# Emission-line galaxies as tracers of the Large-Scale structure


**Álvaro Orsi**

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CEFCA Cosmo group


CEFCA
Centro de Estudios de Física del Cosmos de Aragón


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# ELG surveys

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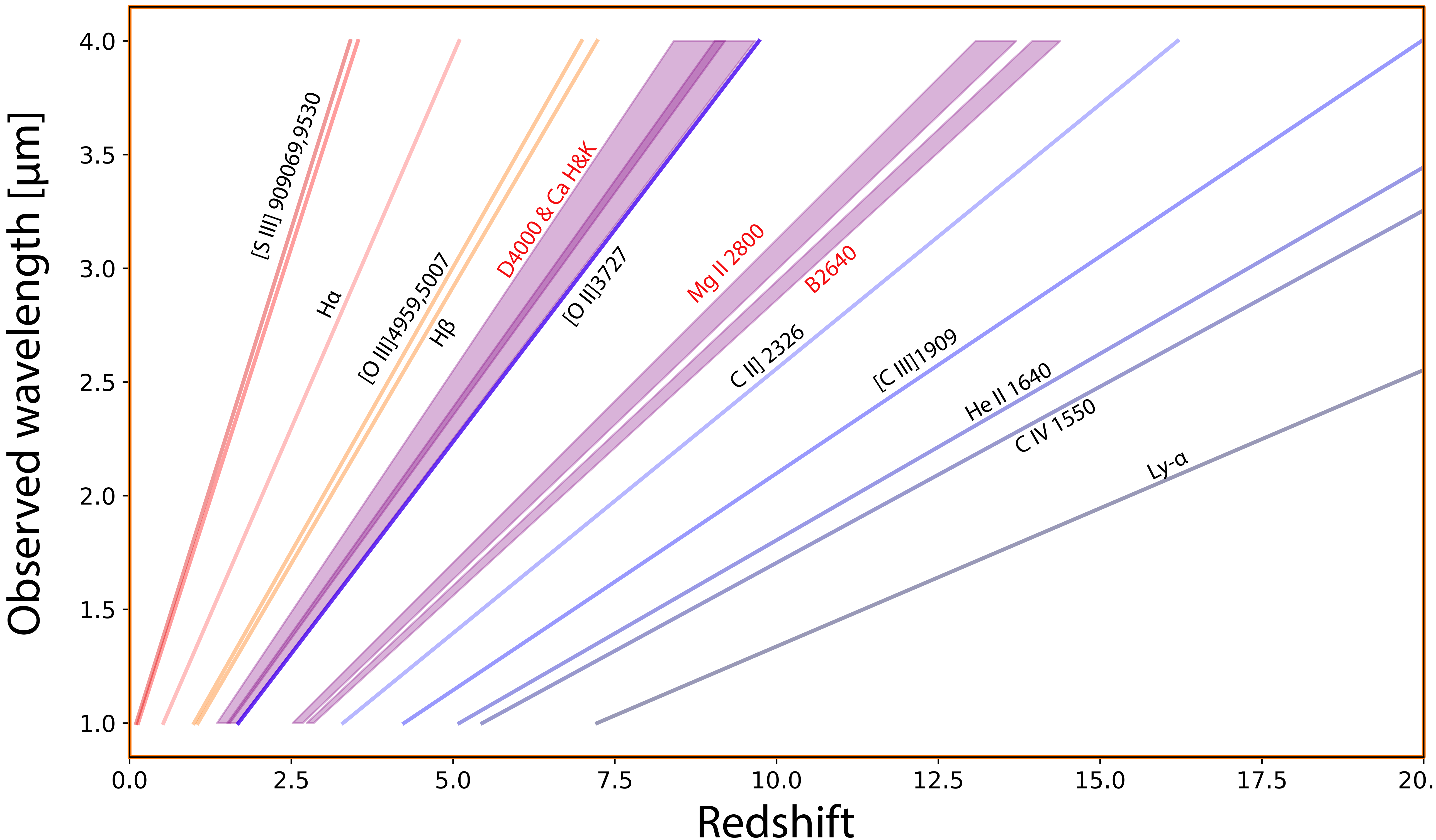


ATLAS Probe (Wang et al. 2018)

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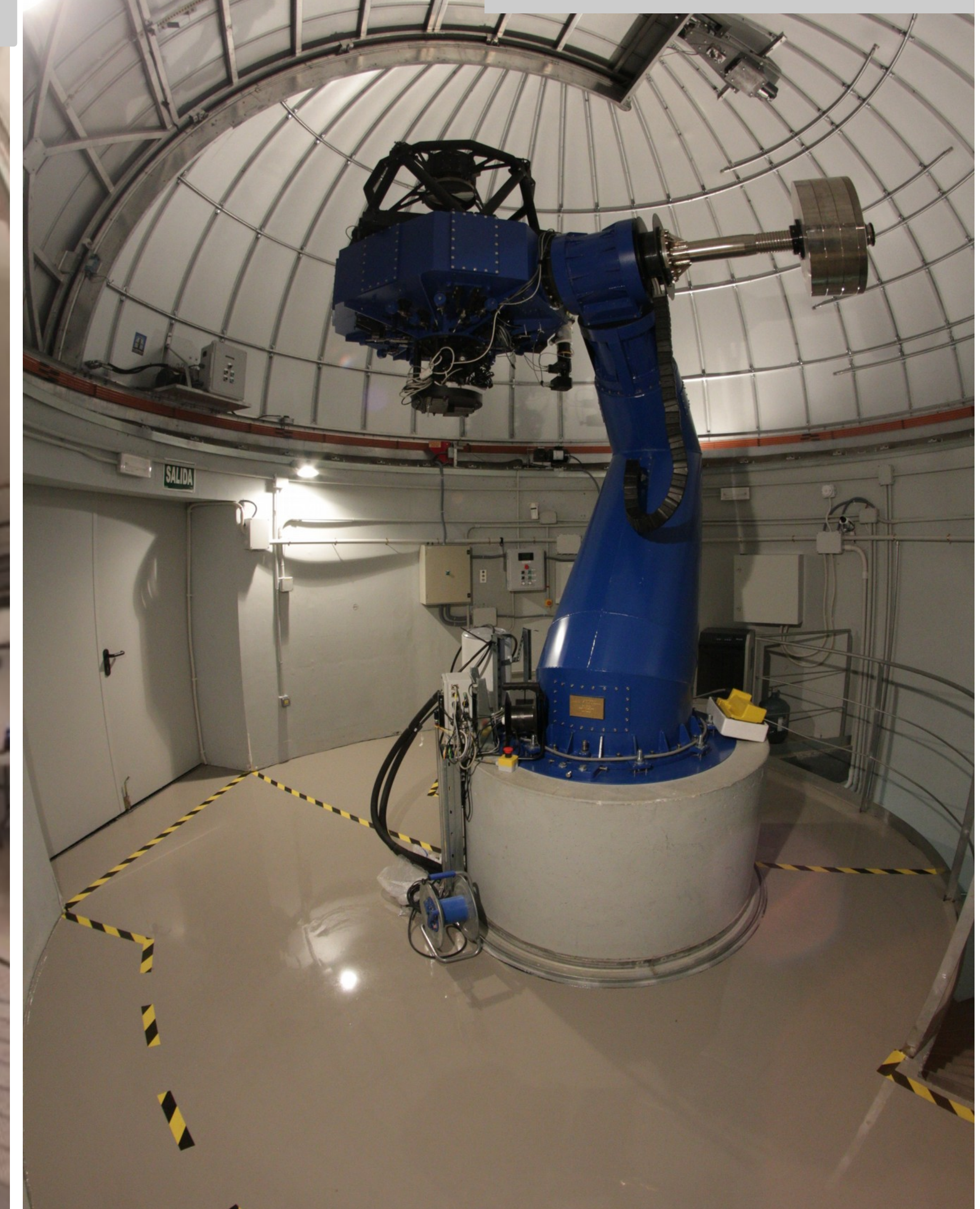
J-PAS
Javalambre Physics of the Accelerating Universe Astrophysical Survey

S-PLUS

M1 (Ø) = 2.55 m
FoV (Ø) = 3 deg = 476 mm at FP
Etendue = 27.5 m$^2$deg$^2$

Currently equipped with the "pathfinder" camera

M1 (Ø) = 0.8 m
FoV (Ø)) = 2 deg



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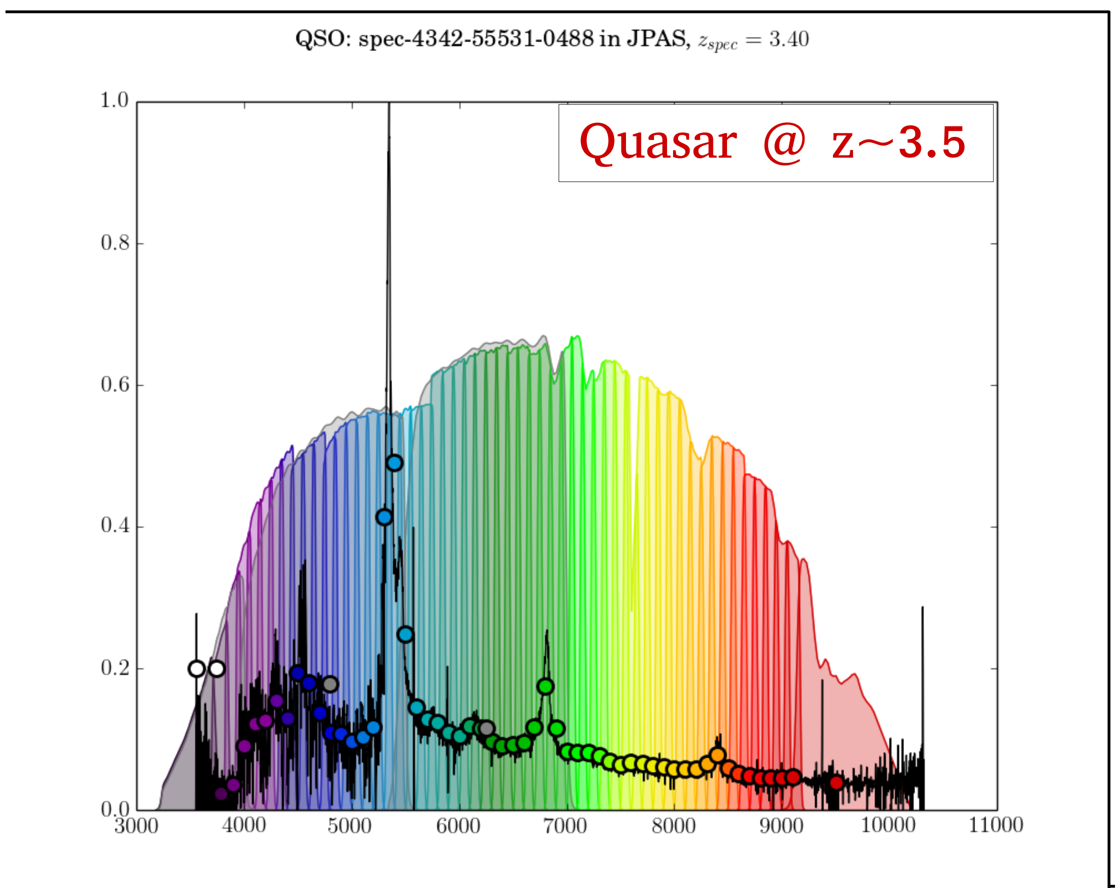
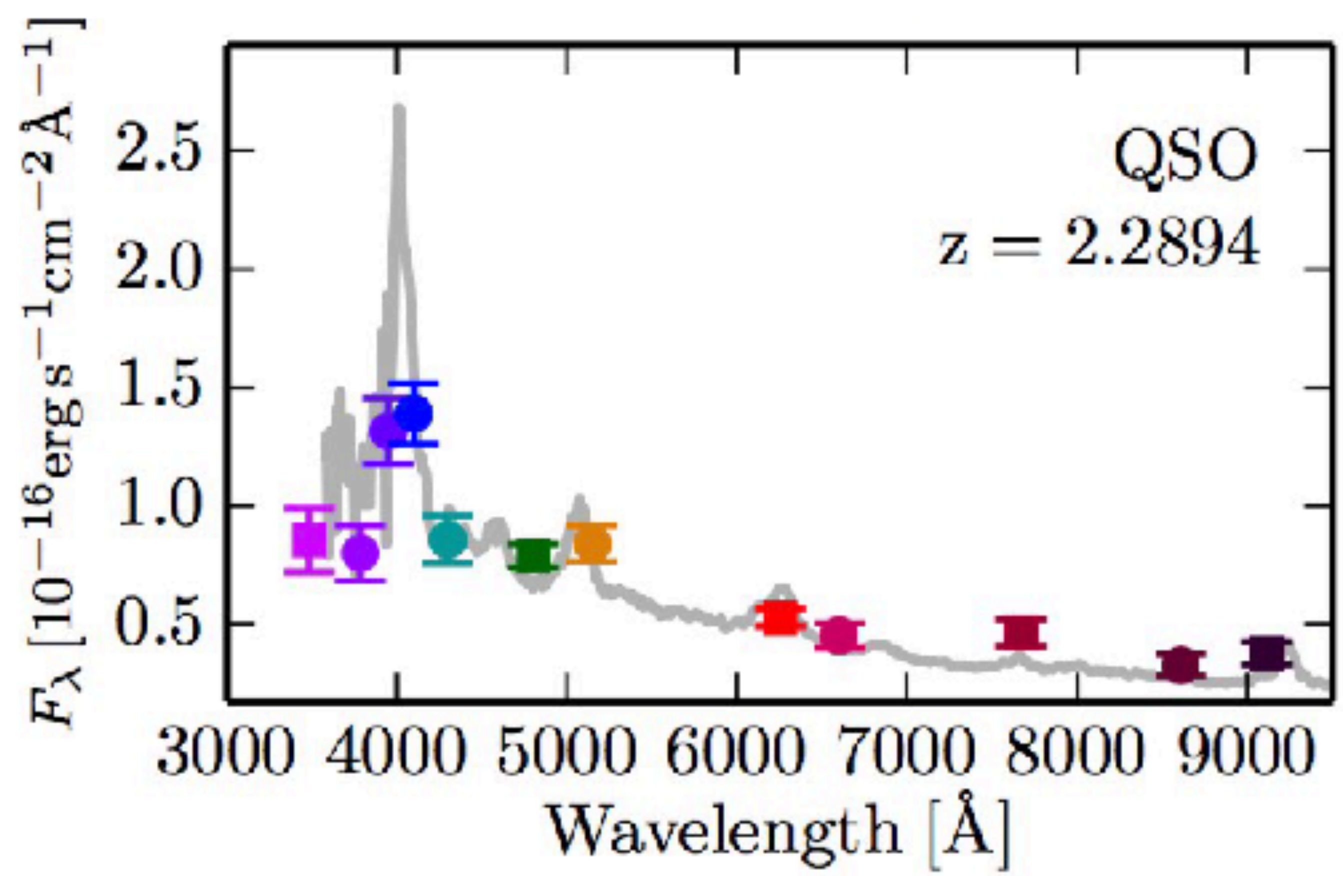
J-PAS
Javalambre Physics of the Accelerating Universe Astrophysical Survey

J-PLUS

# Spectro-photometry

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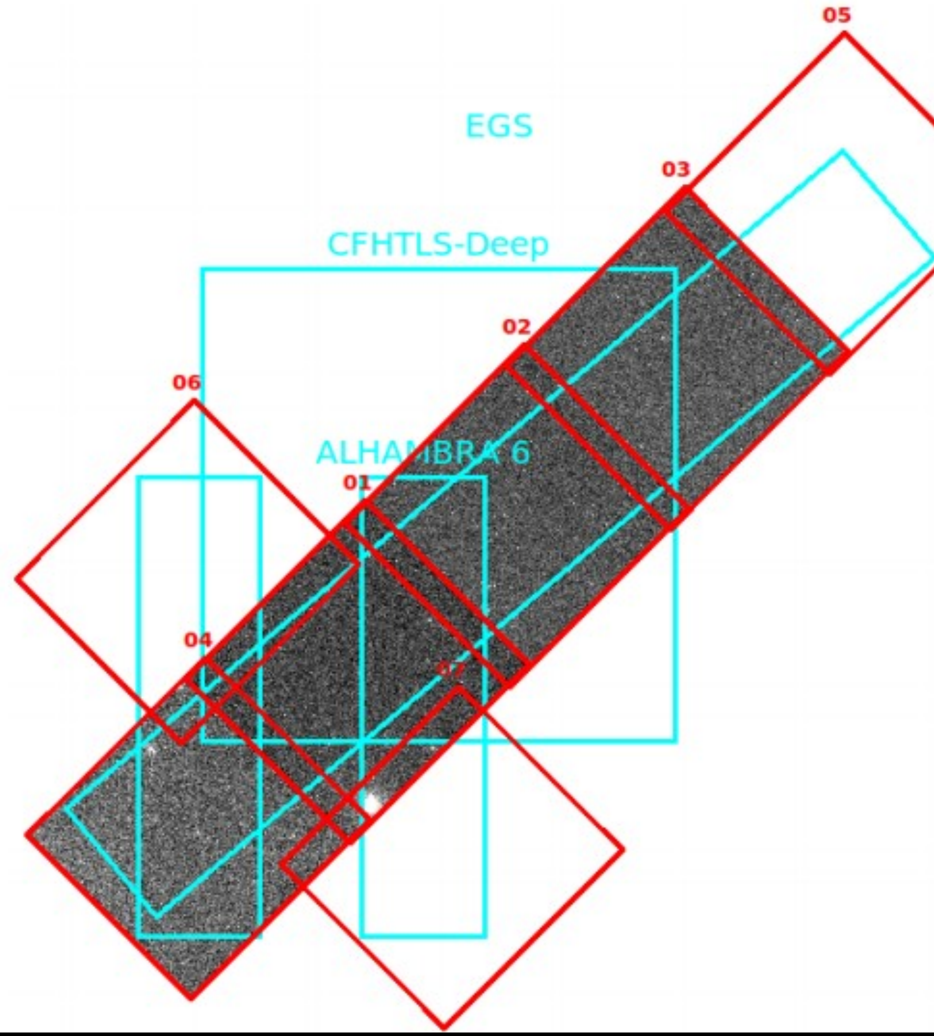
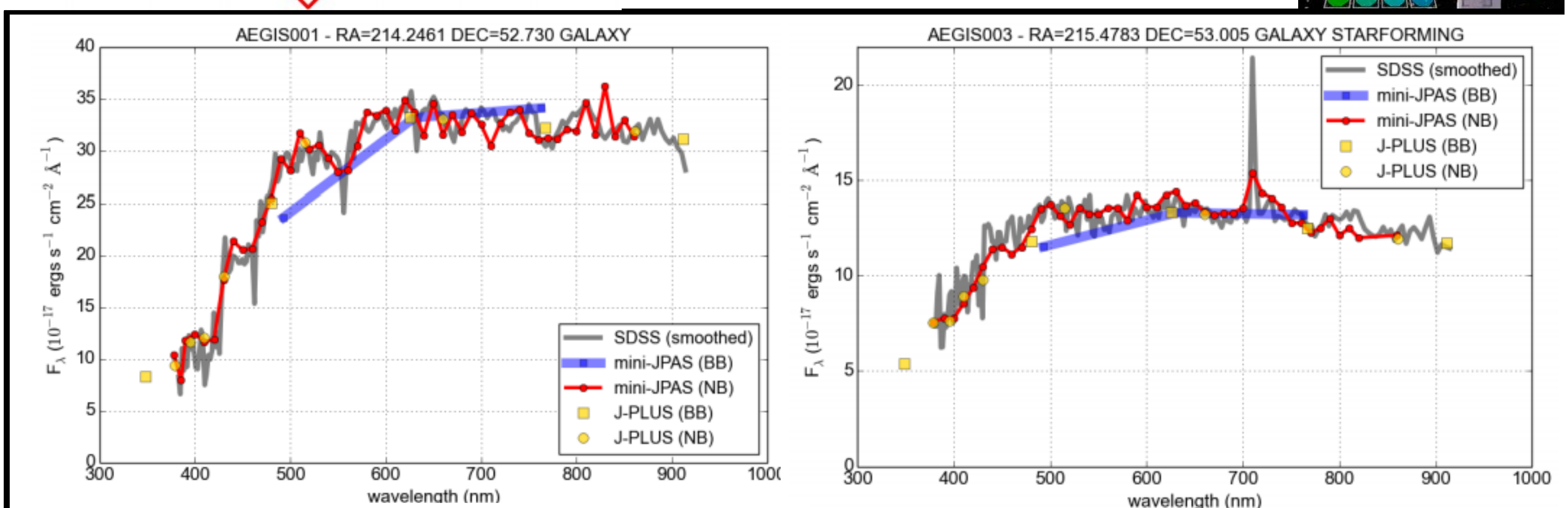



# mini J-PAS

Full filter coverage over ~1 deg^2
with Pathfinder camera

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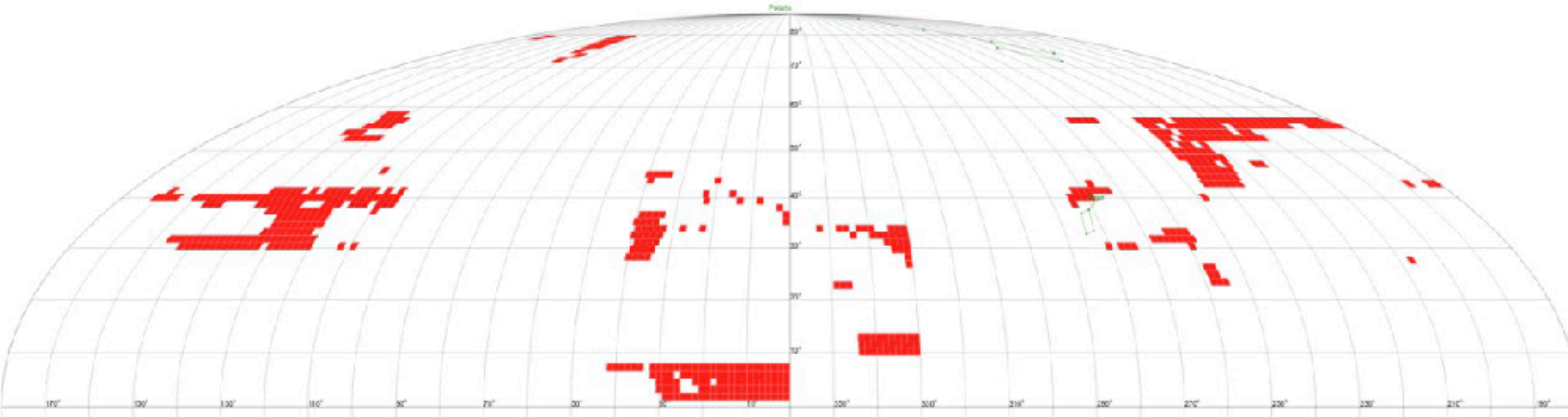
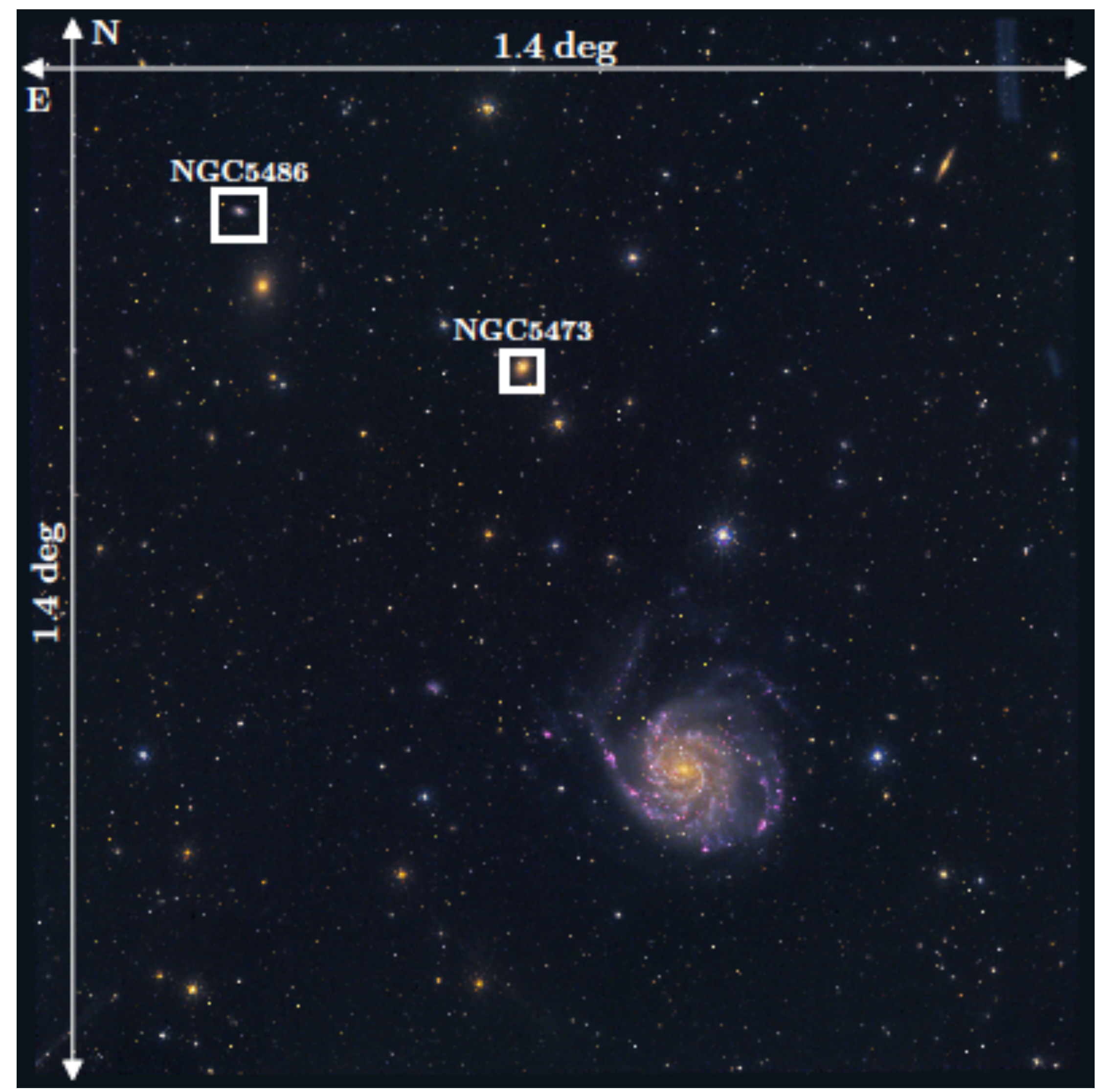


Cenarro et al. (2018)




J-PLUS DR1: over 1000 deg^2

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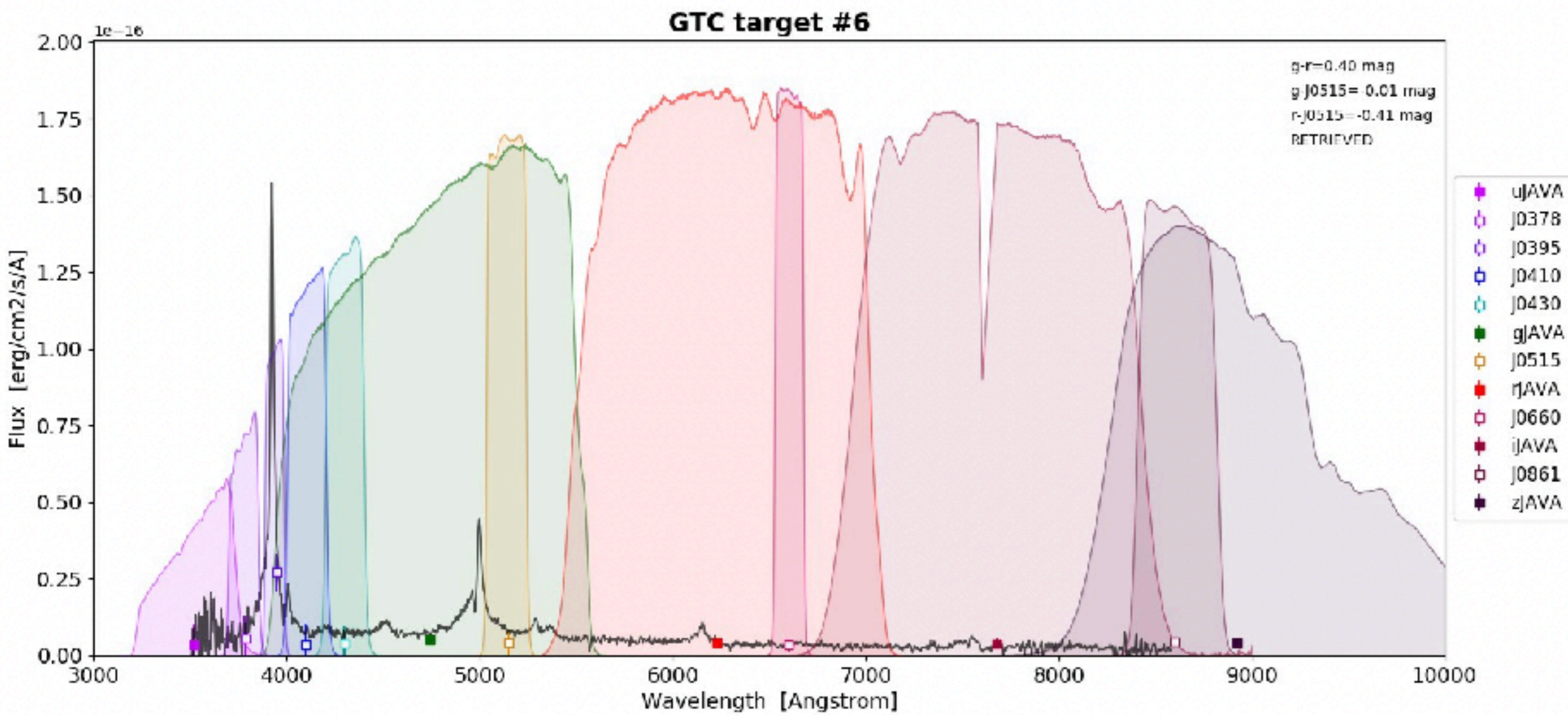
# Extreme LAEs at z~2.2 with J-PLUS DR1 and GTC spectroscopy




Spinoso, Orsi et al. (in prep.)

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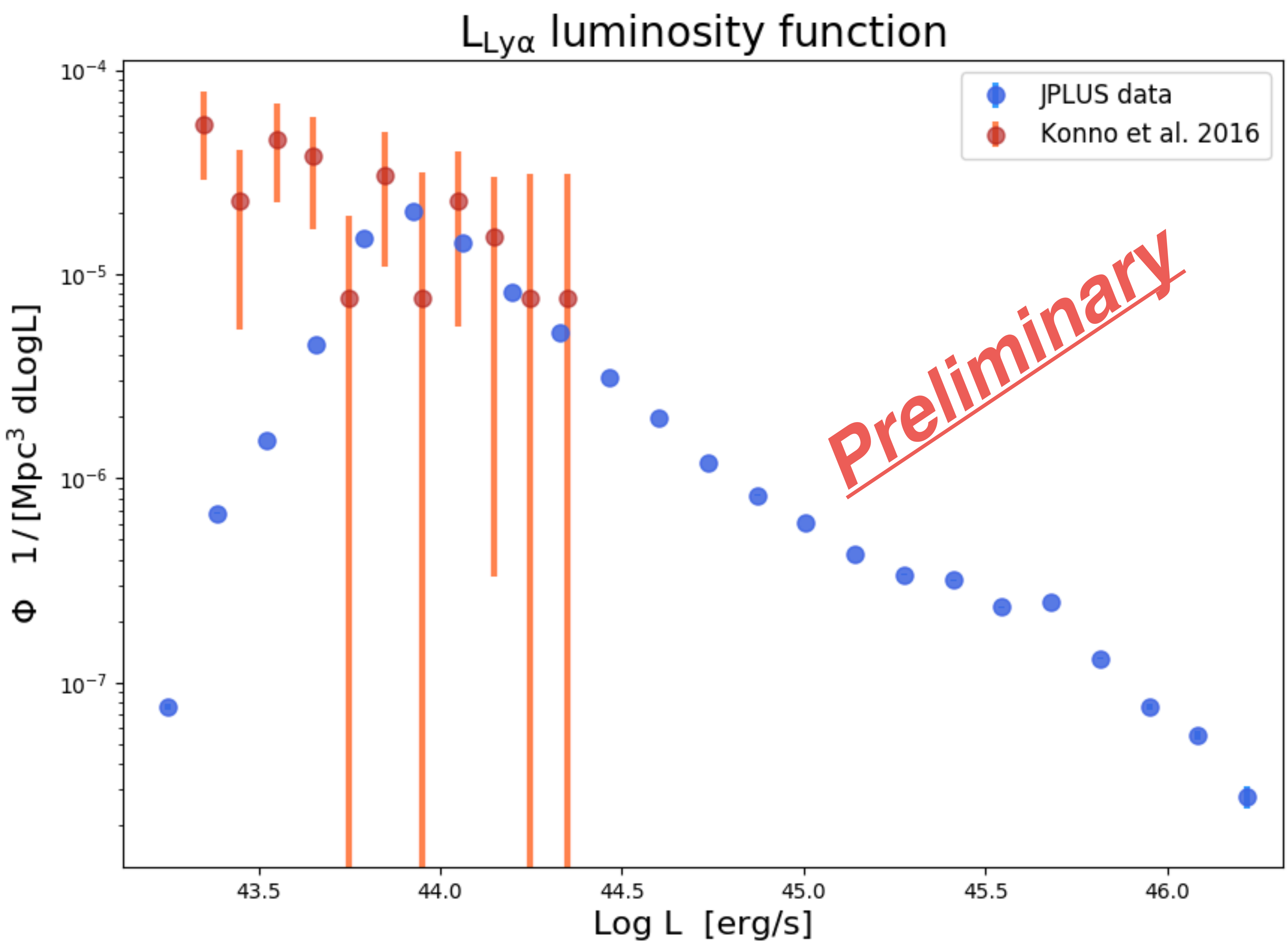


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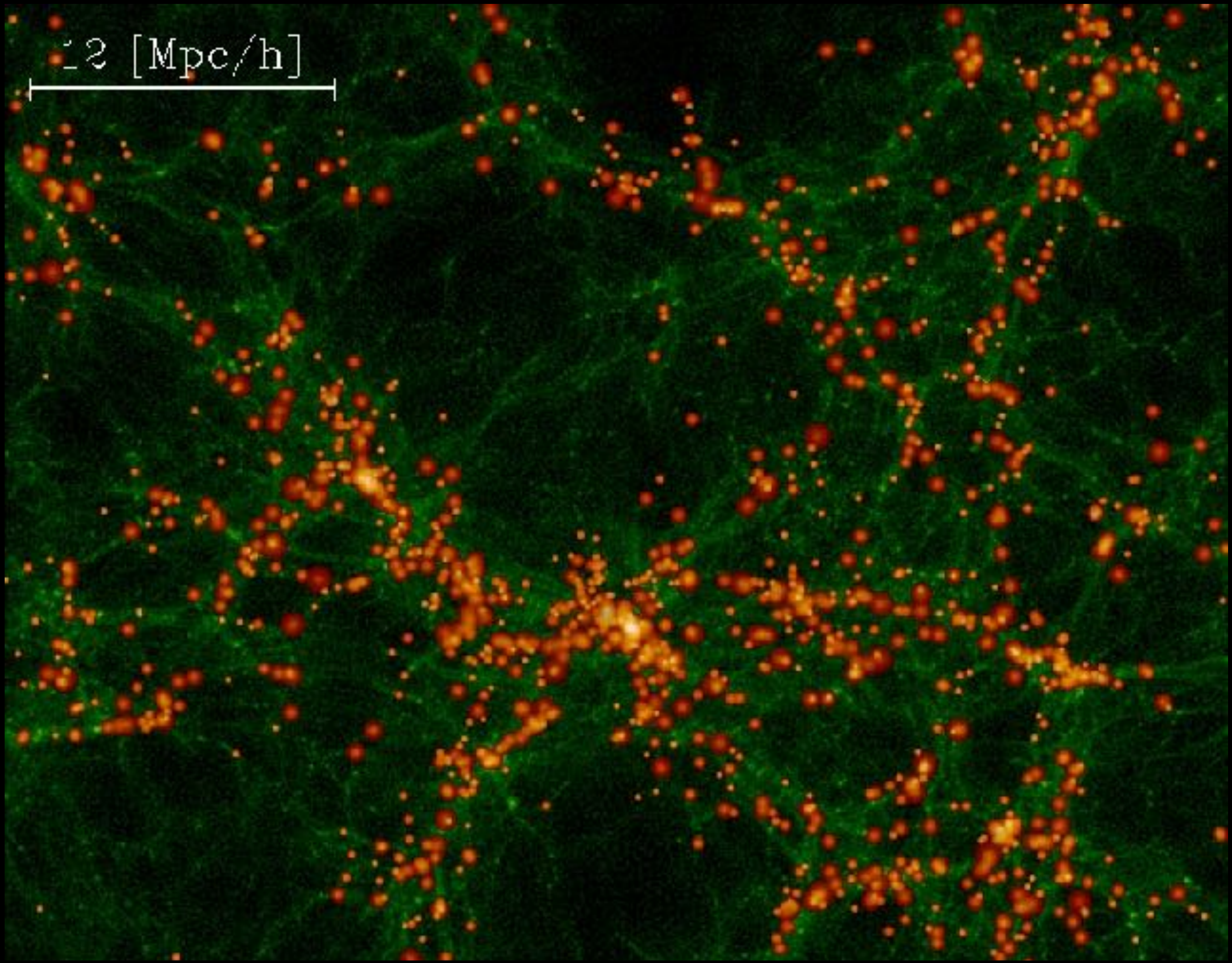
# Semi-analytical models of Galaxy formation

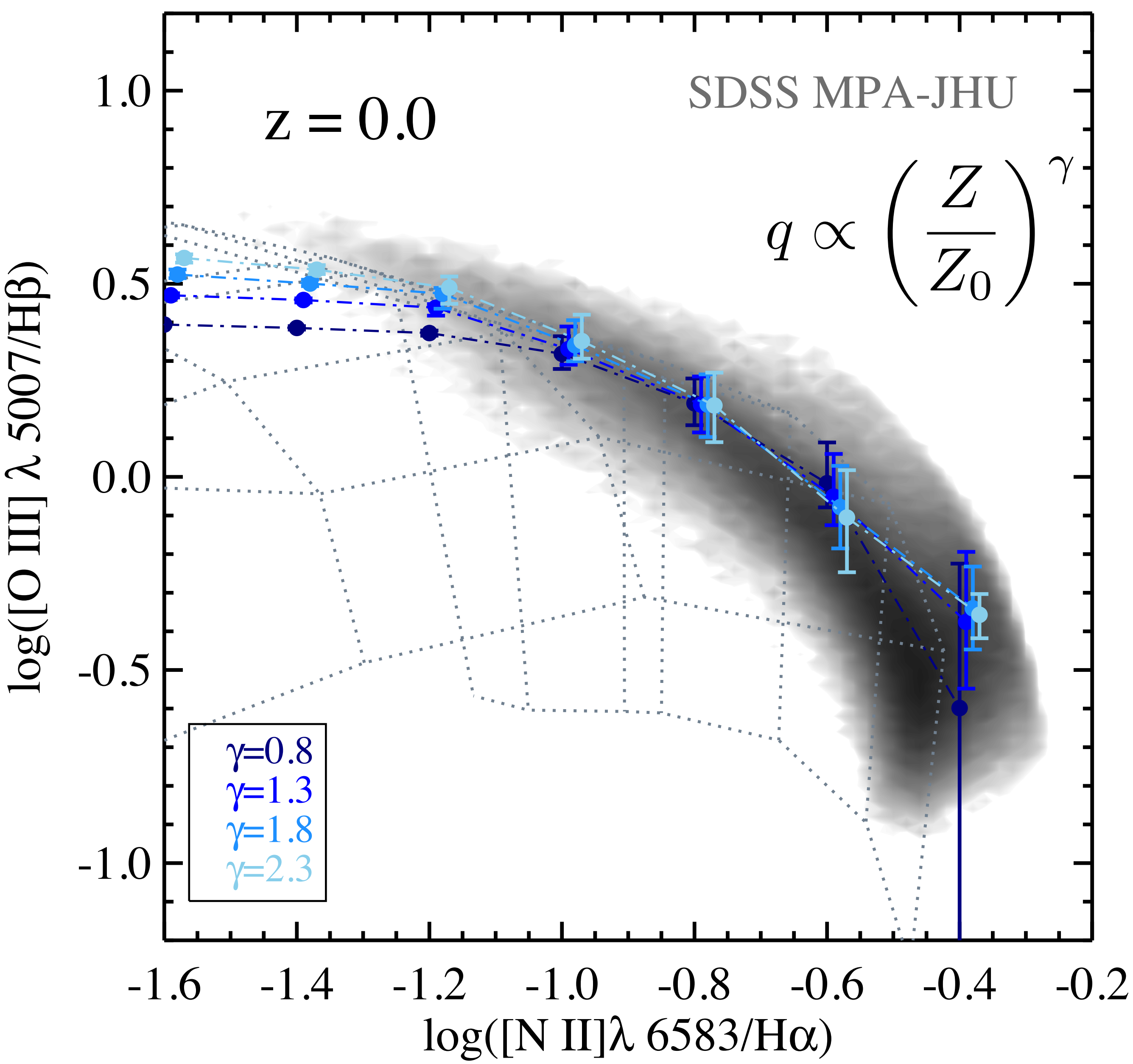
Dark matter halo merging histories → Gas physics → SF/Chemical histories → Composite Stellar population → $Q(H^0)$ → RT, photo-ionization, etc → Line luminosities

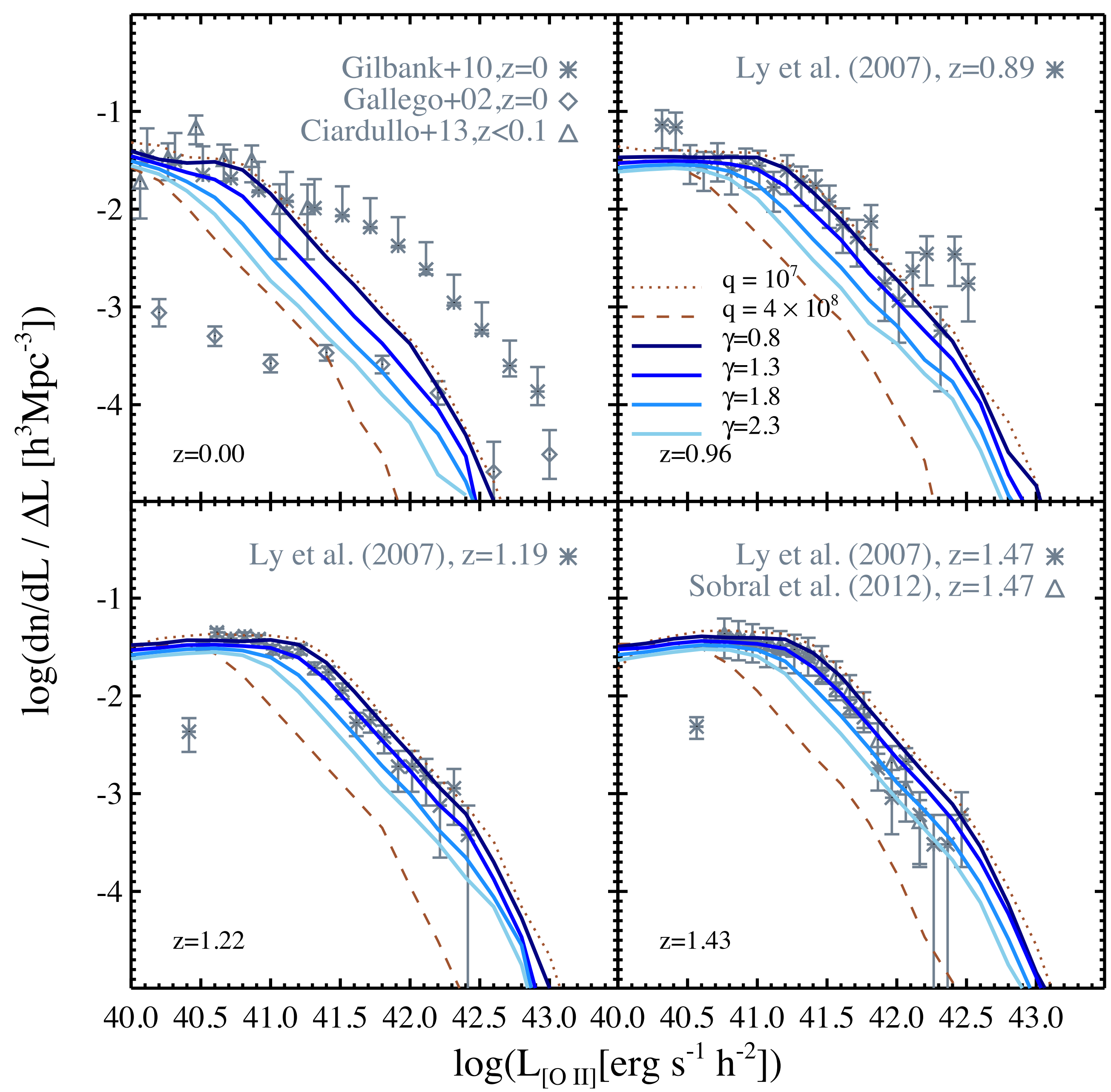


Simple modeling of the ionization parameter:

**very important!**

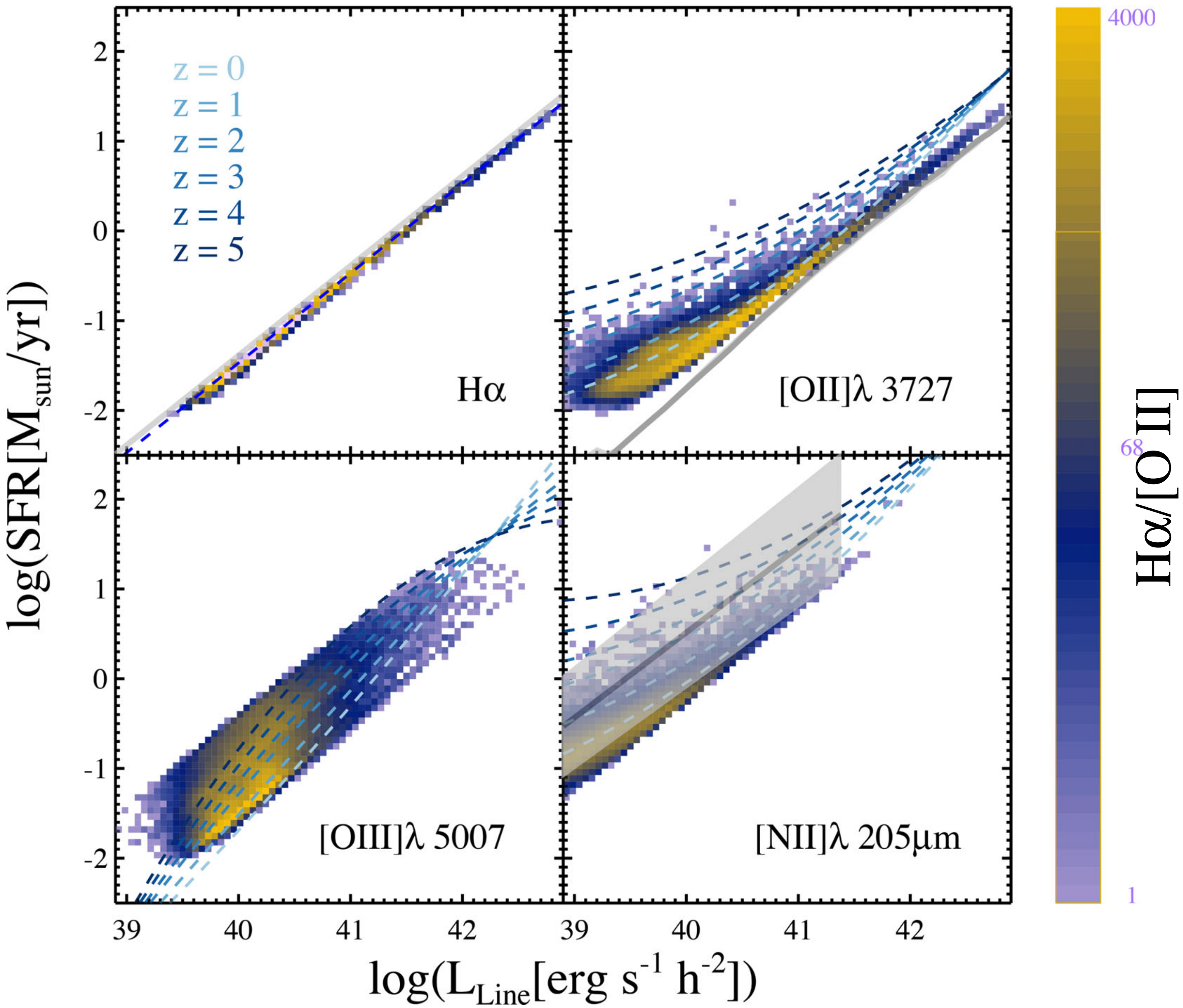
OII LFs vary with q

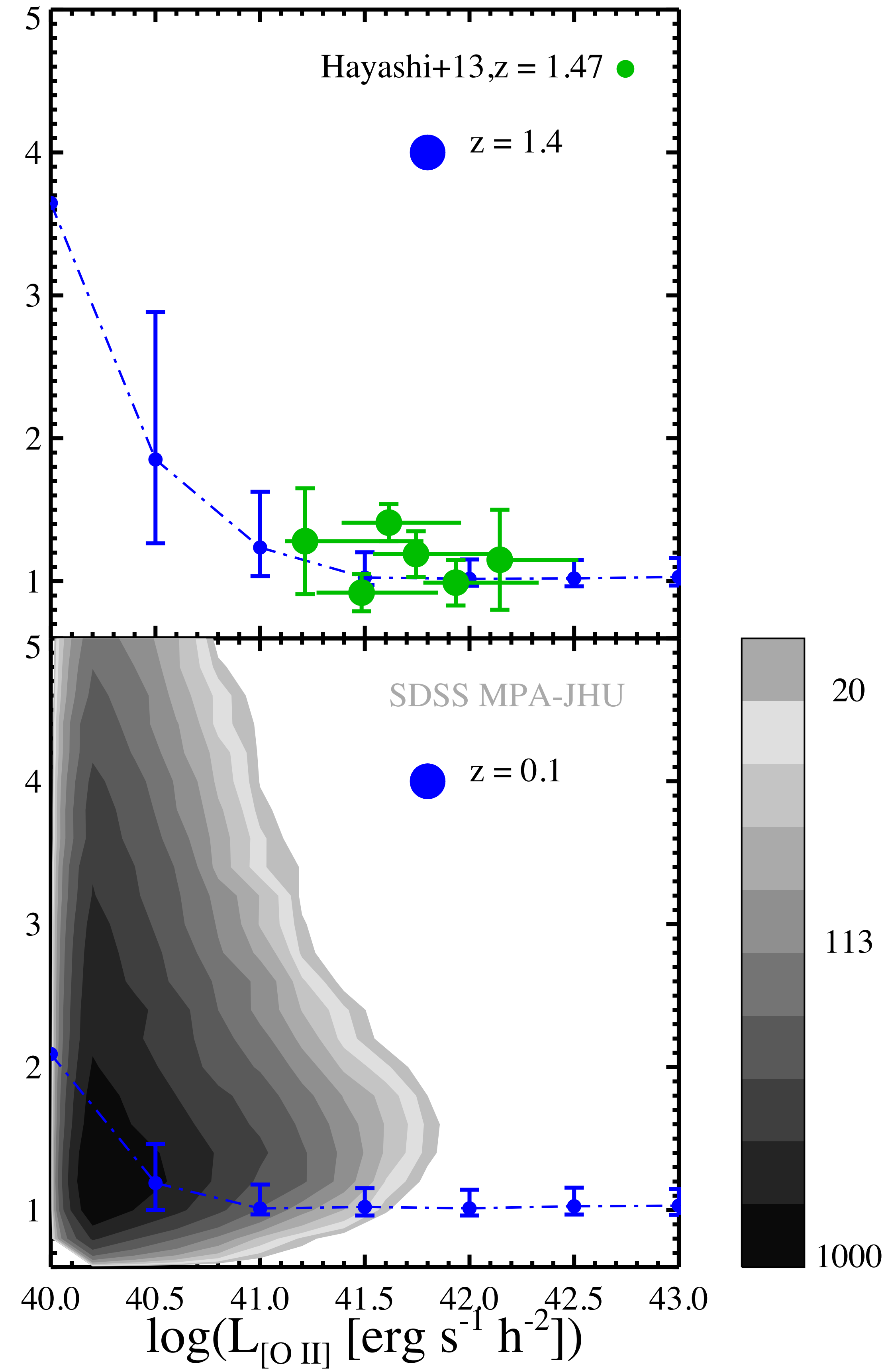



Orsi+14

# Orsi+14




A diversity of line fluxes and ratios consistent with observations

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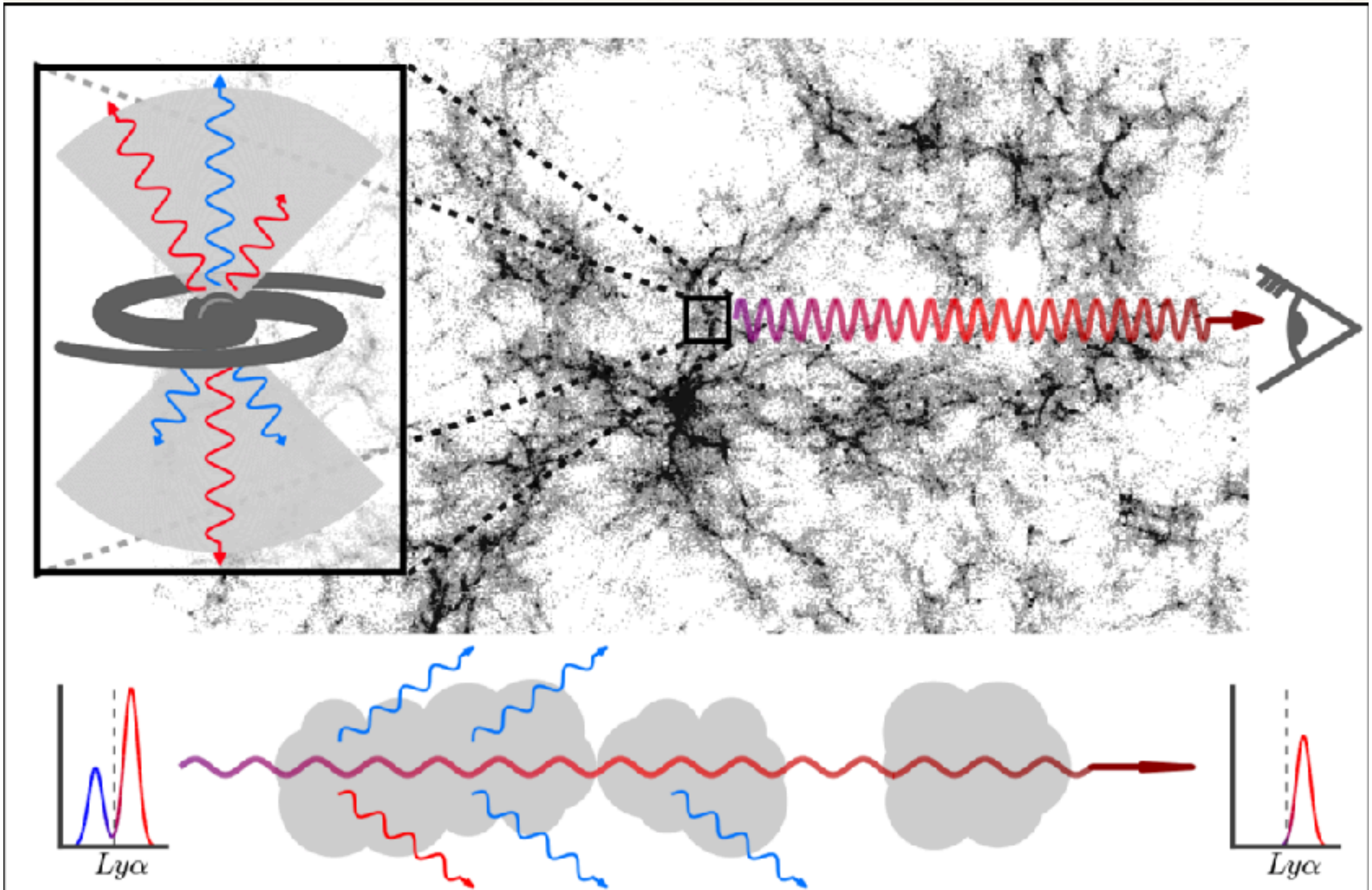
# Modeling LAEs over cosmological volumes




Gurung-Lopez, Orsi et al. (2018a)

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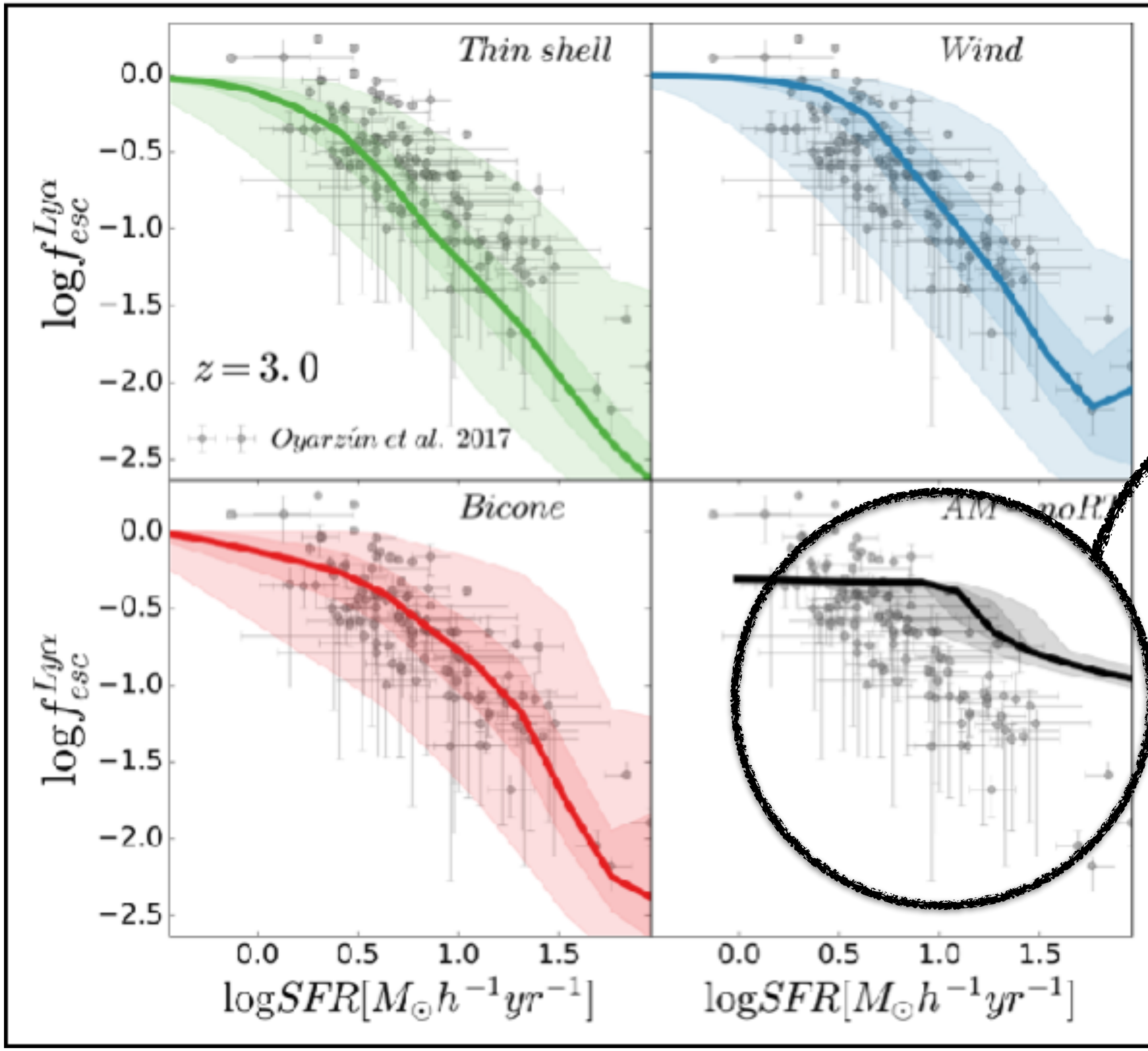
# The impact of RT on LAE properties




Abundance matching

**Simple model fails here**

Gurung-Lopez, Orsi et al. 2018

$$L_{Ly\alpha} = L_{Ly\alpha,0} \times f_{esc}^{galaxy} \times f_{esc}^{IGM}$$

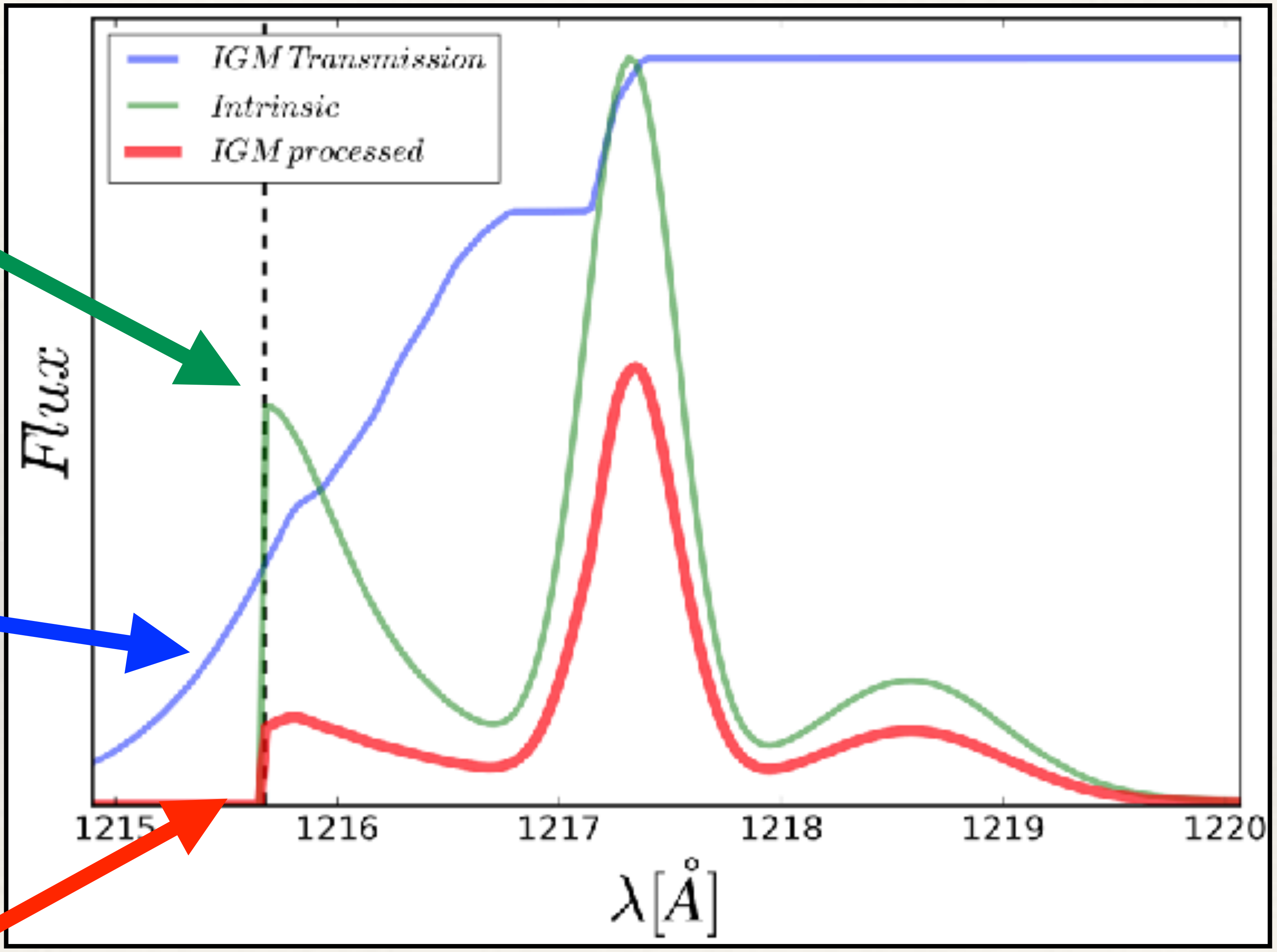
Intrinsic Lyman $\alpha$
Line Profile
(Galaxy properties: SFR, Z, etc)

×

IGM Transmission
( Local galaxy environment :
density, velocity, UV background)

=

Observed Line Profile
( Galaxy Prop. × Environment )




Gurung-Lopez, Orsi et al. (in prep.)

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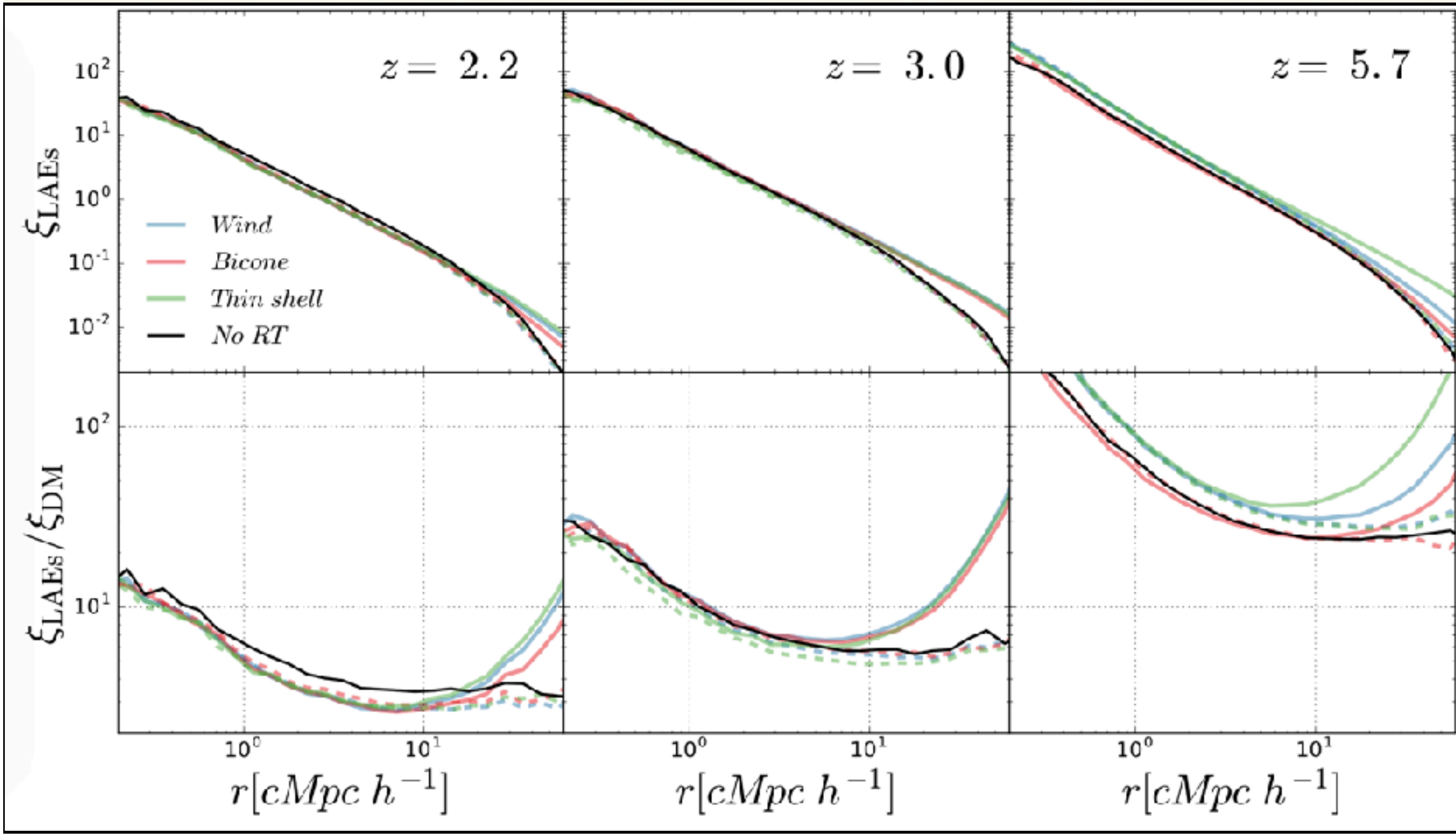
# Large-scale-dependent distortion in LAE clustering due to the IGM

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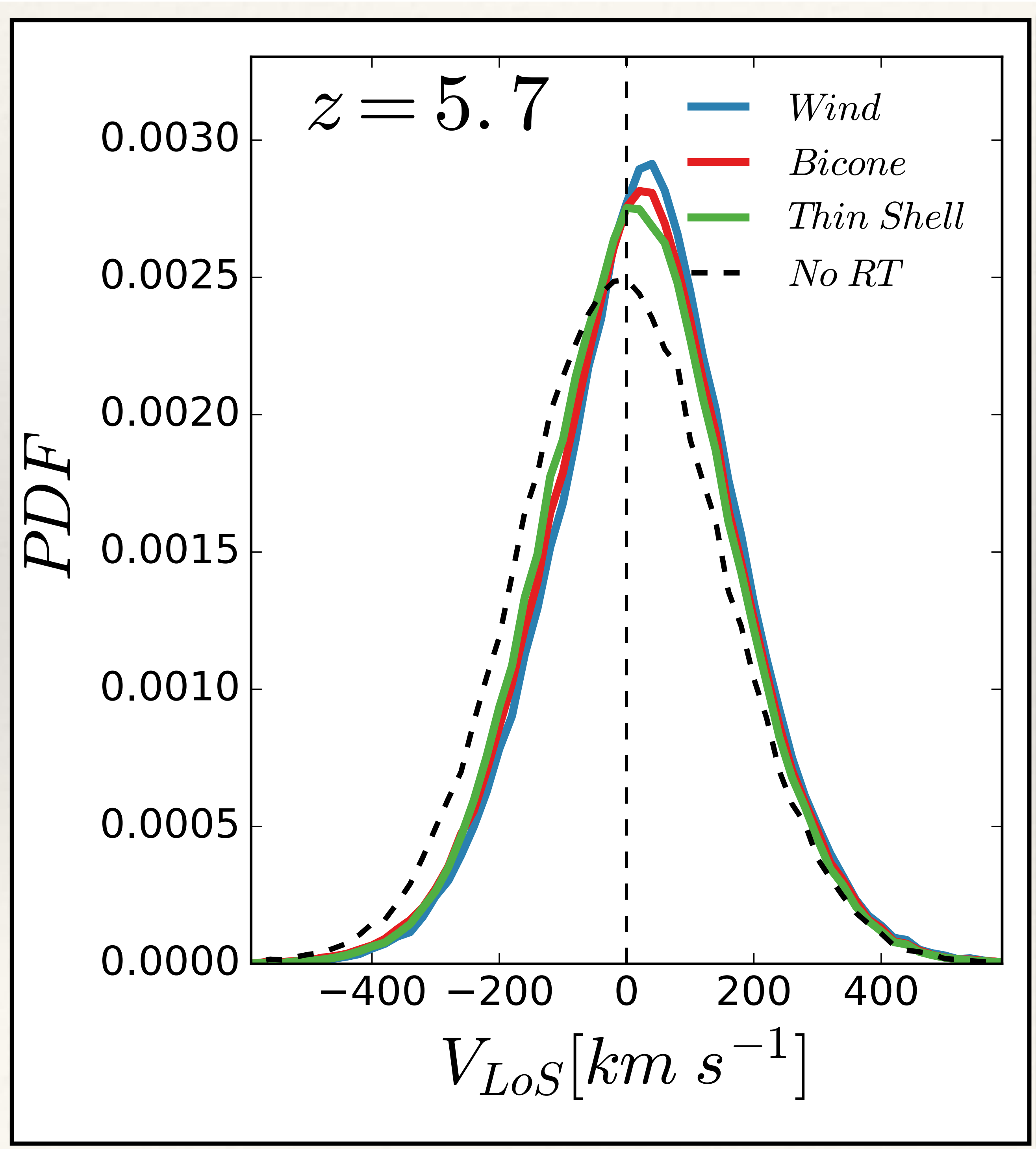


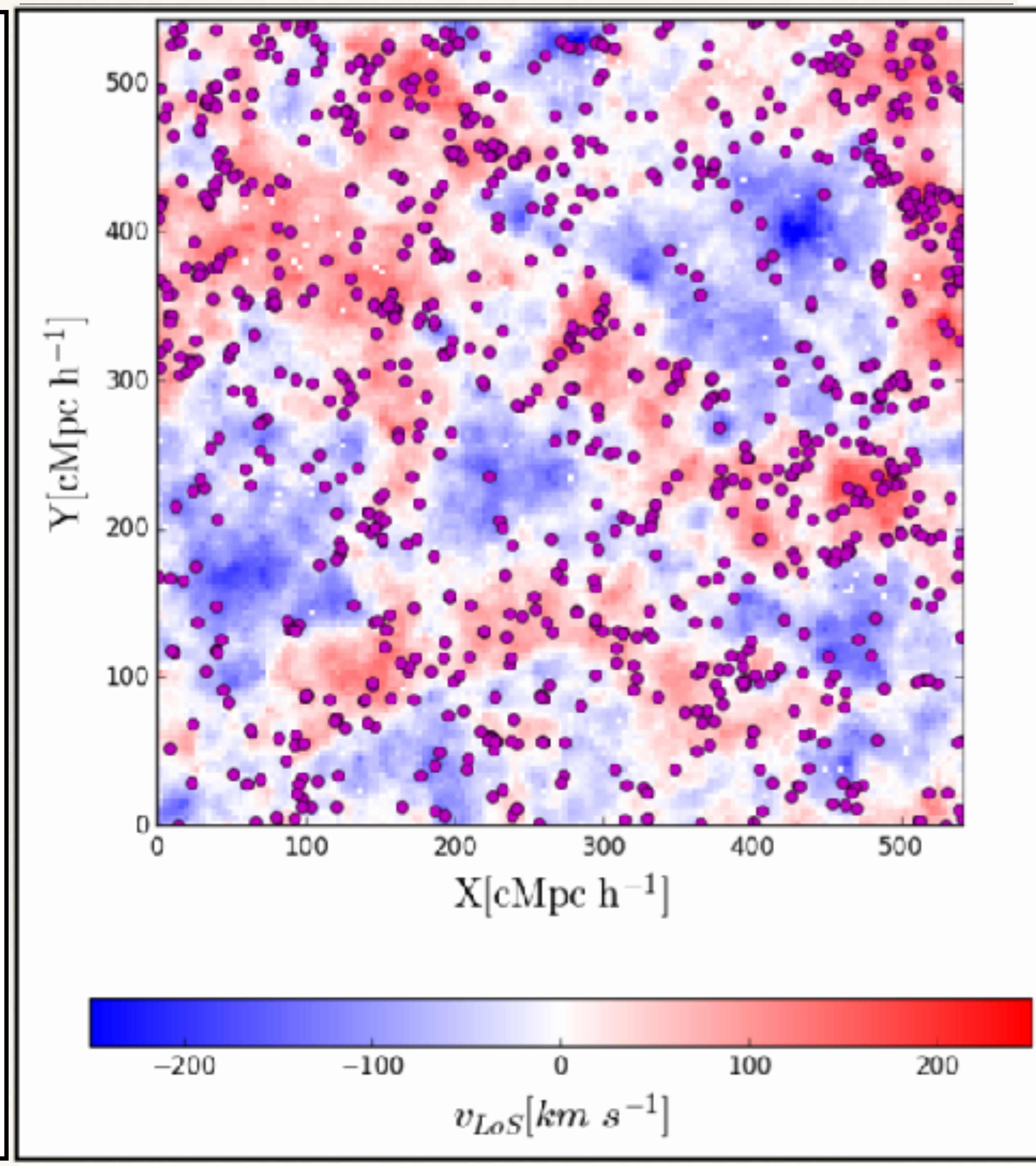


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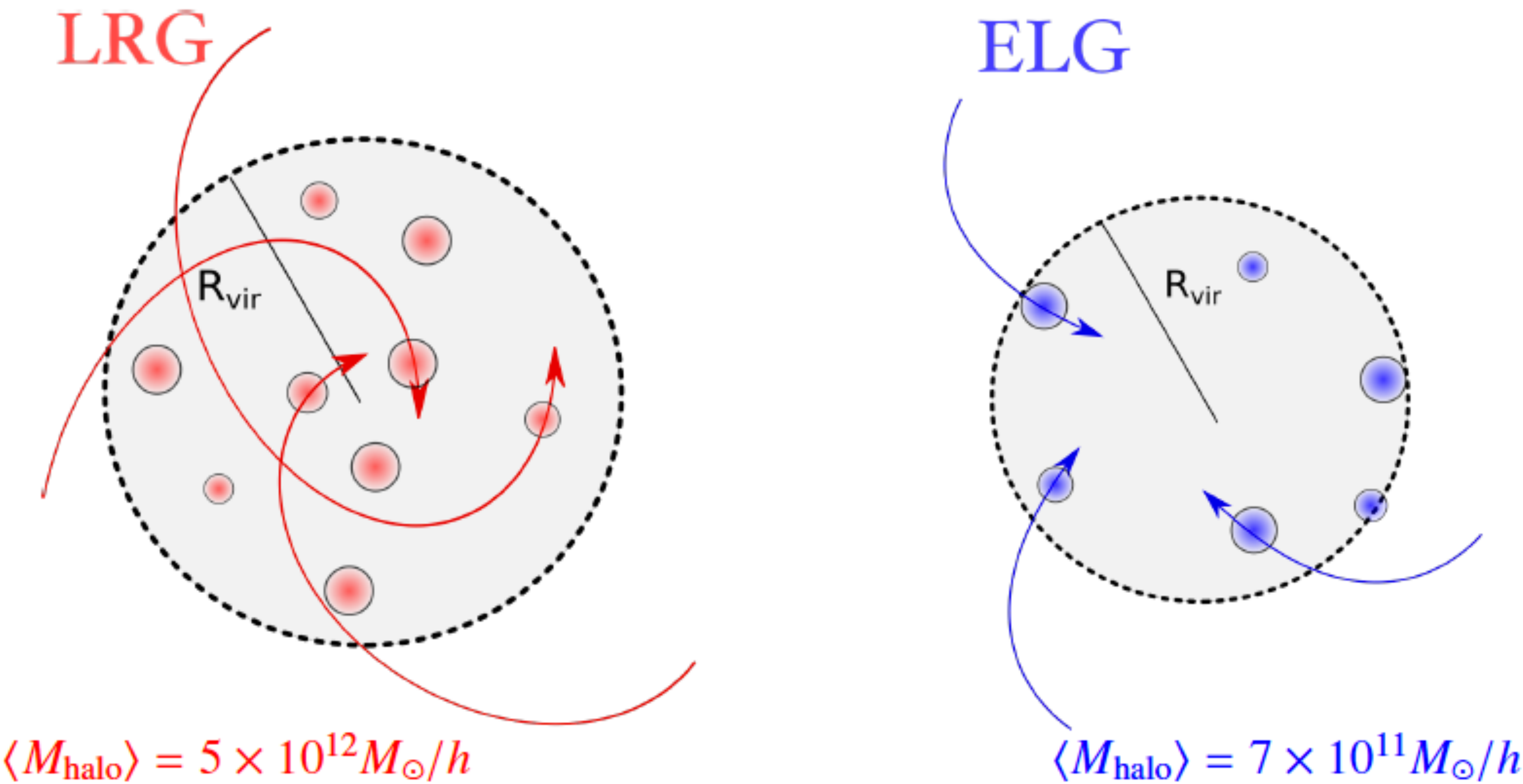


Orsi & Angulo, 2018

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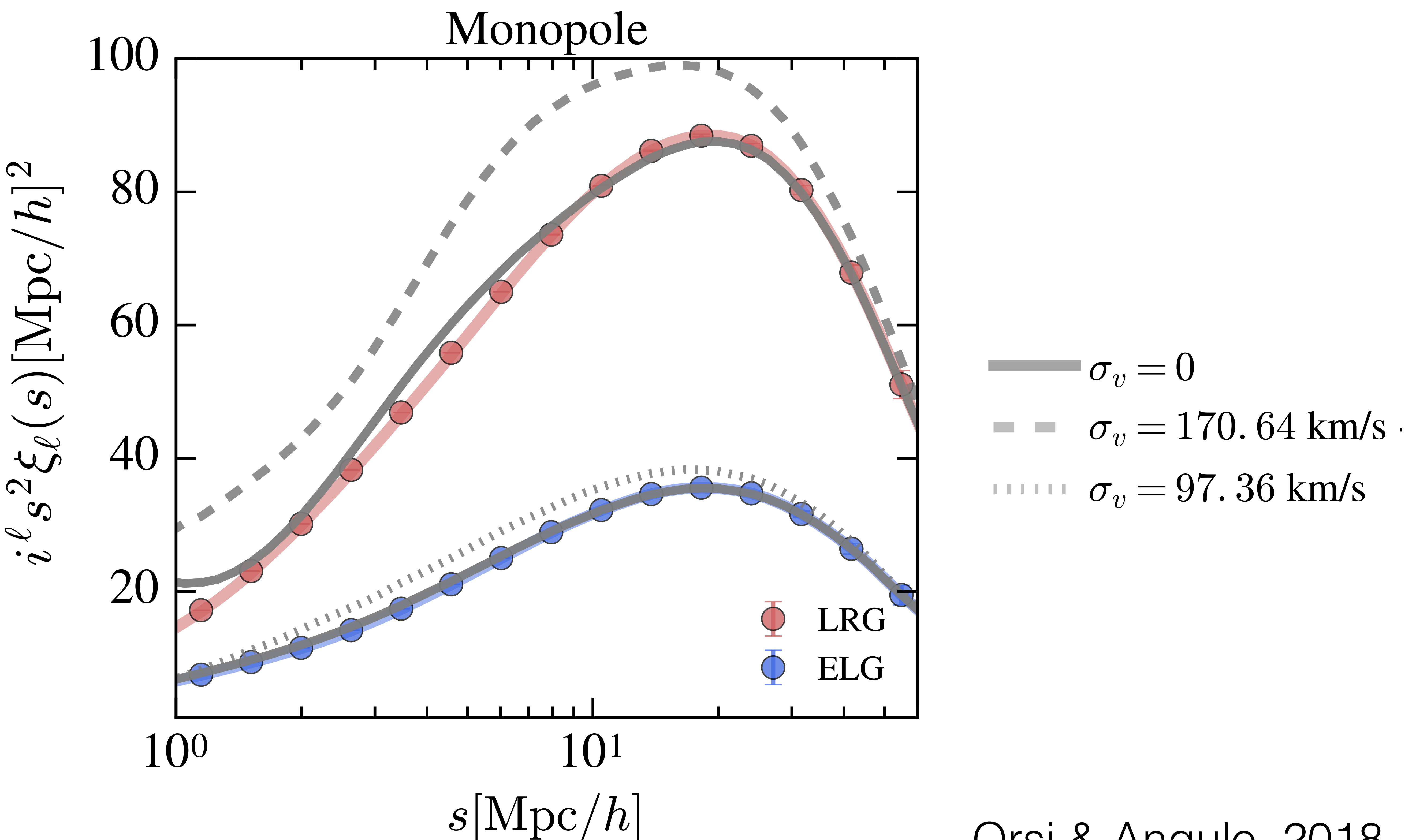
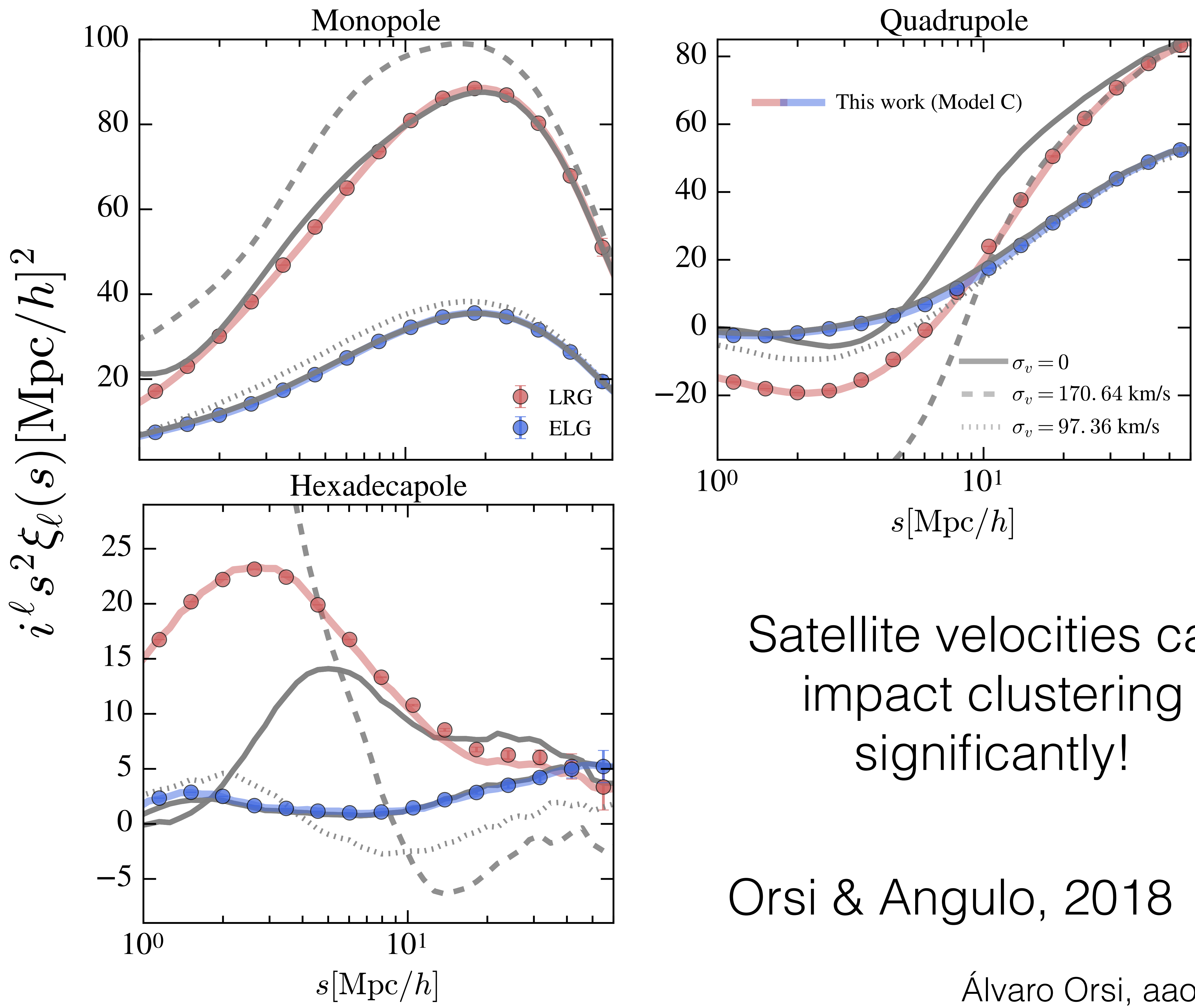
# Testing the best possible clustering description




Orsi & Angulo, 2018




Satellite velocities can impact clustering significantly!

Orsi & Angulo, 2018

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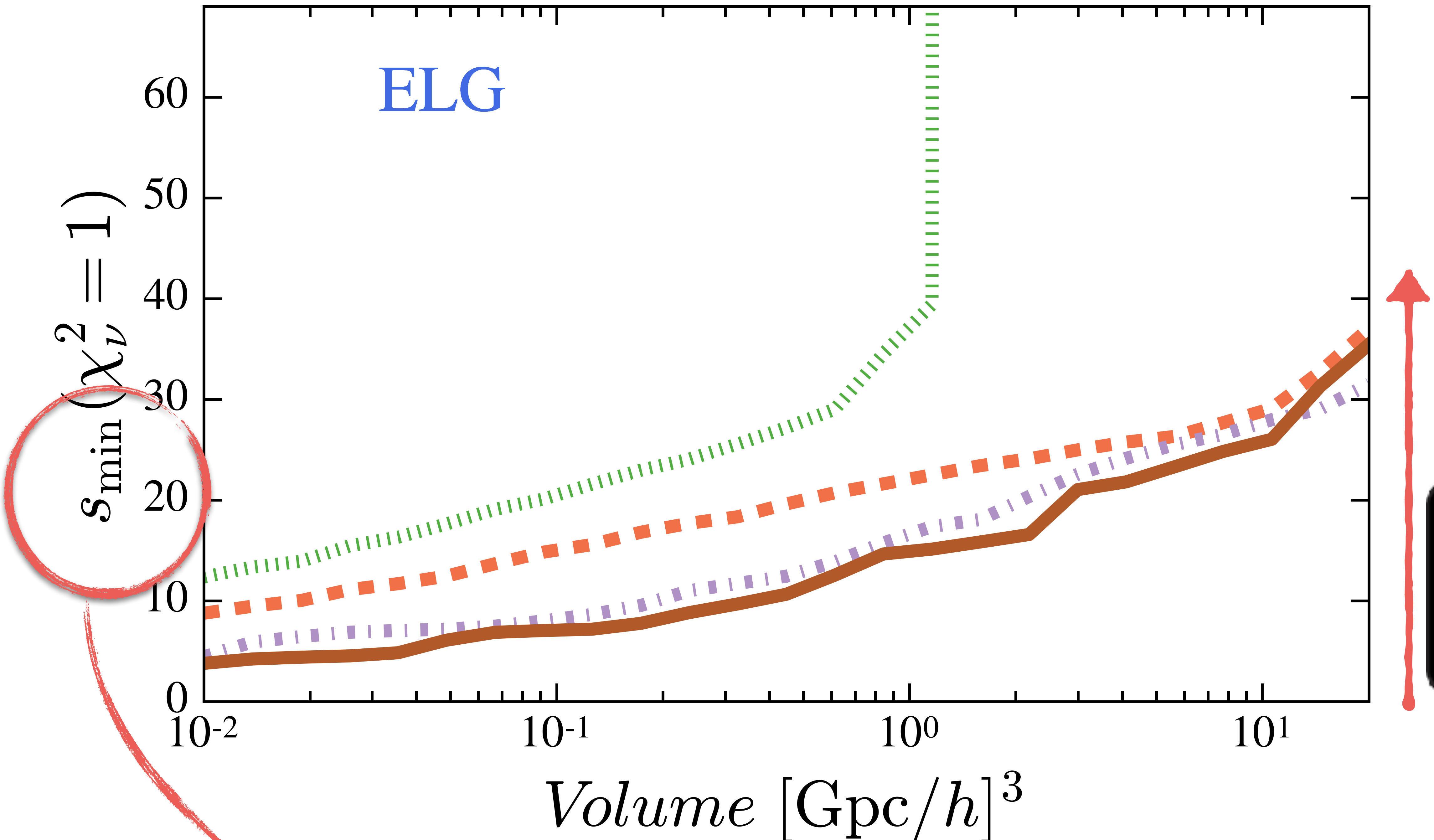
Orsi & Angulo, 2018




**Optimal minimum scale depends on survey volume**

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# Conclusions

- Large datasets of ELGs pose a new challenge
- Complicated selection function of MOS datasets
    - J-PAS/J-PLUS offer a complementary view of ELGs
- Galaxy formation effects: Key ingredient for interpreting surveys and cosmological analysis
        - *LAE clustering is strongly affected by the IGM*
        - *Small fraction of satellites impact redshift-space clustering*
            - *Keys to model: intra-halo spatial distribution and velocities*