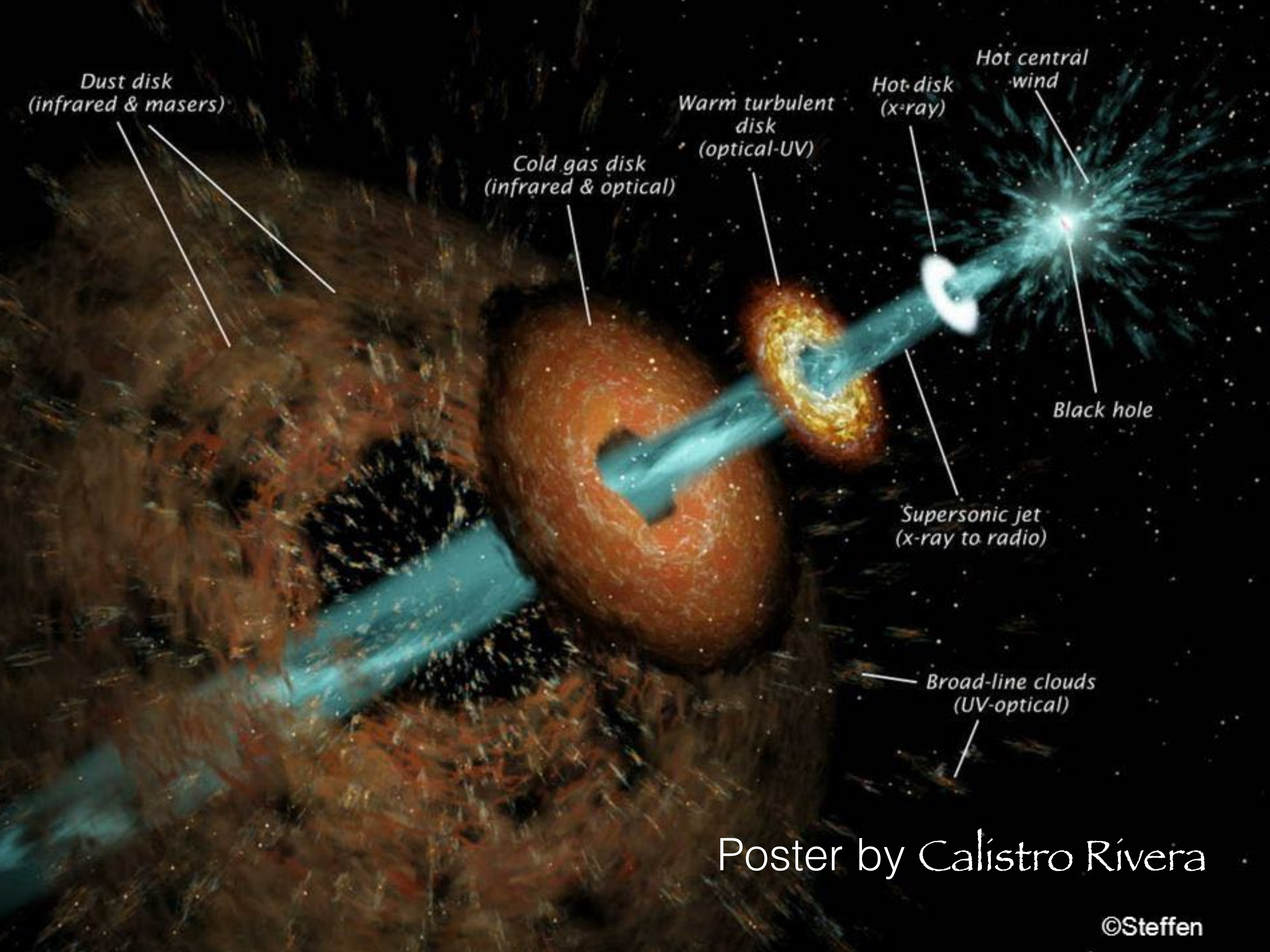
Conference Summary

Elusiveness on all scales

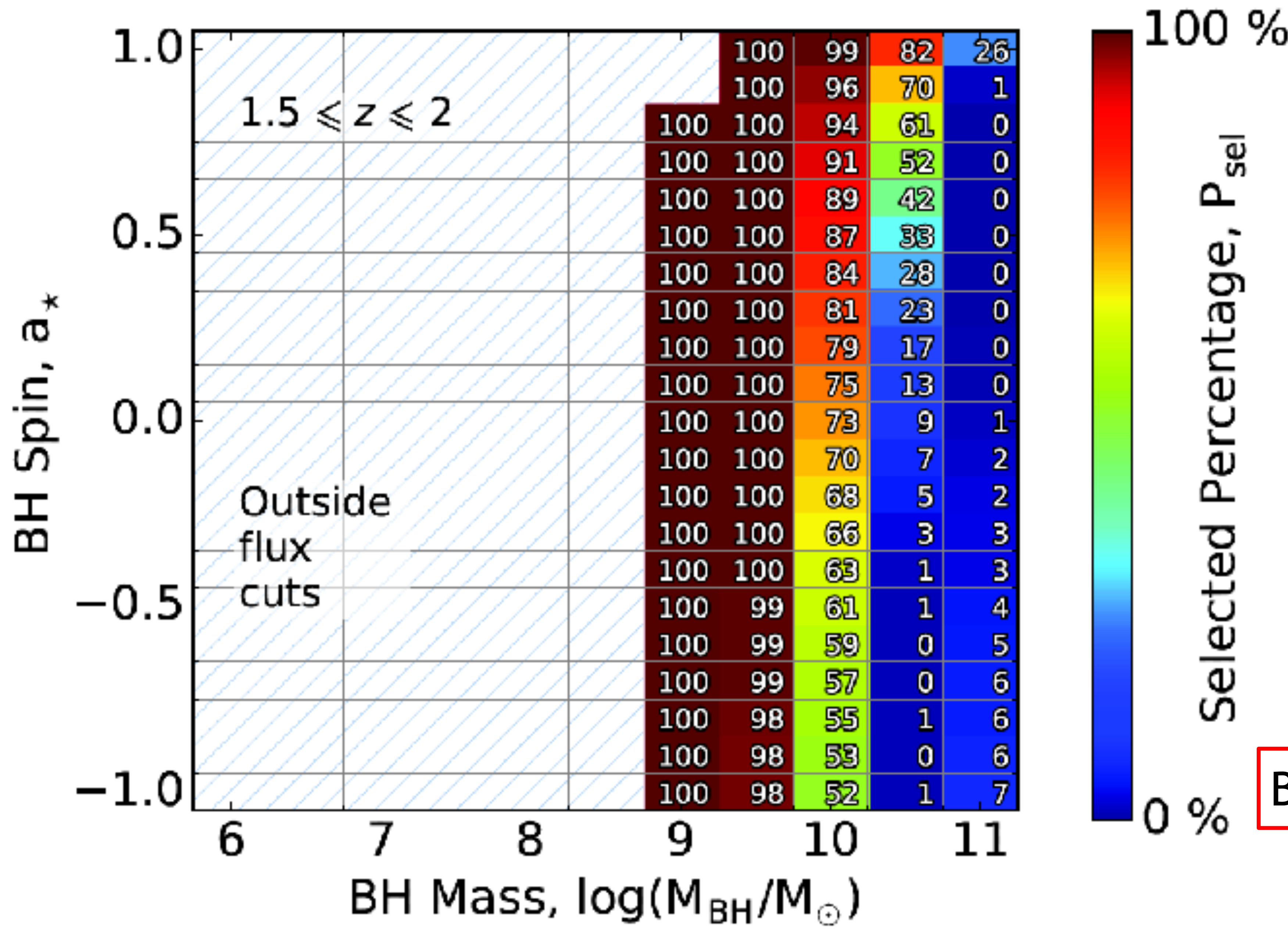
David Rosario (Durham University)


Dust disk
(infrared & masers)
Cold gas disk
(infrared & optical)
Warm turbulent
disk
(optical-UV)
Hot disk
(x-ray)
Hot central
wind
Black hole
Supersonic jet
(x-ray to radio)
Broad-line clouds
(UV-optical)
Poster by Calistro Rivera
©Steffen

Black hole

Trakhtenbrot:

SDSS color-color selection misses high-mass, low spin BHs

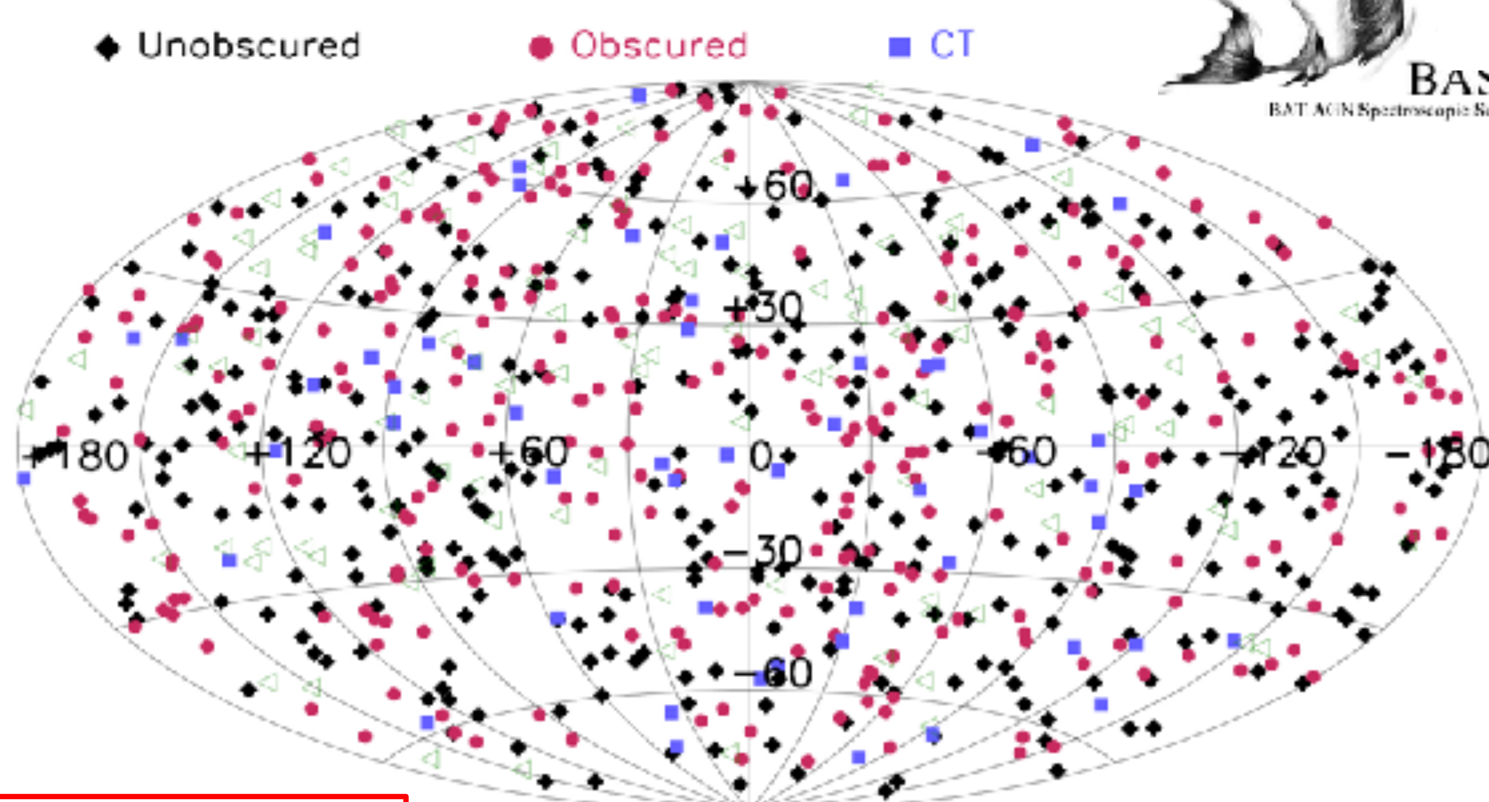


Bertemes +16

Compton Corona

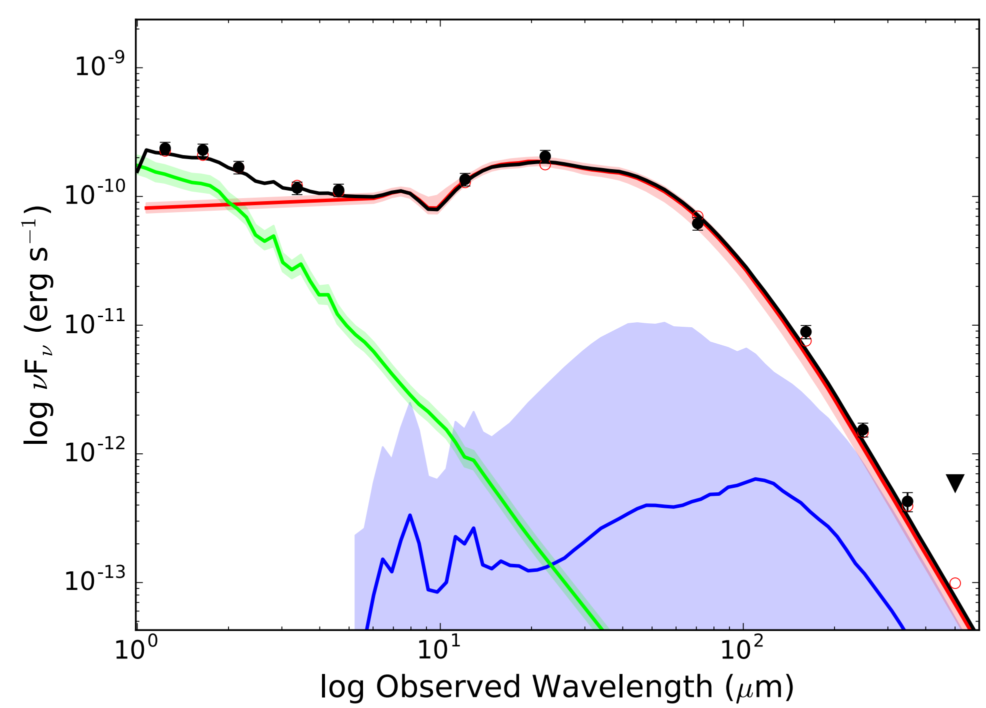
Ricci, Lamperti, Ichikawa:

Hard X-ray BAT AGN survey. This is now the reference survey for the majority of the radiative power from local black holes



Ricci+ 2017 ∞

MCG -05-23-016

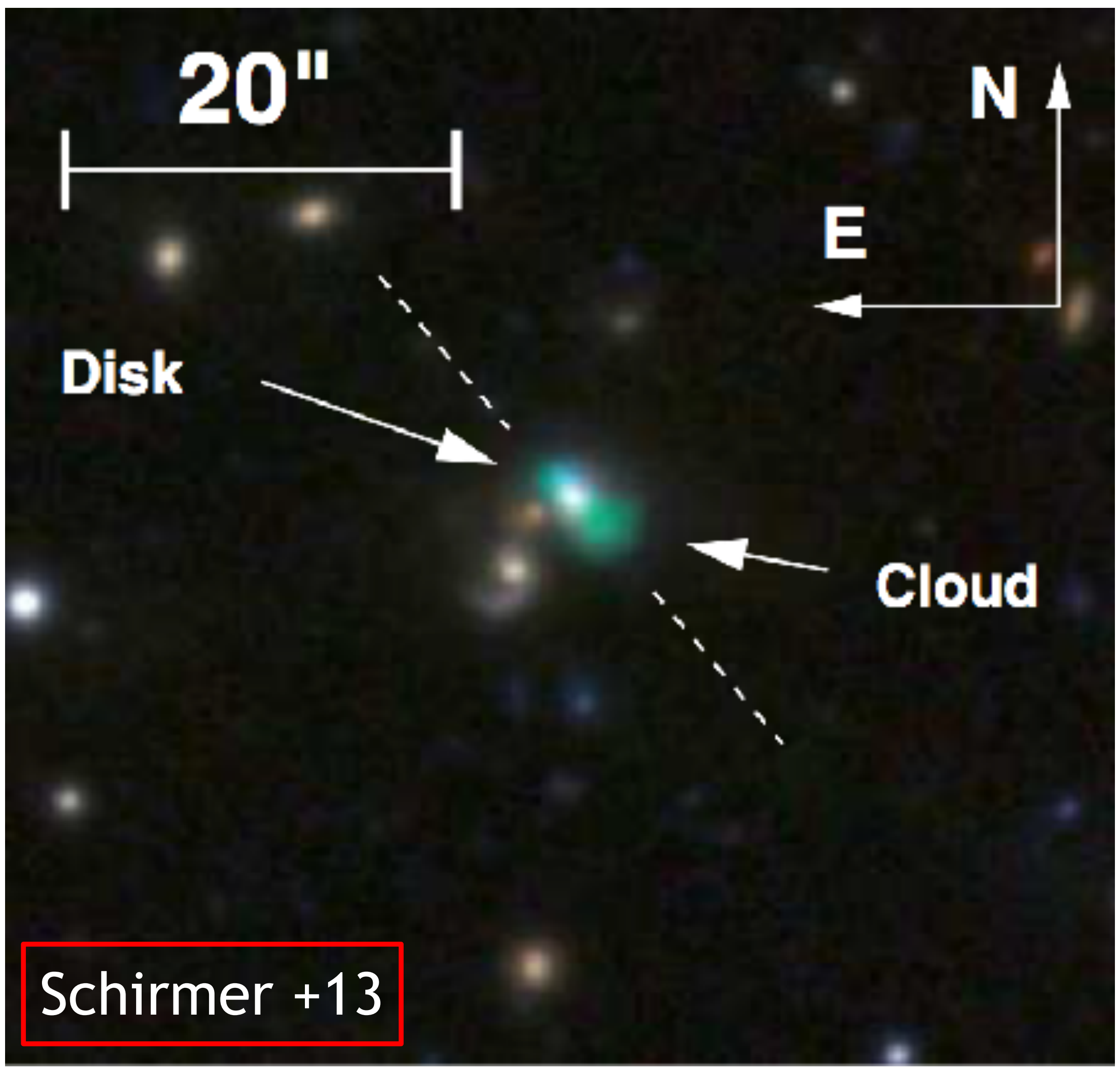


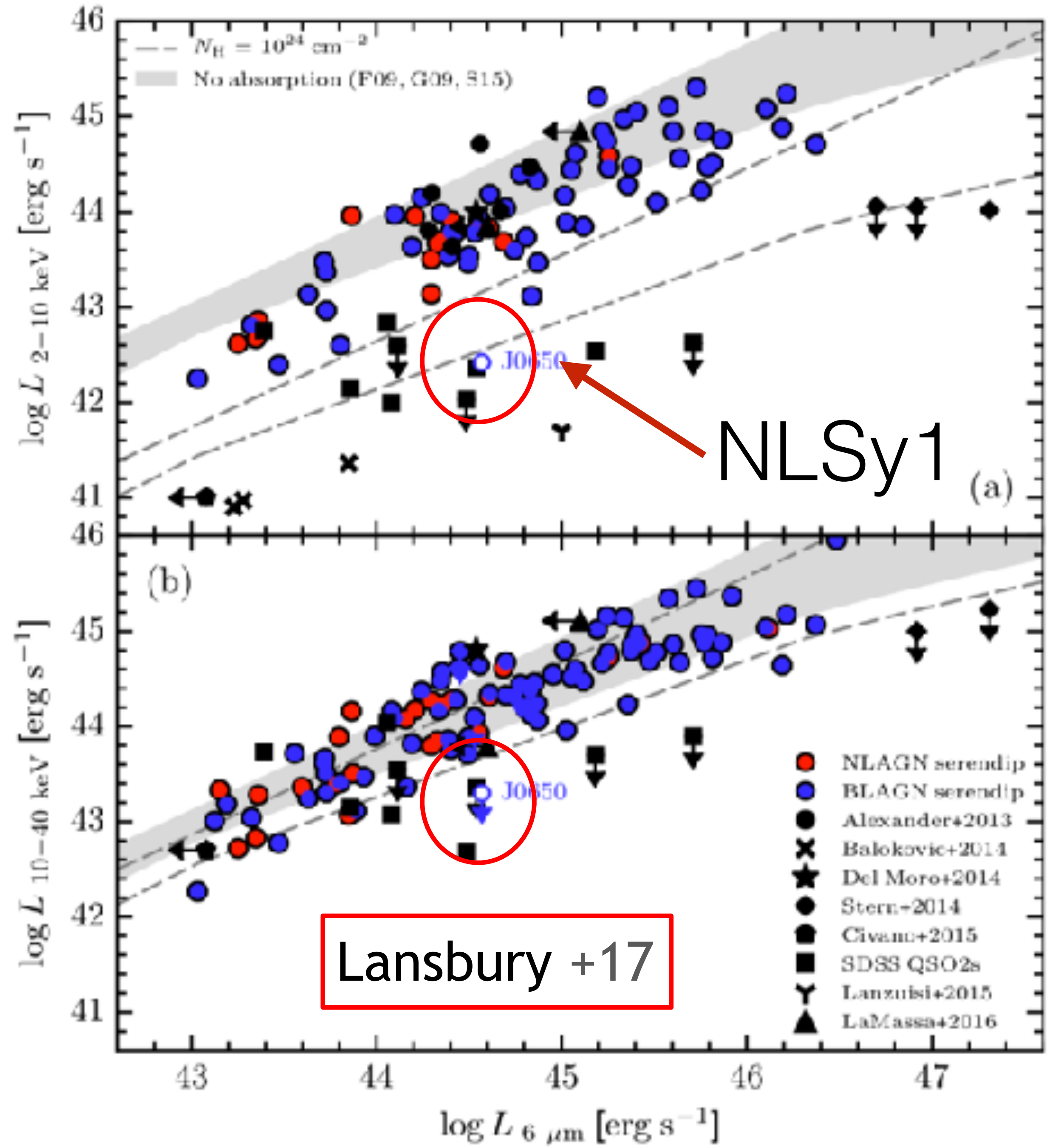
Rosario+ 2017 (submitted)

Compton Corona

Levenson:

X-ray faintness, end of accretion phase, relic AGN





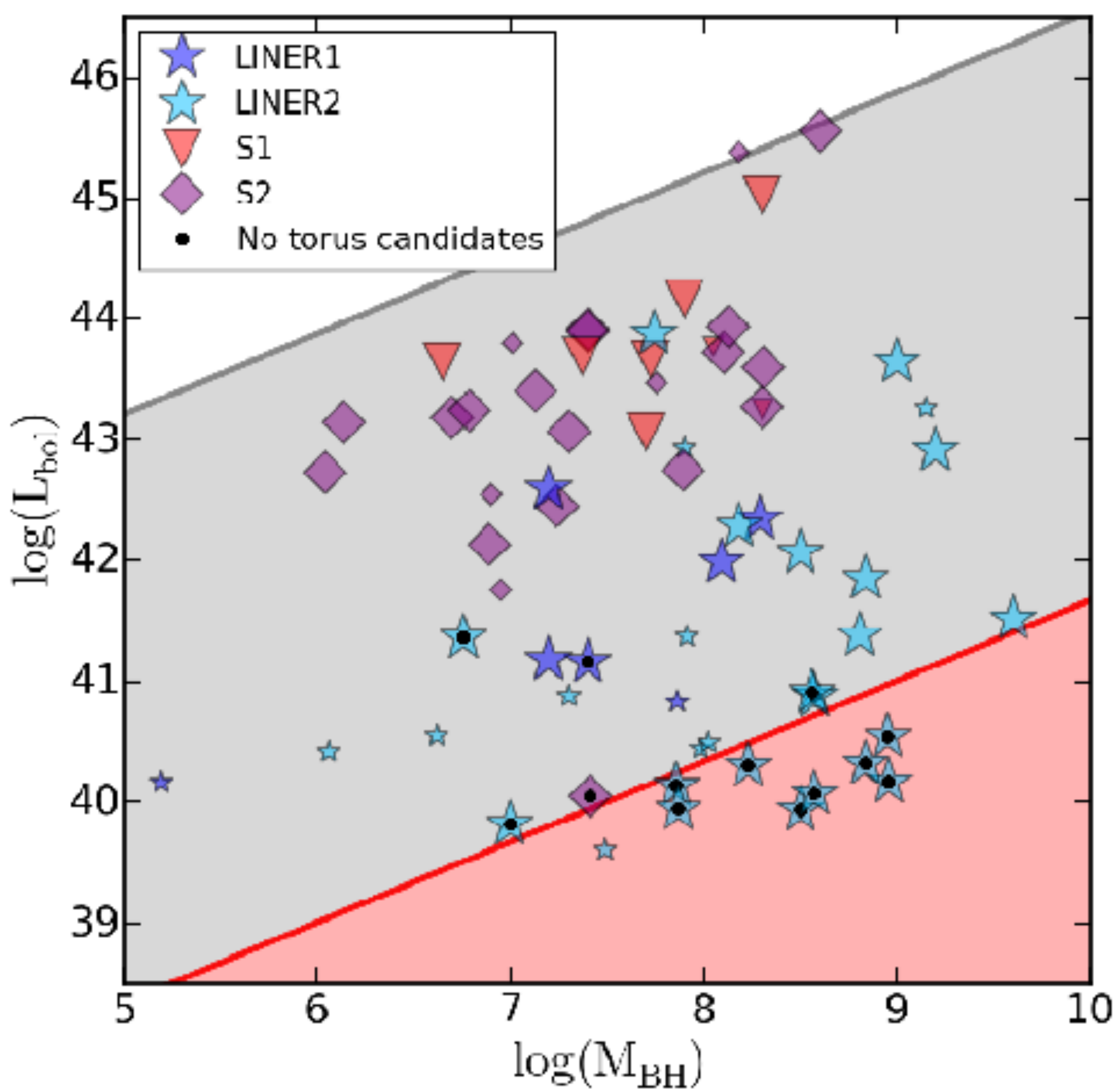
Accretion disk and BLR

Elitzur:

The BLR (and torus) disappears at $L > L_{min} = \Lambda M_7^{2/3}$

$\Lambda = 3.3\text{x}10^{45} (\varepsilon r l)^{4/3}$ erg s^{-1}

Related to disk spin, mass and structure



Finding true Type 2s (X-ray and NIR spectroscopy) and mapping their incidence in this plane gives interesting constraints on the properties of accretion disks.

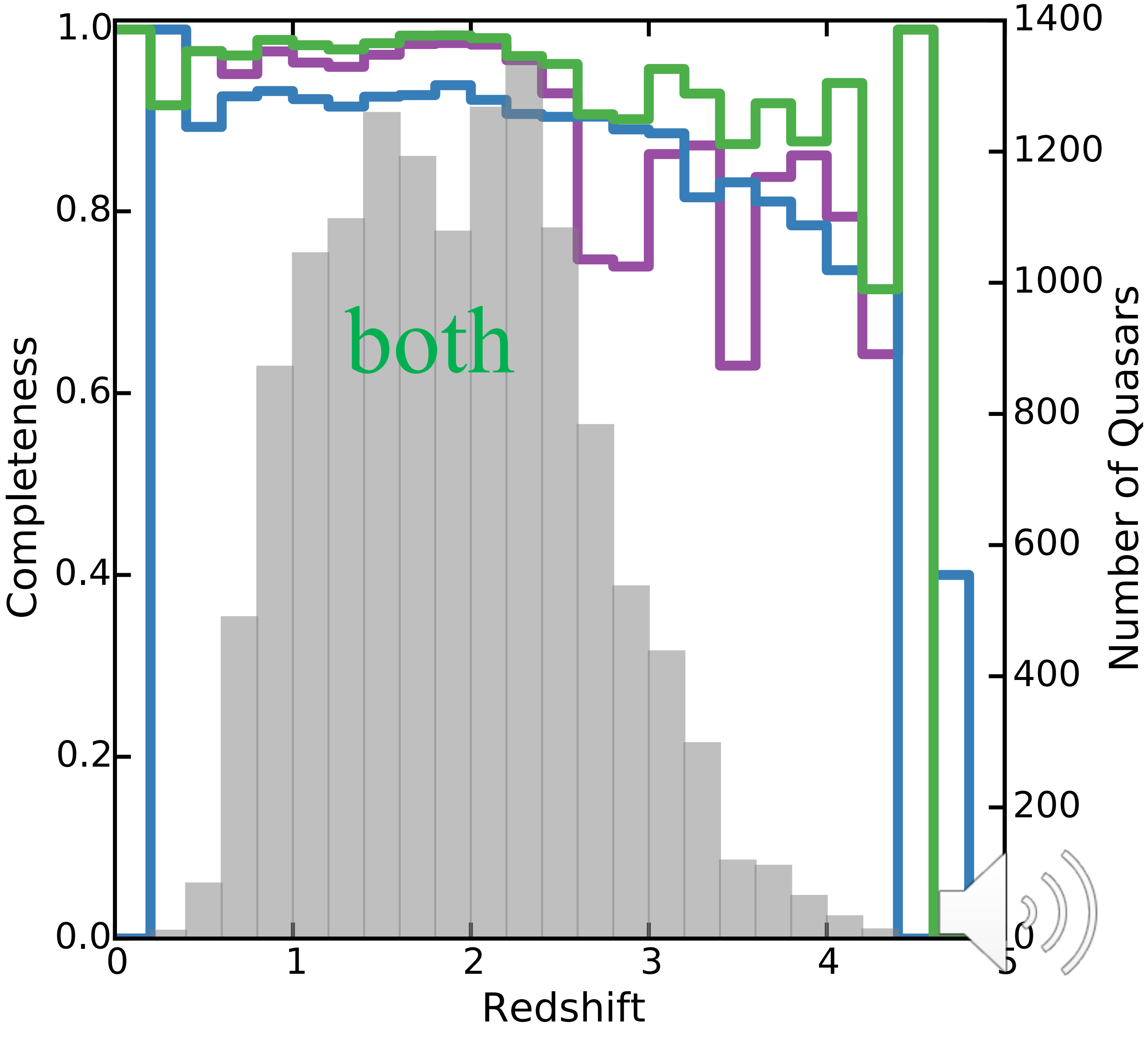
Gonzalez Martin+ 17

Accretion disk and BLR

Richards:

Accretion disk variability improves the completeness of QSO identification in next-generation surveys

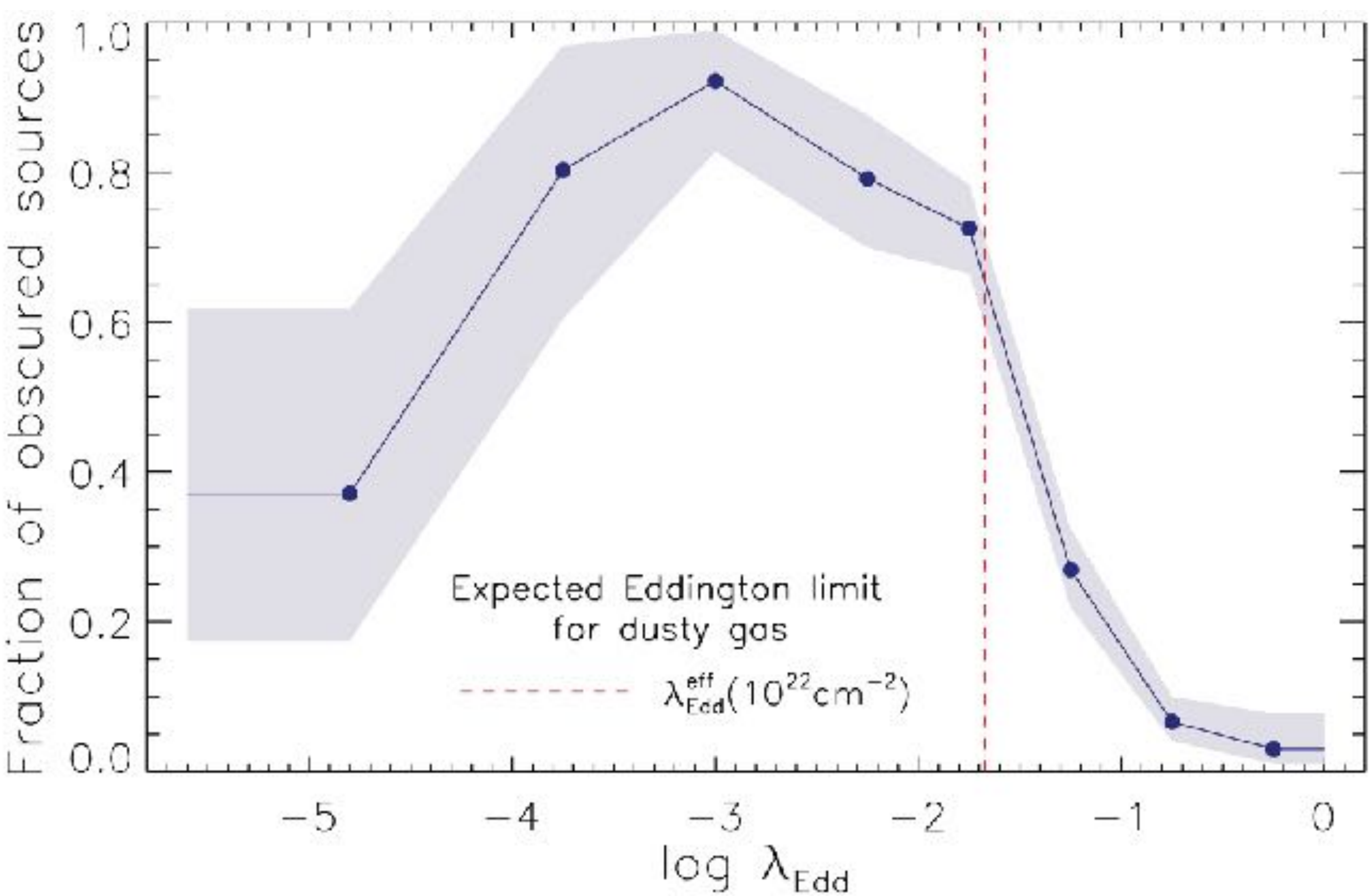
Additional value from astrometry and multi-wavelength data



Wind/Torus

Ricci:

Covering factor of X-ray obscuration depends on Eddington ratio



Ricci+ 17d, submitted

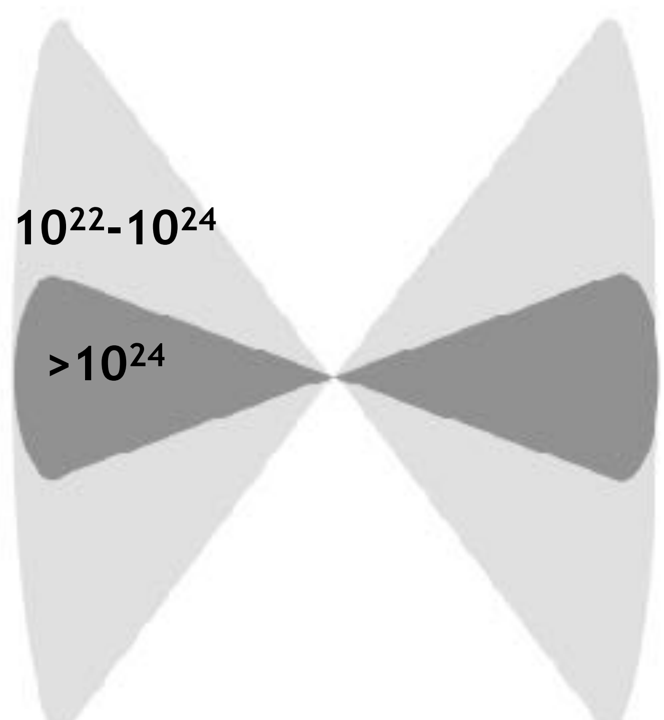
Wind/Torus

Ricci, Kuraszkiewicz:

Obscuring material is dusty and in the sphere of influence of the black hole

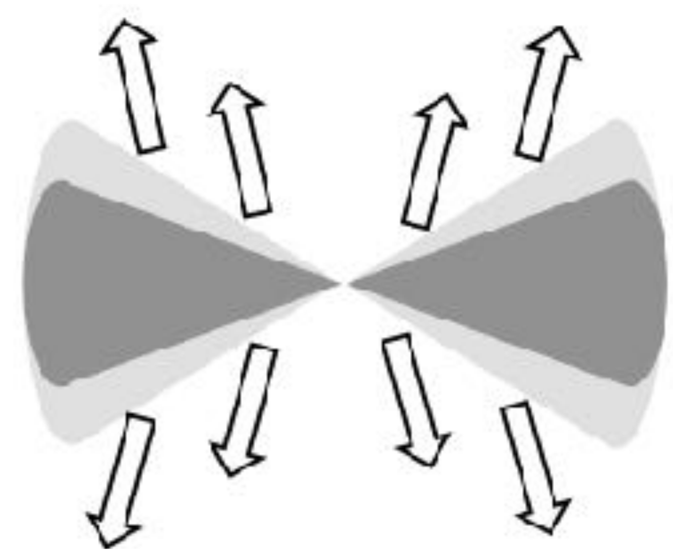
Low Eddington ratio
(λ_{Edd}<$10^{-1.5}$)

Covering factor ~80%



High Eddington ratio
(λ_{Edd}>$10^{-1.5}$)

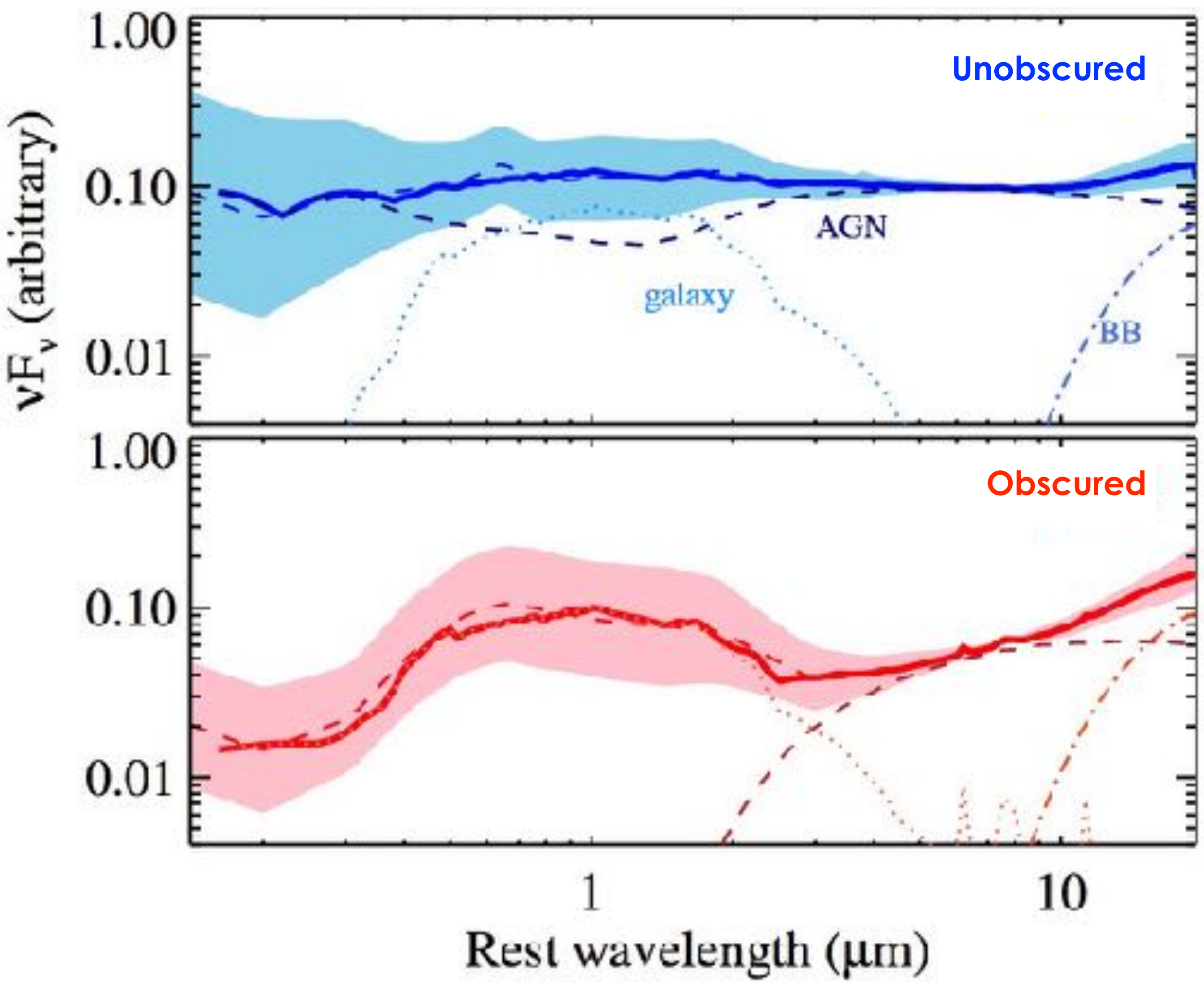
Covering factor ~30% + outflows



Dusty torus

Hickox:

Hot dust makes optically obscured AGN not as elusive.
WISE is a huge game changer.

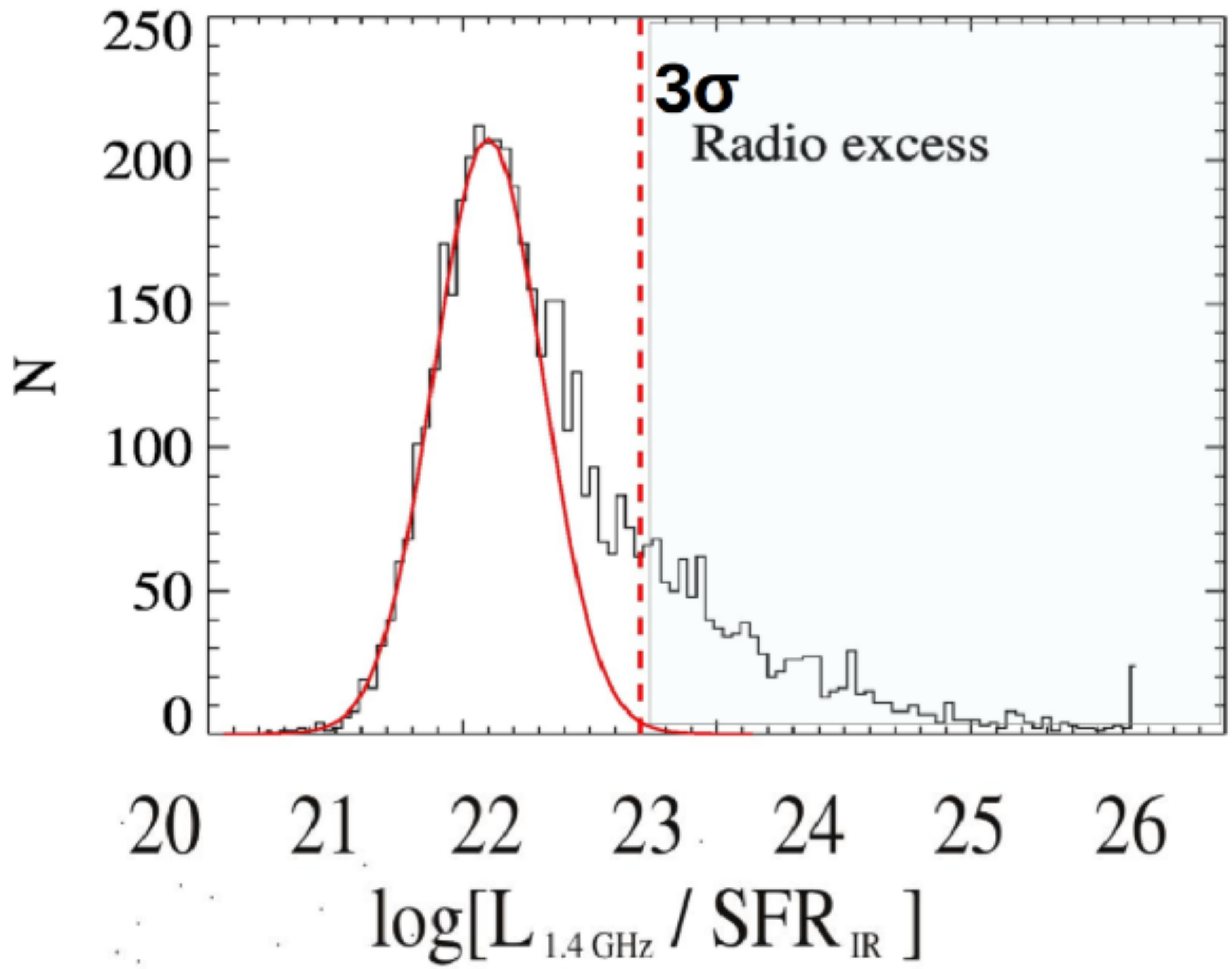


Question for audience:

To what distance can WISE and Swift/BAT give us a truly complete measure of integrated black hole growth in the Local Universe?

Synchrotron "jet"

Delvecchio: Radio-based multi-wavelength selection can also recover a substantial population of radiatively-inefficient AGN

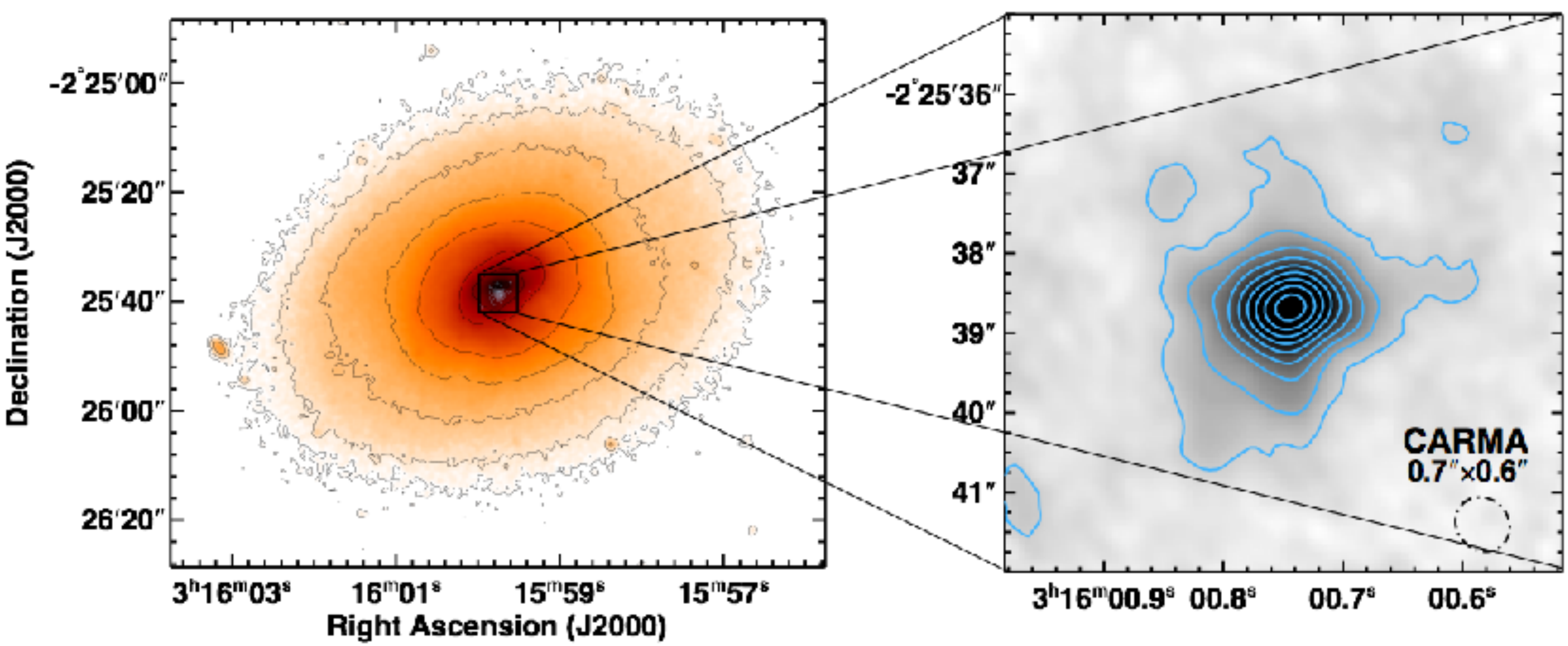


Delvecchio+ 2017

Circum-nuclear gas and stars

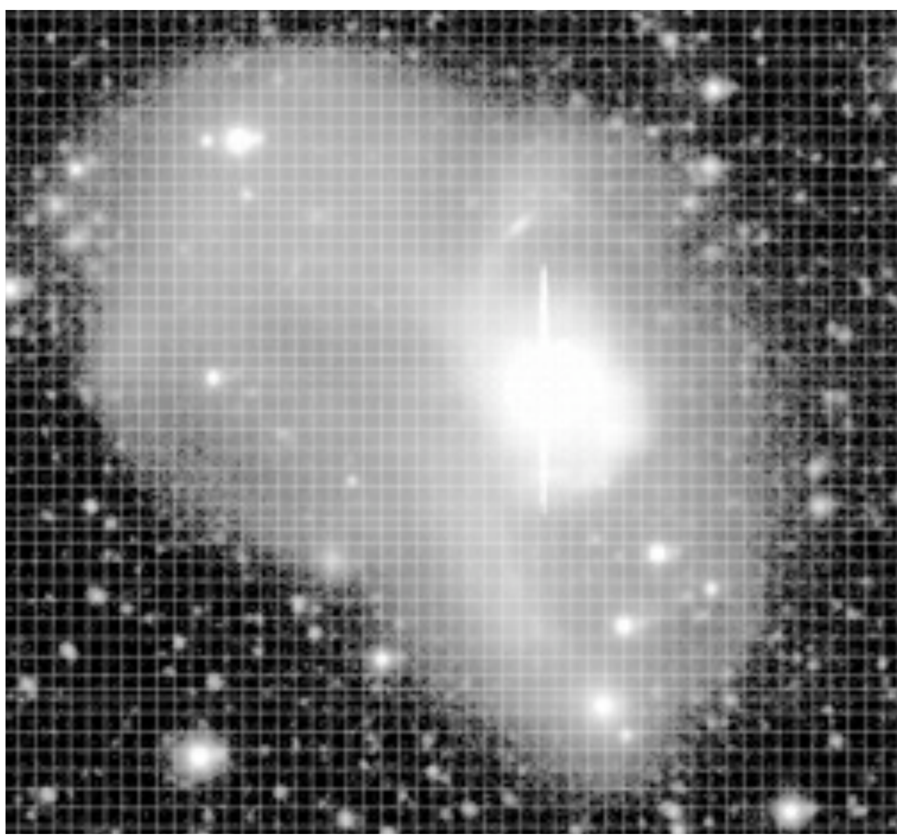
Lanz: NGC 1266 has a high surface density of infertile cold gas, average $N_H > 10^{24}$ cm^{-2}

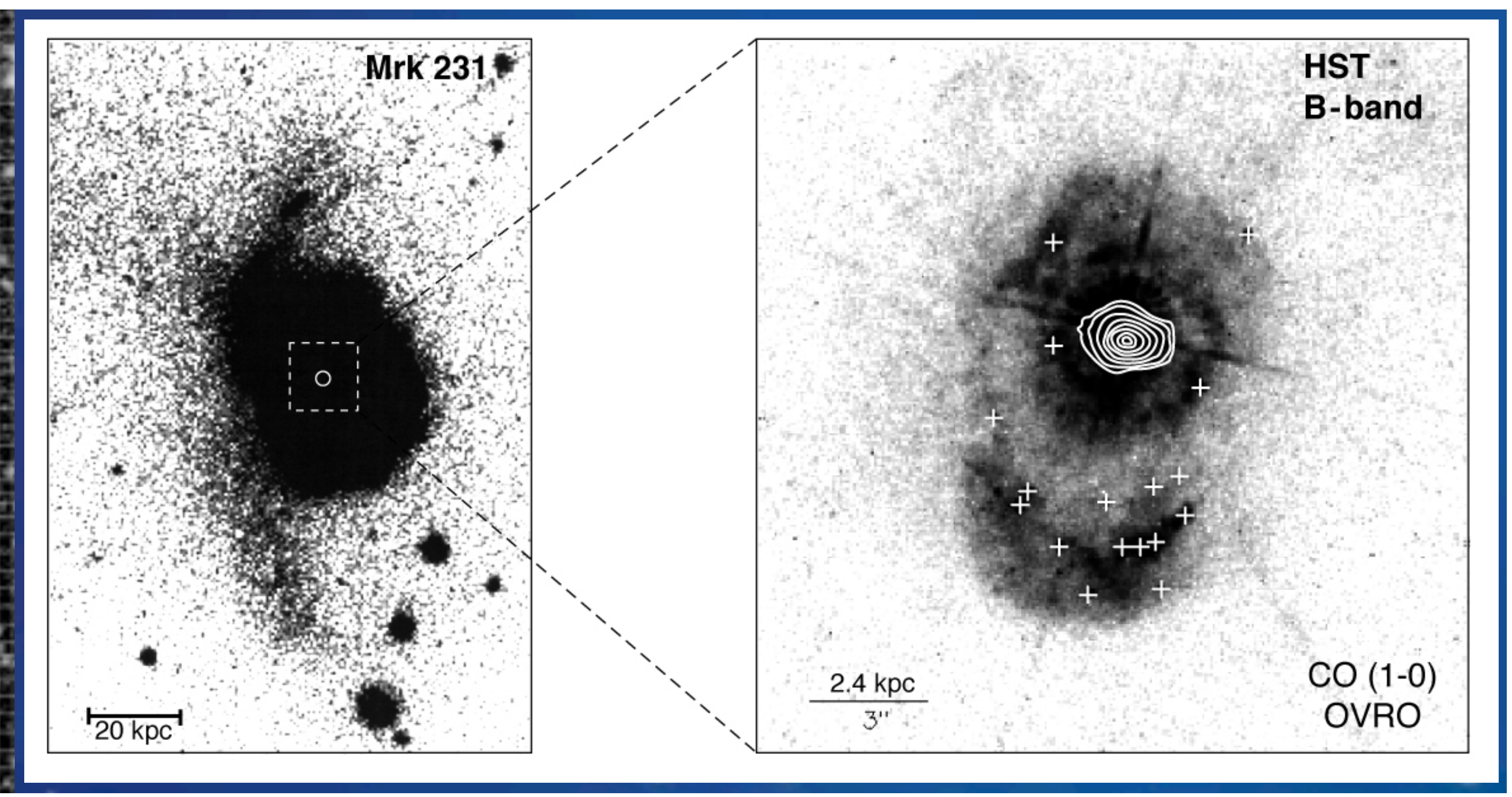
Alatalo+ 2015



Circum-nuclear gas and stars

Sanders: Mrk 231 has a high surface density of fertile cold gas, average $N_H > 10^{24}$ cm^{-2}

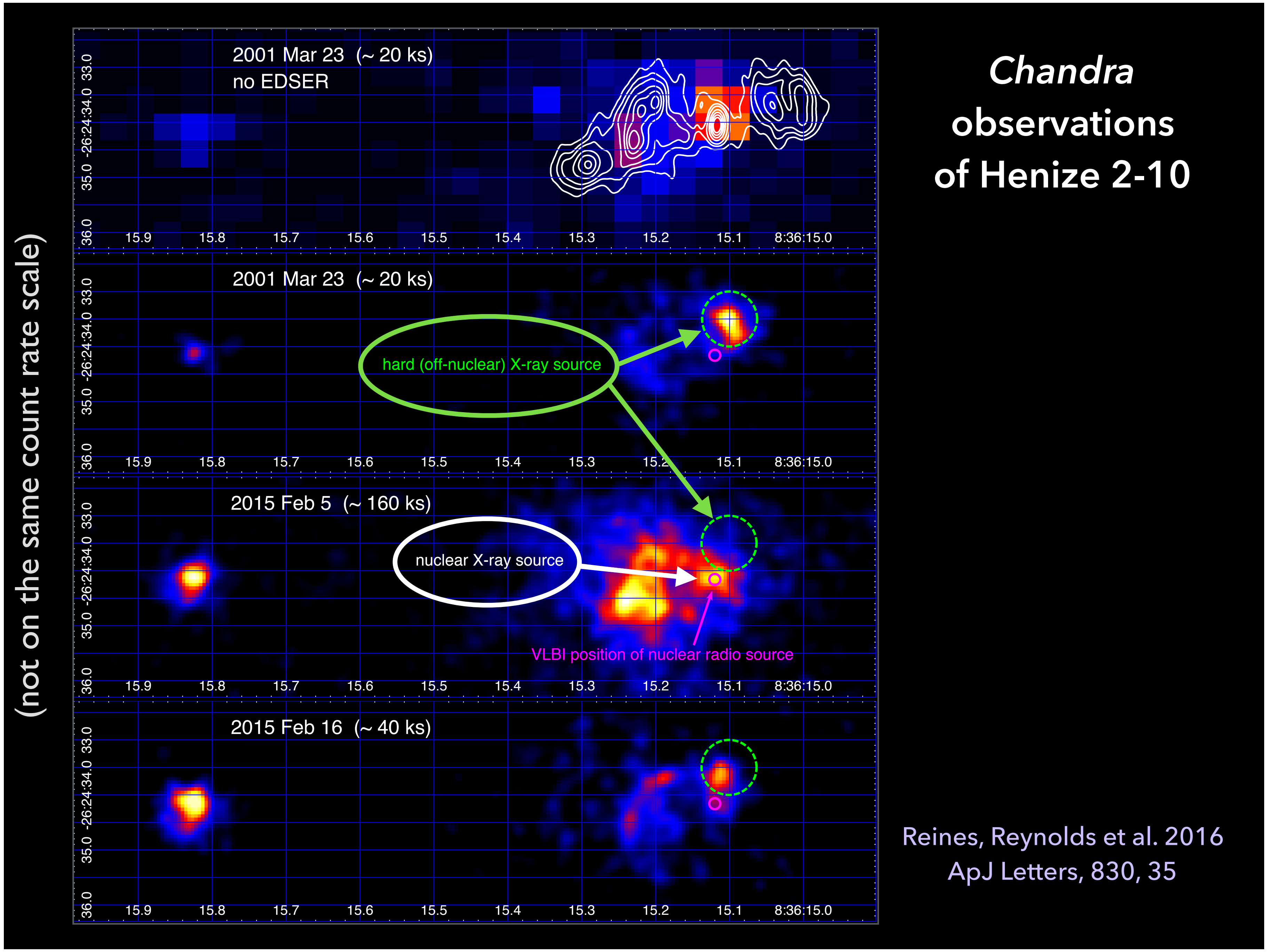




More from talk by Imanishi

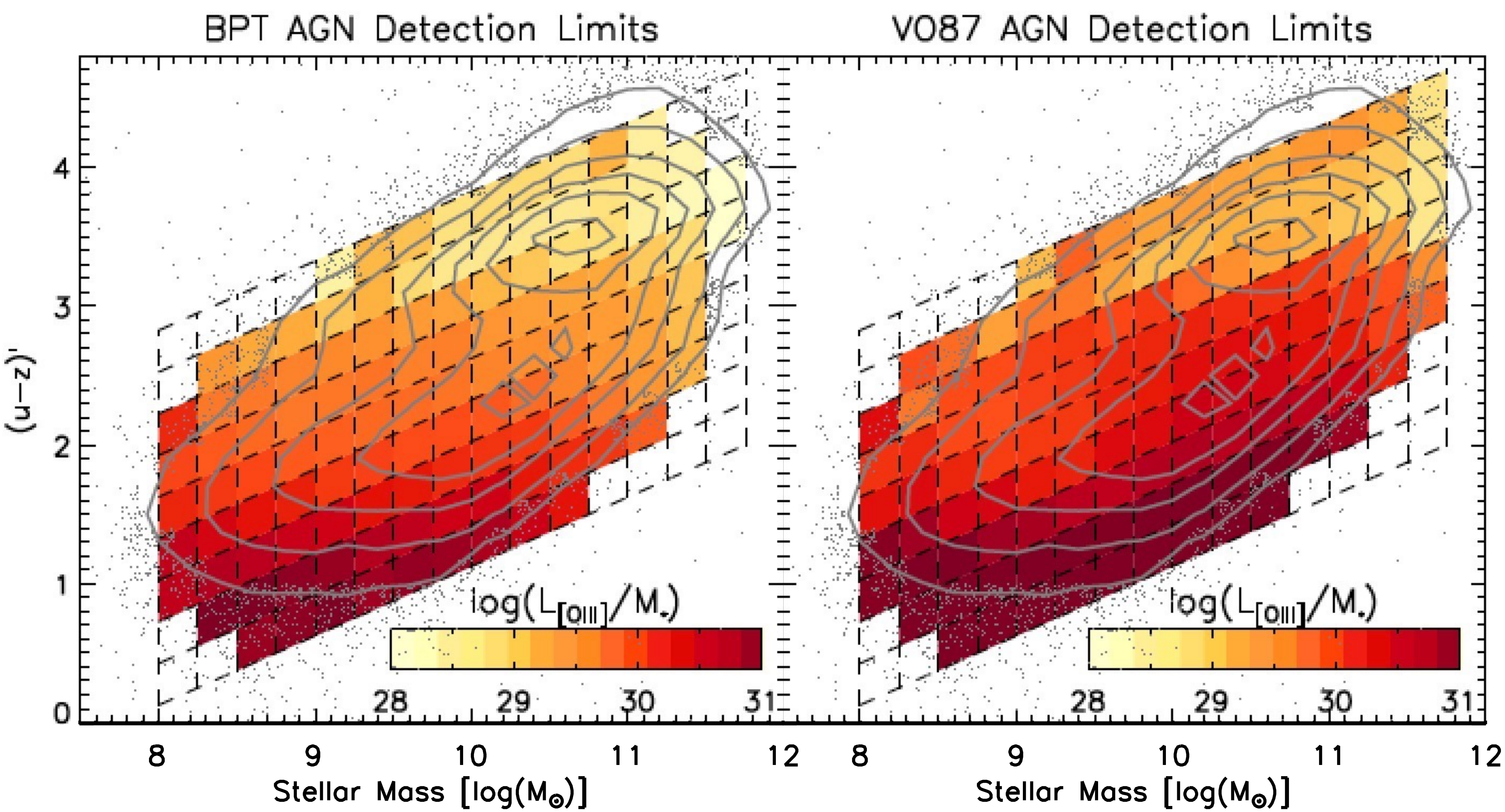
Circum-nuclear gas and stars

Reines: Faint AGN can be swamped by stellar emission (XRBs, etc).



Galaxy-wide gas and stars

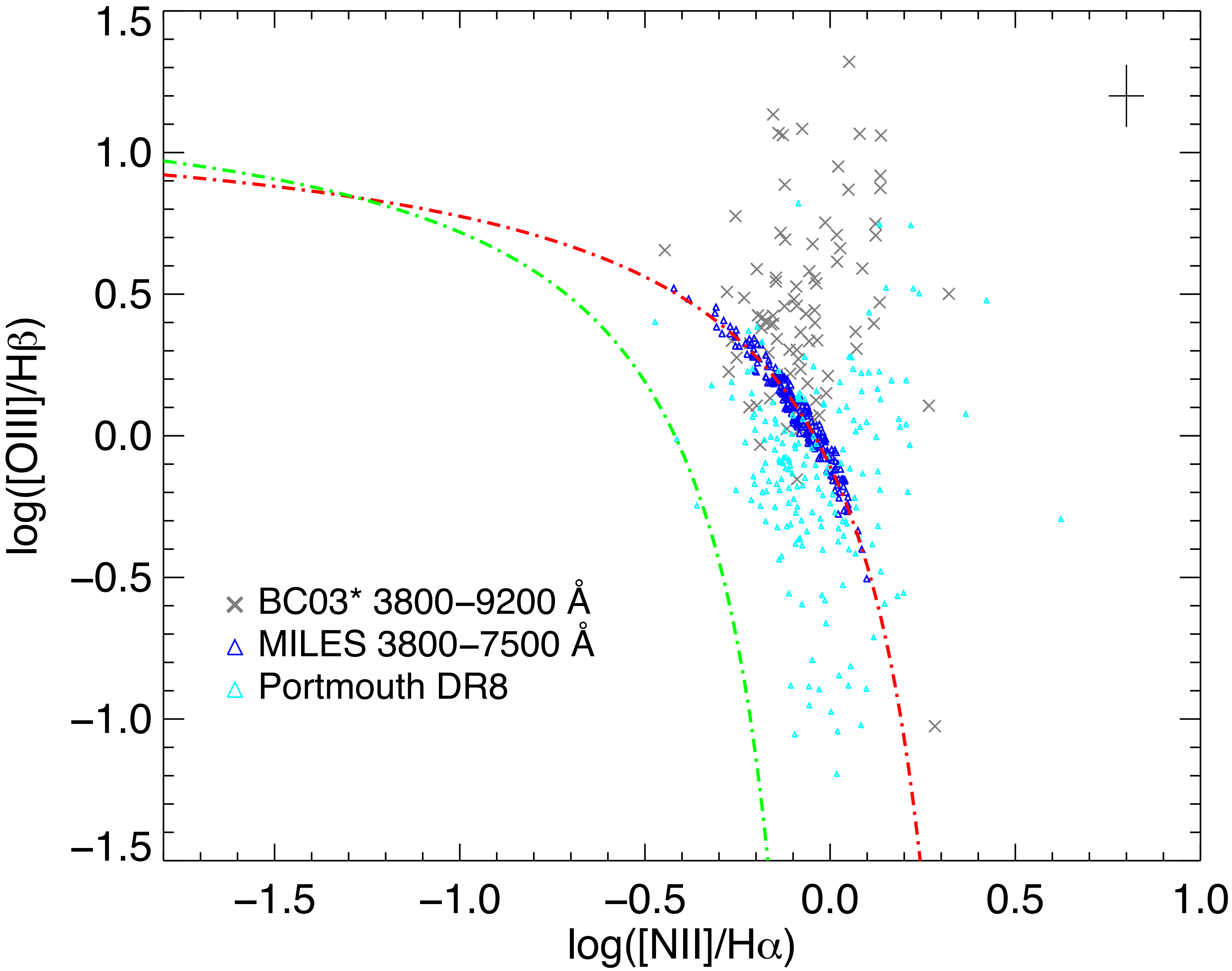
Trump: BPT selection misses AGN in star-forming hosts.



Trump+ 2015

Galaxy-wide gas and stars

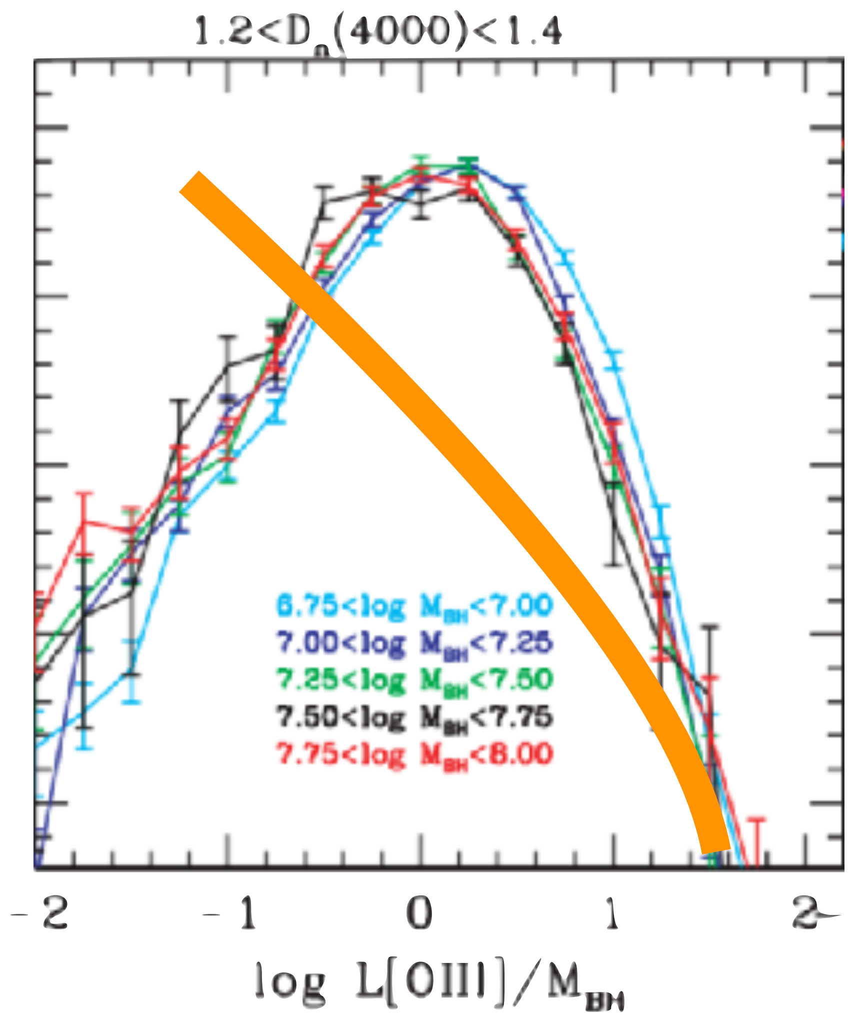
Zaw: Stellar population details matter when trying to identify emission-line AGN, especially faint ones.



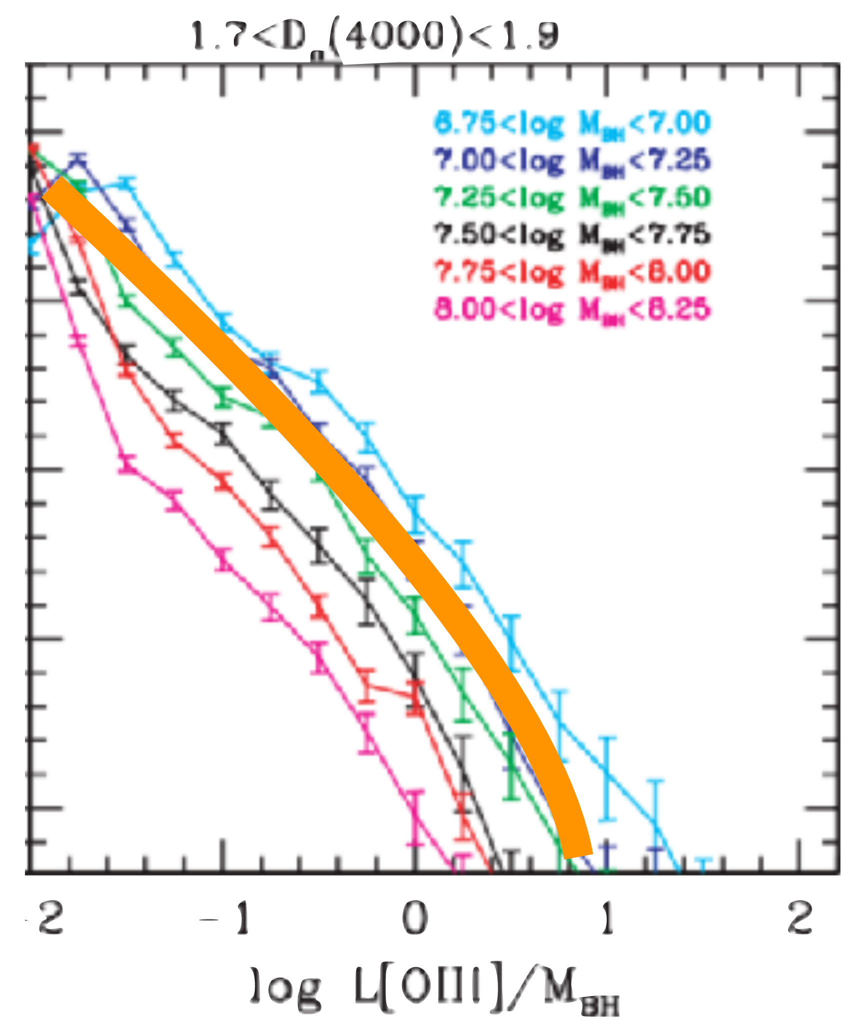
Galaxy-wide gas and stars

Jones: Missed AGN affect observed host properties and inferred accretion rate distributions.

Young Galaxies



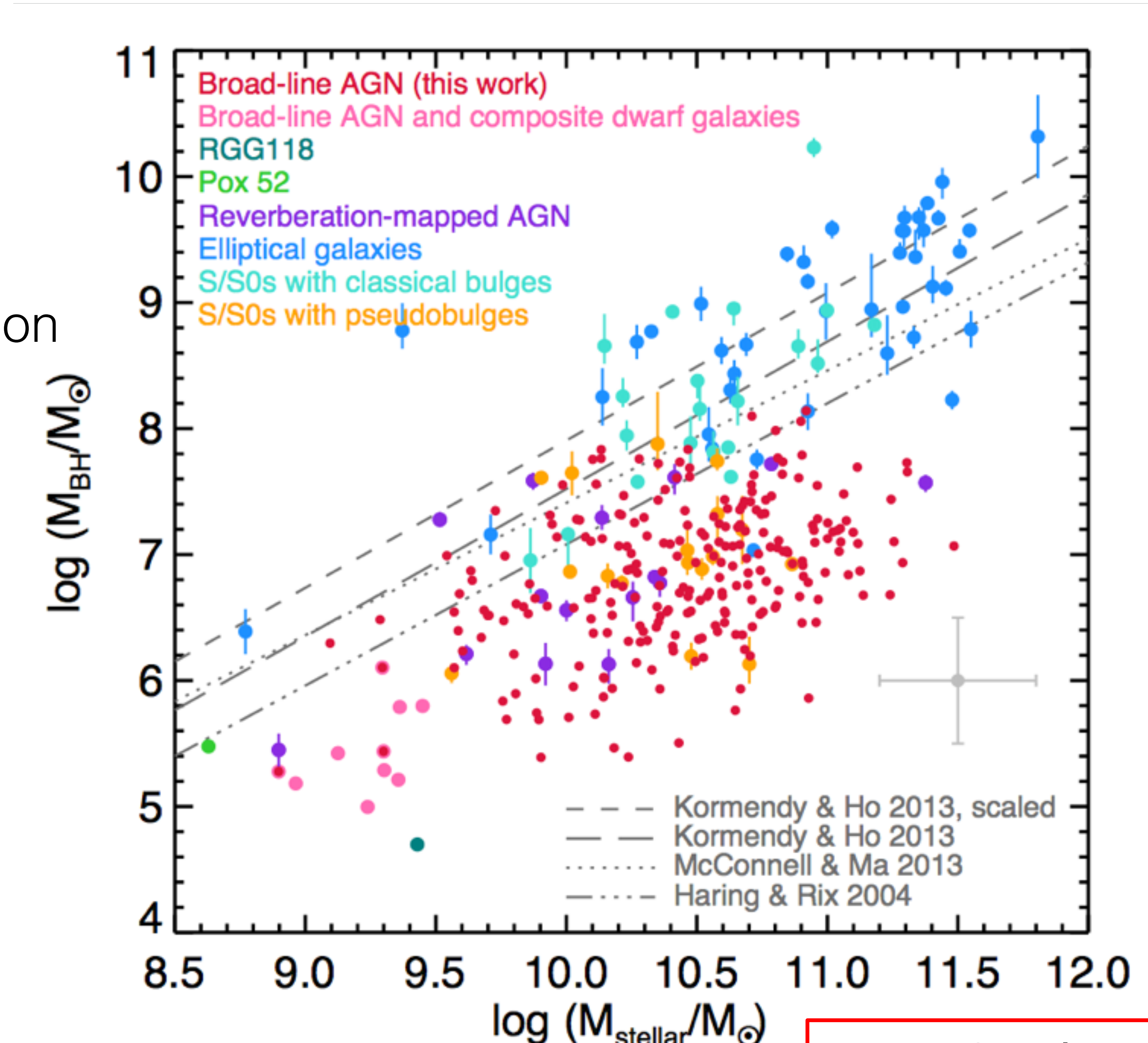
Older Galaxies



Dwarf AGN and low-mass BHs

Line-selected AGN
in dwarf galaxies

"Offset" M_{BH} - M_* relation

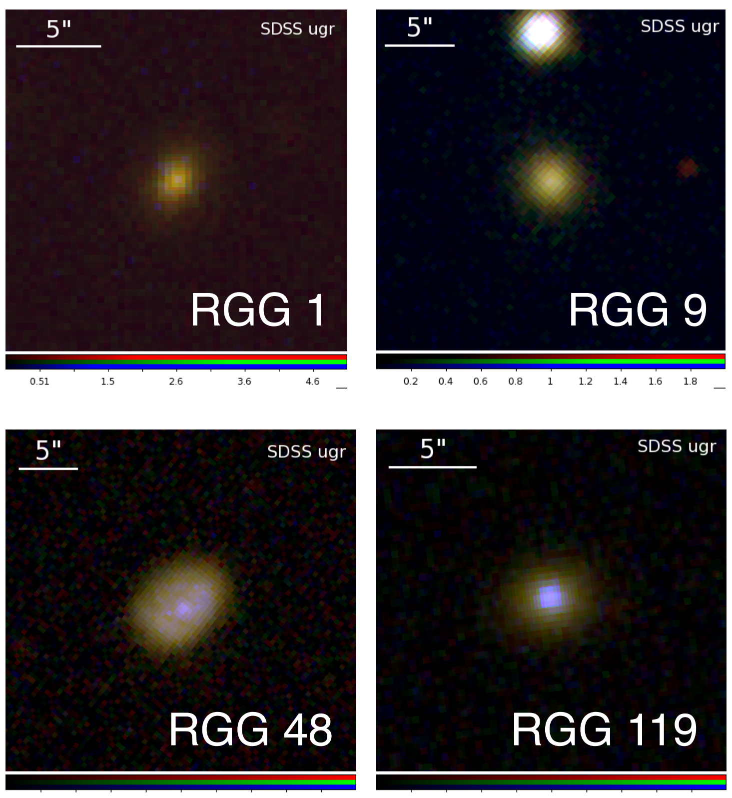


Reines & Volonteri 2015

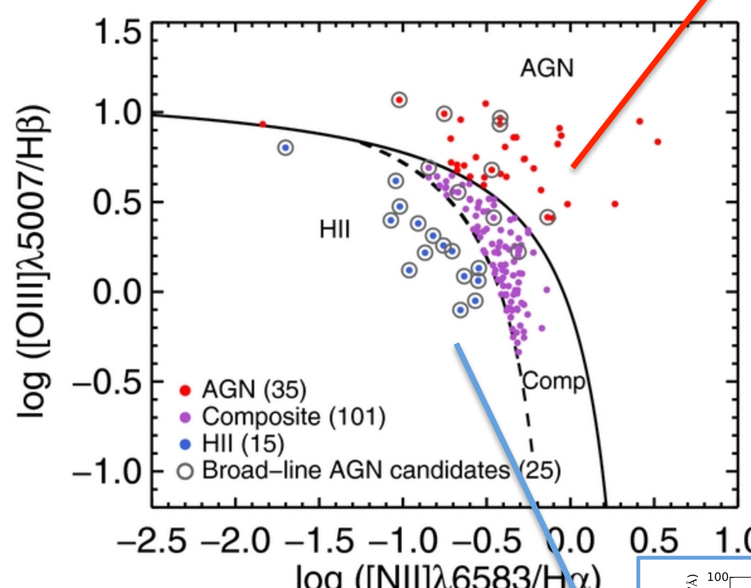
Talk by
Reines

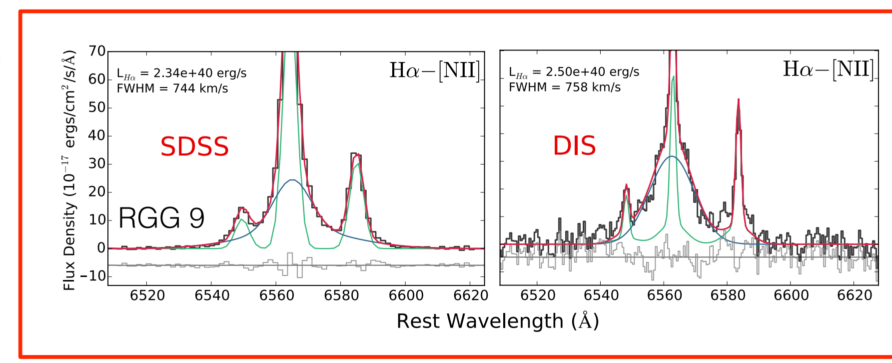
Dwarf AGN and low-mass BHs

25 Broad Line AGN



For dwarf galaxies, broad Hα alone is not evidence for an AGN

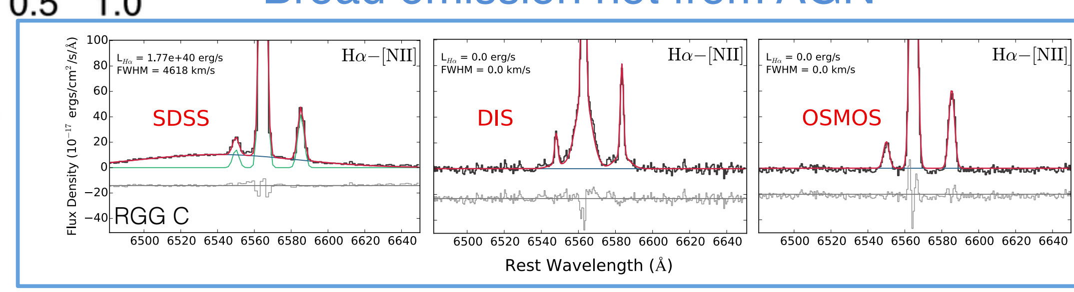




Broad emission from AGN

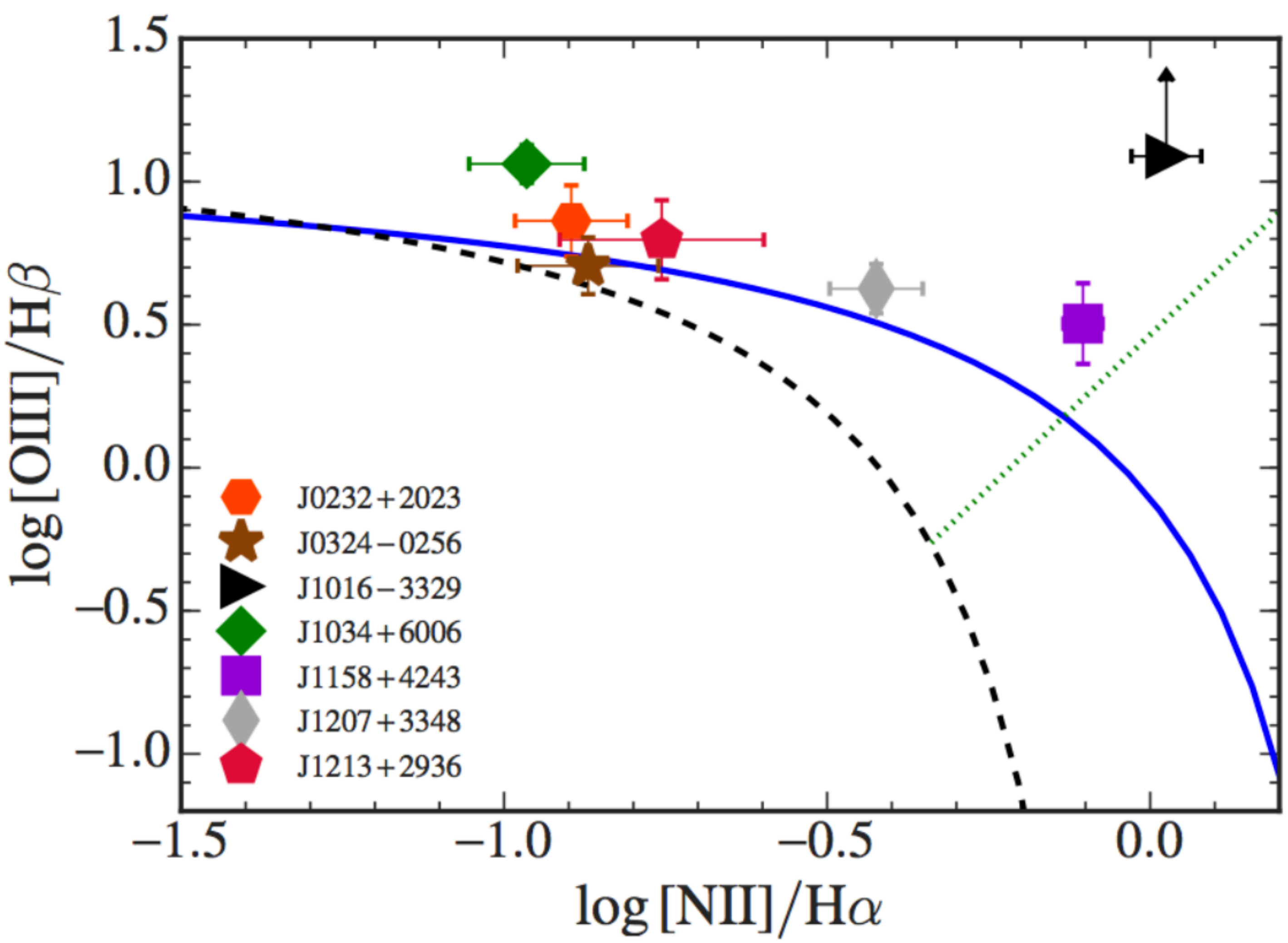
Baldassare et al. 2016

Broad emission not from AGN

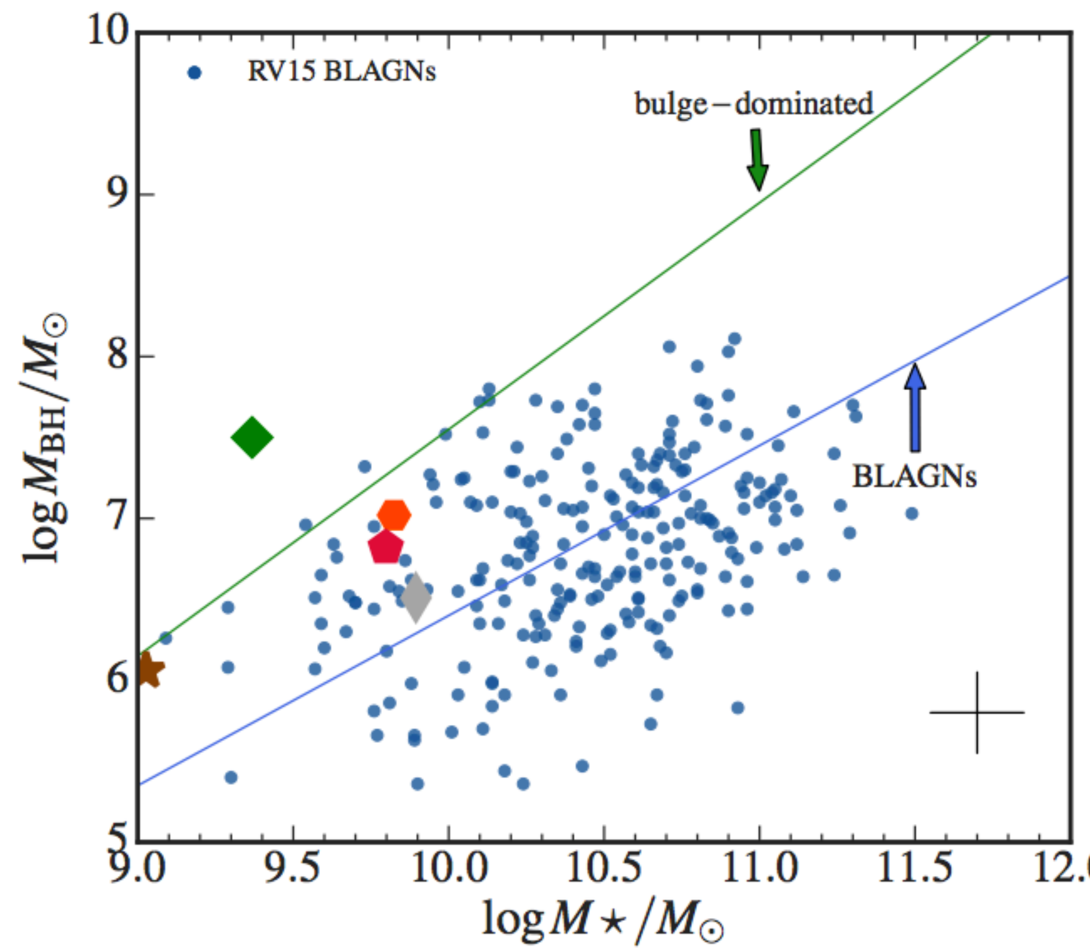


Talks by
Baldassare, Chilingarian

Dwarf AGN and low-mass BHs

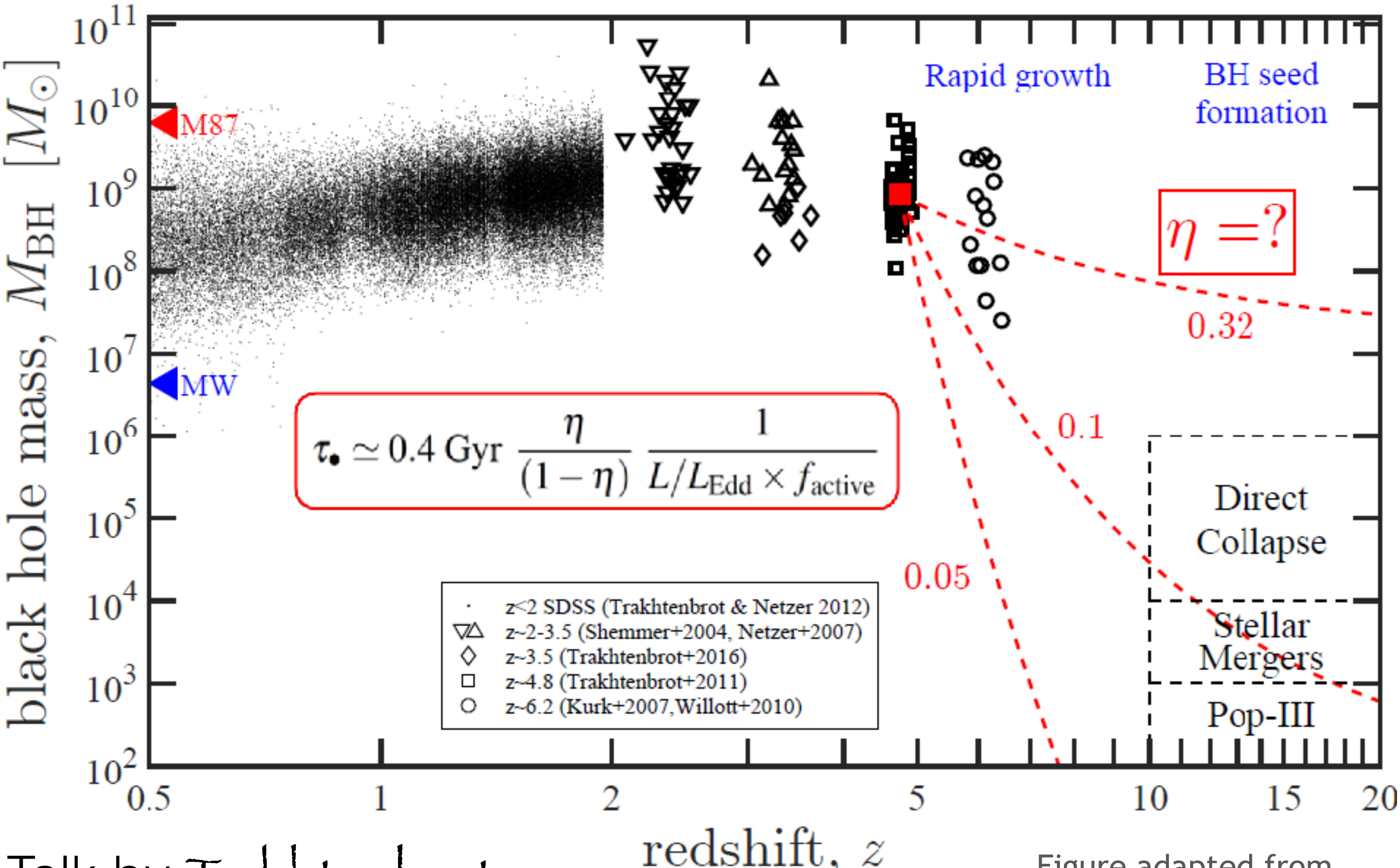


"Normal" M_{BH} - M_{*} relation



Talk by Chen

X-ray selected AGN in dwarf galaxies

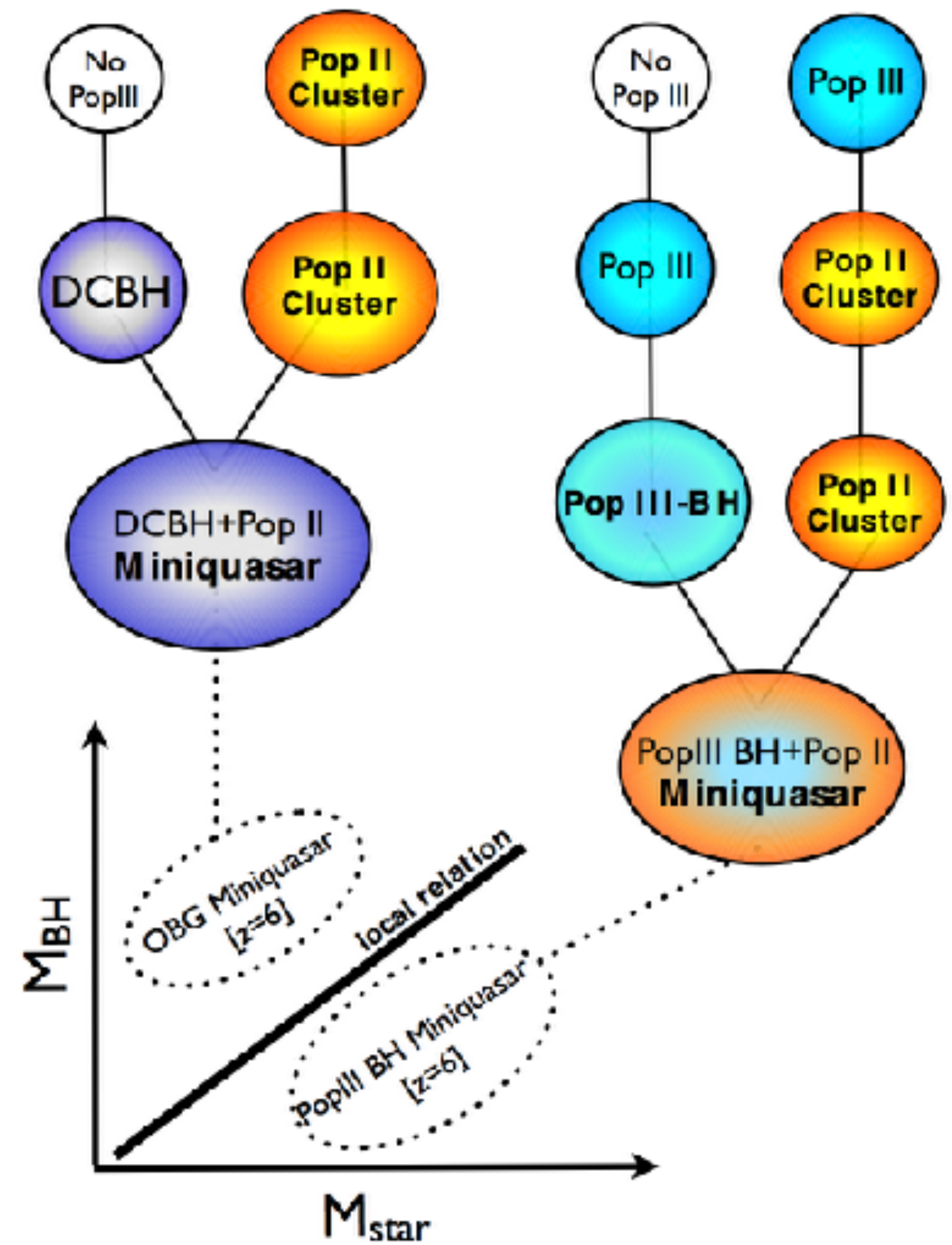


Talk by Trakhtenbrot

Figure adapted from Trakhtenbrot & Netzer 12

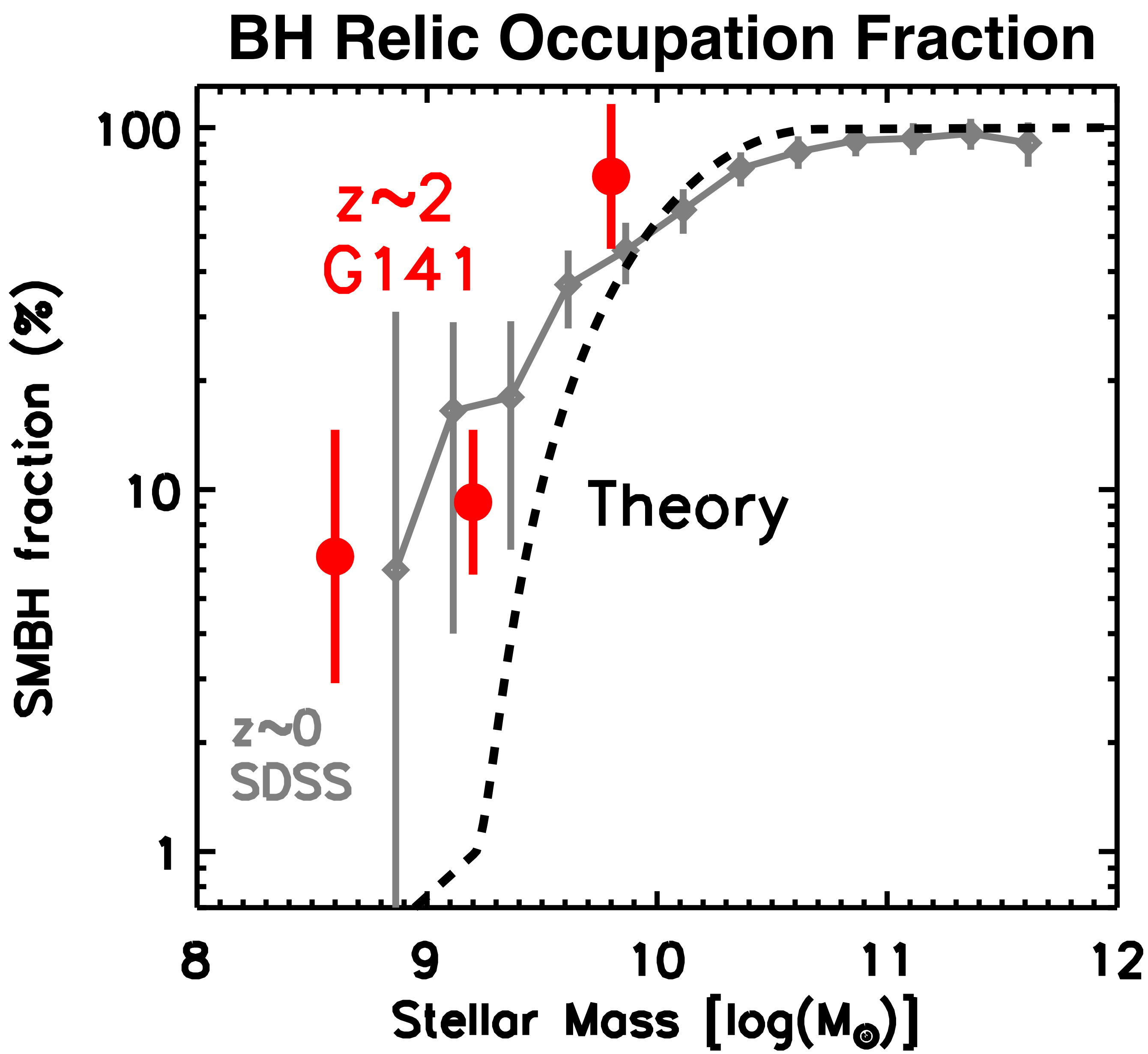
Early Black holes

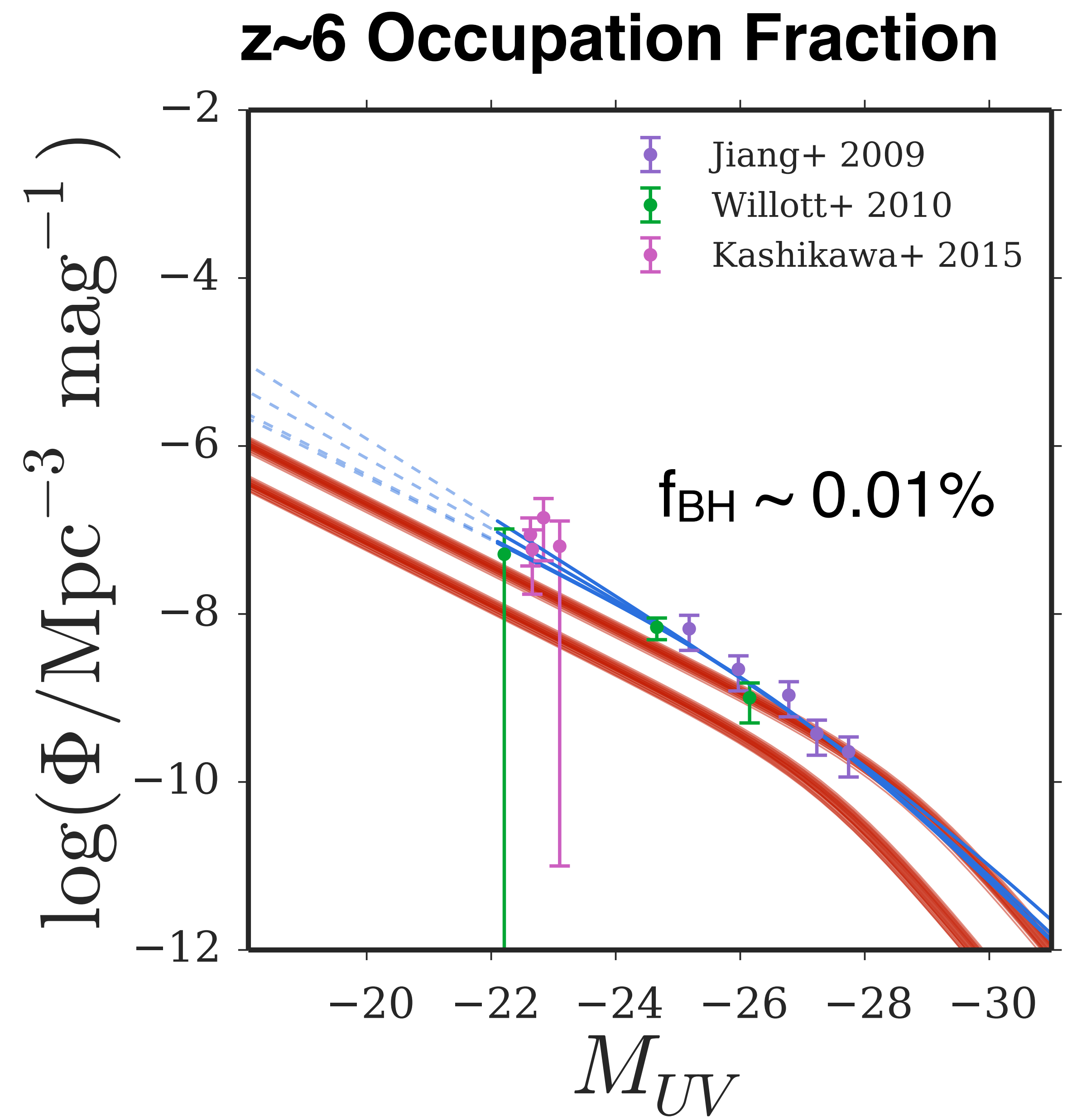
- Massive initial BH seeds
- Brief periods of super-Eddington accretion
- Periods of obscured growth during mergers
- Very inefficient feedback from BHs
- Long lived steady accretion mode



Talk by Natarajan
Poster by Ricarte

Early Black holes

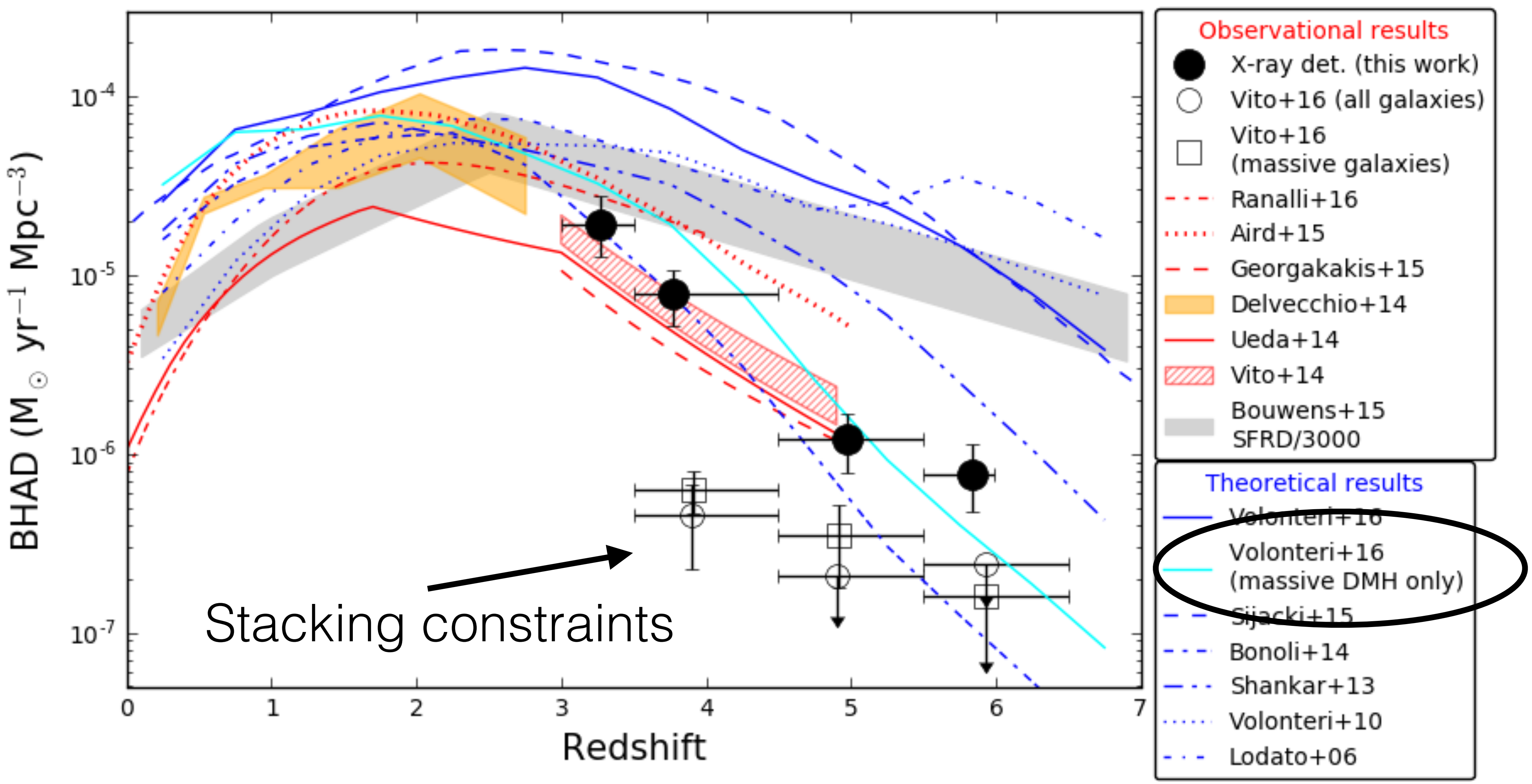




Talks by Trump, DeGraf, Schawinski, Reines

Early Black holes

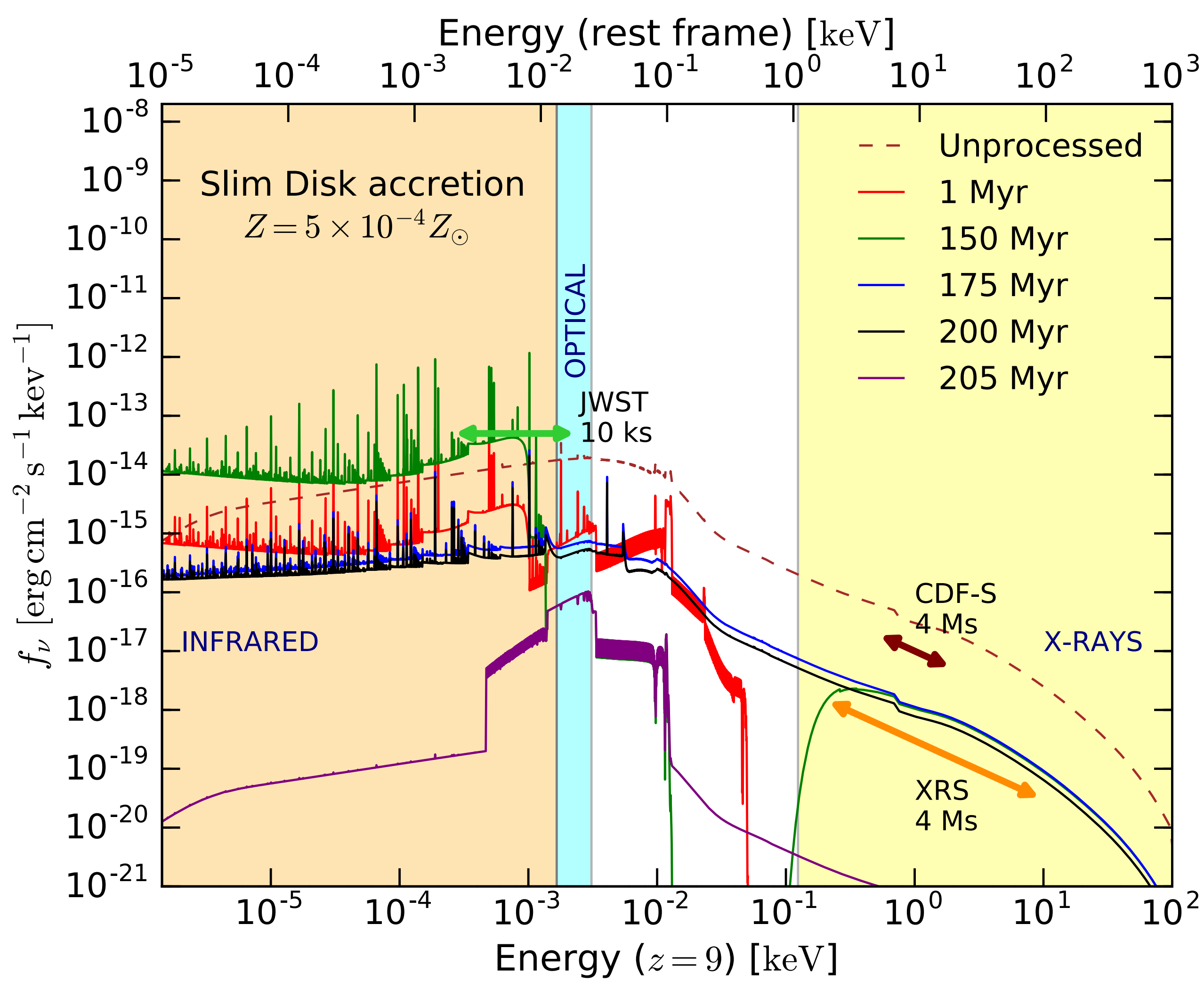
Early black hole growth in massive haloes only



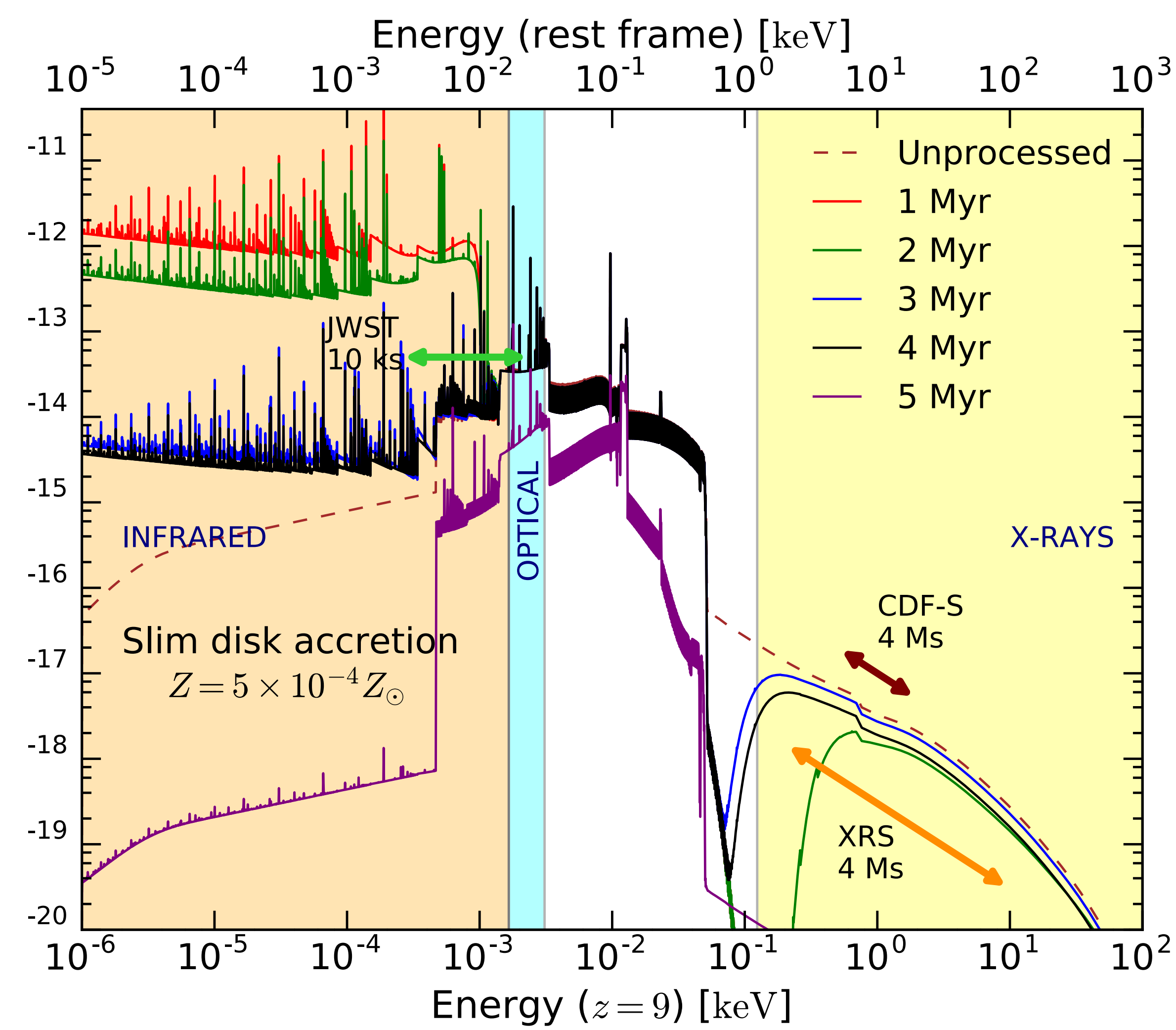
Talk by Vito

Early Black holes

PopIII SEED + STELLAR COMPONENT



DCBH SEED + STELLAR COMPONENT (OBG)



Talk by Pacucci

DCBH emission will be directly observable by JWST; few per GOODS field

Question for audience:

Do BH hosts at $z>3$ evolve differently from galaxies without black holes? What are the observational signatures in host properties?

Mid Infrared AGN

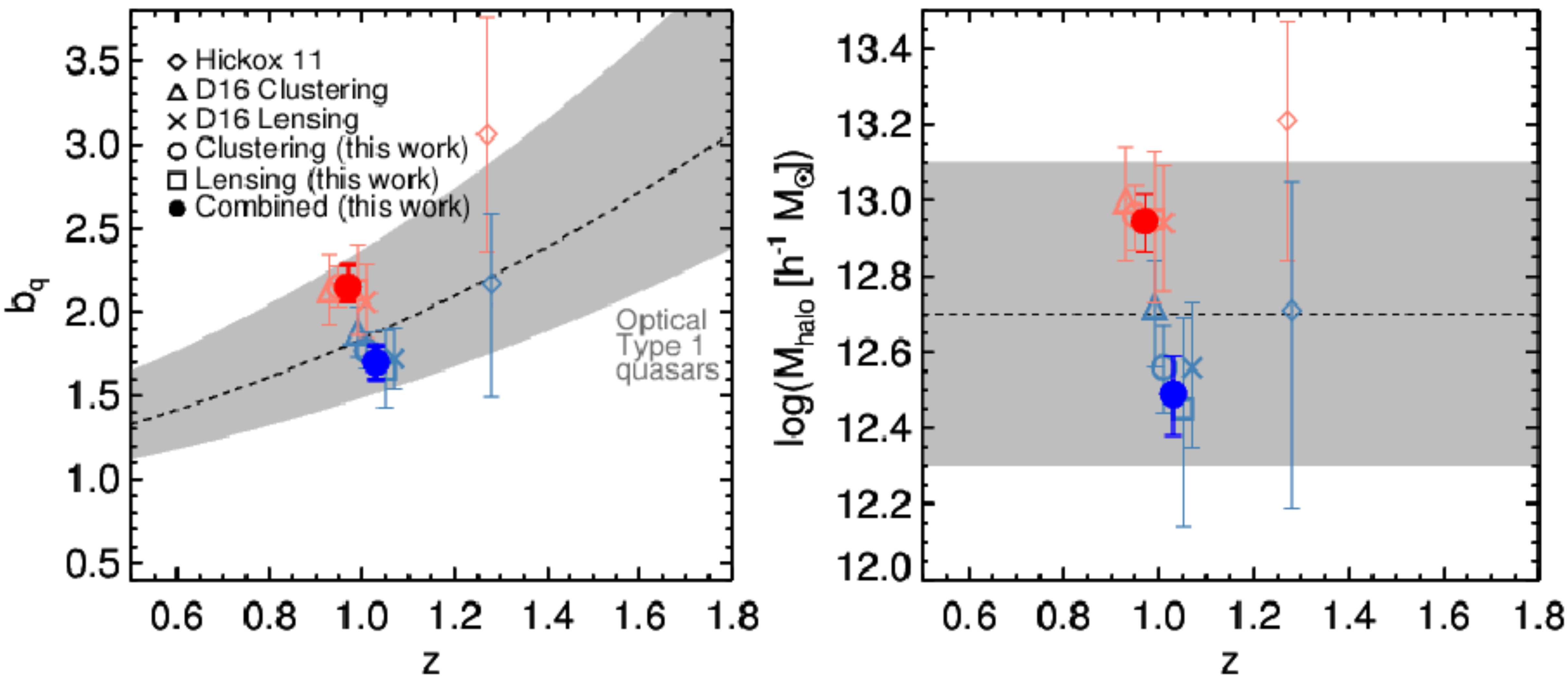
These will give you the elusive QSOs
with no biases as long as:

- selection is clean
- covering factor distributions are the same
- accretion rate distributions are the same
- spins and accretion structures are the same
- host galaxy properties are the same

Talks by
Alonso-Herrero,
Richards, Carroll

Mid Infrared AGN

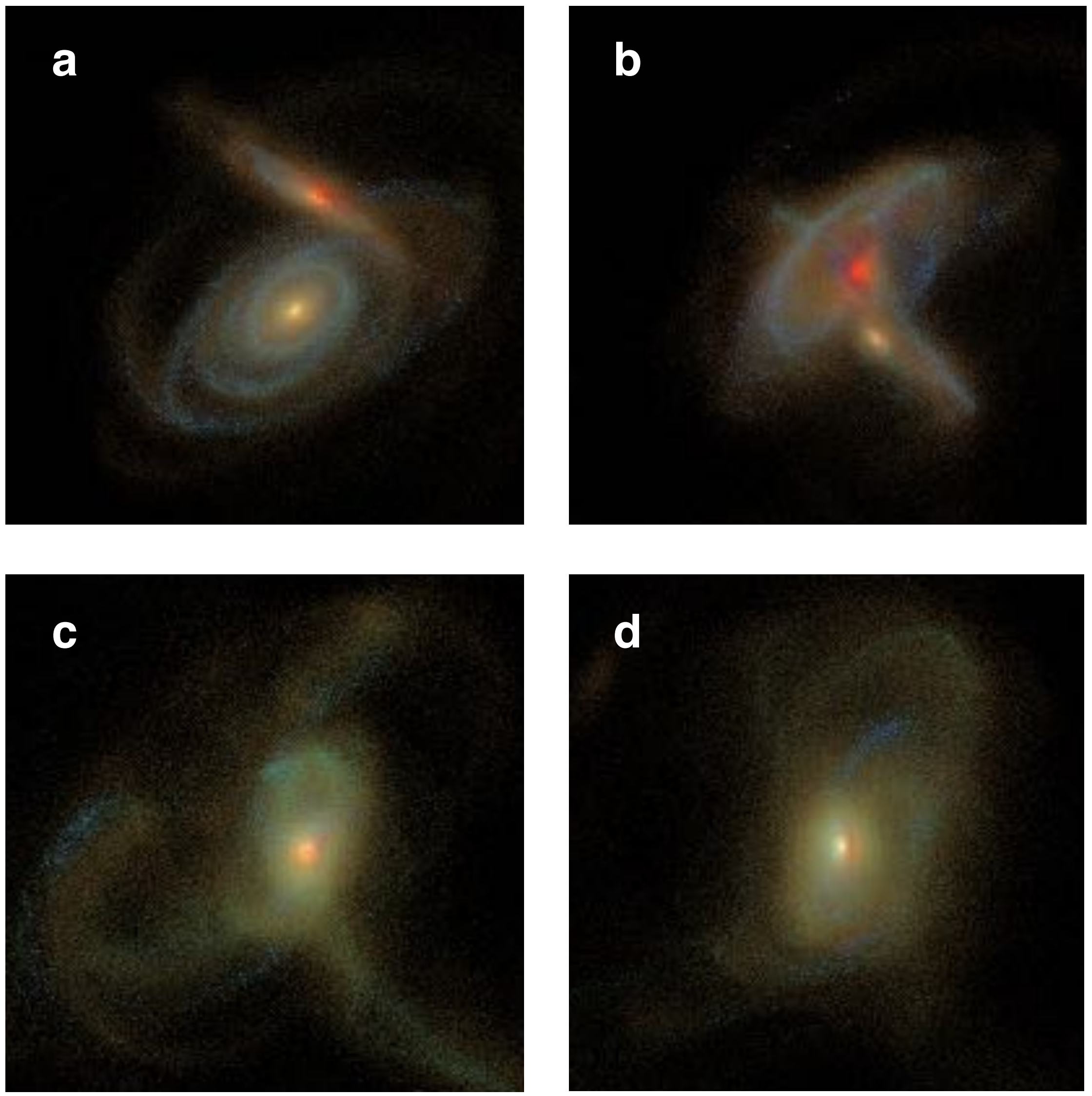
DiPompeo+ 2017b

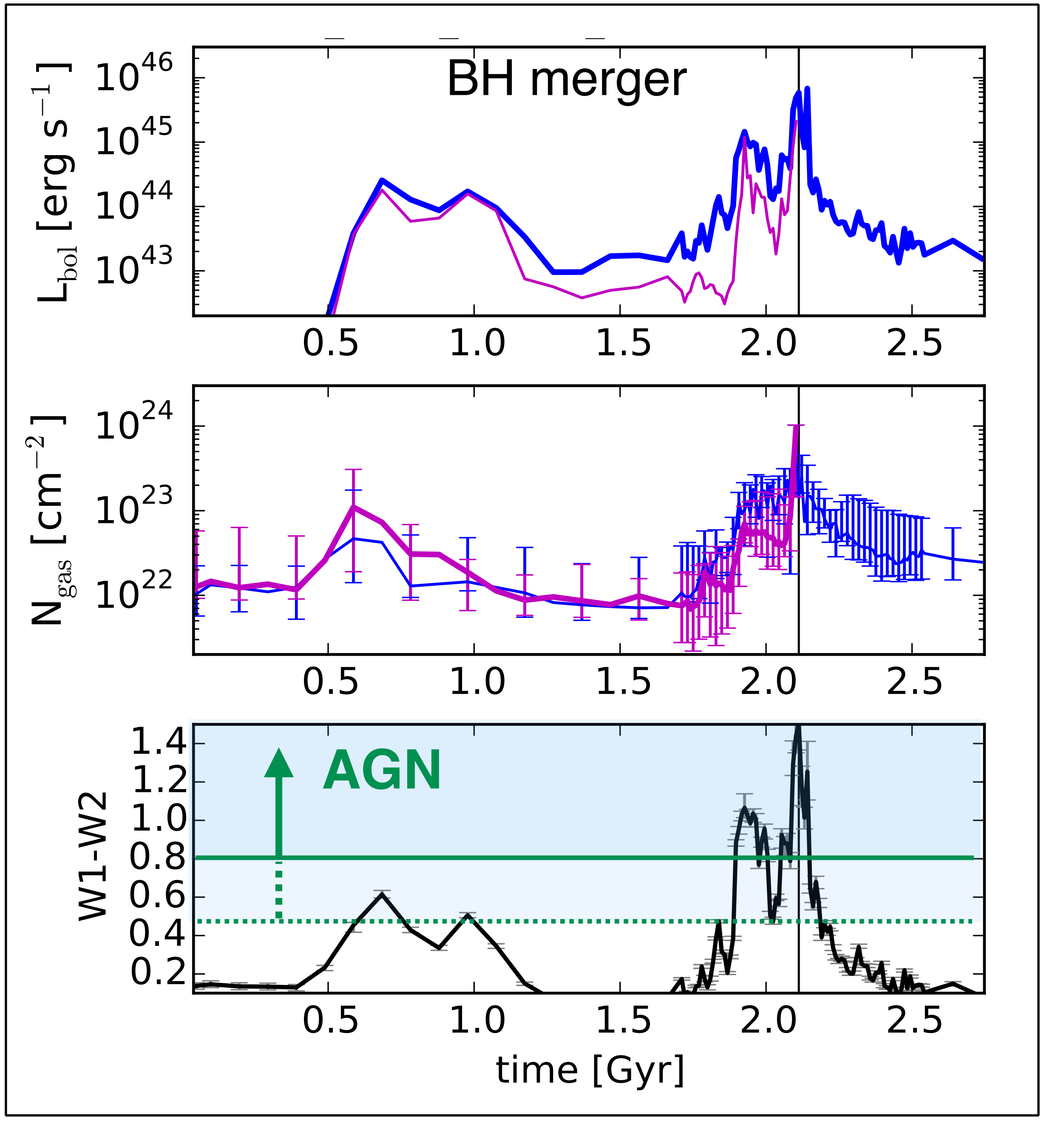


Talk by DiPompeo

Significant difference in the clustering and halo masses of luminous QSOs and MIR AGN

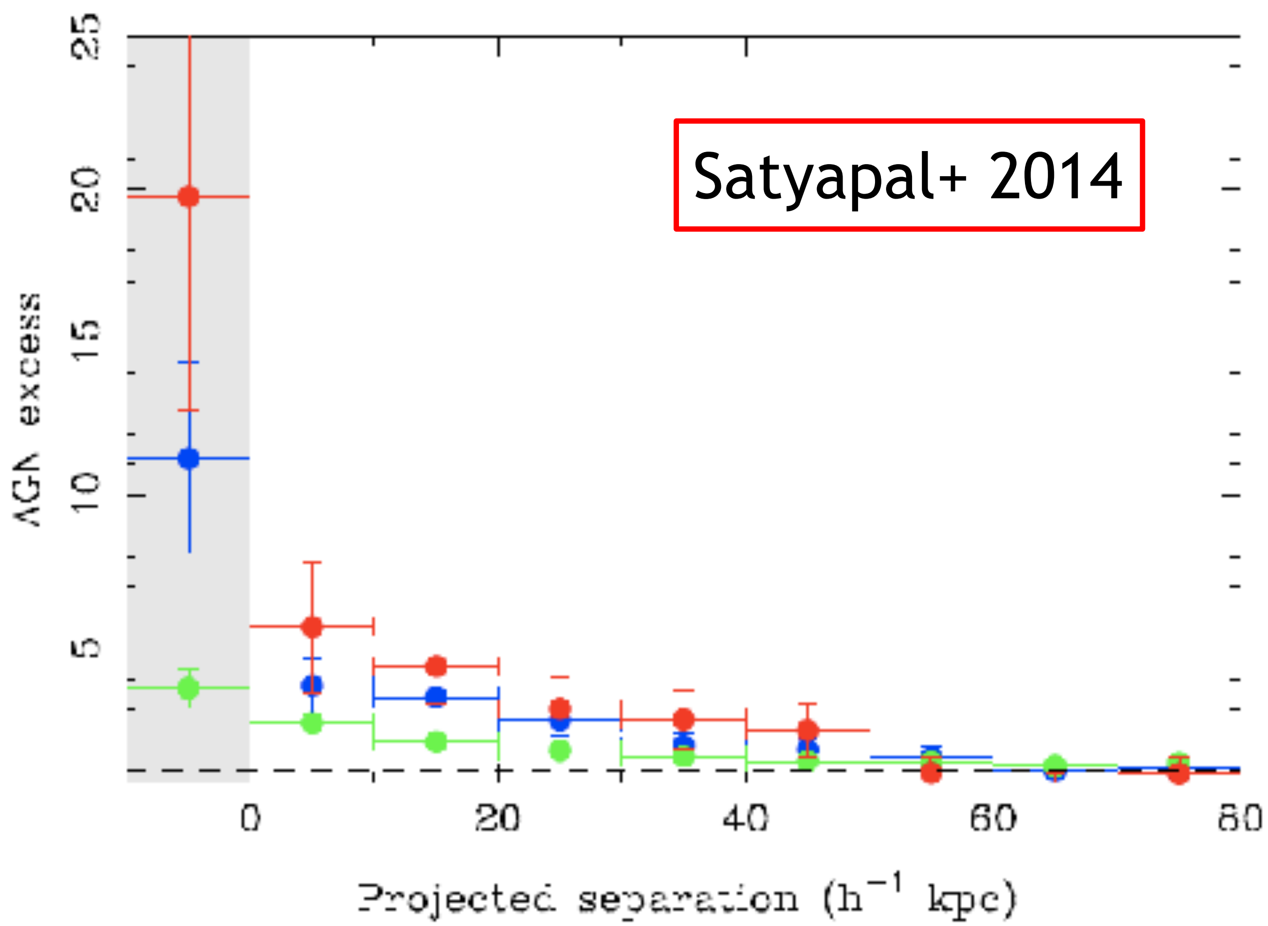
Mid Infrared AGN

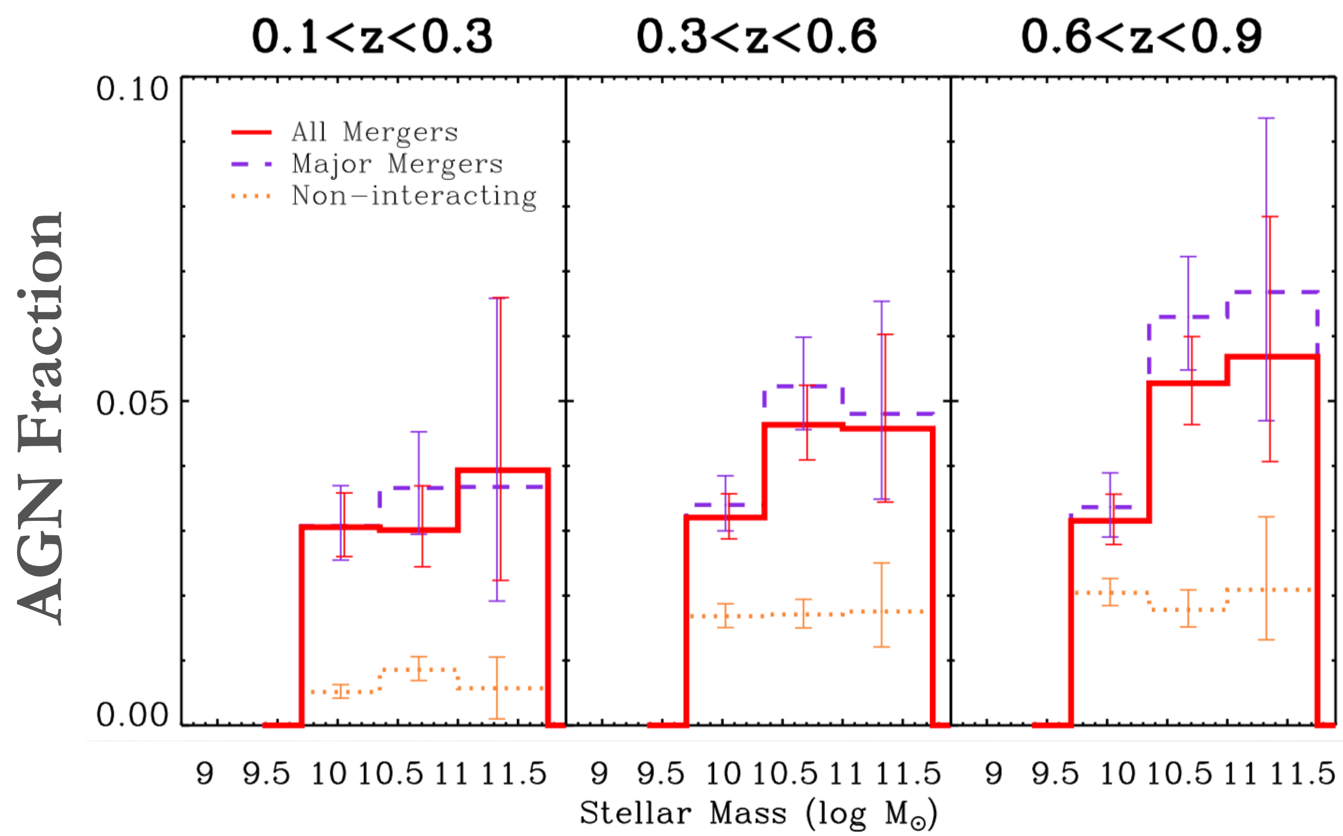




Talk by Blecha

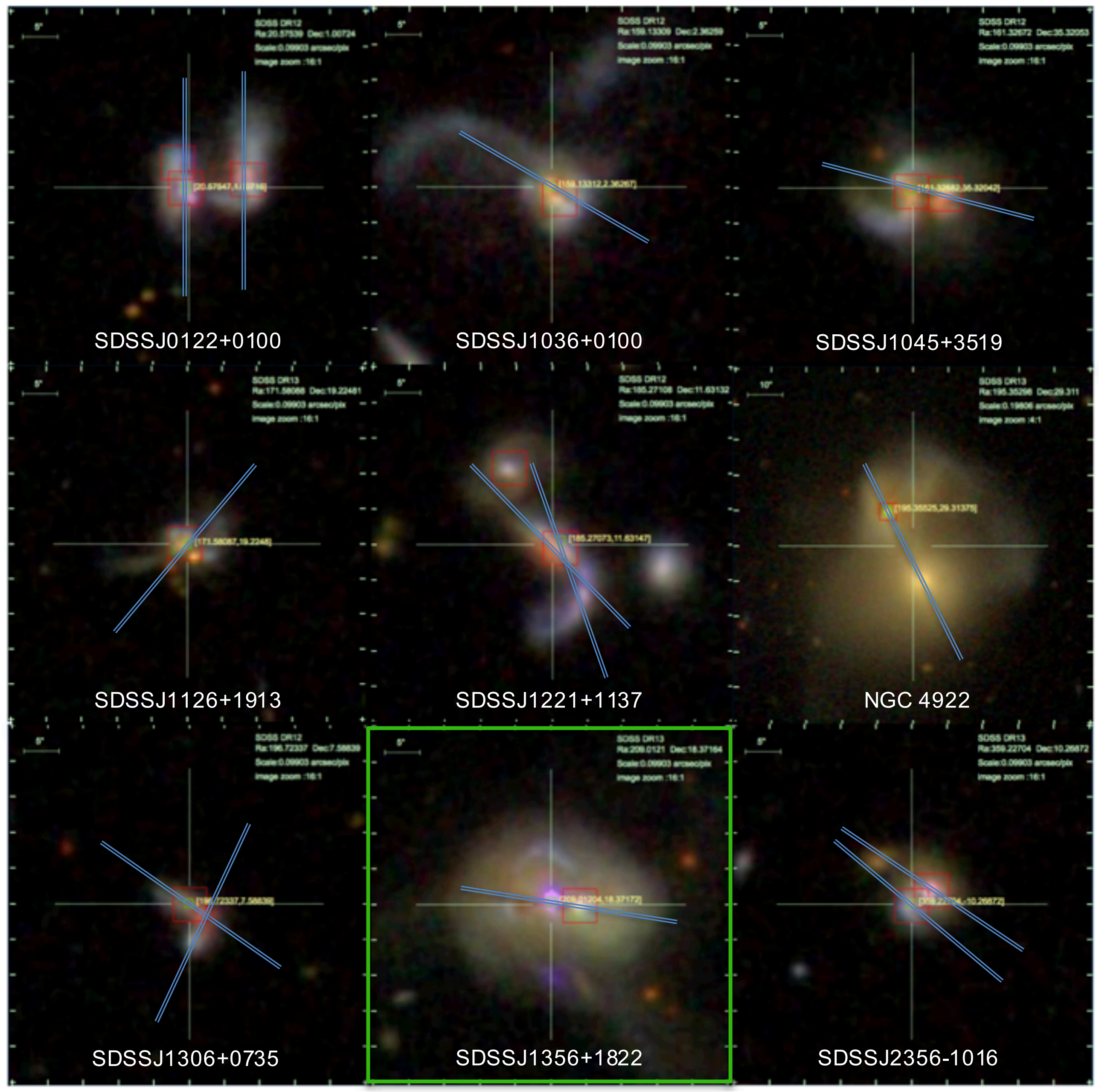
Mid Infrared AGN

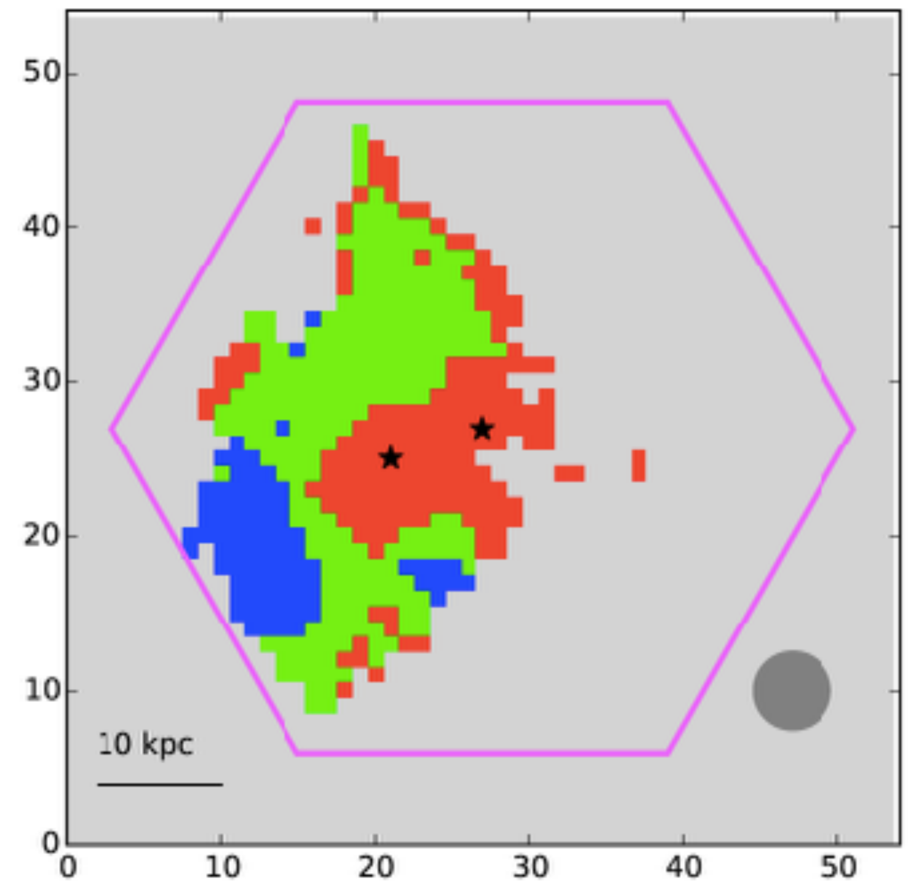


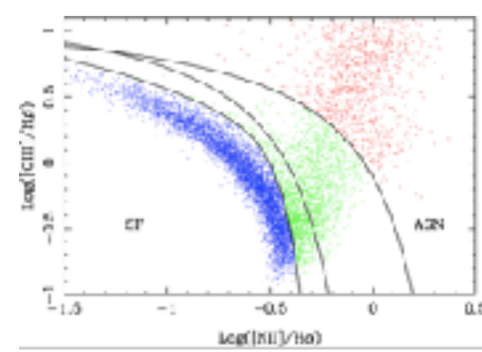


Talks by Ellison, Goulding, Blecha

Mid Infrared AGN







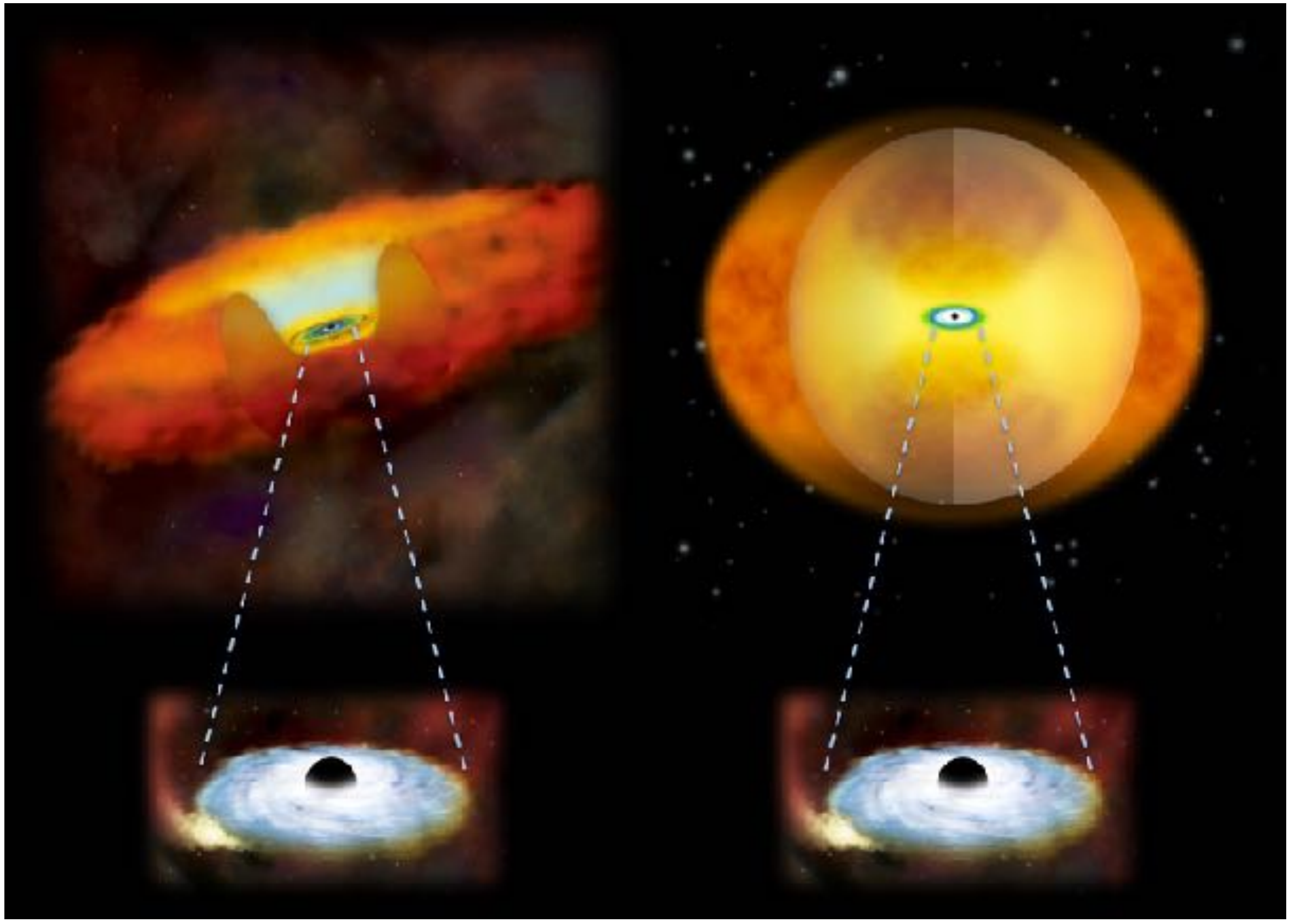
Ellison+ 2017

Talks by Ellison, Constantin
Poster by Ferguson

Mid Infrared AGN

	Isolated galaxies	Late stages of merger
Log N_H> 23	52±4%	95±5%
Log N_H> 24	27±4%	65±12%

Talk by Ricci



Ricci+ 2017a

Question for audience: