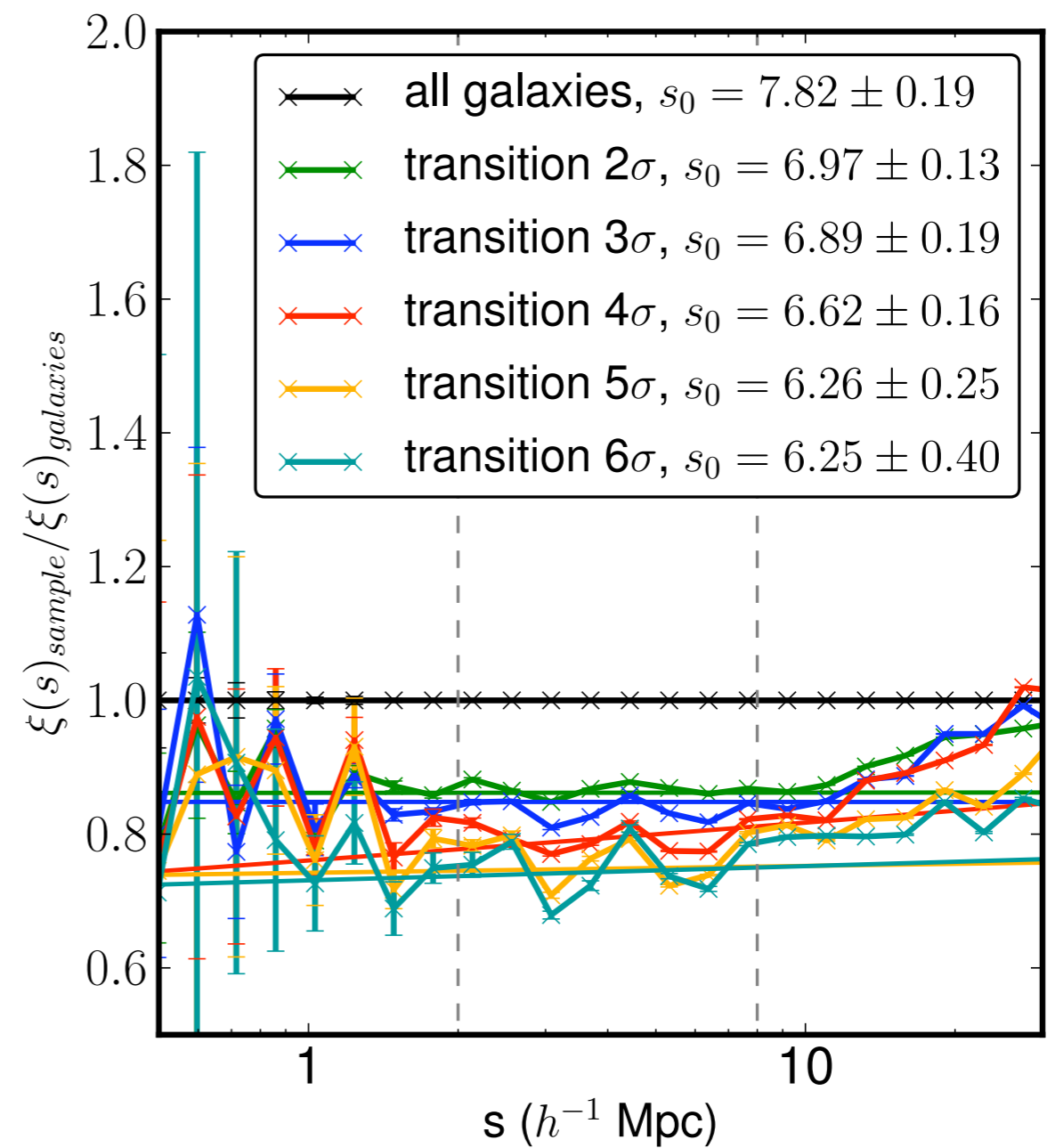
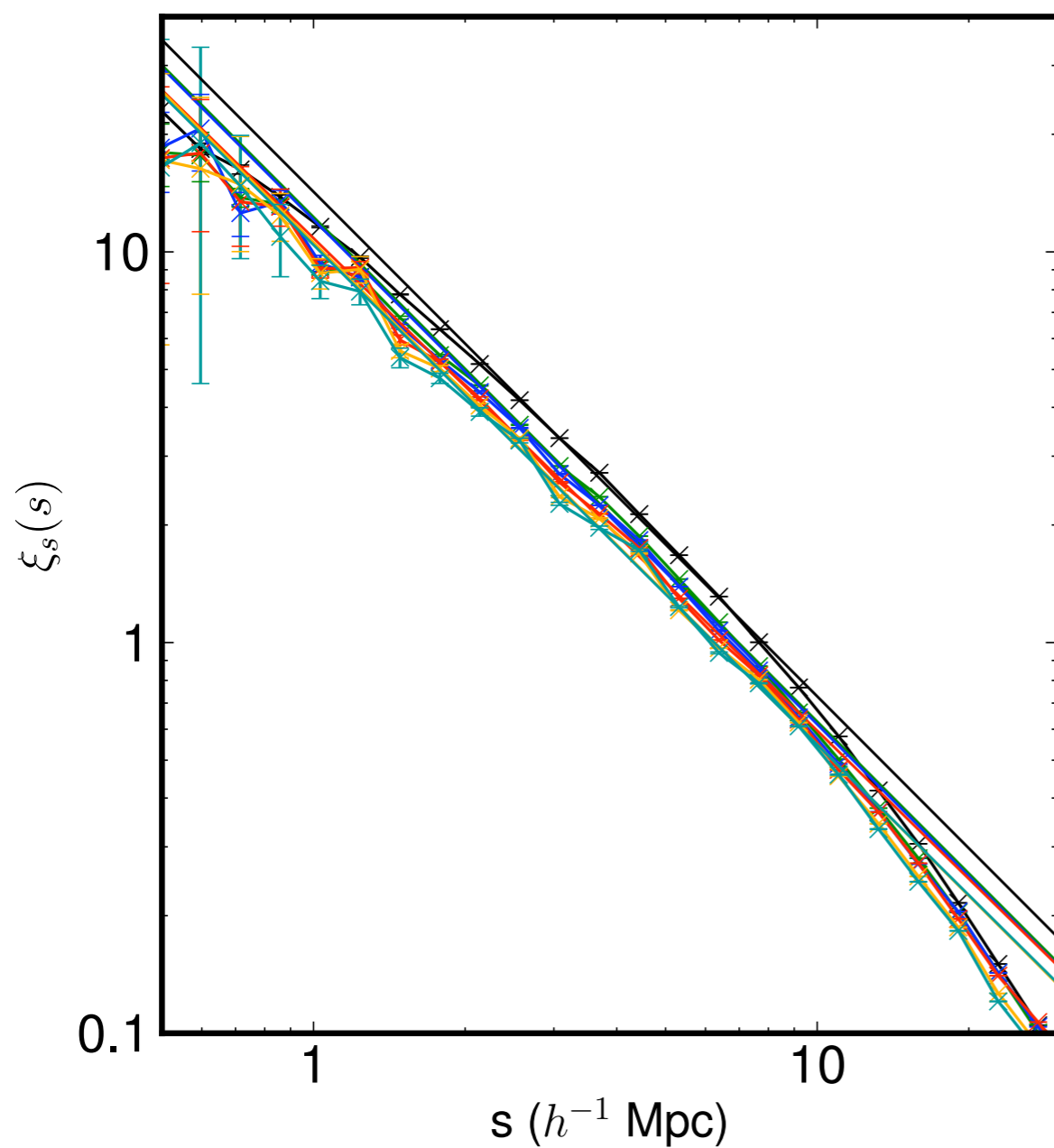
The Future

- Compare the clustering of AGN in early and late type galaxies (see Kevin Schawinski's talk later)
- Matched samples of non-AGN galaxies
- Real space correlation functions to compute bias

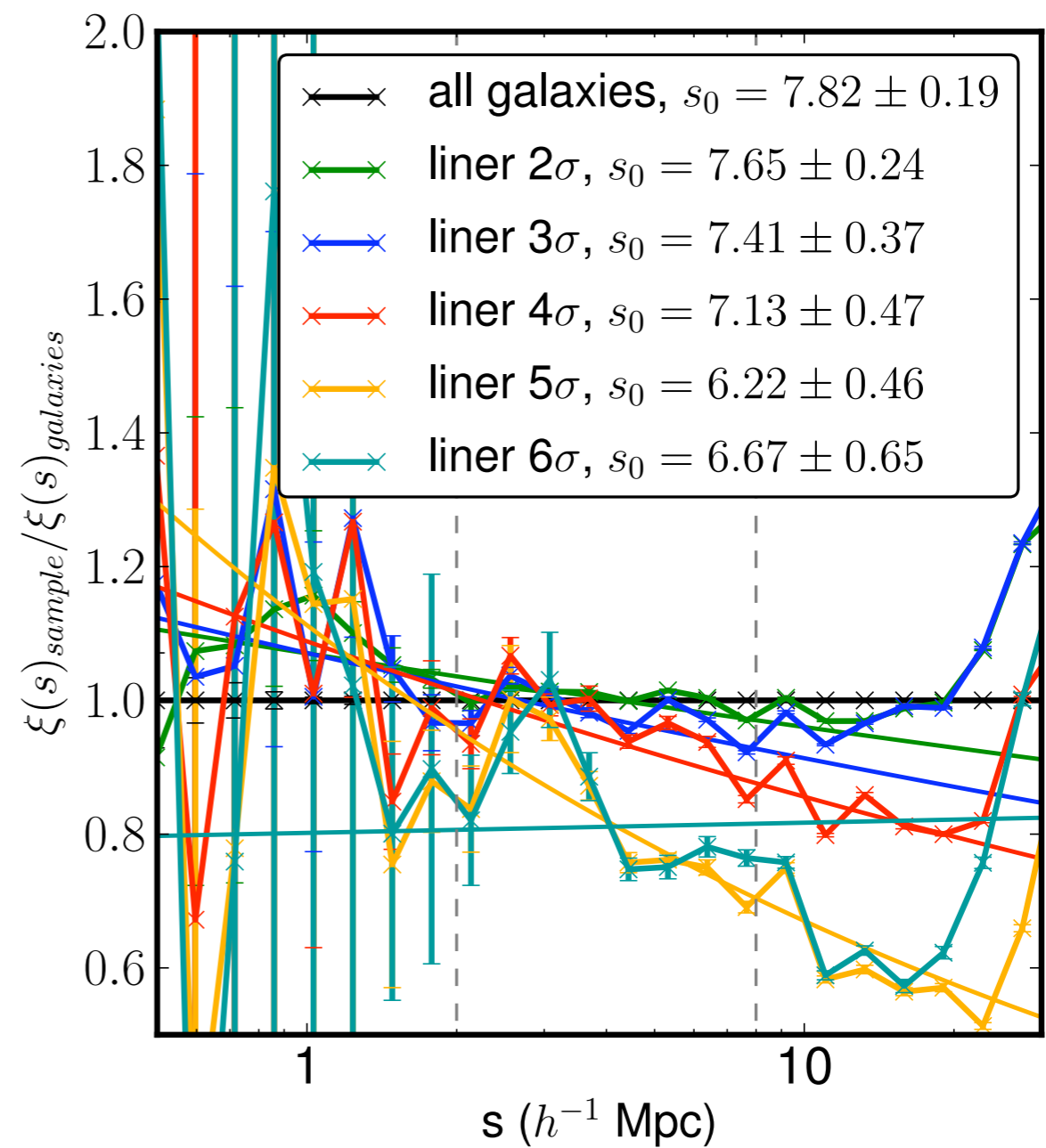
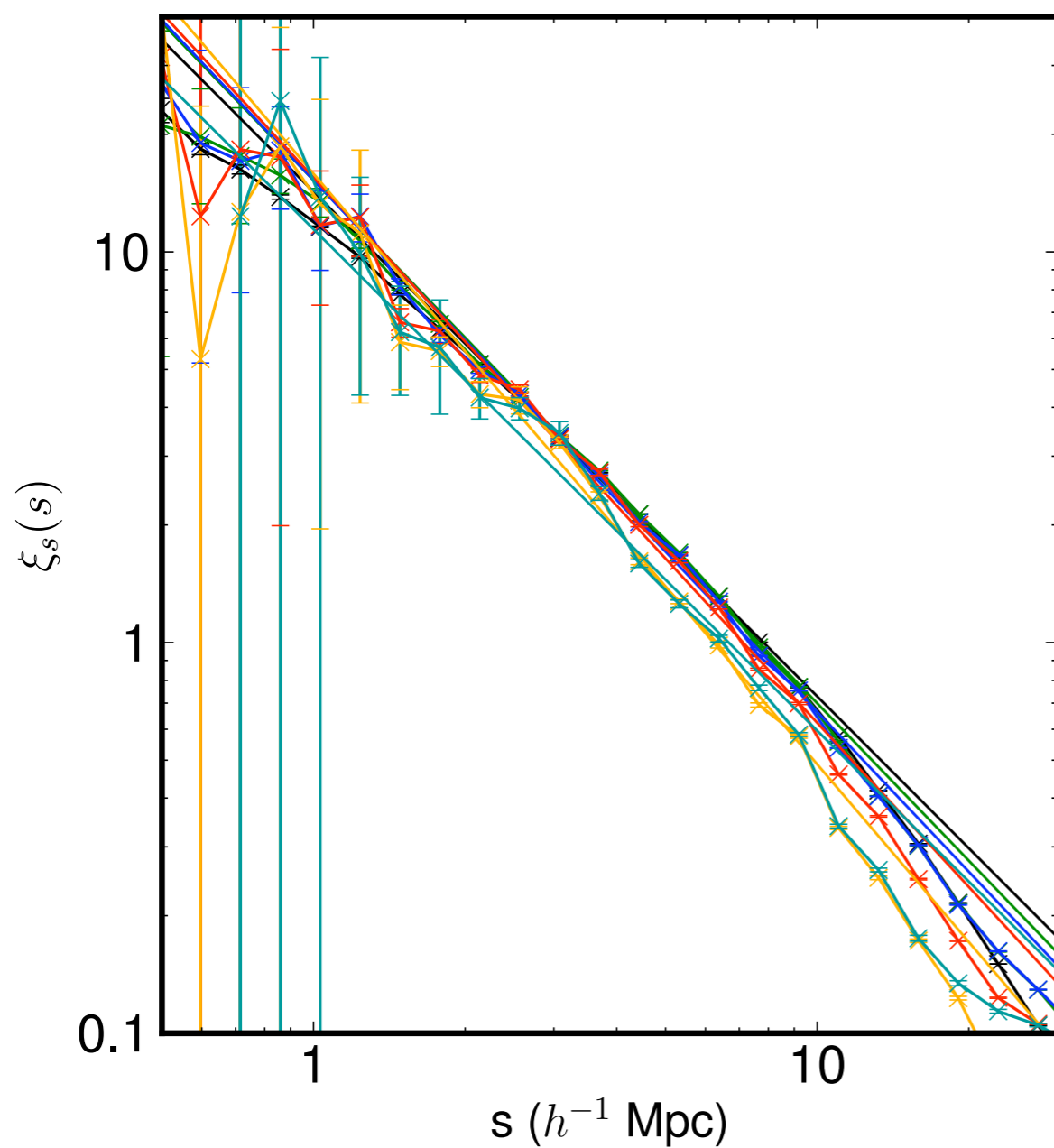
What else is in my thesis?

- ROSAT/SDSS matching for galaxies. (Parejko et al. 2009)
- Small scale effects - mergers! (Parejko et al. 2010)
- How do galaxy voids affect AGN?

Line Detection: Transition



Line Detection: LINER



Seyfert Redshift Distributions

