An HST imaging view of the leakiest low-z galaxies

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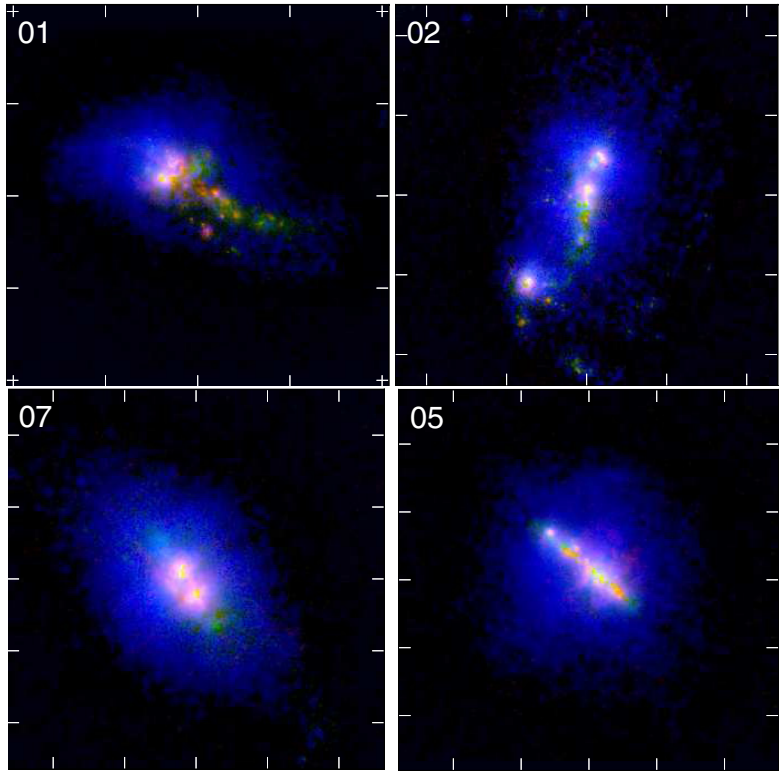
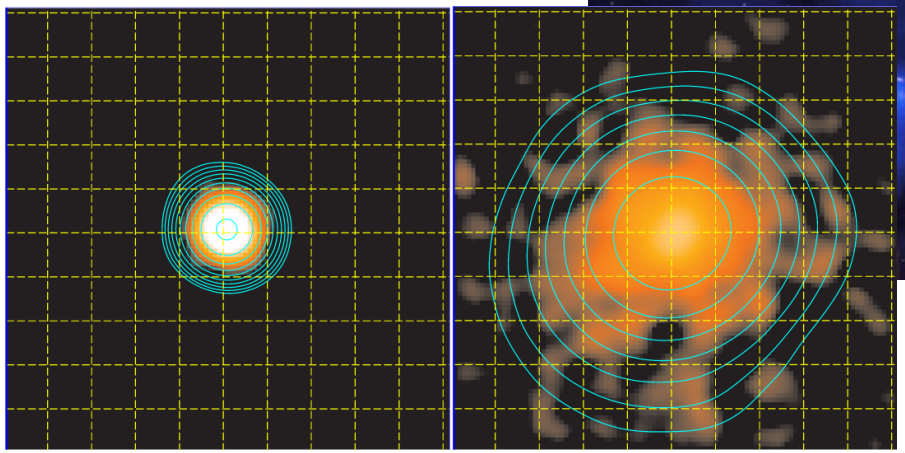
Lyα from starburst galaxies tend bo be extended

Some LARS galaxies Blue = Lyα,
Green = UV continuum, Red = Hα
Lyα is extended

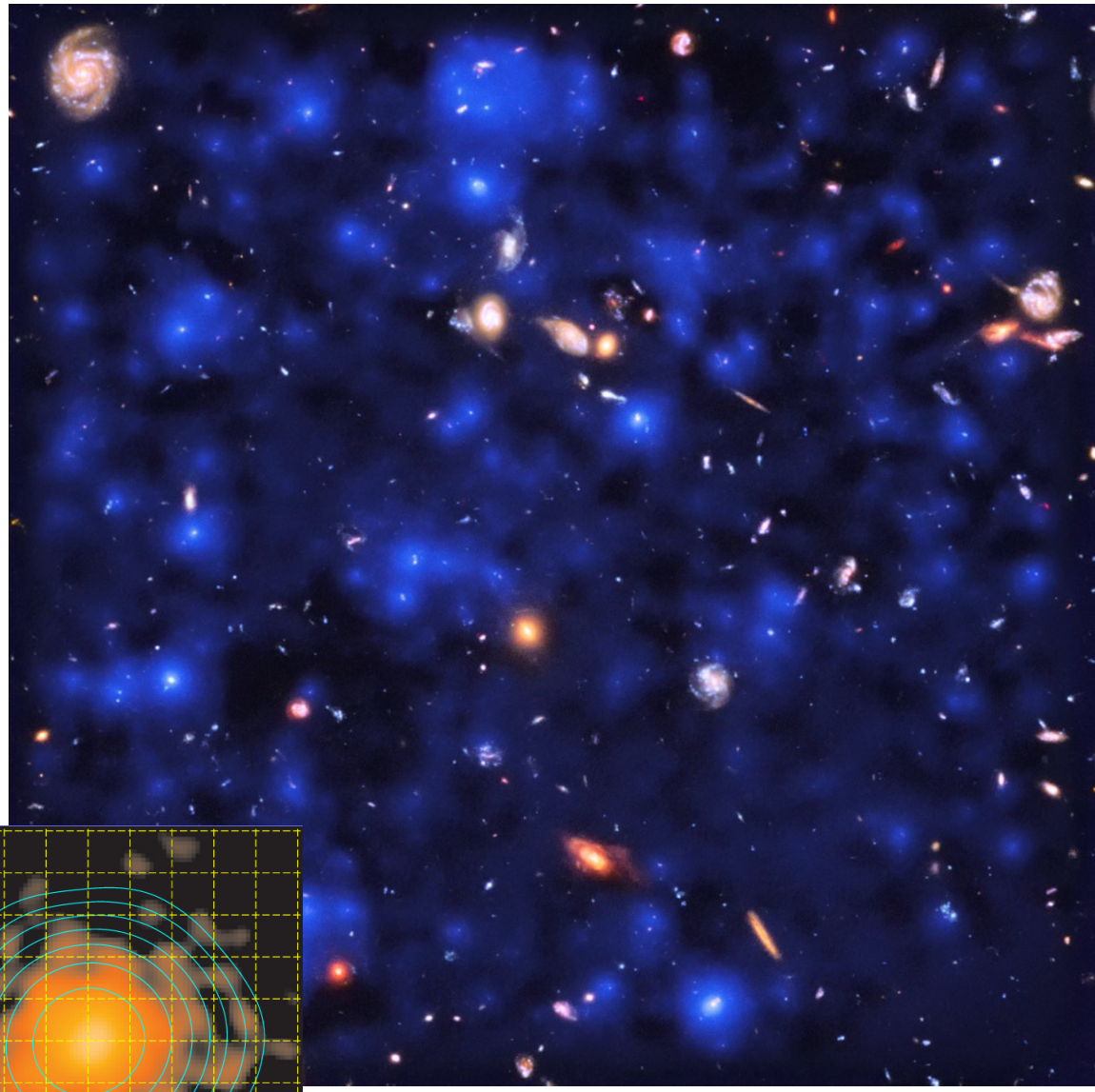


(Östlin+2014, Hayes+2014, Melinder+2023)



Continuum (Steidel+2010)

Lya



3D spectroscopy with MUSE (Wisotzki et al 2016, 2018)

HST program 16245

- 34 orbits, Cycle 28, but scheduling problems, data just arrived (95%)
- Sample: the three highest f_esc galaxies from Izotov et al (2018a,b):
  - J1256+4509, z=0.35, fesc = 38%
  - J1154+2443, z=0.36, fesc = 46%
  - J1243+4646, z=0.43, fesc = 72%

-What are their Lyα extensions and ionization structure at HST resolution?

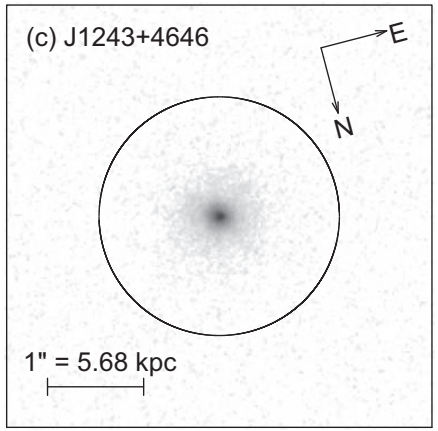
Prior to LzLCS results known, but these remain among the leakiest ones

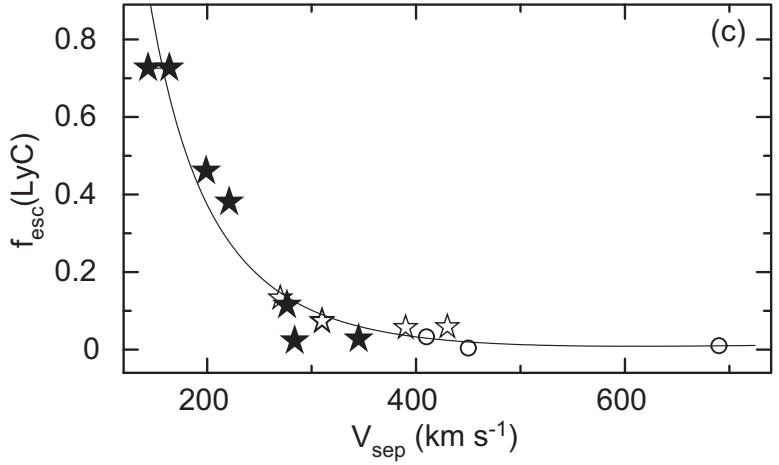
41 LzLCS galaxies will be imaged in 5 filters -> Lyα + continuum (LaCOS)

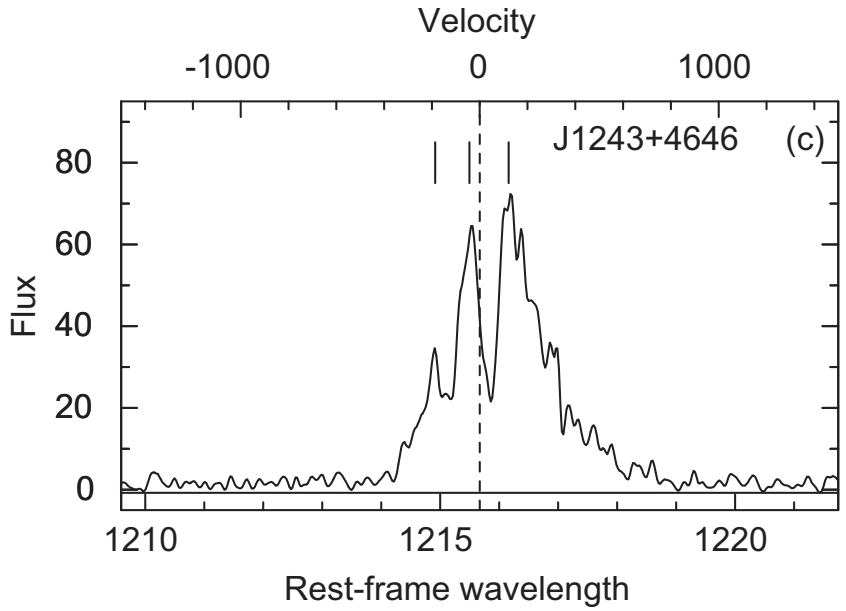
Here we use more filters, e.g. Hα Hβ [OII] and [OIII]

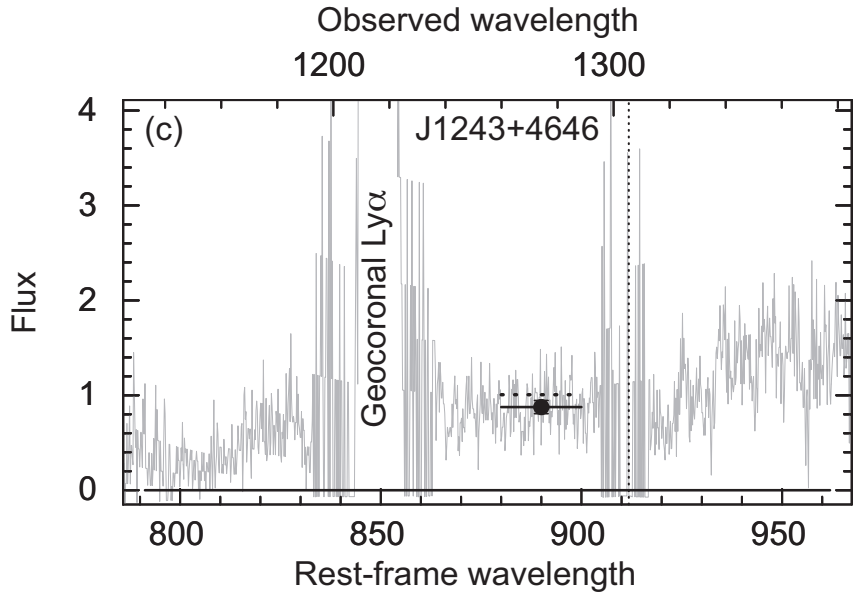
- See talk by Melinder on Lyα and Hα of six GPs (including 3 moderate leakers)

O/H = 7.9
O_{32} = 13.5
M_{FUV} = −20.5
EW(Lyα) = 98Å
Lyα/Hα = 4.5
v_{sep}~150 km/s





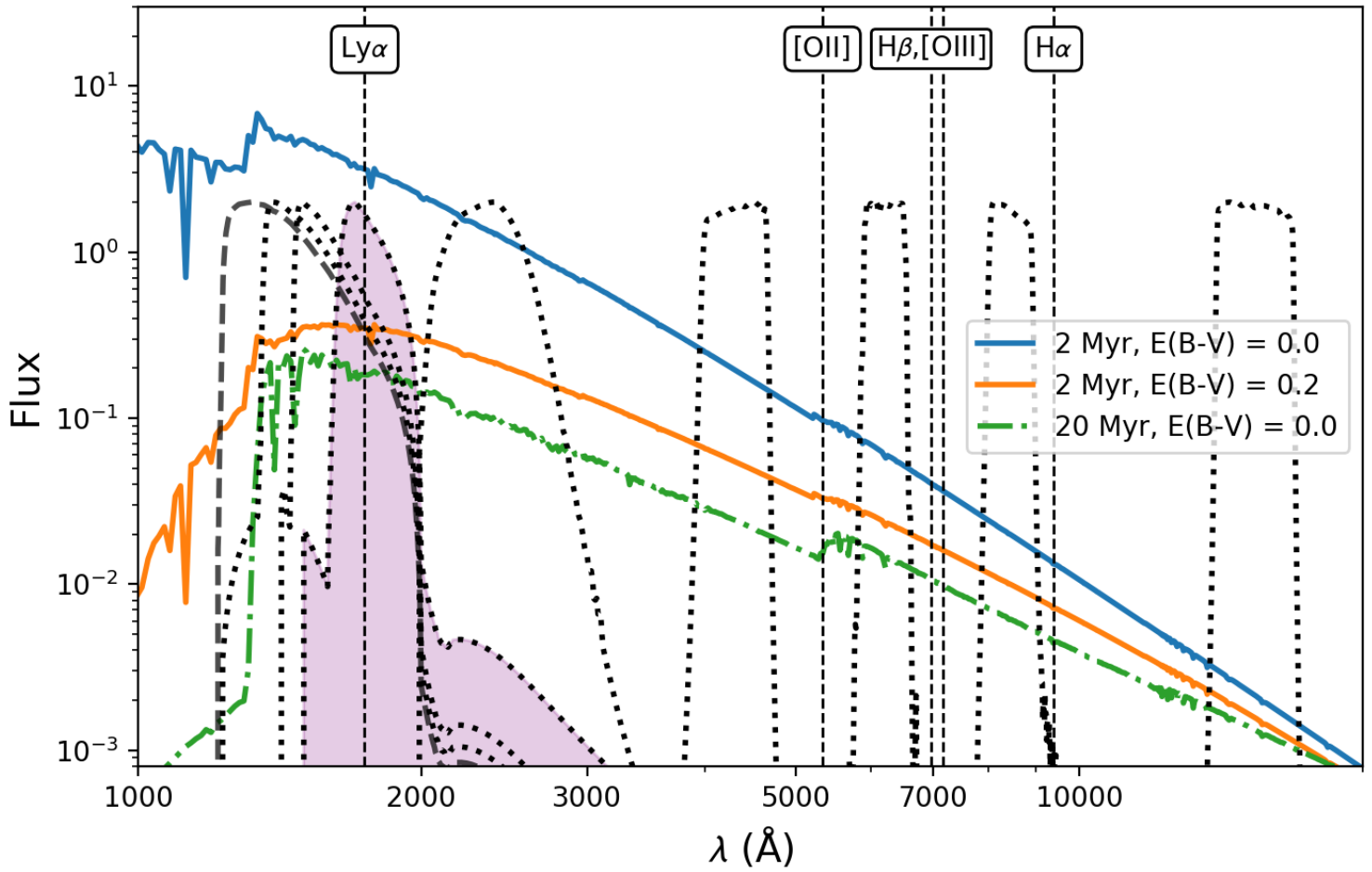




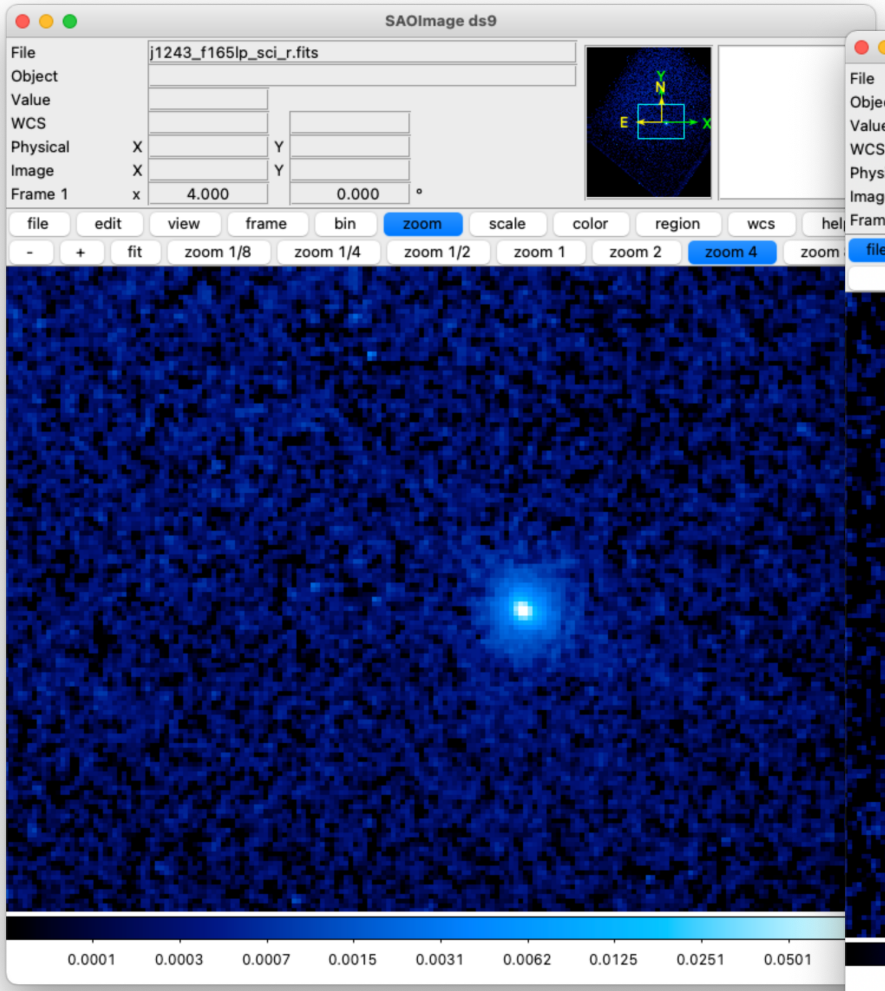
(Izotov et al. 2018)

HST imaging observations SDSS J1243+4646

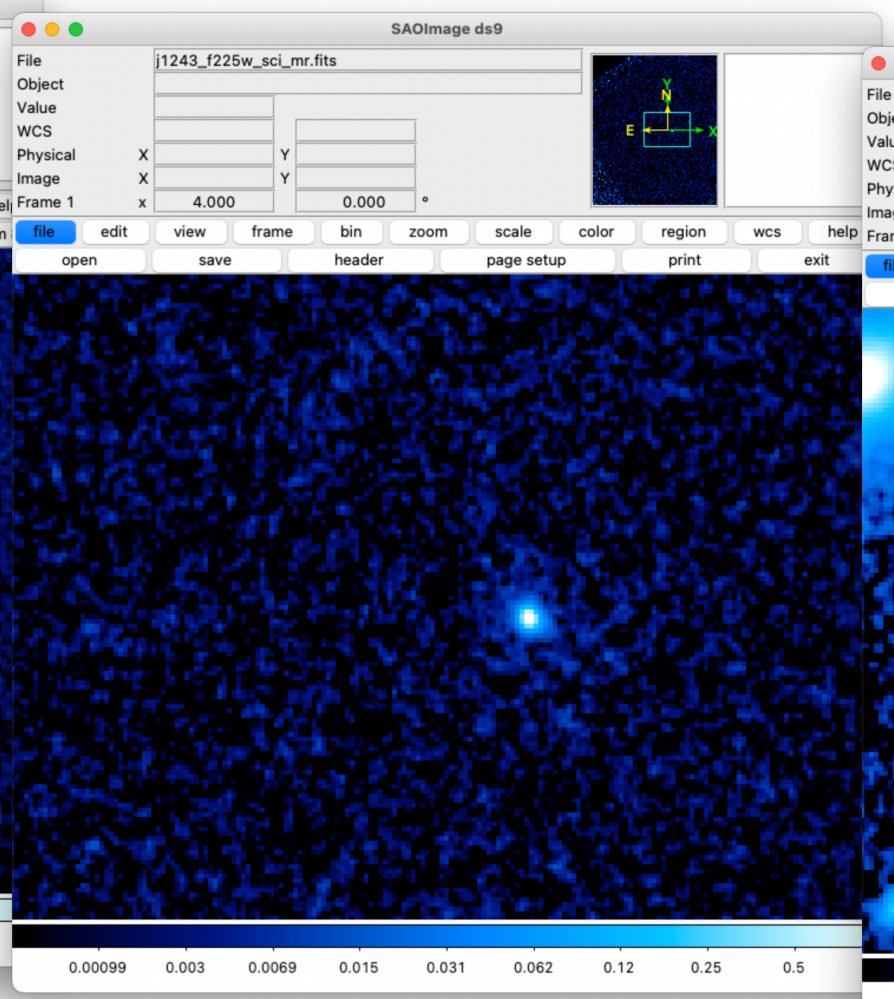
Filter	feature probed
• SBC/F125LP	LyC
• SBC/ F140LP	1000 Å
• SBC/ F150LP	1100 Å
• SBC/ F165LP	Lyα
• UVIS/F225W	1500 Å
• UVIS/F438W	3000 Å
• ACS/FR551N	[OII]
• UVIS/F621M	4300 Å
• ACS/FR716N	Hβ
• ACS/FR716N	[OIII]
• UVIS/F845M	5800 Å
• ACS/FR931N	Hα
• IR/F140W	1 μm



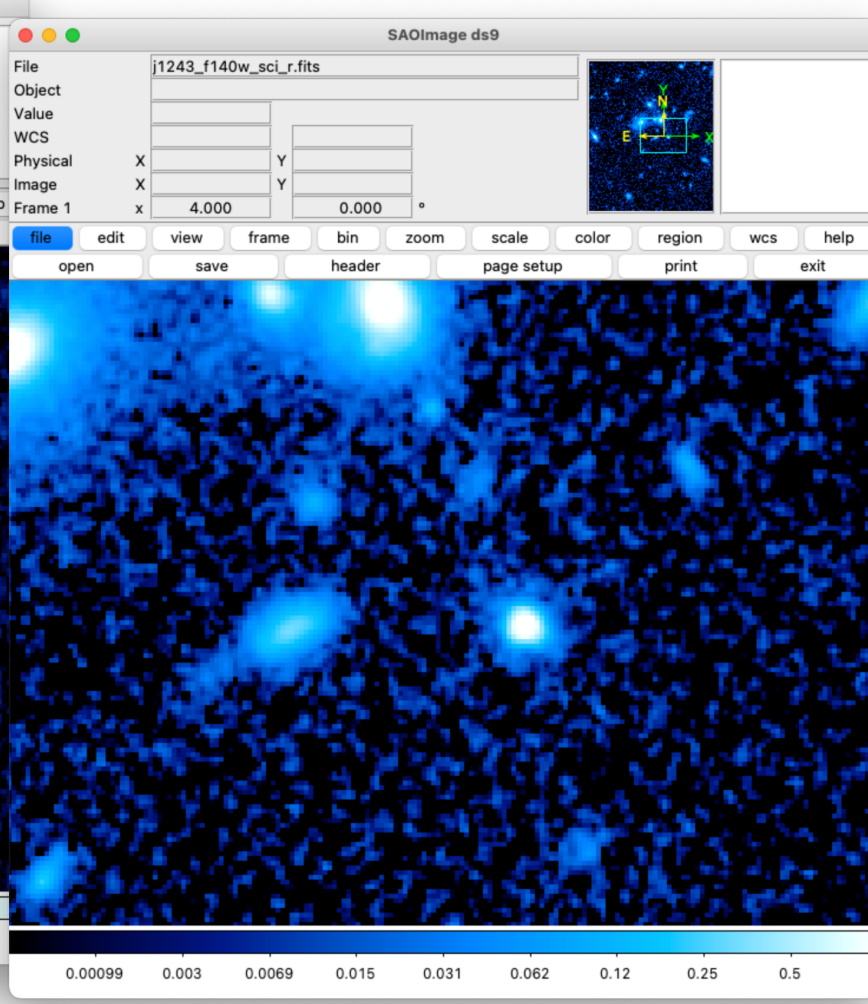
Images



F165LP (Lyα)

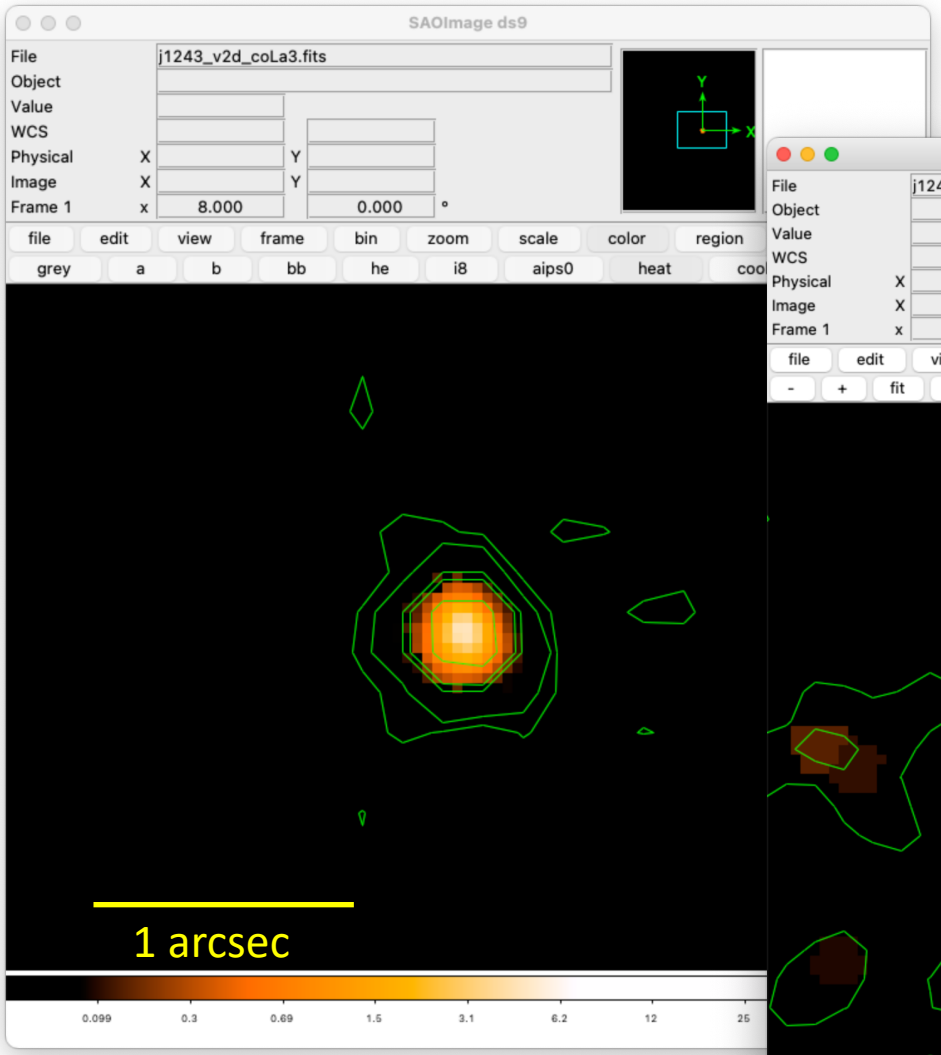


F225W (1500Å)

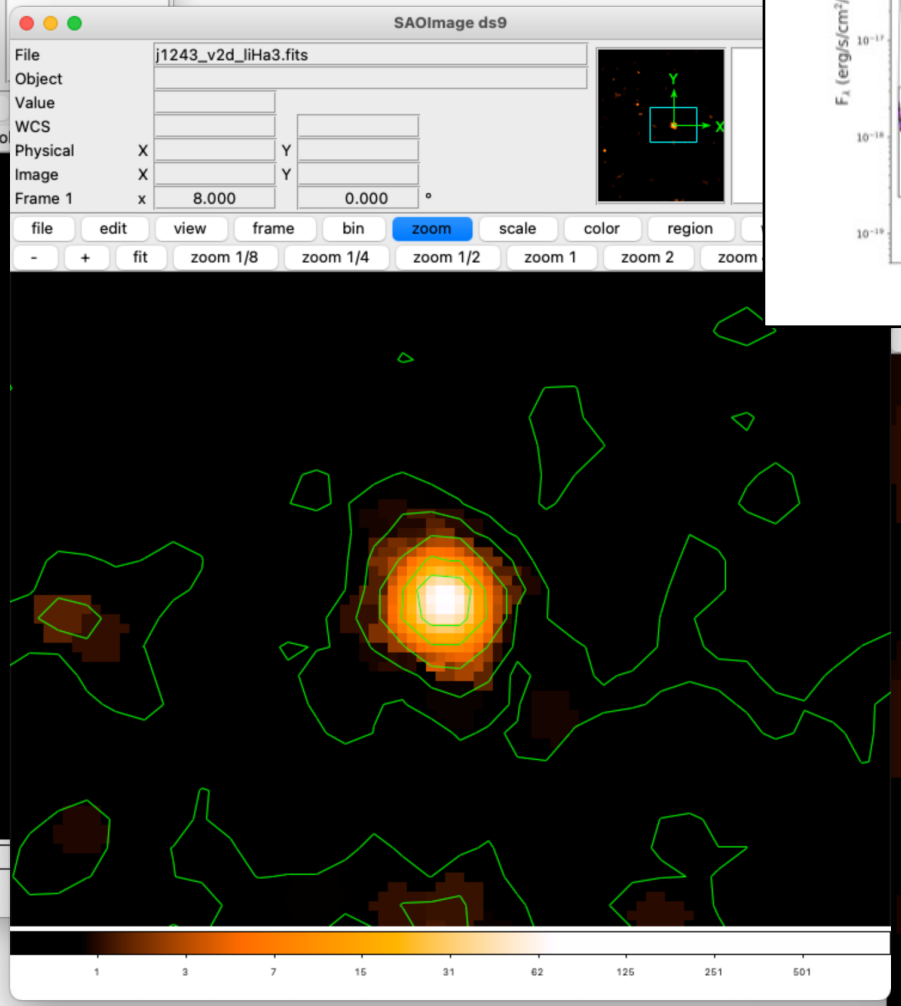


F140W (1 μm)

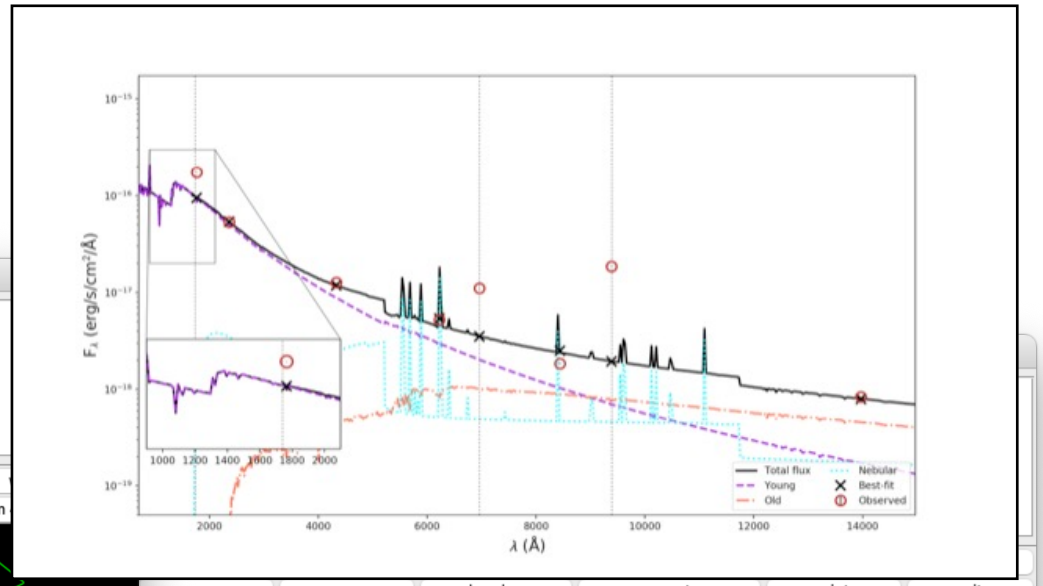
Output from LaXS after PSF harmonisation and drizzling to 0.067 ”/pix

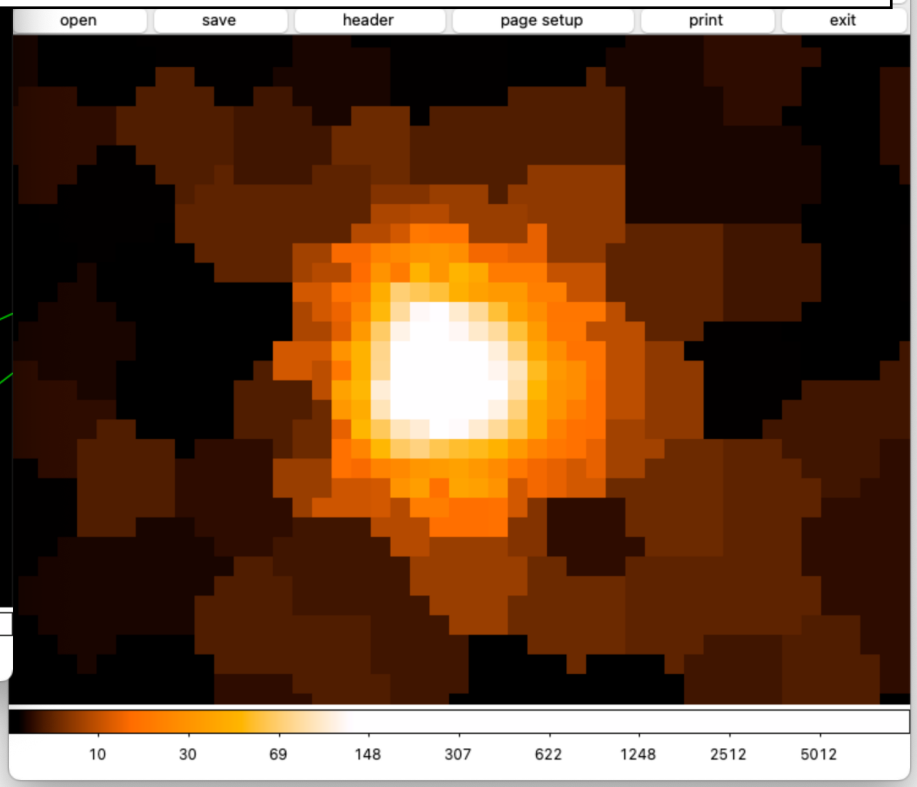


1200 continuum



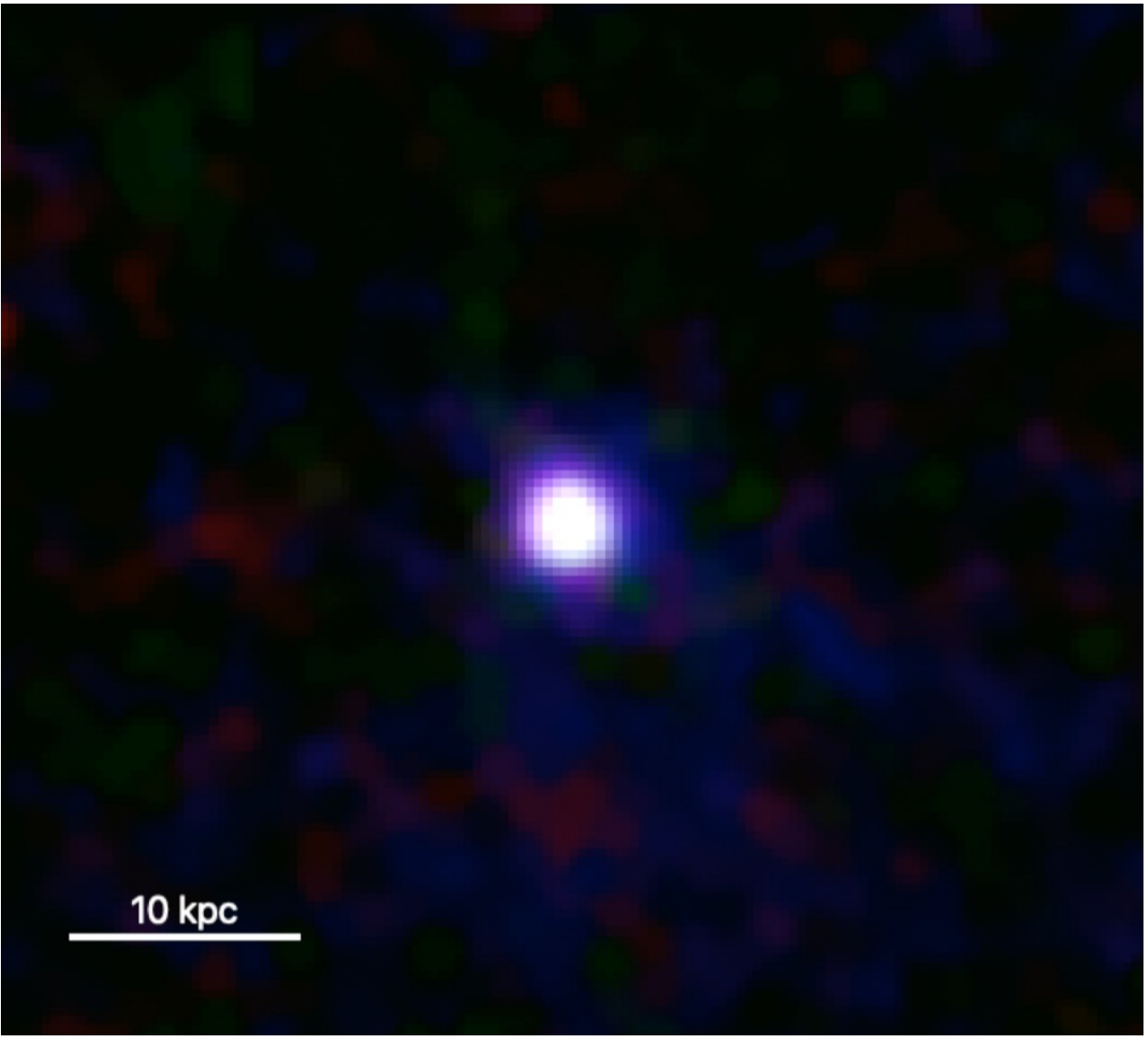
Hα



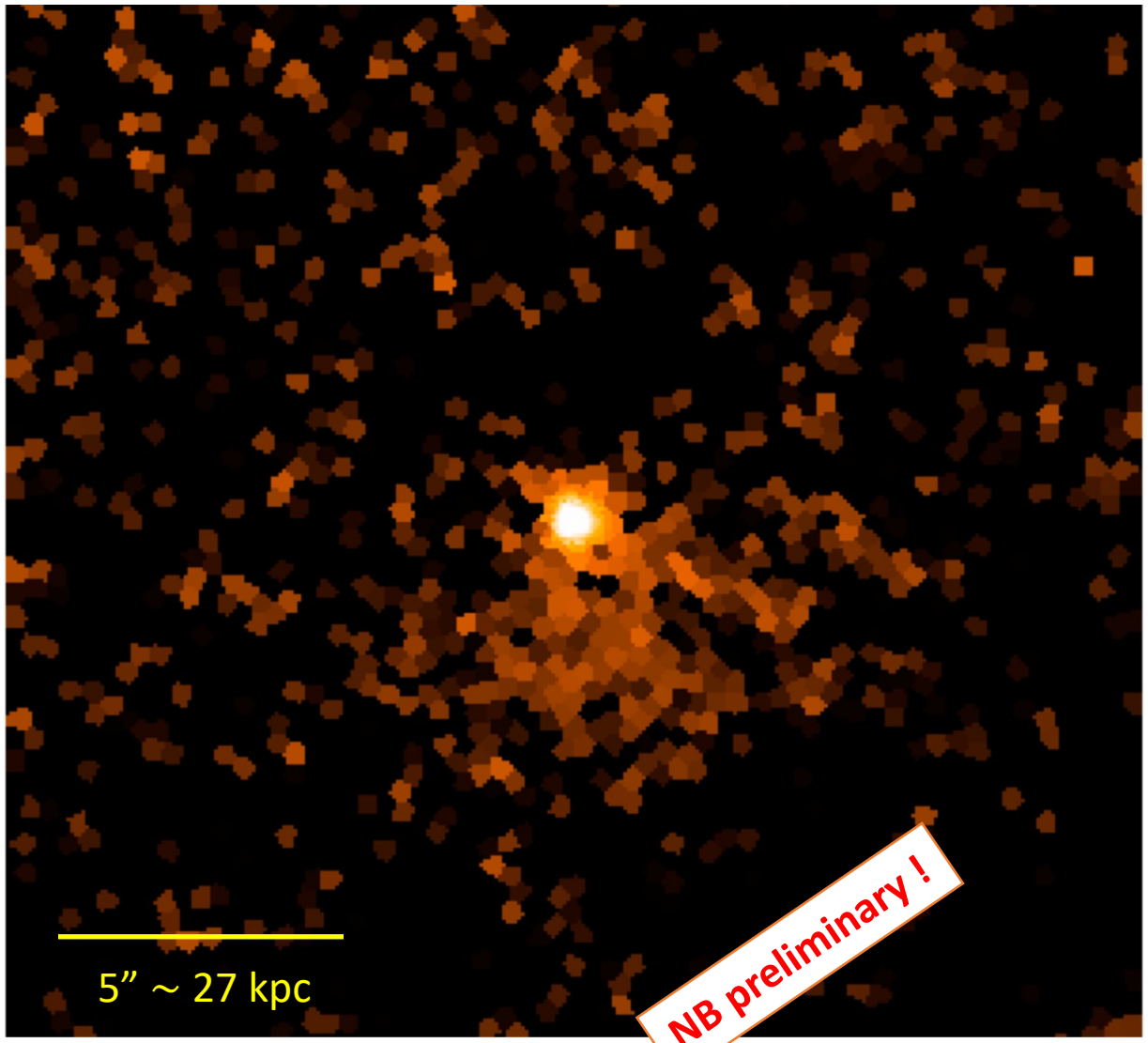


Lyα

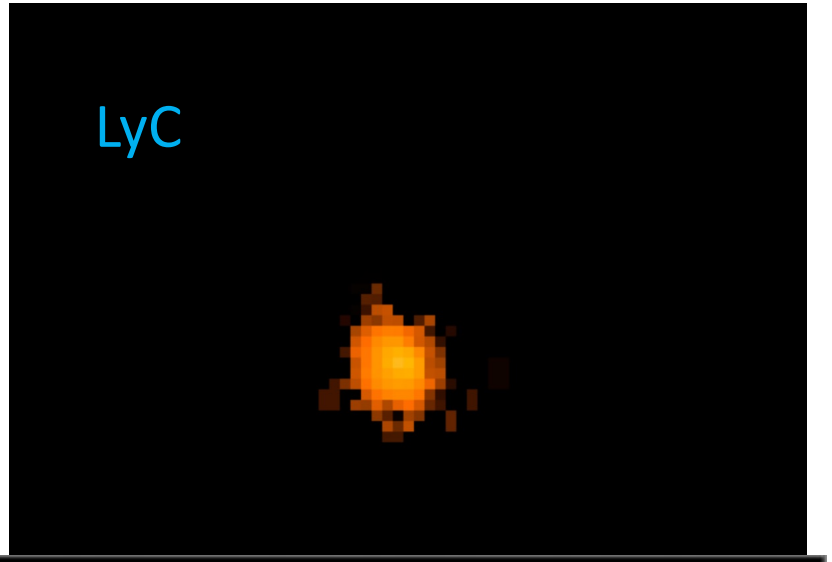
Hα, UV, Lyα (smoothed)

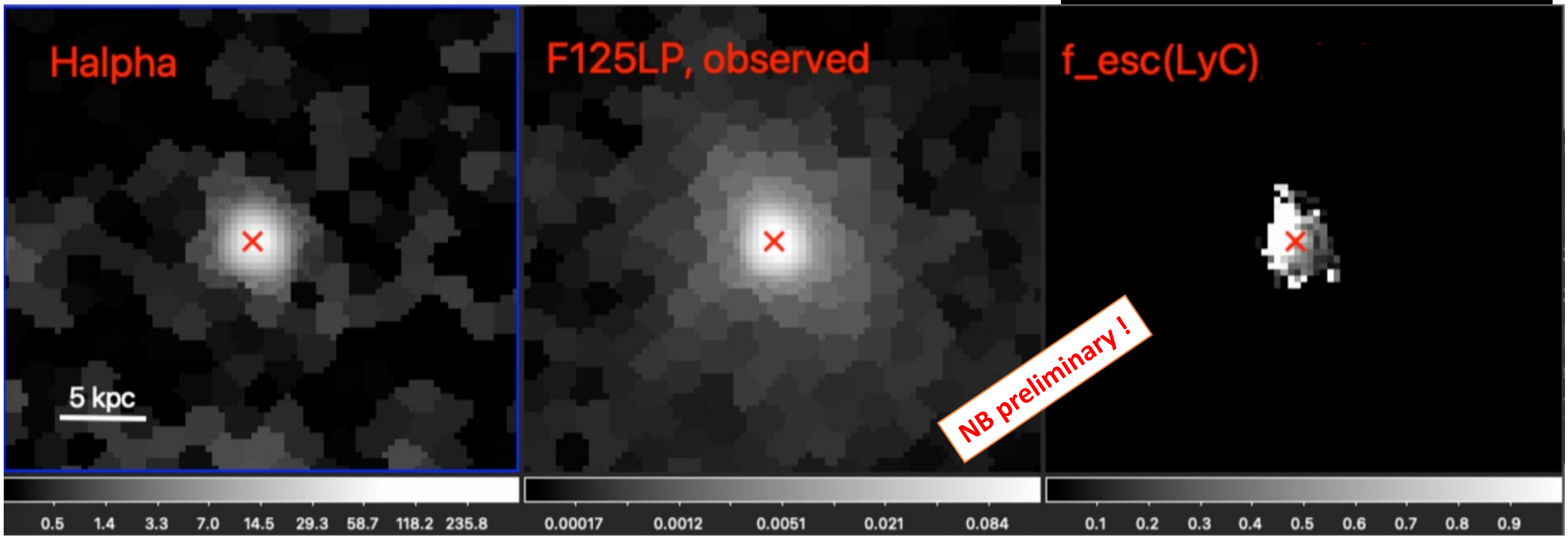


Zooming out on Lyα



F125LP, Filter contains LyC (down to 865Å) but also nonionizing continuum
LaXS produce intrinsic LyC flux which is subtracted to yield LyC image





Summary and outlook

- J1243+46 shows widespread Lyα emission, more extended than Hα and UV
- LyC detected in imaging

- Derive ionisation maps from [OIII]/[OII], [OIII]/Hα
- Alalyse LyC and fesc as compared to ionization, age, E(B-V) etc
- Do strong leakers have smaller (fewer Lyα photons produced) or larger (longer mean free paths for LyC) Lyα halos?
- Include J1256+4509, J1154+2443, sample from Melinder and LaCOS