ALMA OBSERVATIONS OF HIGH-REDSHIFT (RADIO) GALAXIES (AND AGN)

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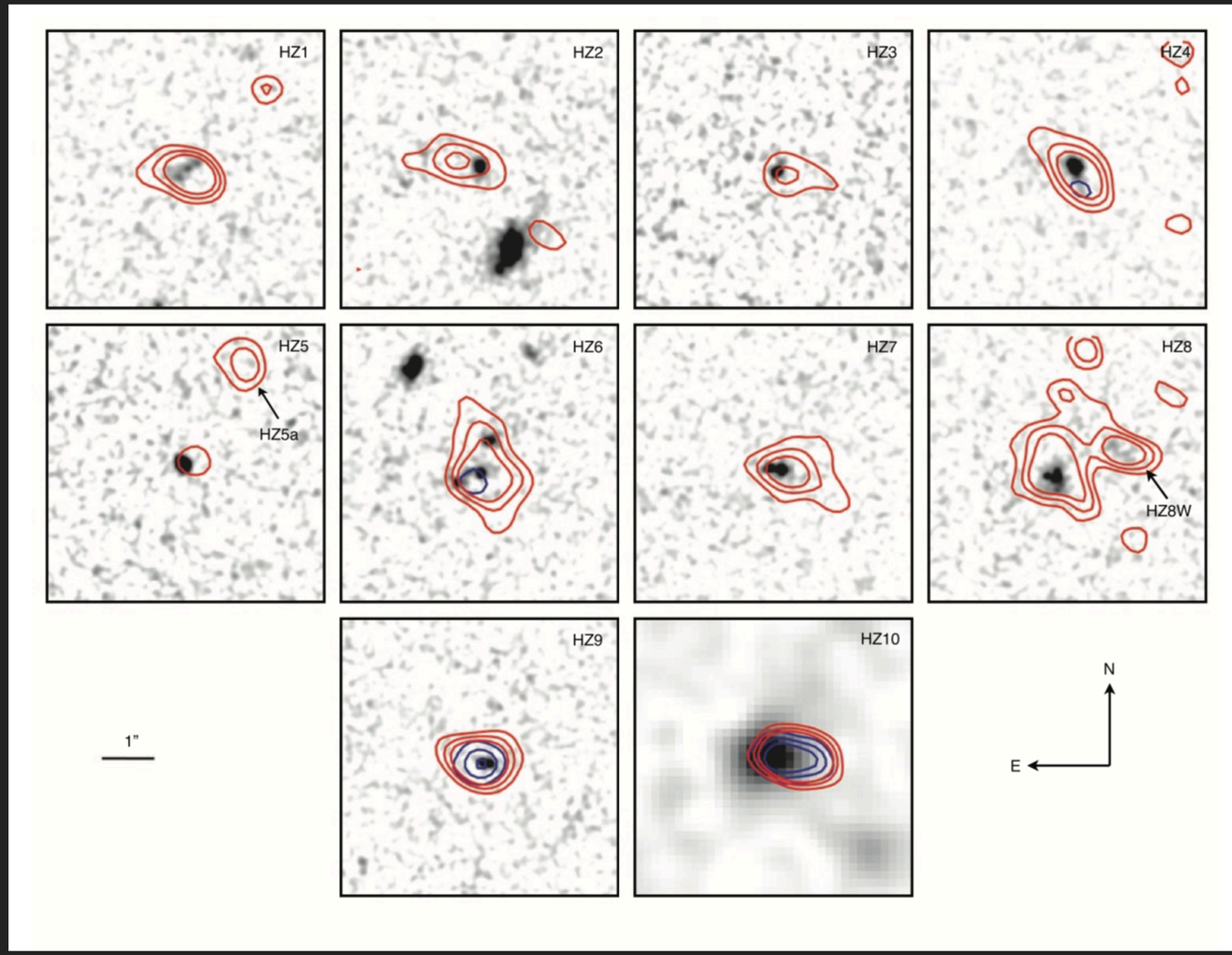
WHAT HAS ALMA TOLD US ABOUT GALAXIES AND QUASARS AT HIGH REDSHIFTS?

Z ~ 5 - 6 TYPICAL SFG OBSERVATIONS

Capak et al. (2015, Nature)

- Exp. time ~20 min per source
- <40% continuum detections
- [CII] lum = 0.3 - 2 x 10^9 L_{sun}
- SFR ~ 6 – 170 M_{sun} / yr
- Diverse dynamics
- Little to no dust: >12x less than low-z galaxies

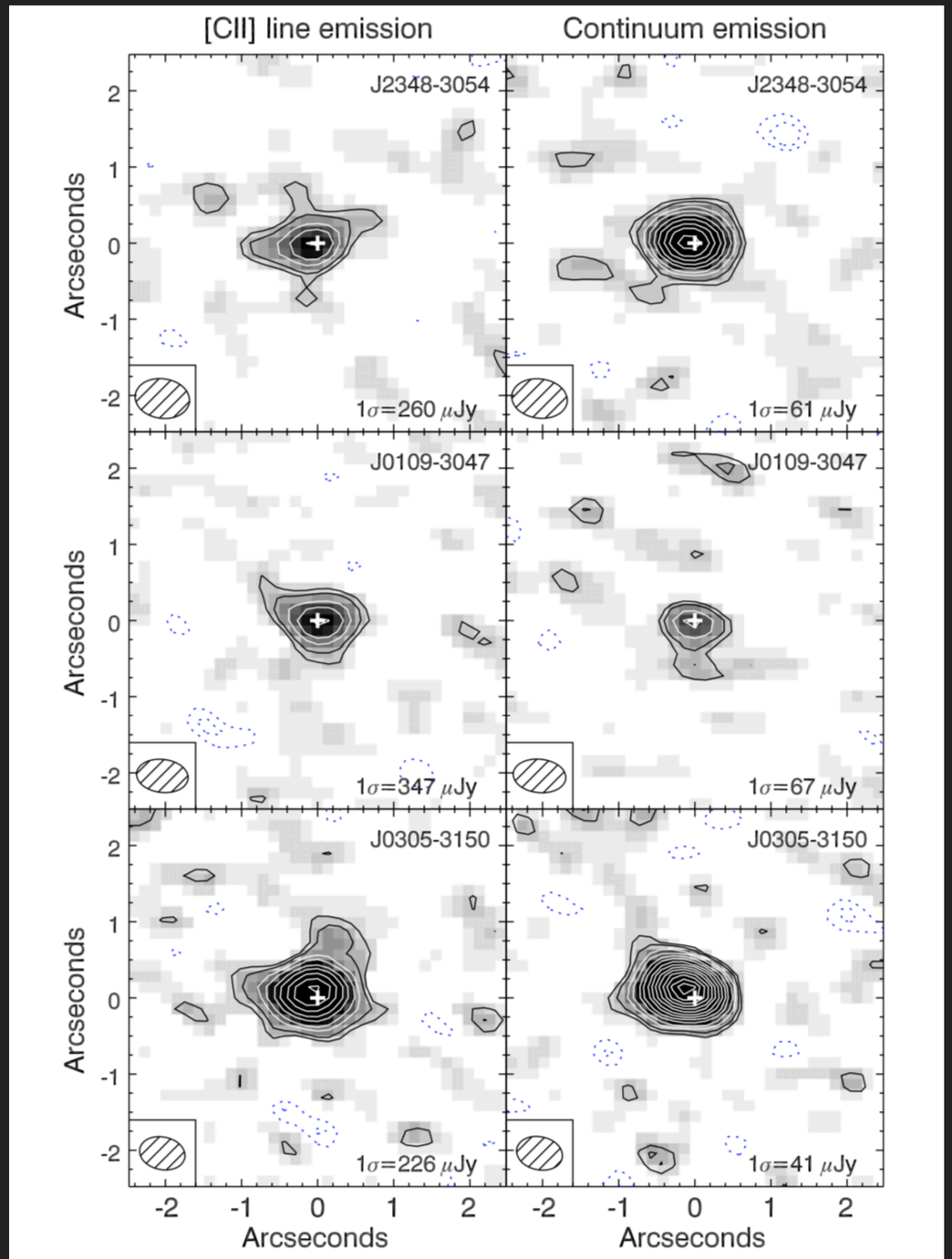


See Pentericci et al. (2016) + others for z~7 SFGs

Z > 6 QSO OBSERVATIONS

Venemans et al. (2016)

- Exp. time ~15 min per source
- Bright continuum detections
- [CII] lum = 1.9 - 3.9 x 10^9 L_{sun}
- SFR ~ 100 – 1600 M_{sun} / yr
- Large dust masses: 1 – 20 x 10^8 M_{sun}



WHAT ABOUT RADIO GALAXIES AT Z~6?

For lower z, see recent paper by Falkendal et al. (2018)

WHY STUDY HIGH-Z RADIO GALAXIES?

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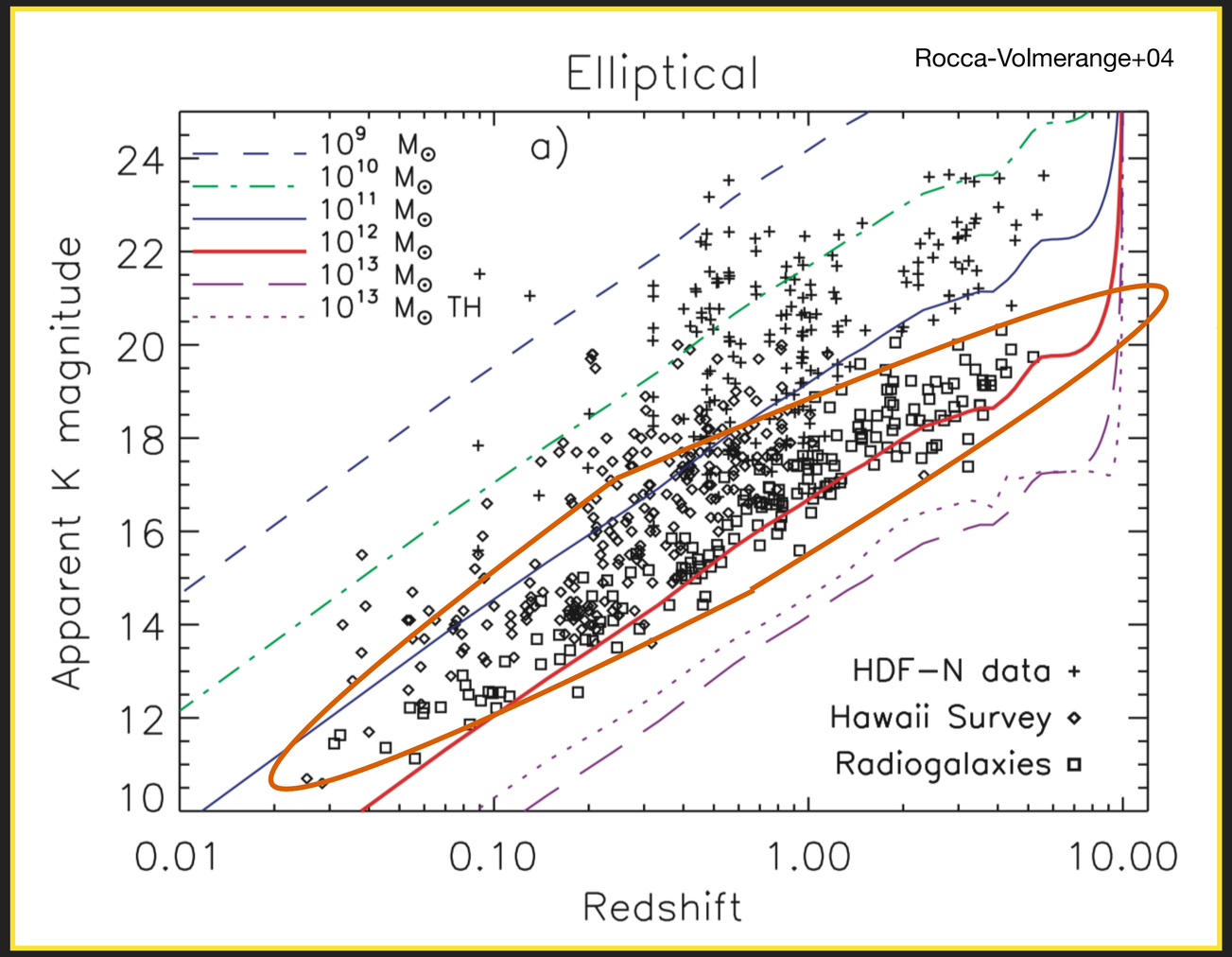

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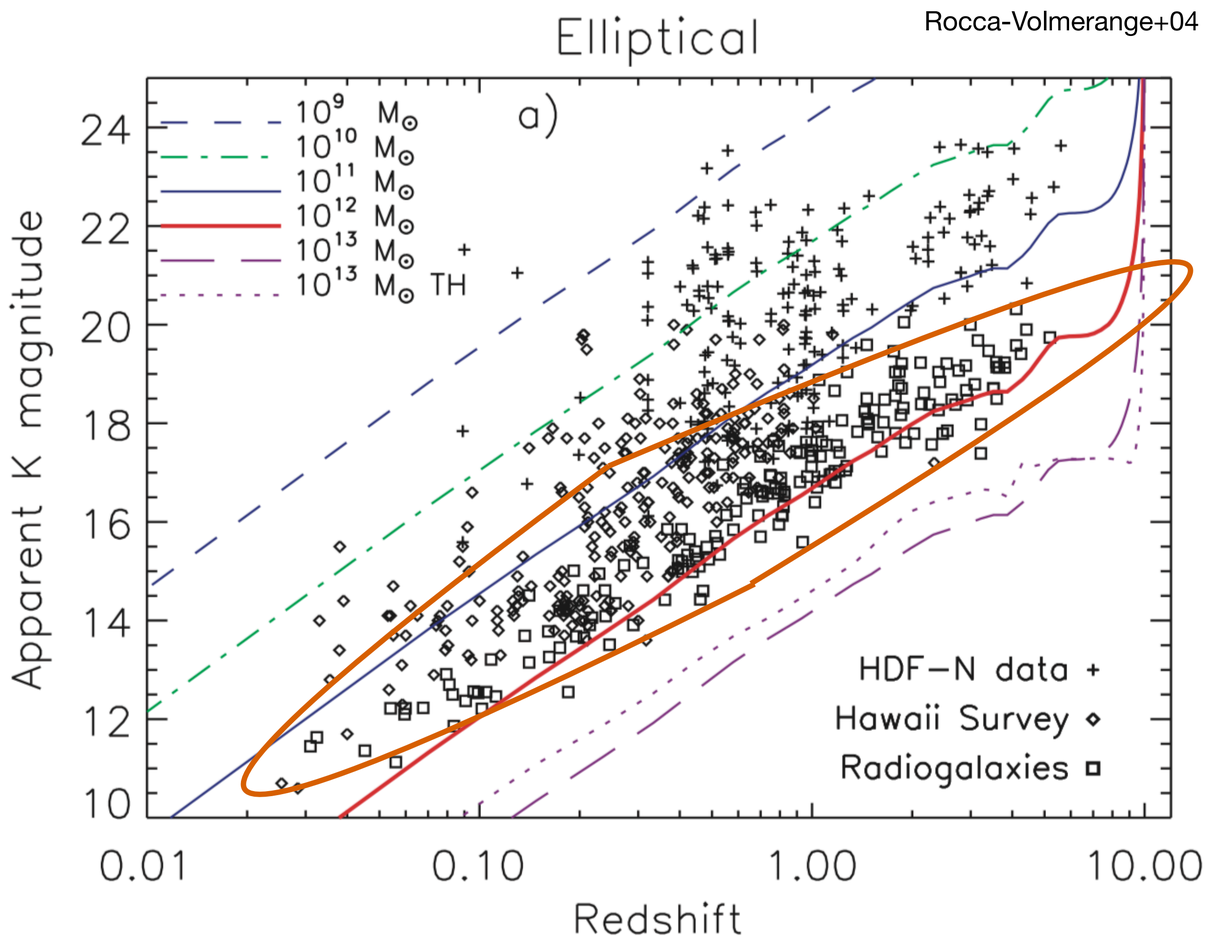
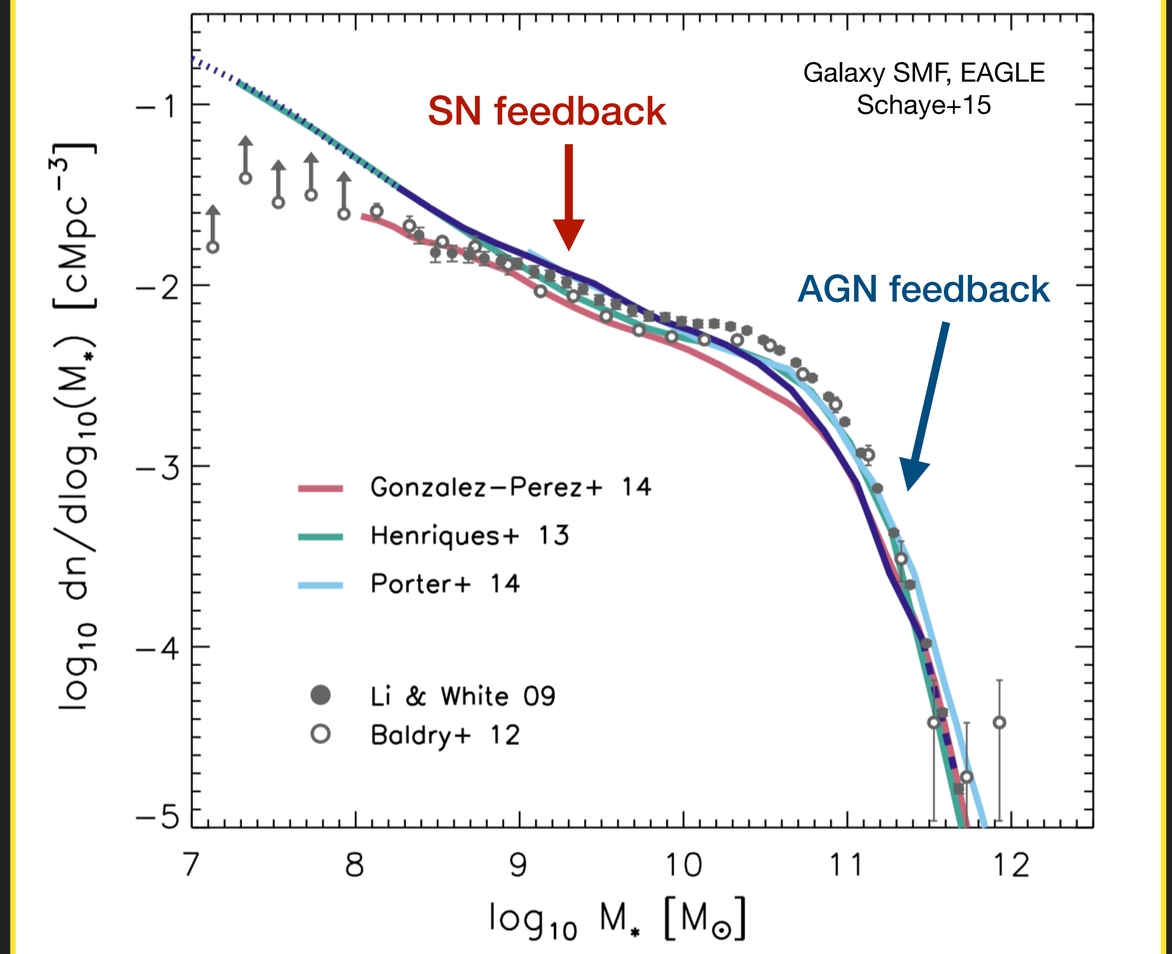
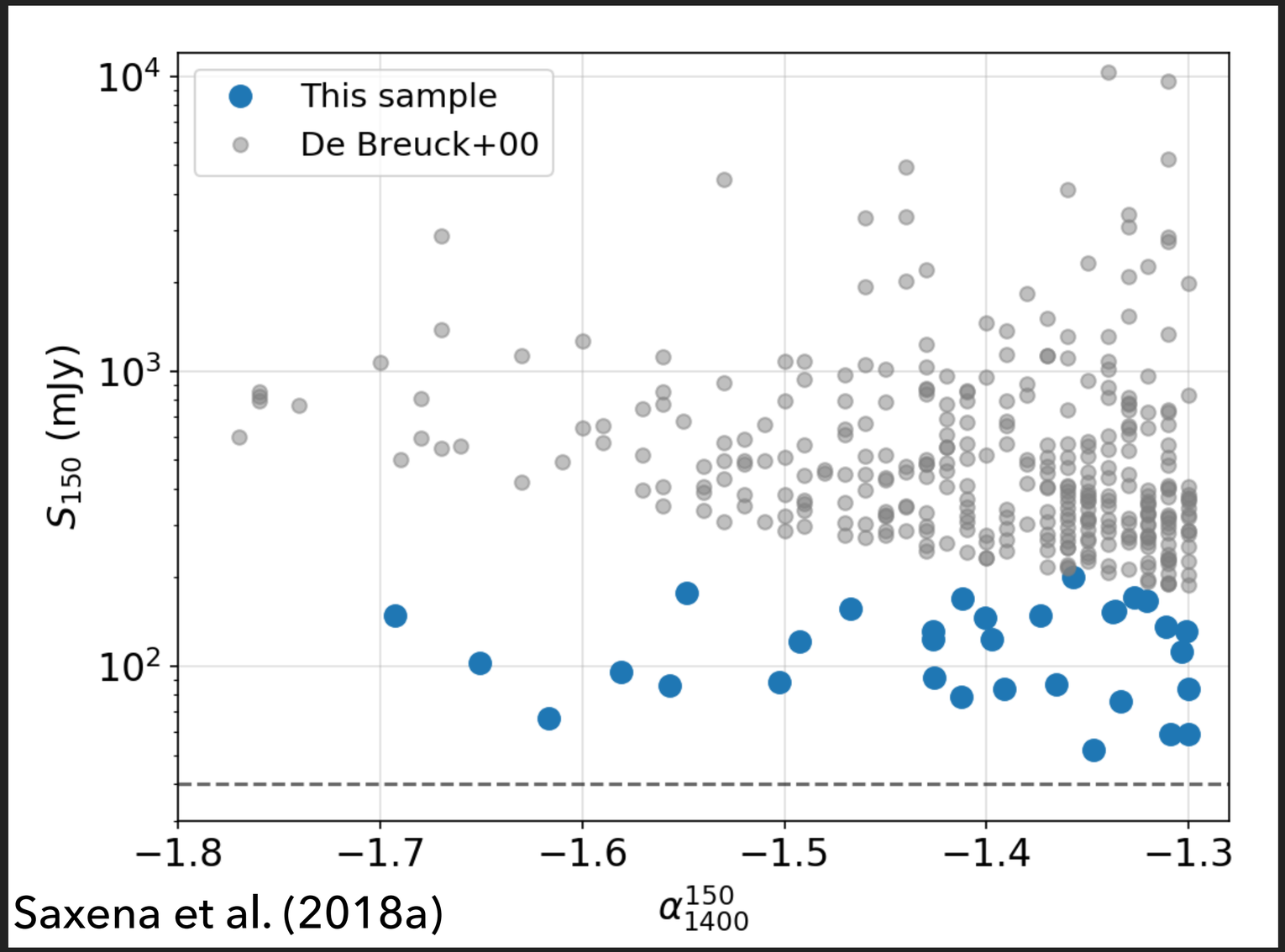




CANDIDATE HZRGS FROM TGSS ADR (150 MHZ)

Intema et al. (2017)



Saxena et al. (2018a)

10,000 square degrees of overlap with the VLA FIRST survey at 1.4 GHz

~66,000 sources with spectral index information

32 sources (0.05%) candidates shortlisted using strict selection criteria (spectral index, size, optical/ IR faintness)

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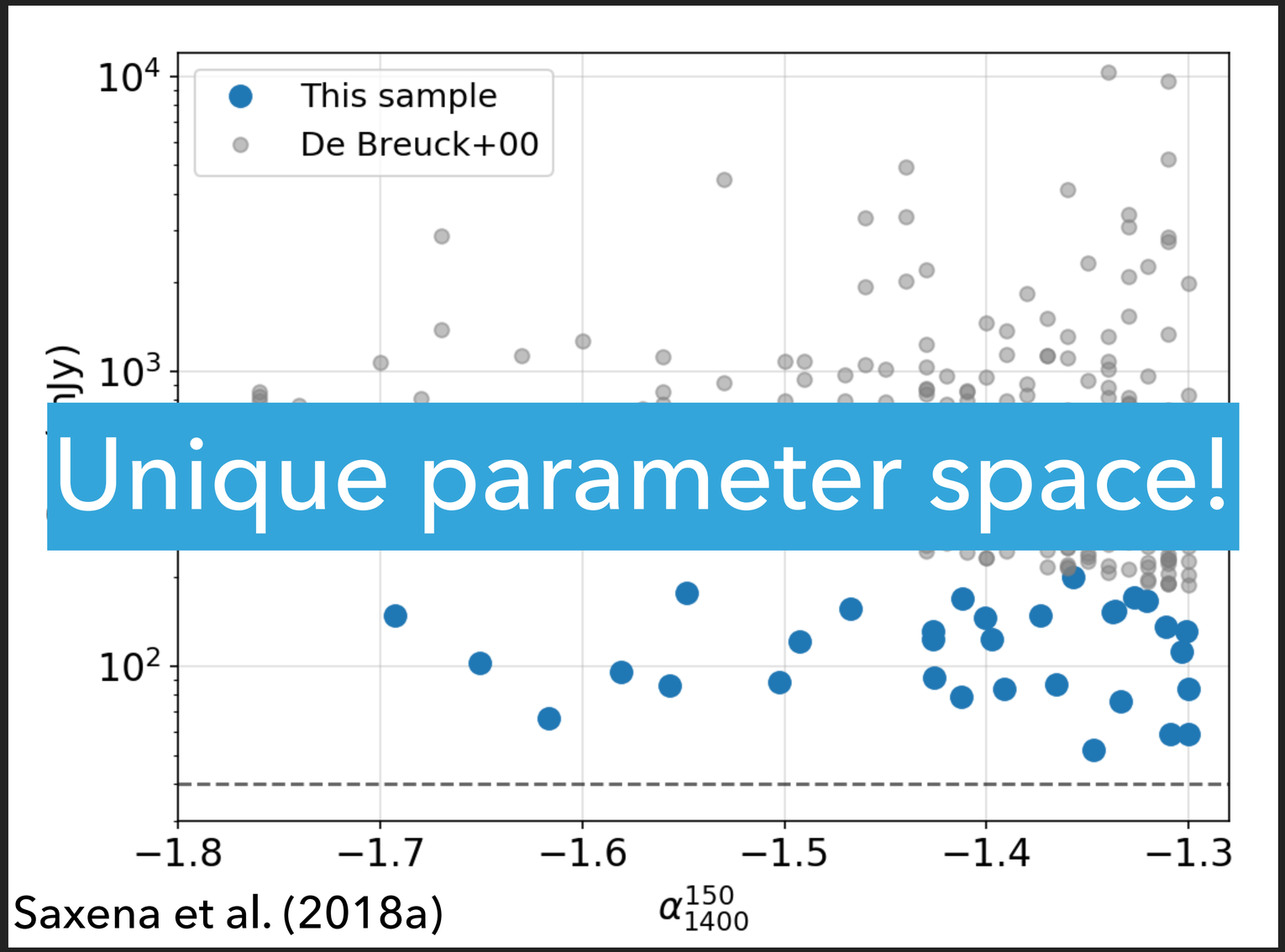

Unique parameter space!

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VLA L (1.4 GHz) and P (350 MHz) observations in A-configuration obtained for all 32 candidate HzRGs

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TGSS J1530+1049 AT Z = 5.72

Saxena et al. (2018b)

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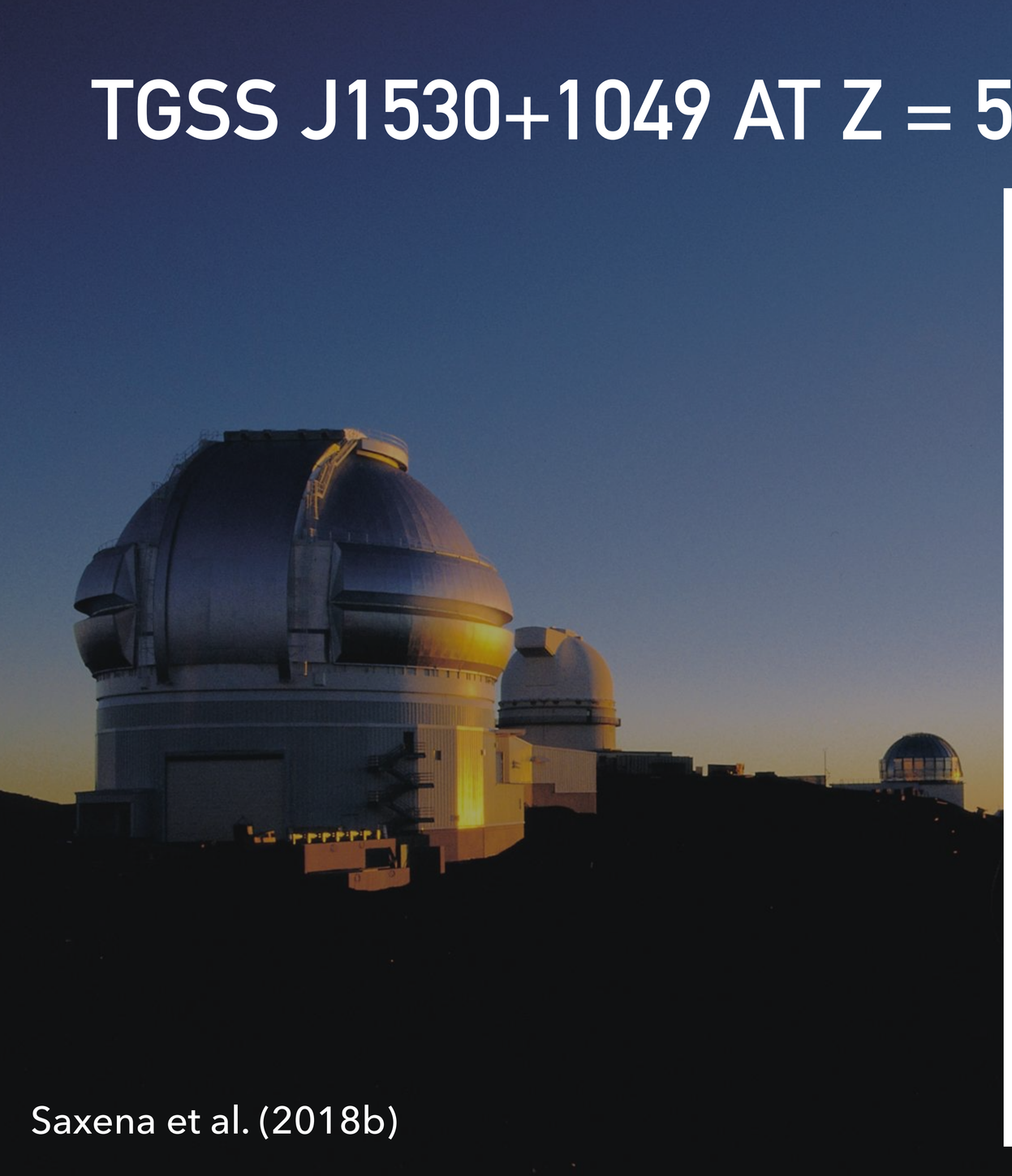

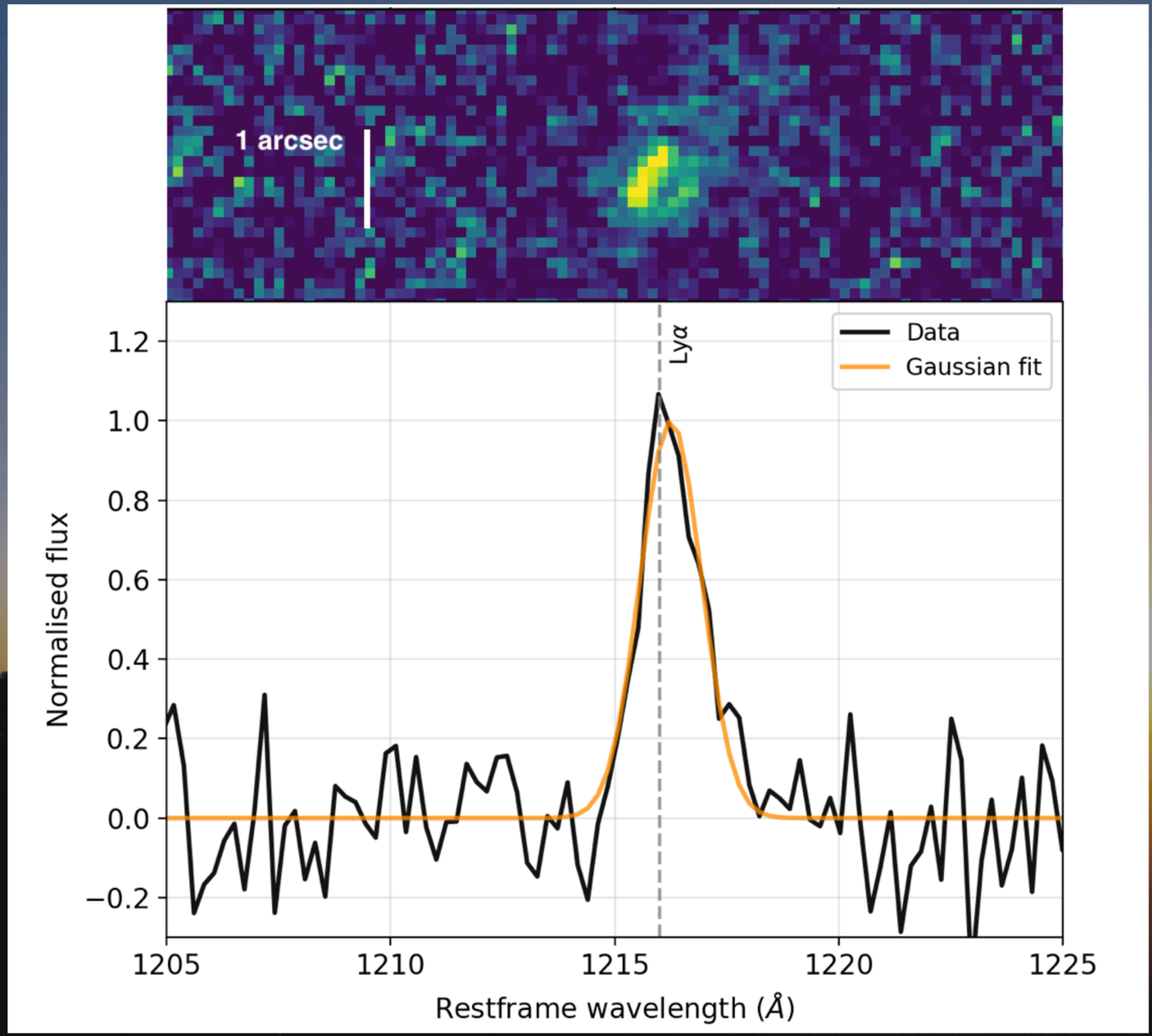

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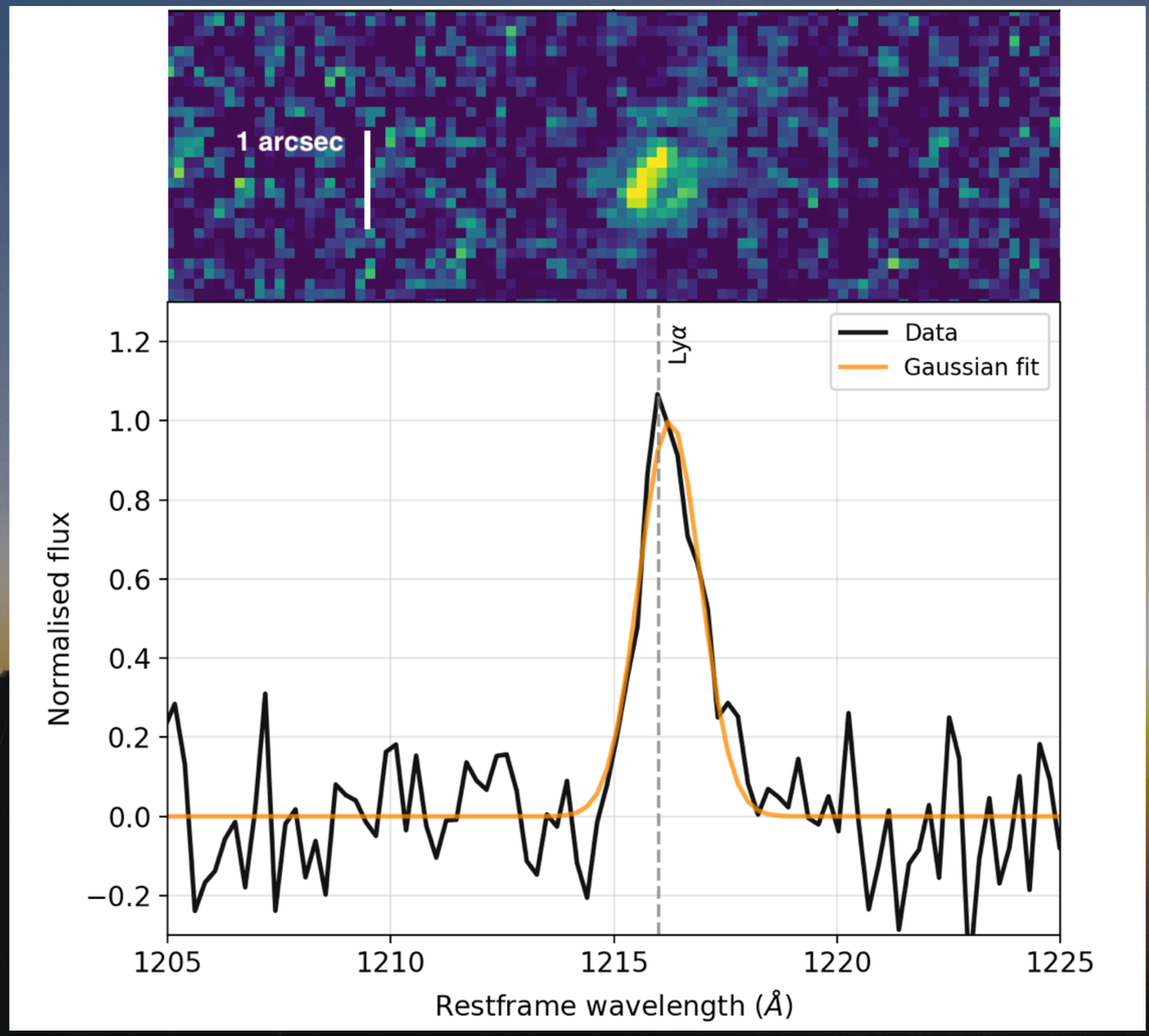
Line flux: 1.6e-17 erg/s/Å/cm^2
FWHM = 370 km/s
EW > 40 Å



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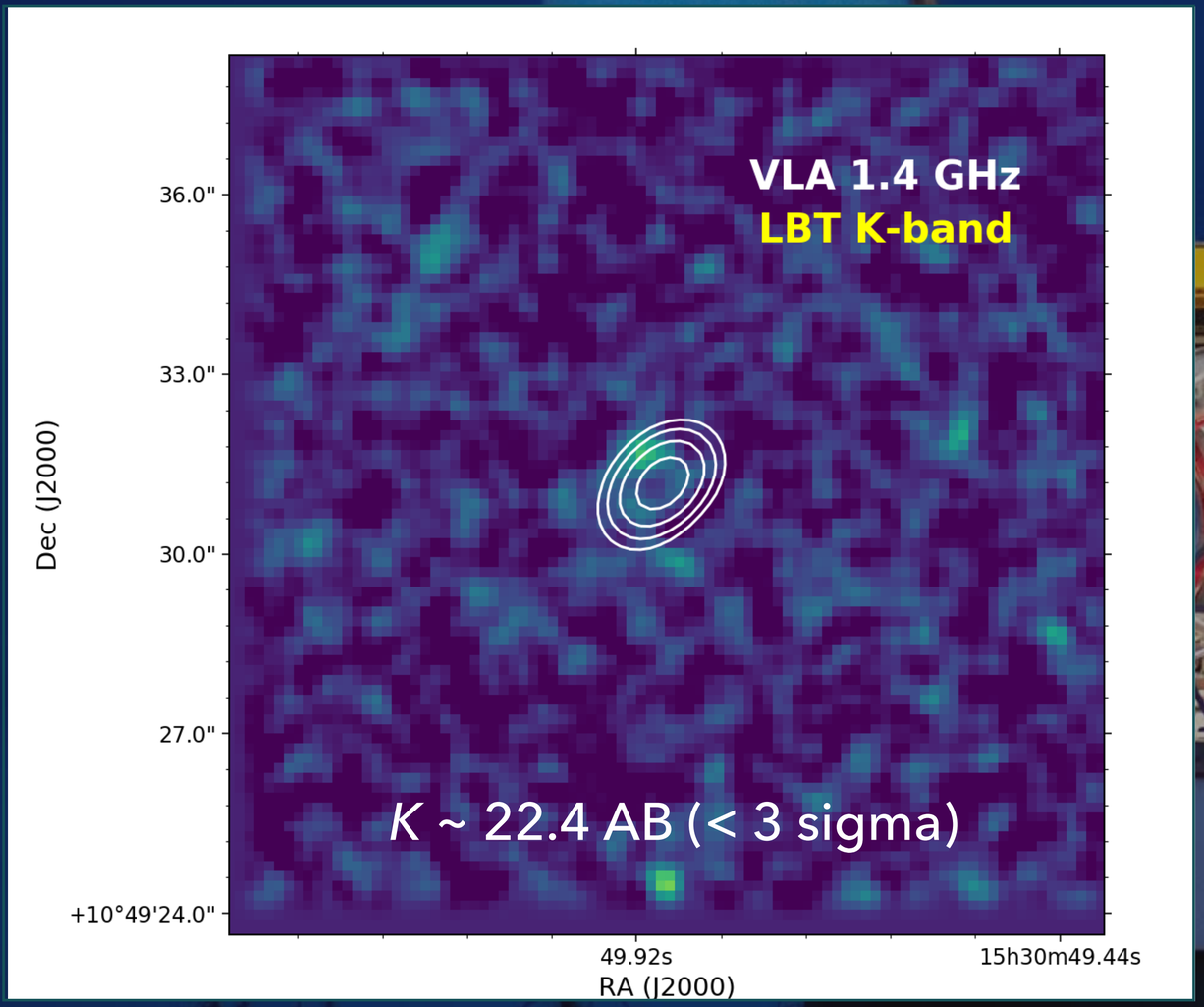

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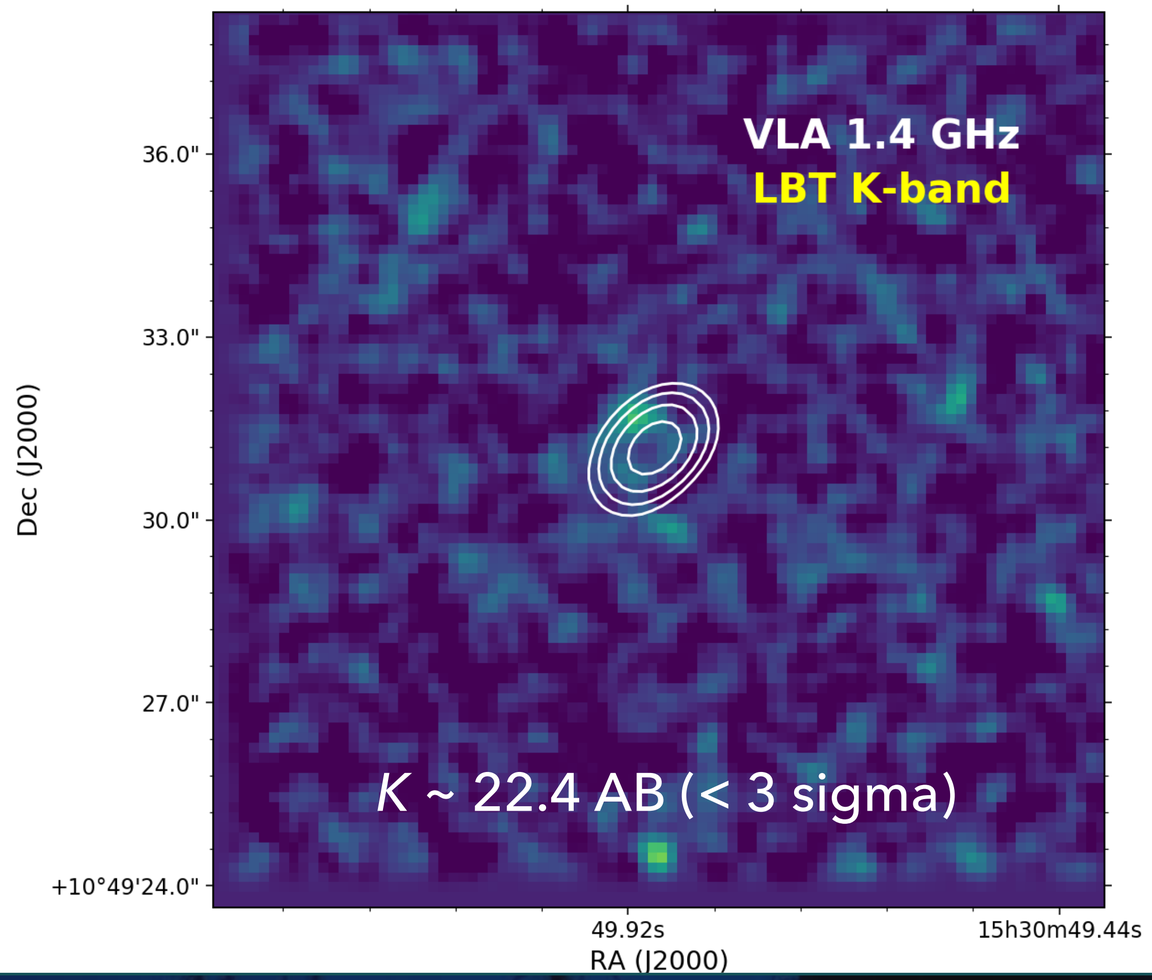
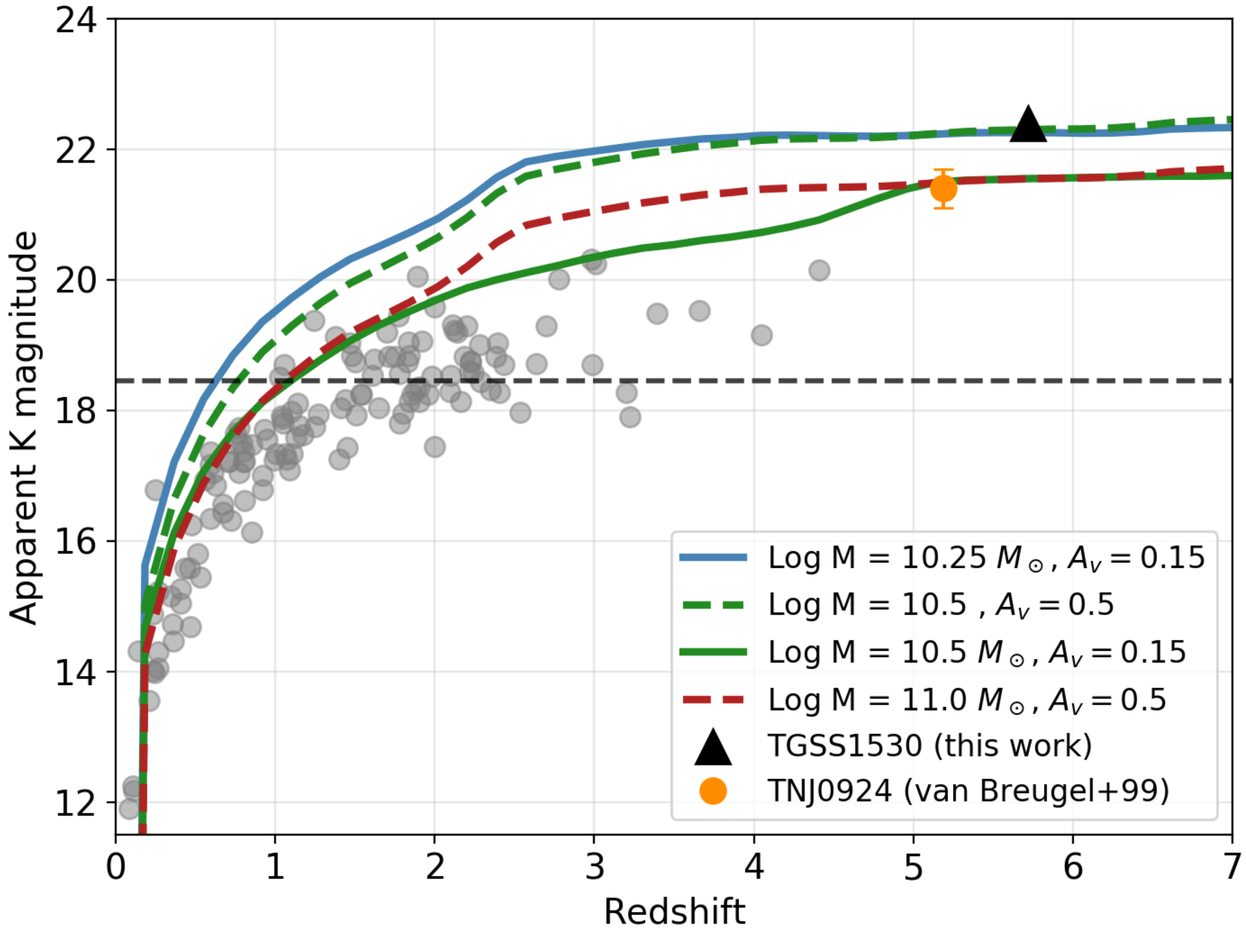
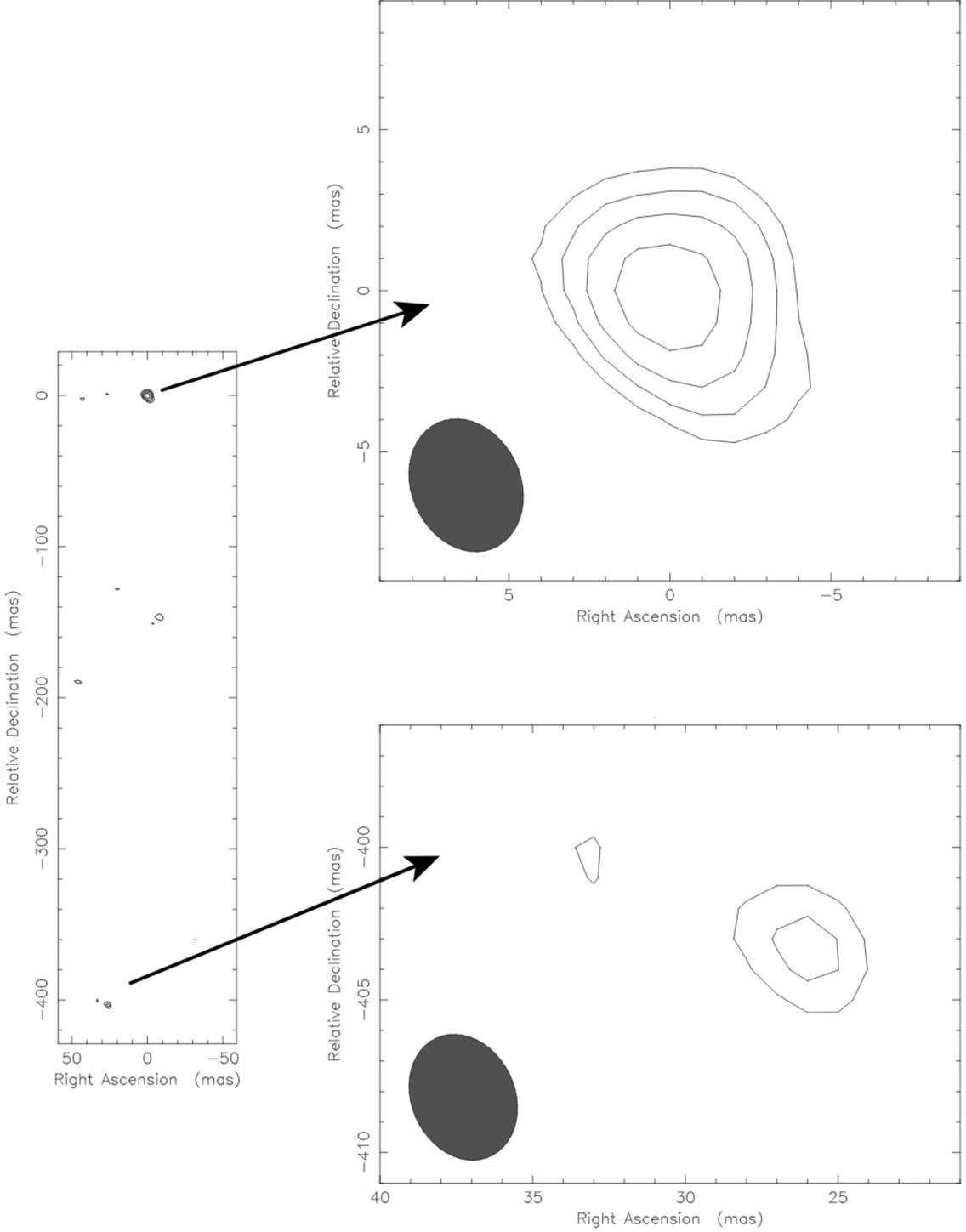






VLBI imaging at 1.4 GHz by Gabanyi et al. (2018).

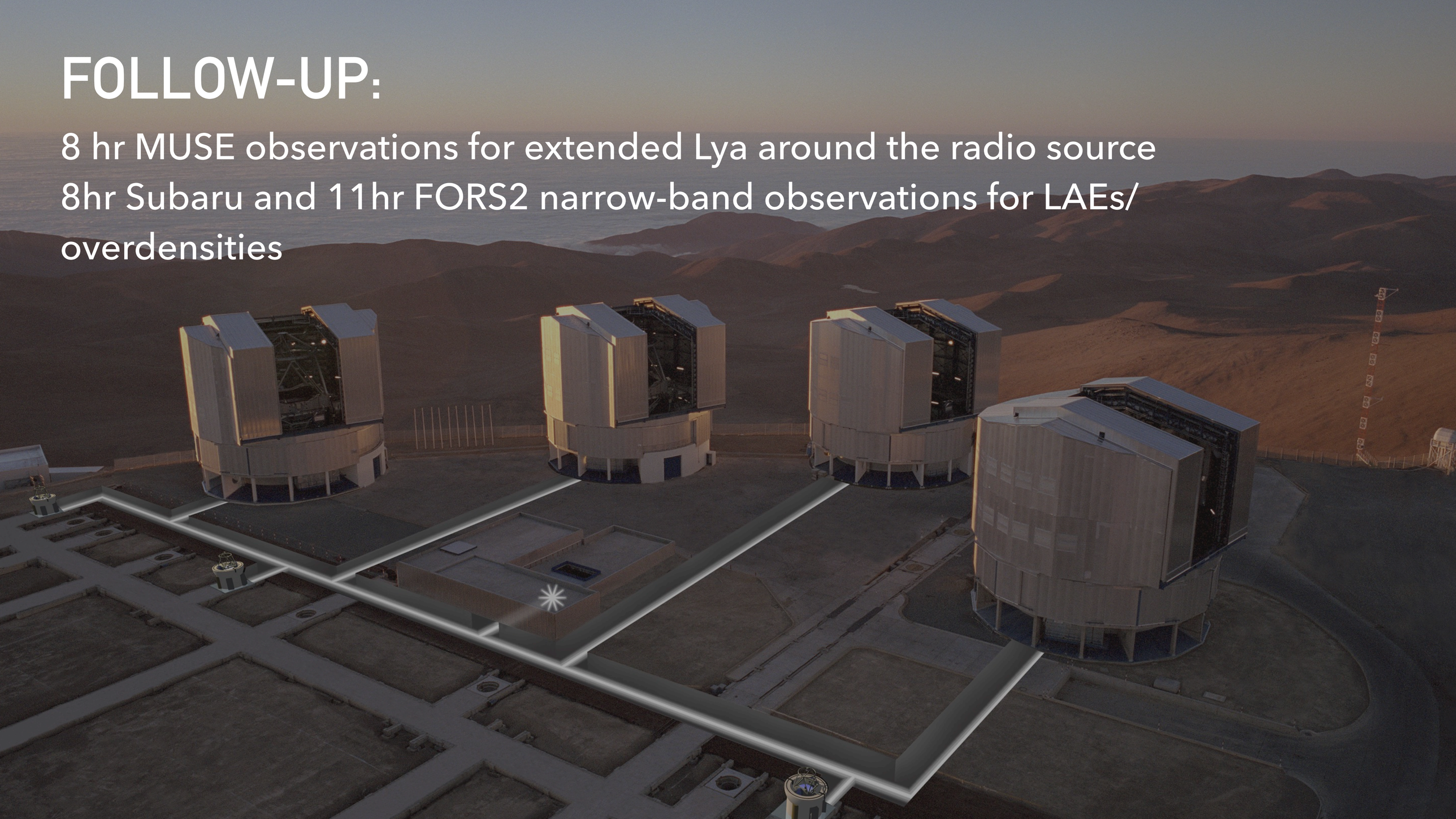
~5 mas resolution!!!

Reveals 2 lobes separated by 400 mas and possible emission from the core.

FOLLOW-UP:

8 hr MUSE observations for extended Lya around the radio source

8hr Subaru and 11hr FORS2 narrow-band observations for LAEs/ overdensities



WHAT CAN ALMA TELL US?

Systemic redshift: [C II] line
Star-formation rate
ISM morphology/jet-gas interaction.
Is the radio jet from the AGN disturbing or displacing the gas?
Dust content. Heavy obscuration of the central AGN?

Anything else?

Get involved!