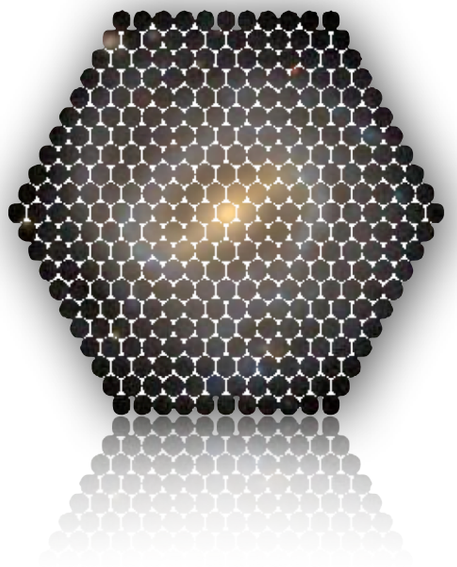
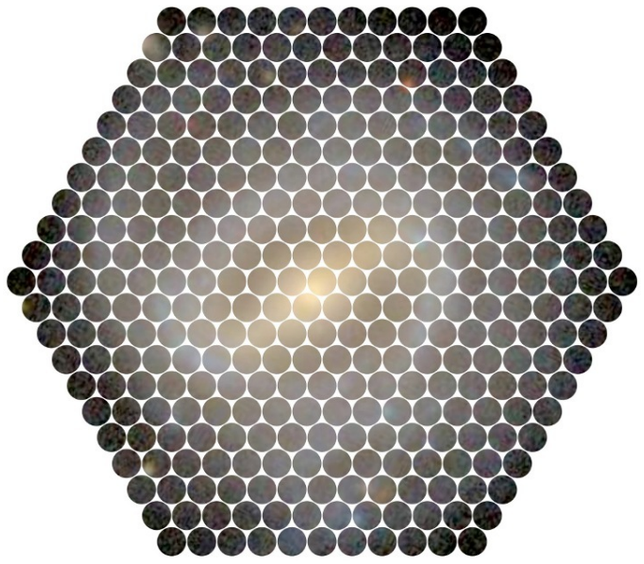


The Nature of **LINER** galaxies

Robert Singh, Glenn v. d. Ven & Knud Jahnke

CALIFA

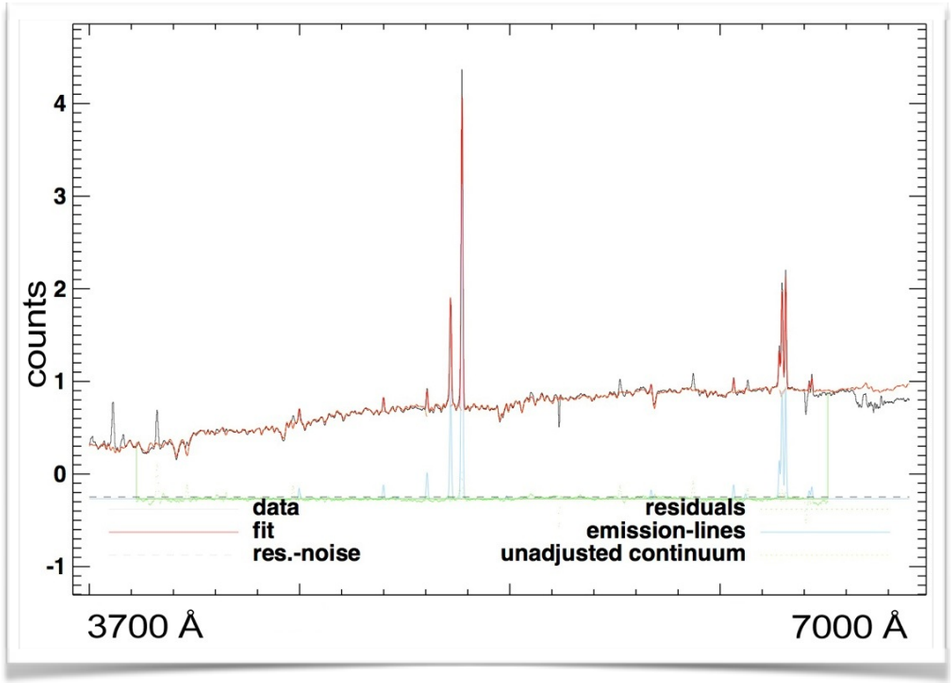
- ~600 galaxies, diameter selected, 0.005<z<0.03
- Spatial sampling ~2”≈0.5-1 kpc
- Spectral resolution R~850 (v500)/ ~1650 (v1200)
- Wavelength coverage 3400 – 7300 Å
- 3σ limiting surface brightness ~23.0 mag/arcsec^2



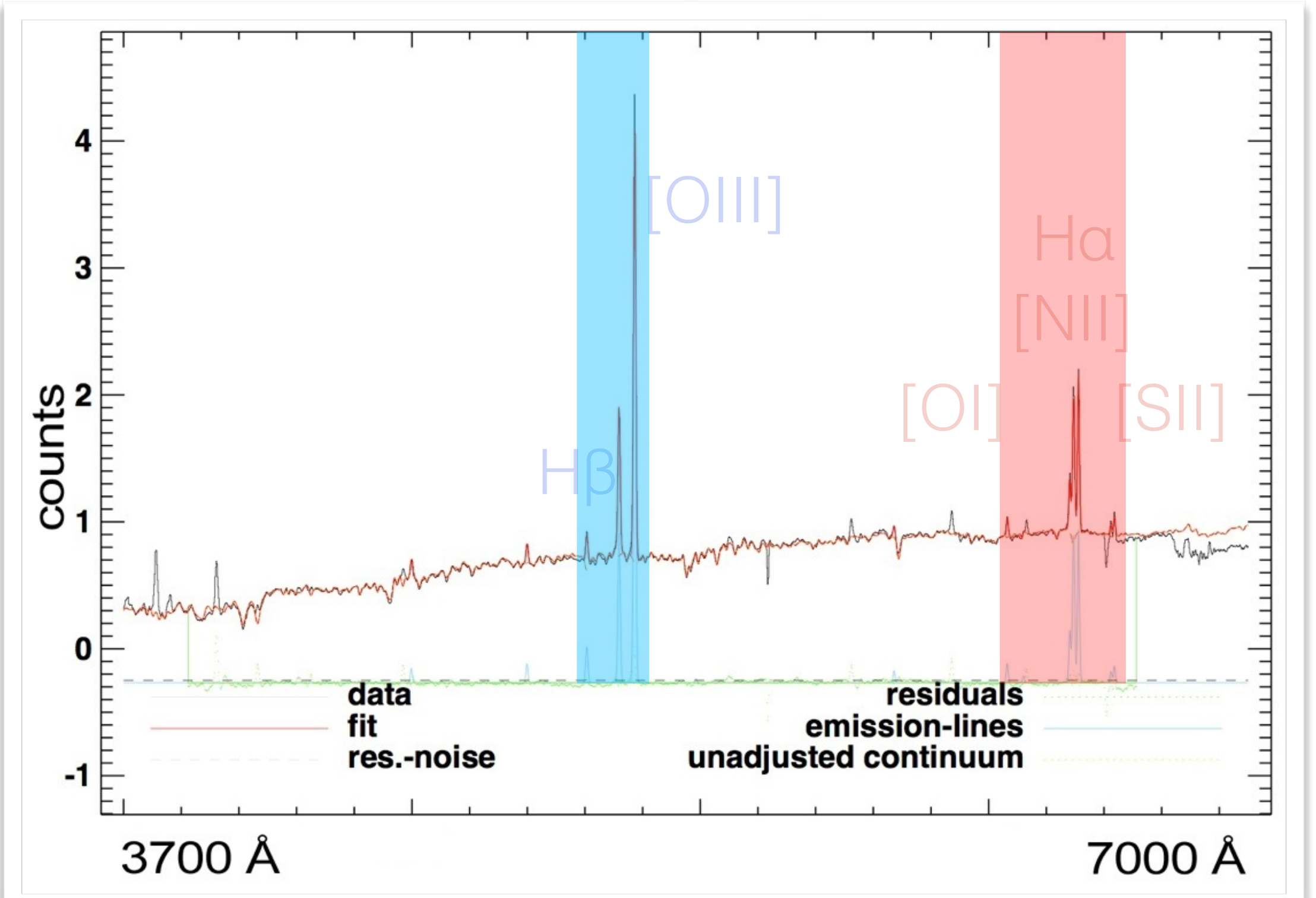
LINERs

- **L**ow **I**onisation **N**uclear **E**mission-line **R**egion

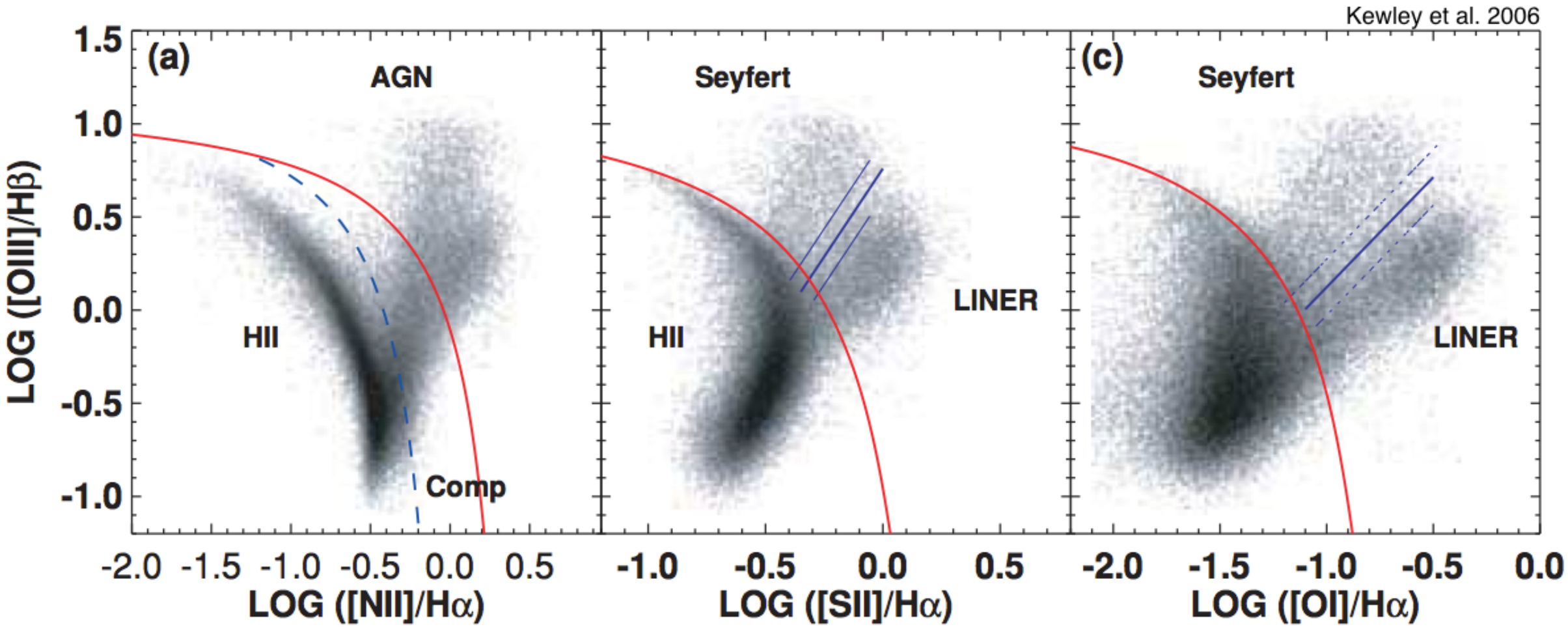
- *possible ionisation sources:*
  - low luminosity AGN
  - hot old stars (post-AGB)
  - shocks (mergers, outflows)



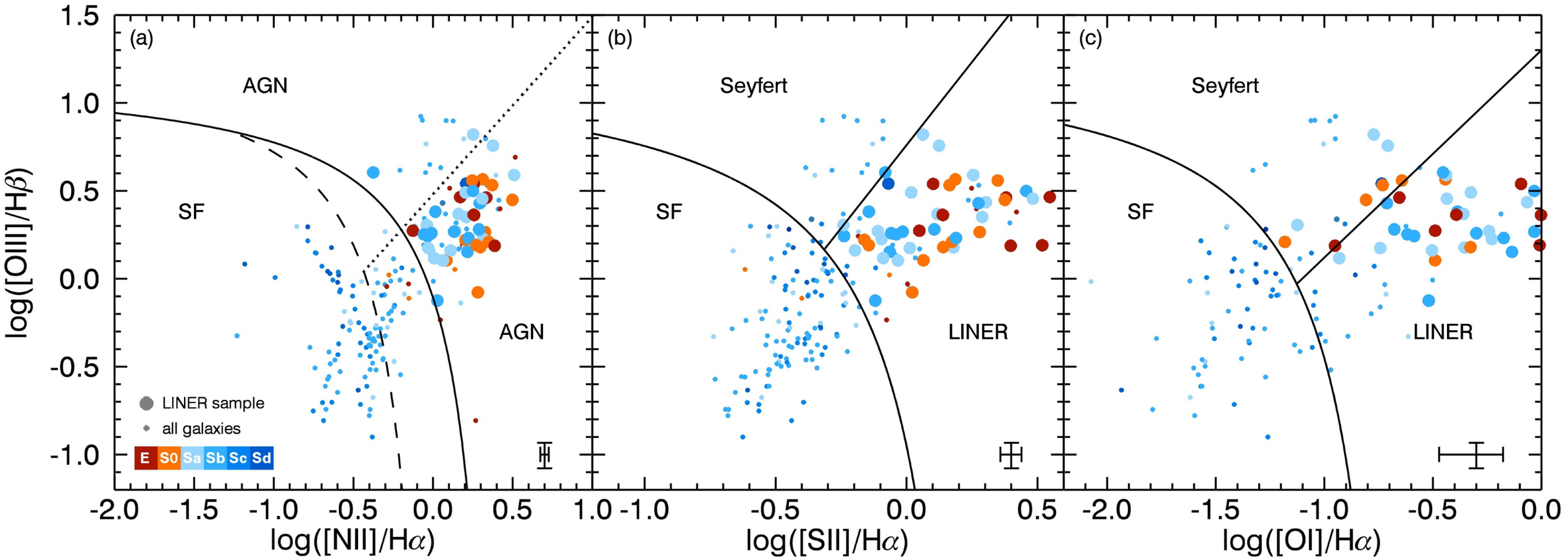
- *general properties:*
  - old stellar pops
  - line emission from weakly ionised atoms
  - fraction with central X-ray
  - > 50% of the AGN population


counts
4
3
2
1
0
-1
[OIII]
Hα
[NII]
[OI]
[SII]
Hβ
data
fit
res.-noise
residuals
emission-lines
unadjusted continuum
3700 Å
7000 Å

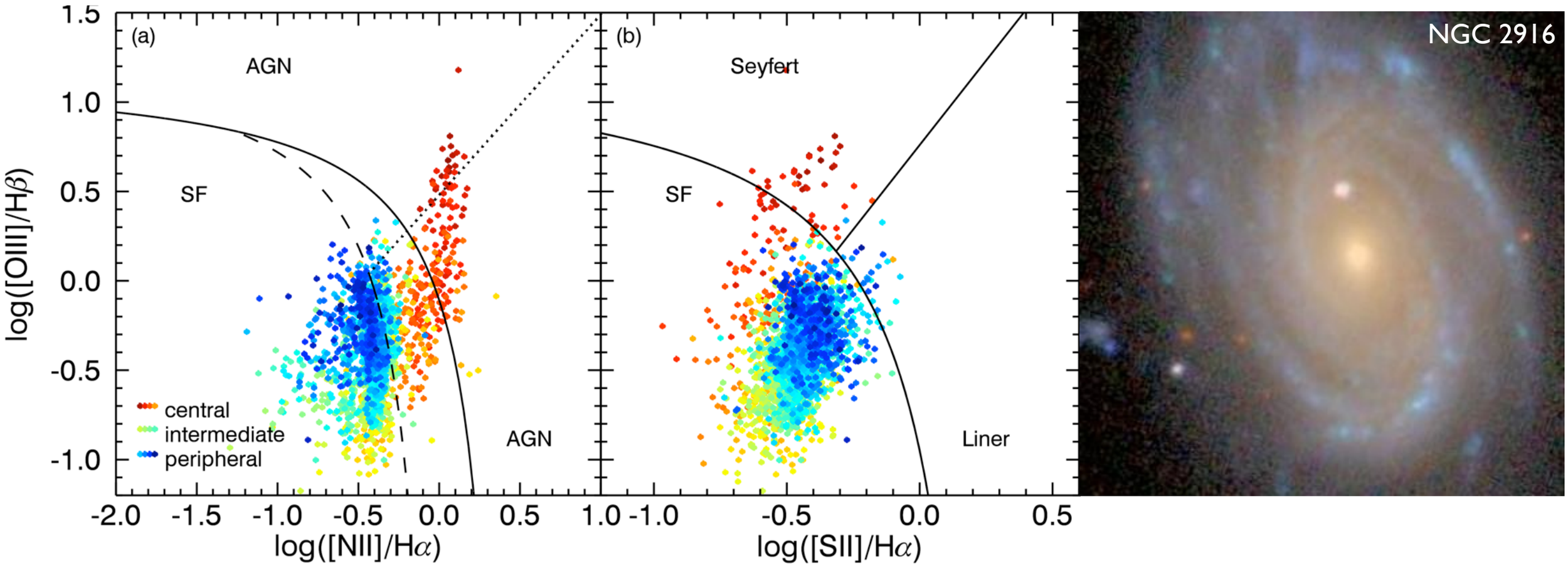
85,224 SDSS galaxies



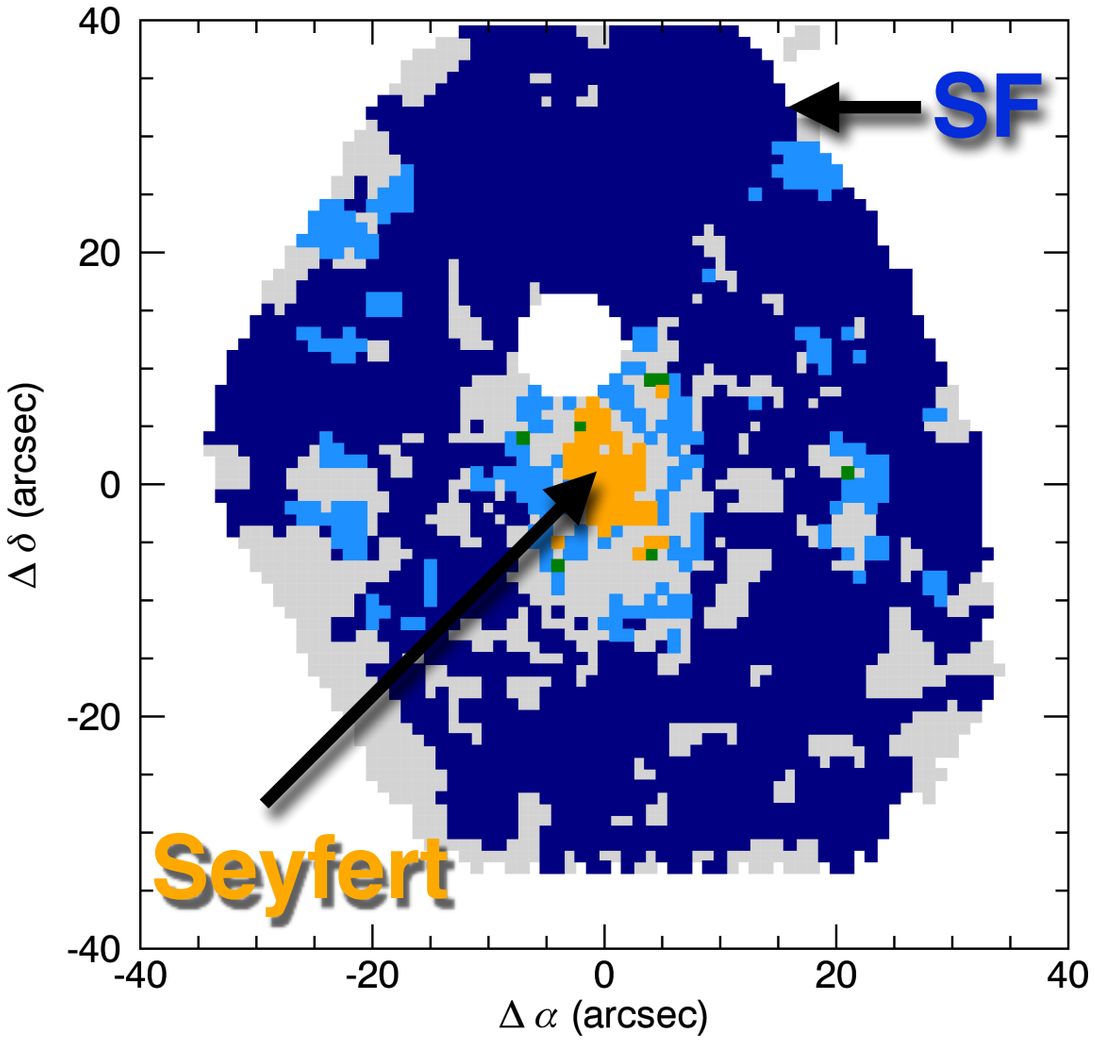
257 CALIFA galaxies

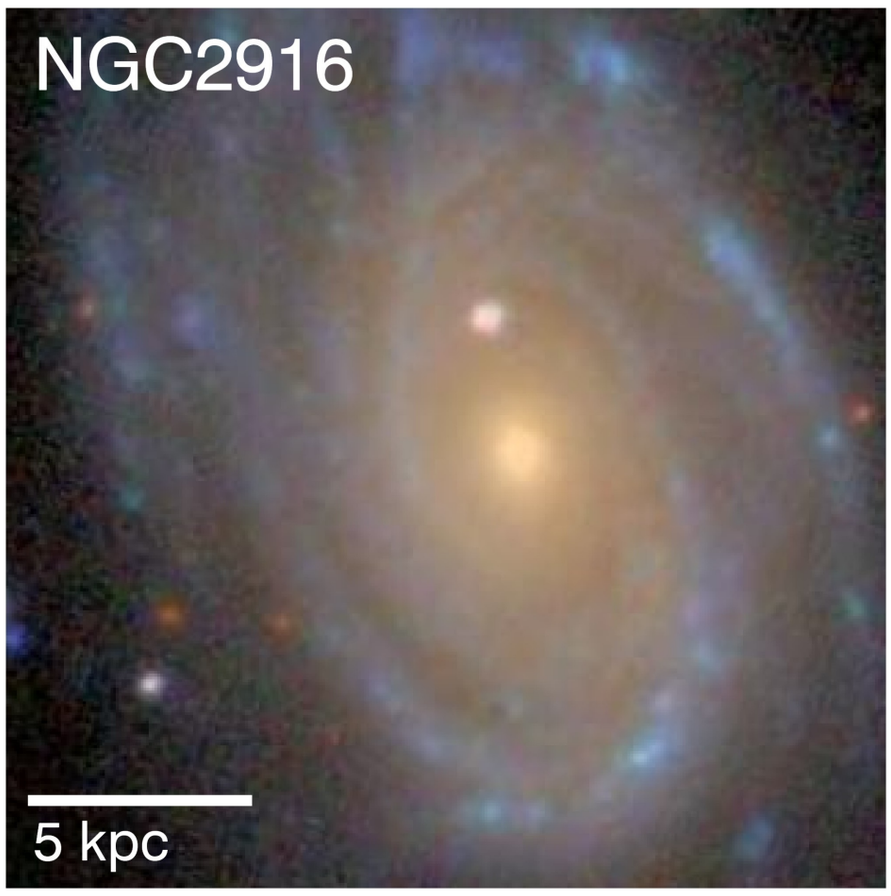


1 CALIFA galaxy

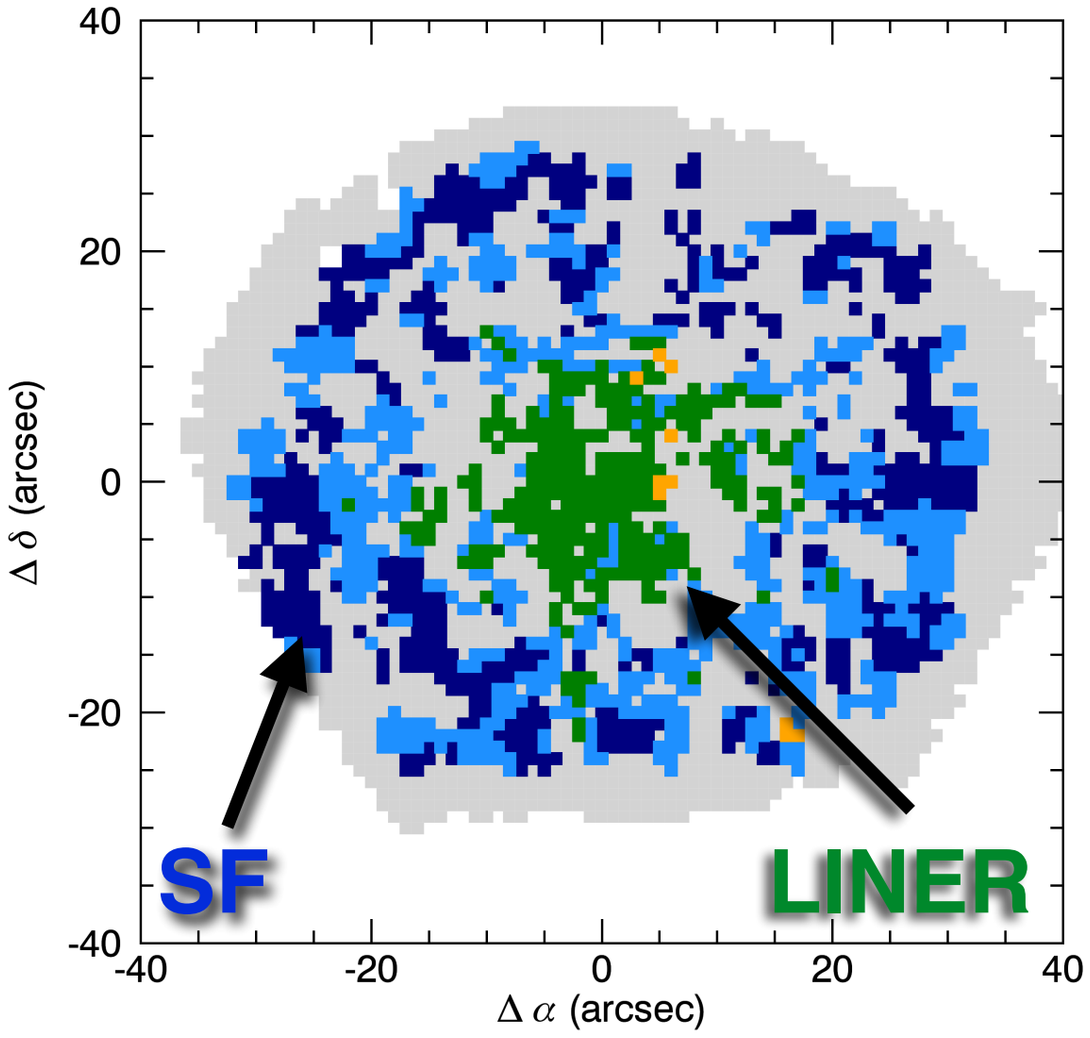


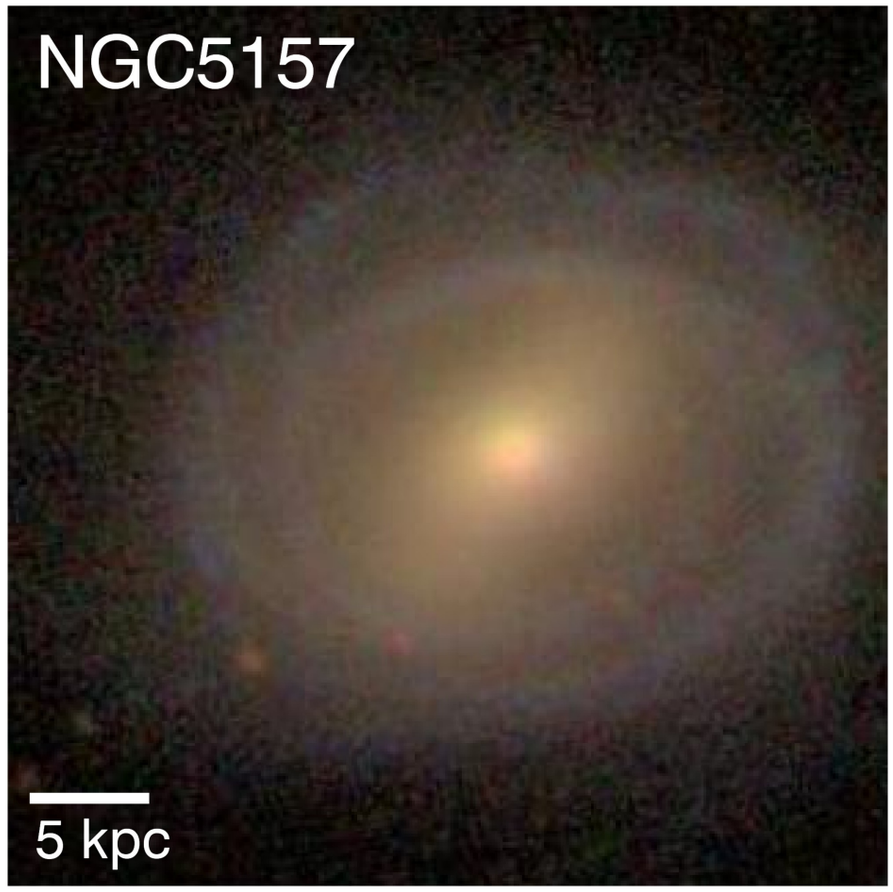
BPT maps


SF
Seyfert
40
20
0
-20
-40
-40
-20
0
20
40
Δ δ (arcsec)
Δ α (arcsec)

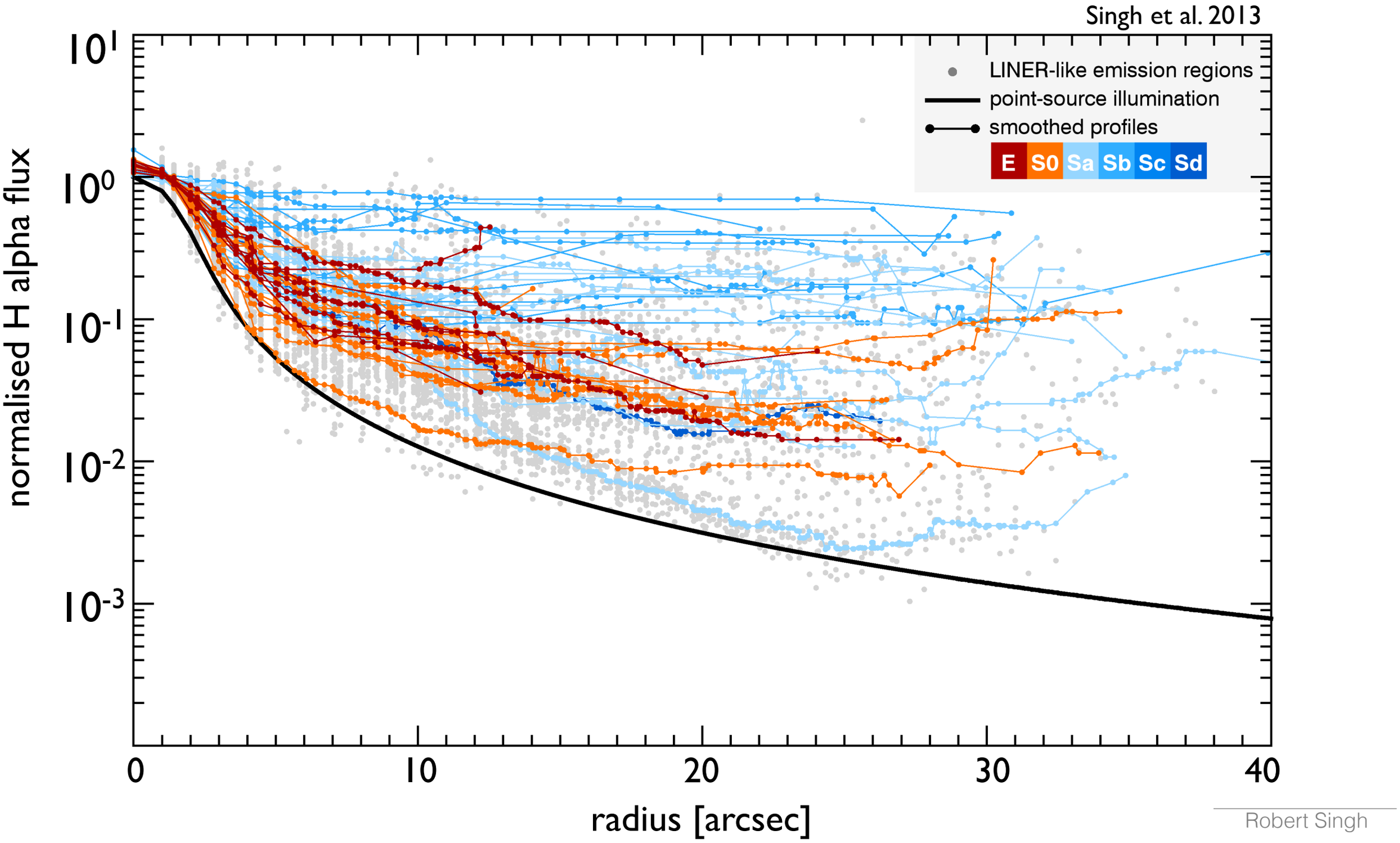

NGC2916
5 kpc

BPT maps

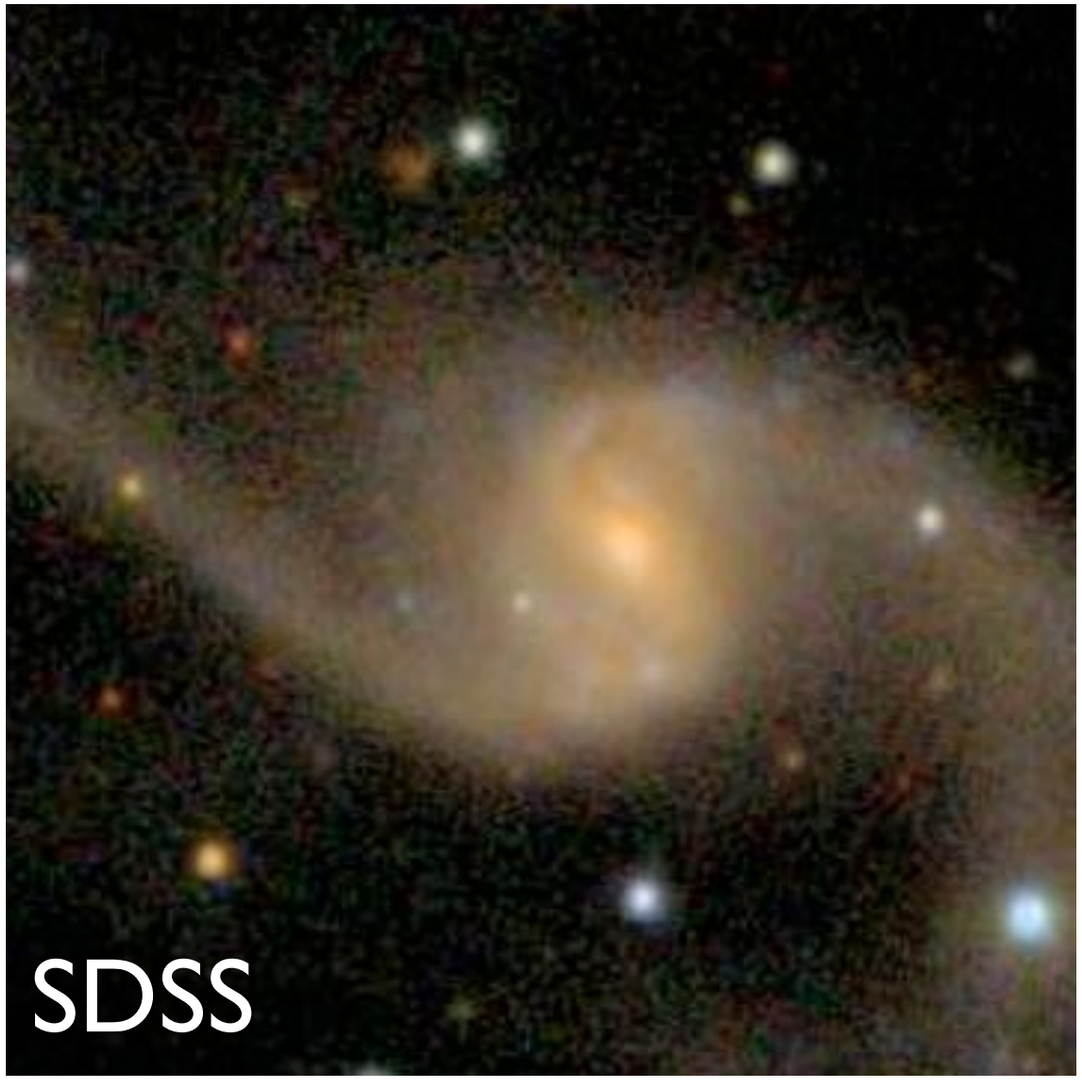

40
20
0
-20
-40
-40
-20
0
20
40
Δ δ (arcsec)
Δ α (arcsec)
SF
LINER

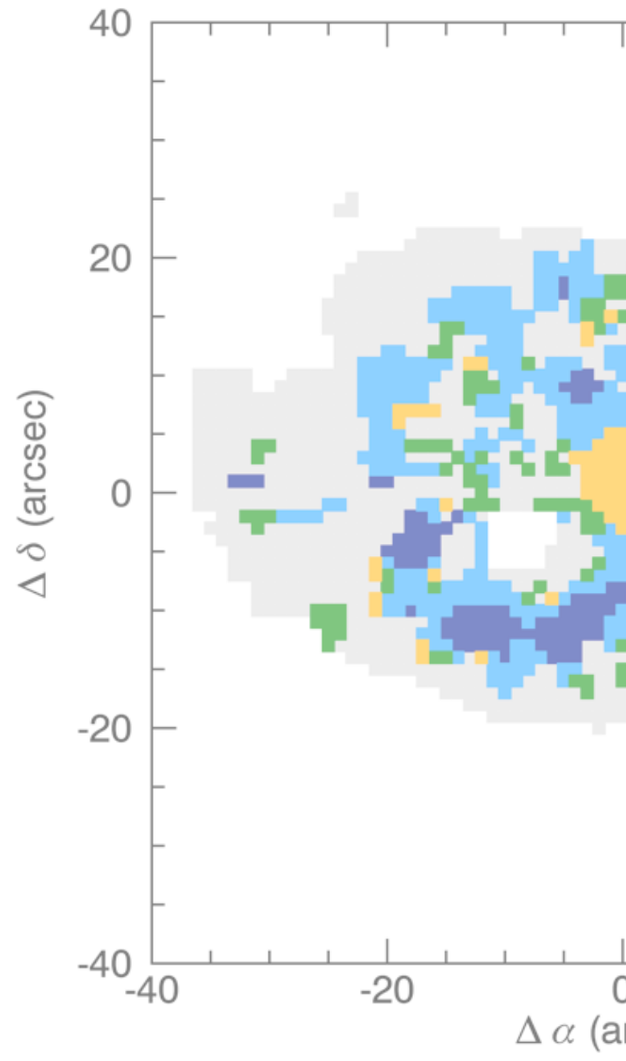

NGC5157
5 kpc

LINER emission



UGC11680





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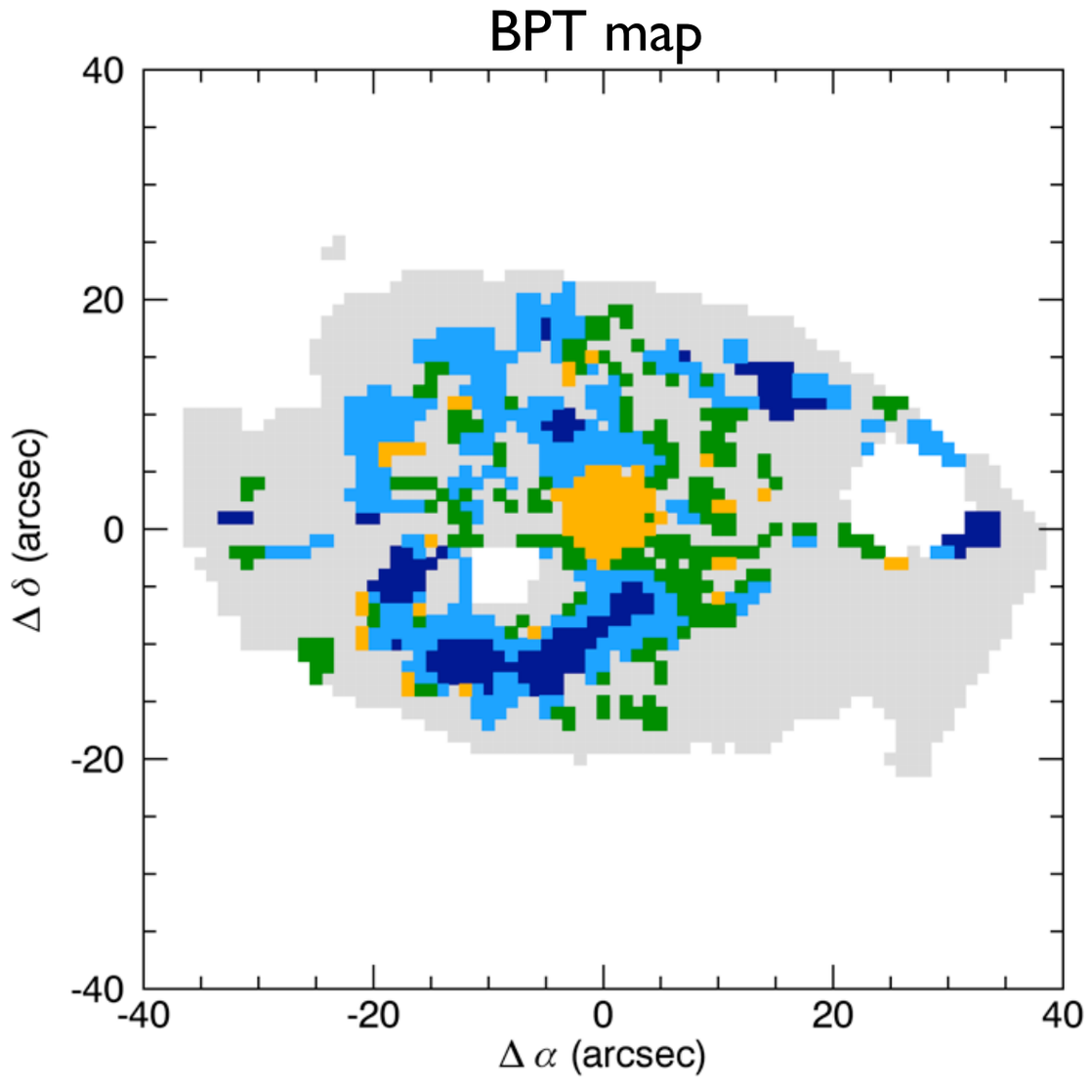
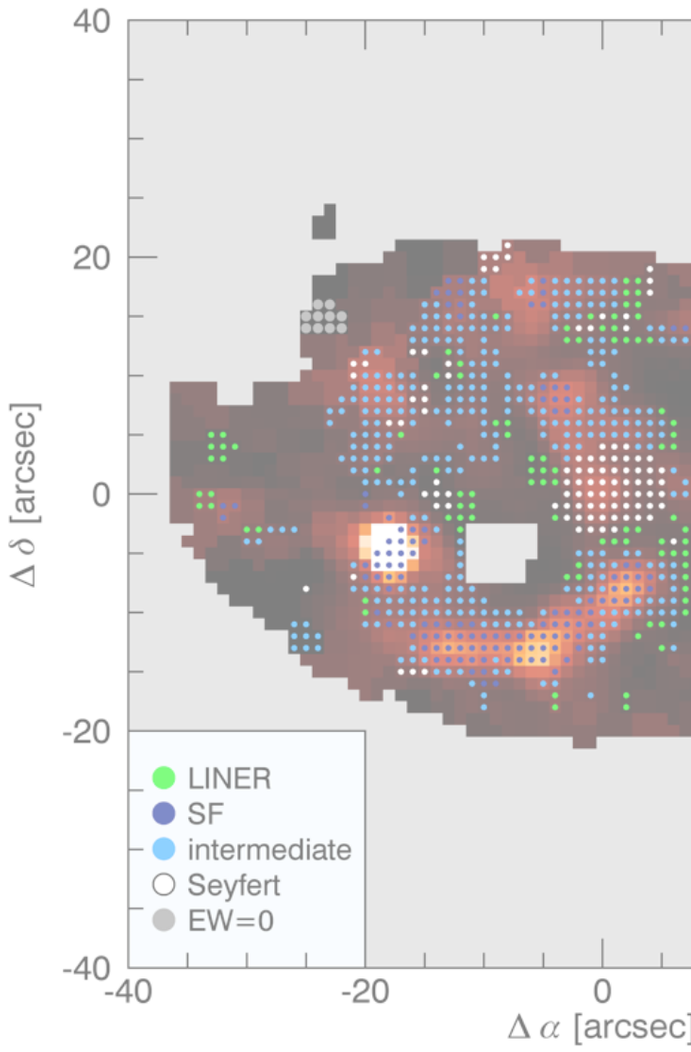
UGC11680





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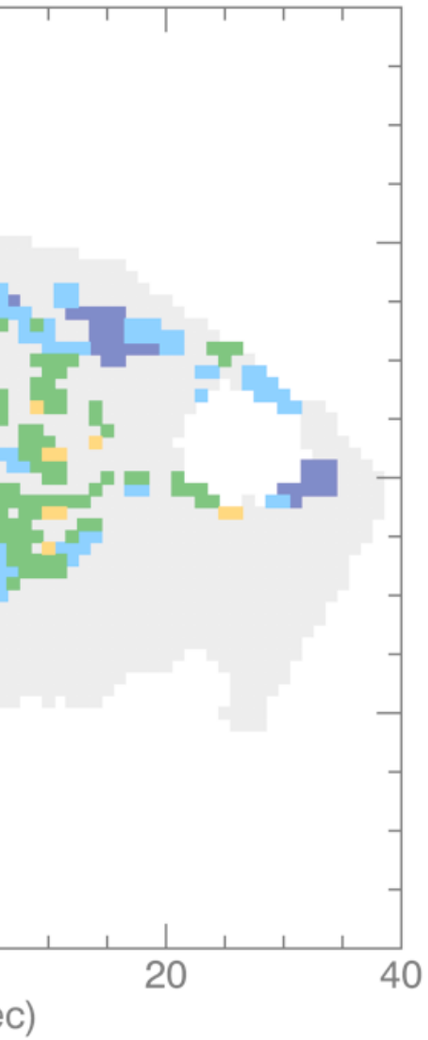
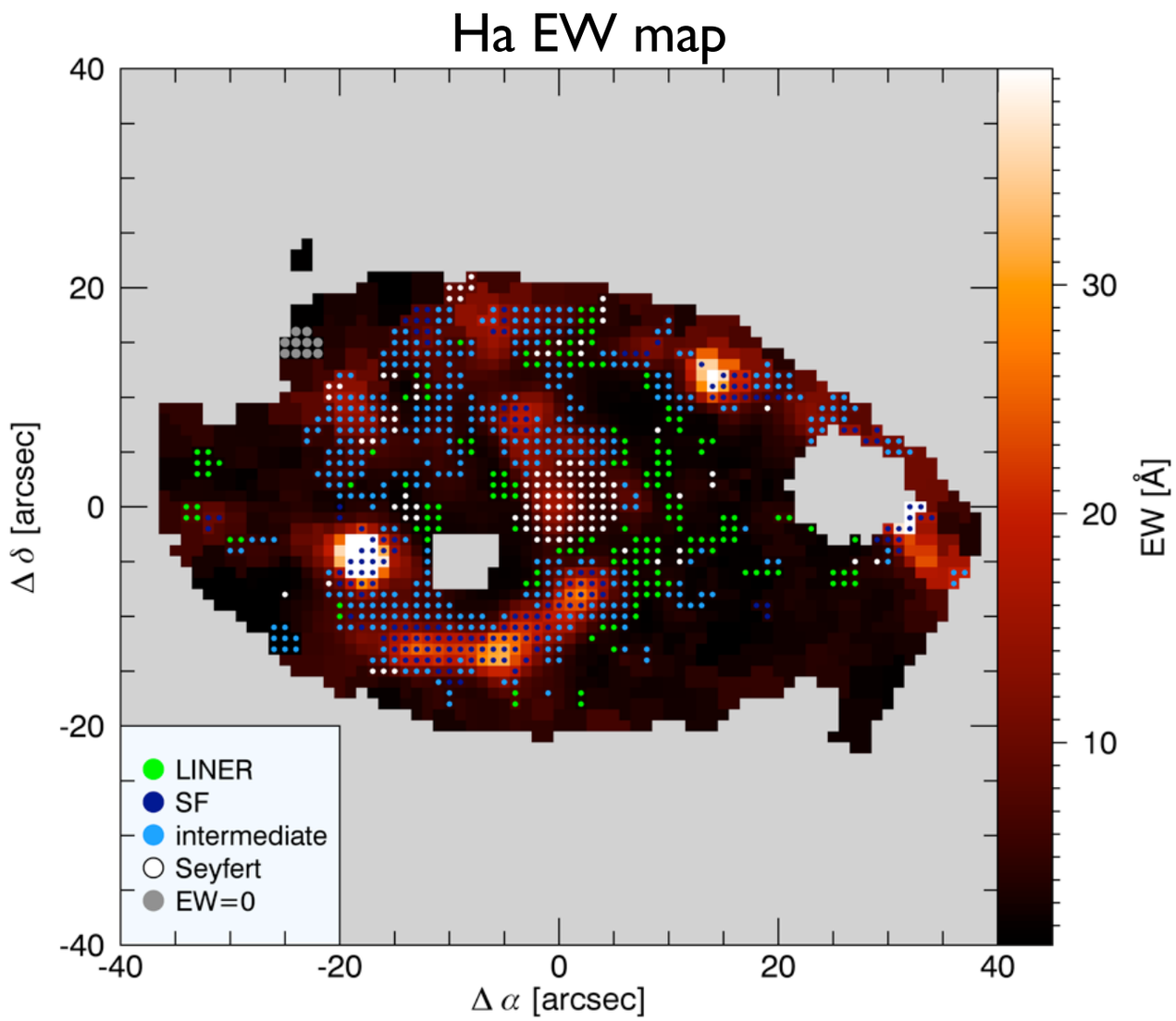
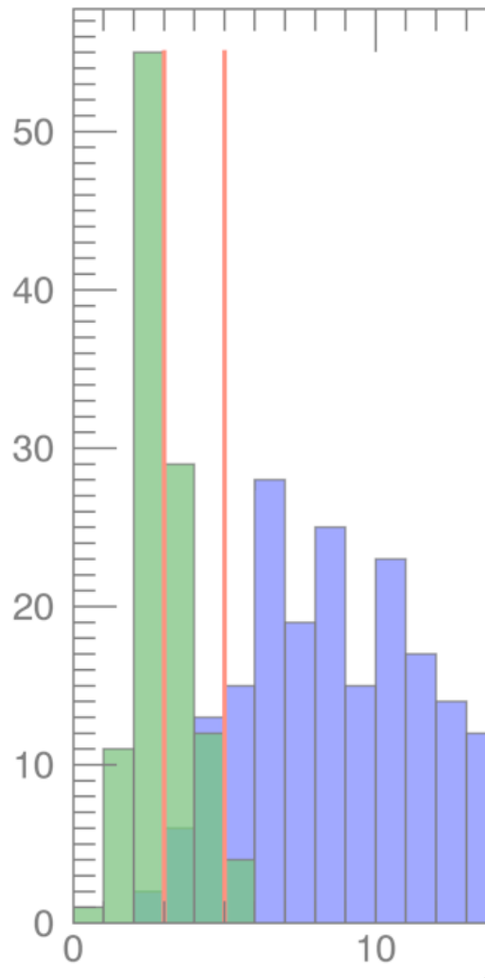
UGC11680

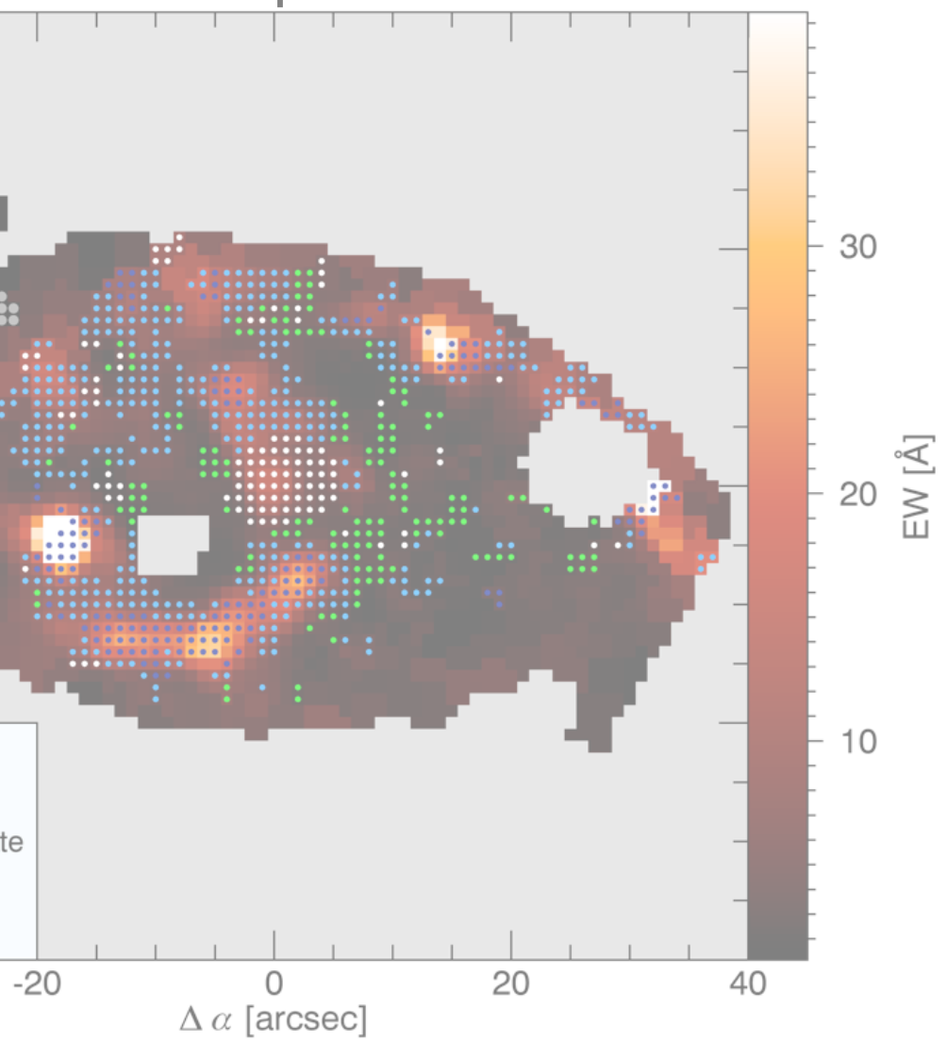

20
40
ec)


Ha EW map
40
20
0
-20
-40
Δ δ [arcsec]
-40
-20
0
20
40
Δ α [arcsec]
30
20
10
EW [Å]
LINER
SF
intermediate
Seyfert
EW=0

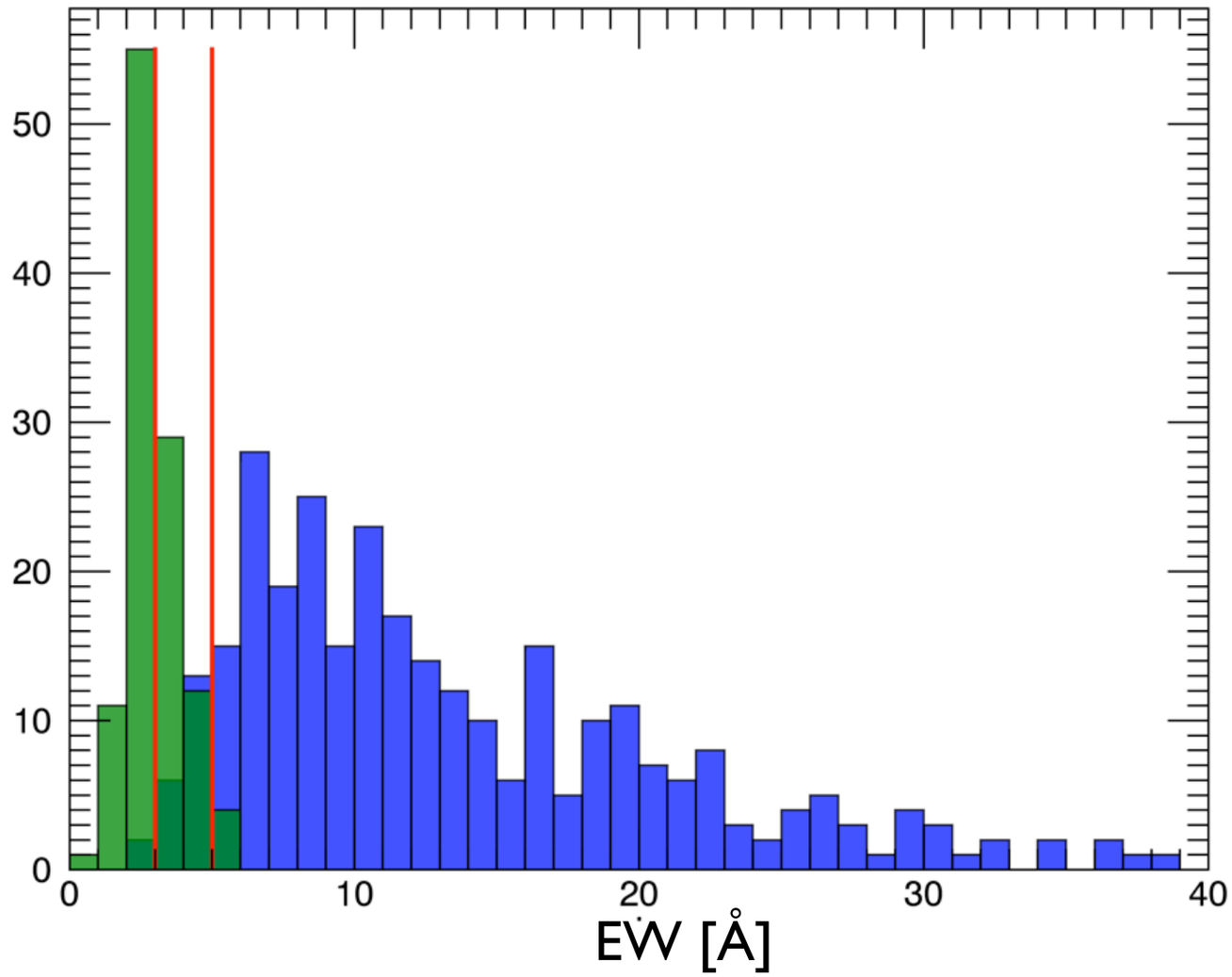

50
40
30
20
10
0
0
10

UGC11680

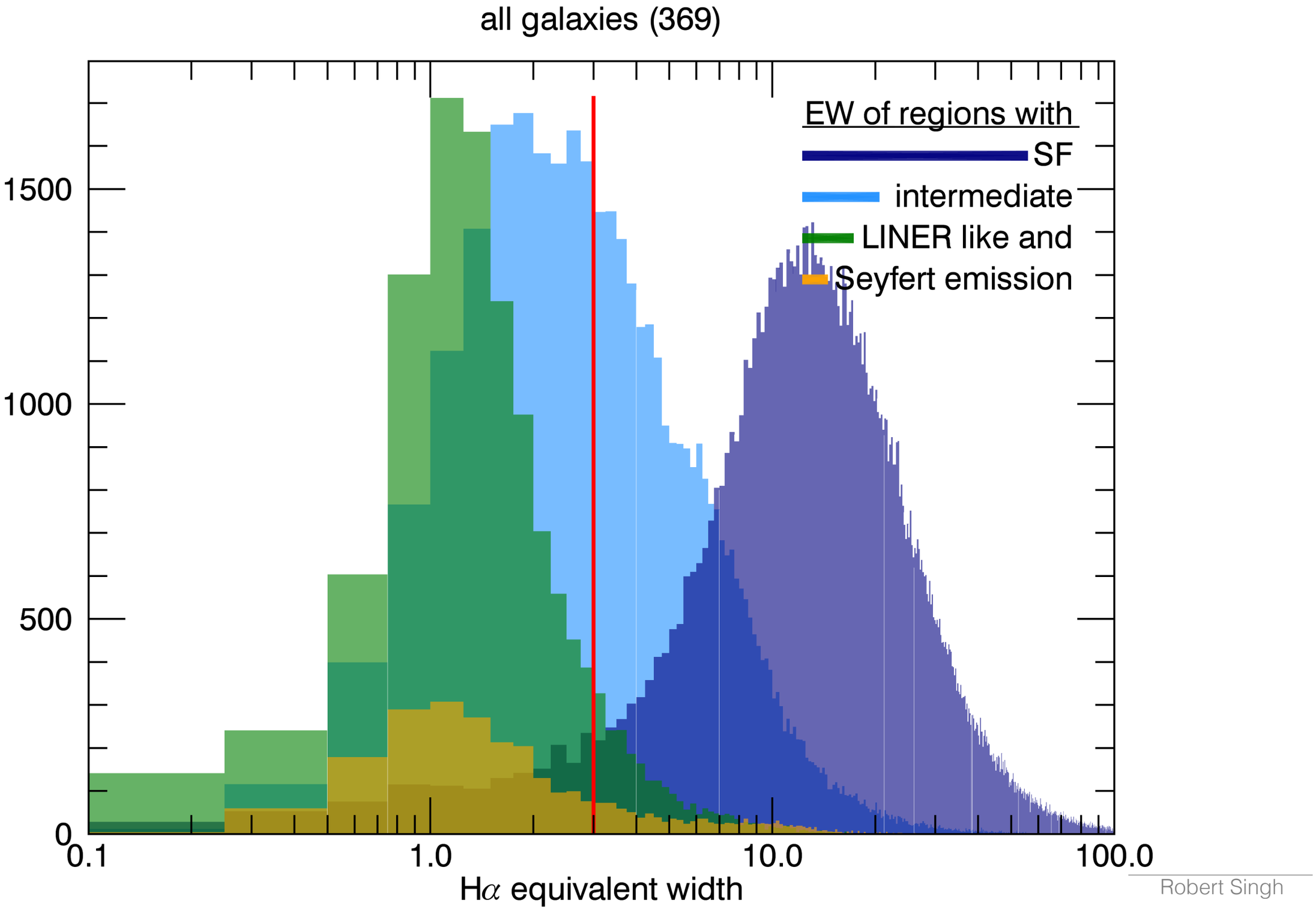
Ha EW map



Histogram of LINER bins



EW(Ha)



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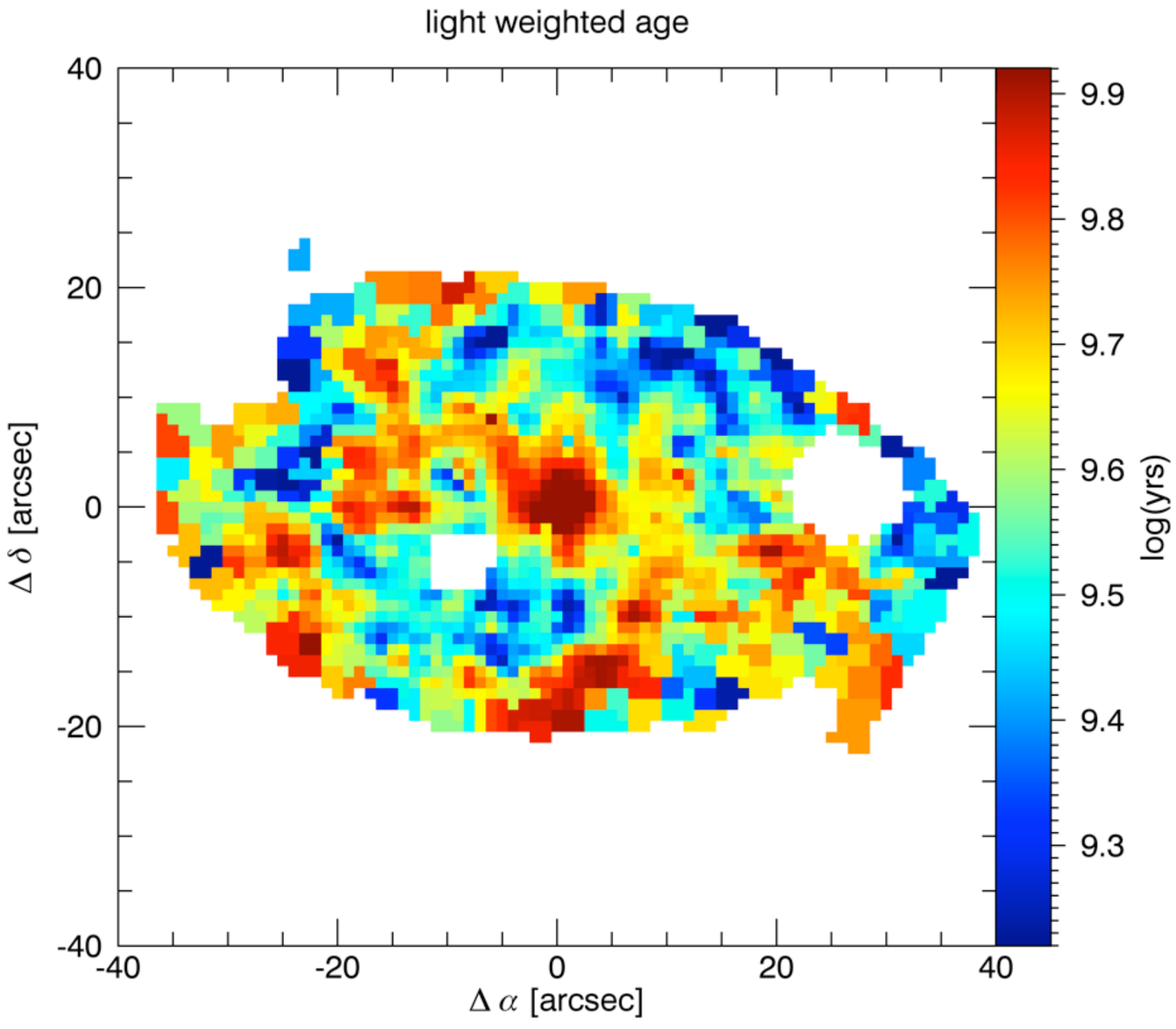
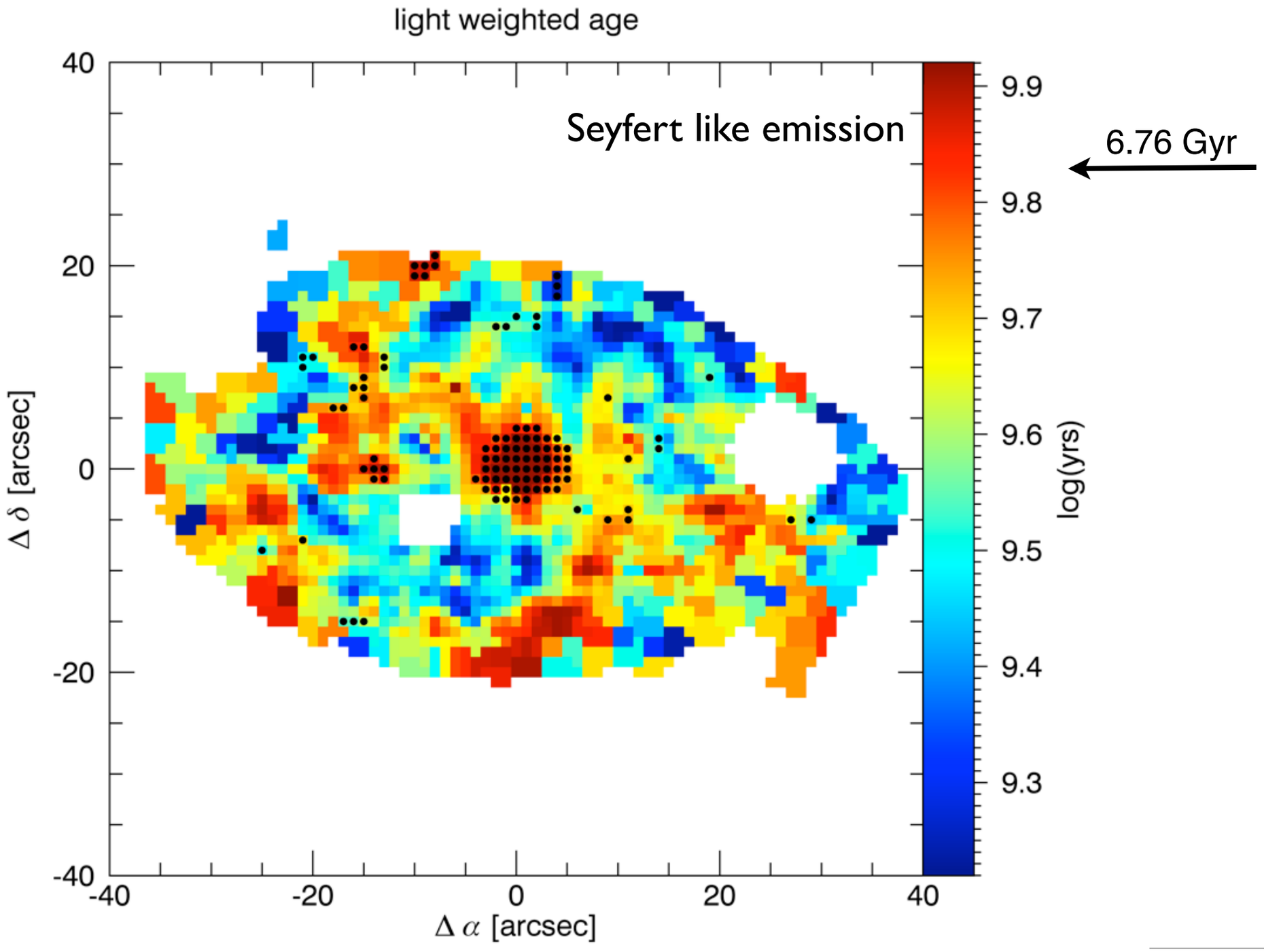
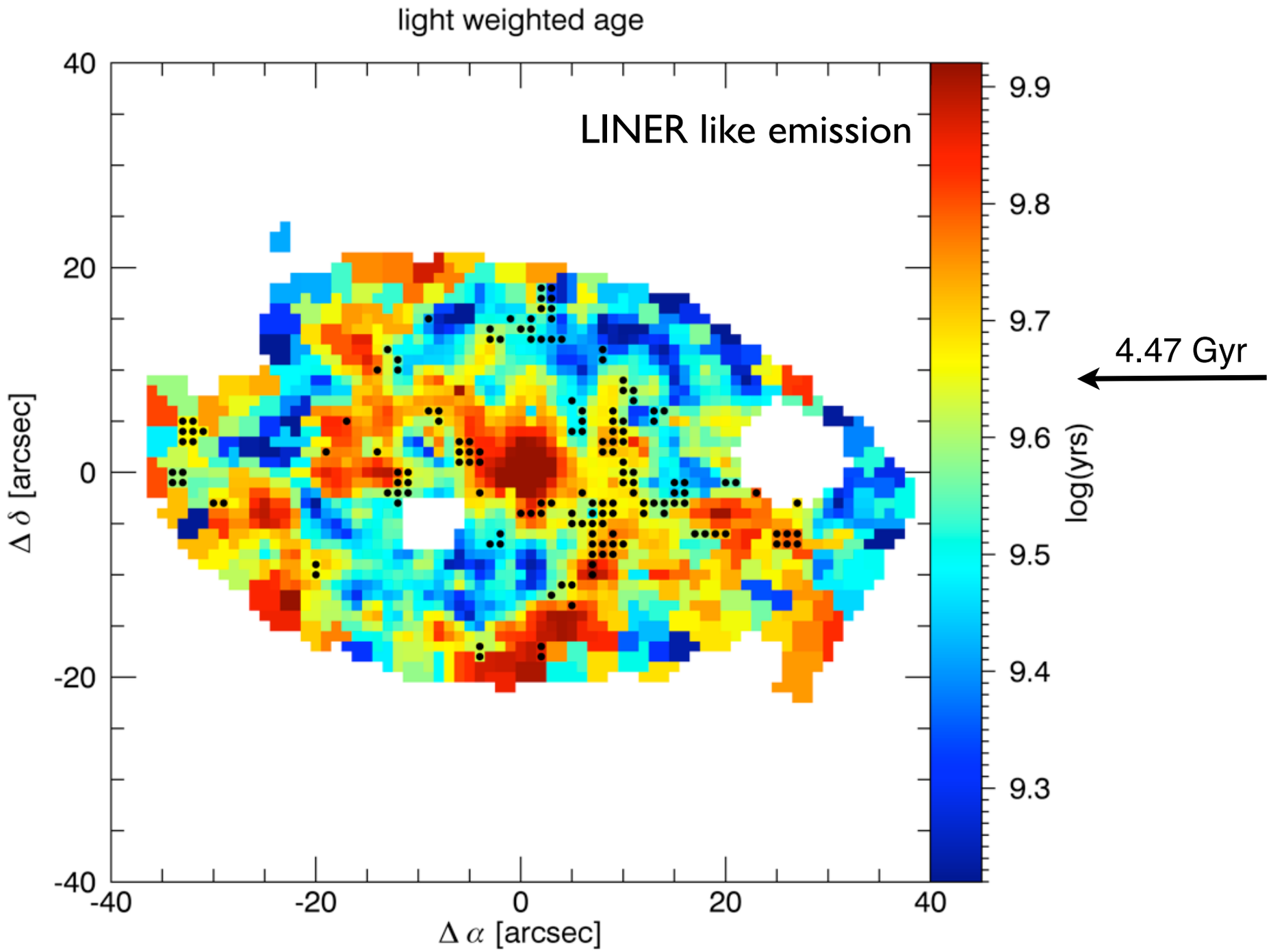
star-formation histories



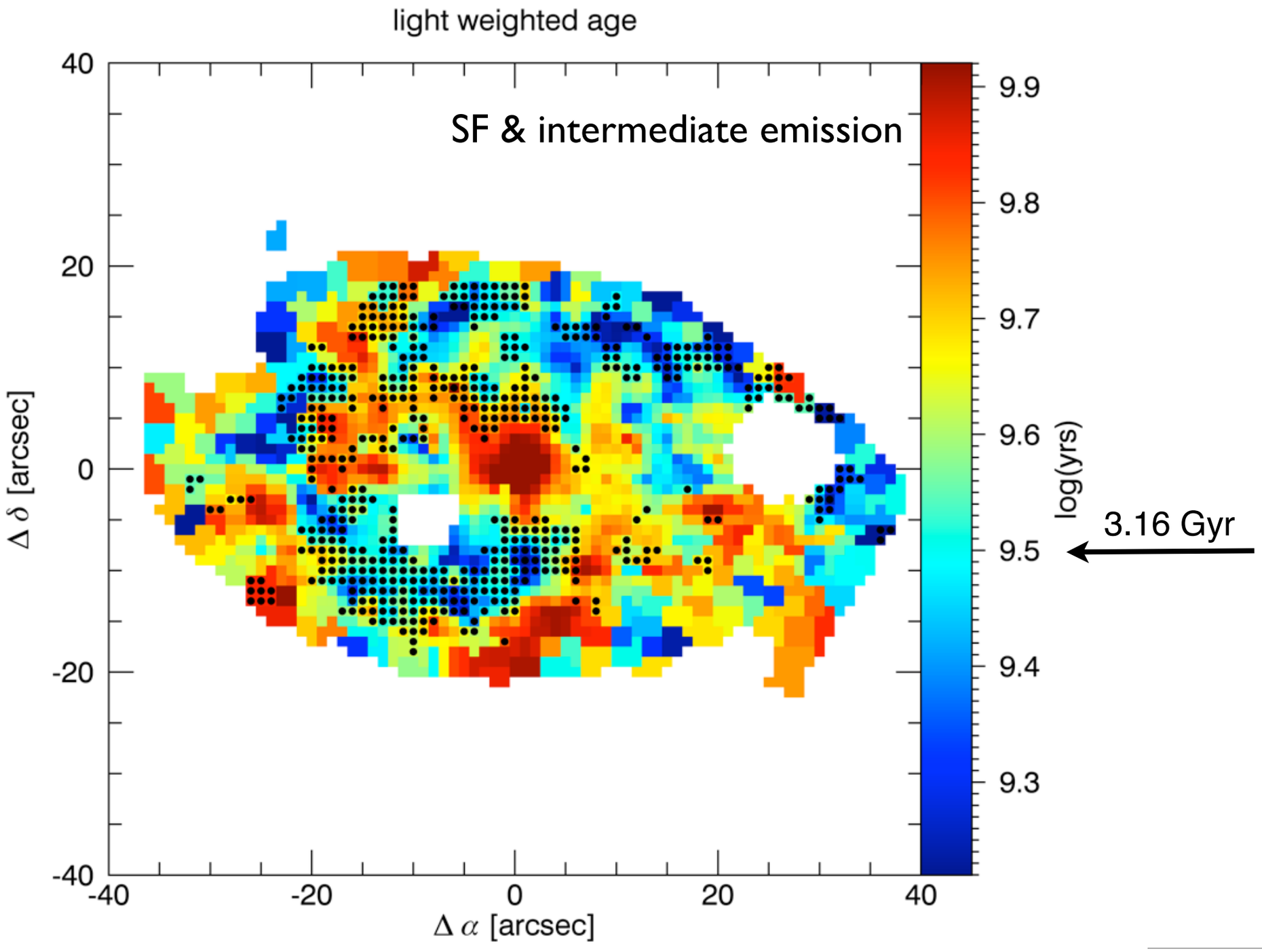
star-formation histories



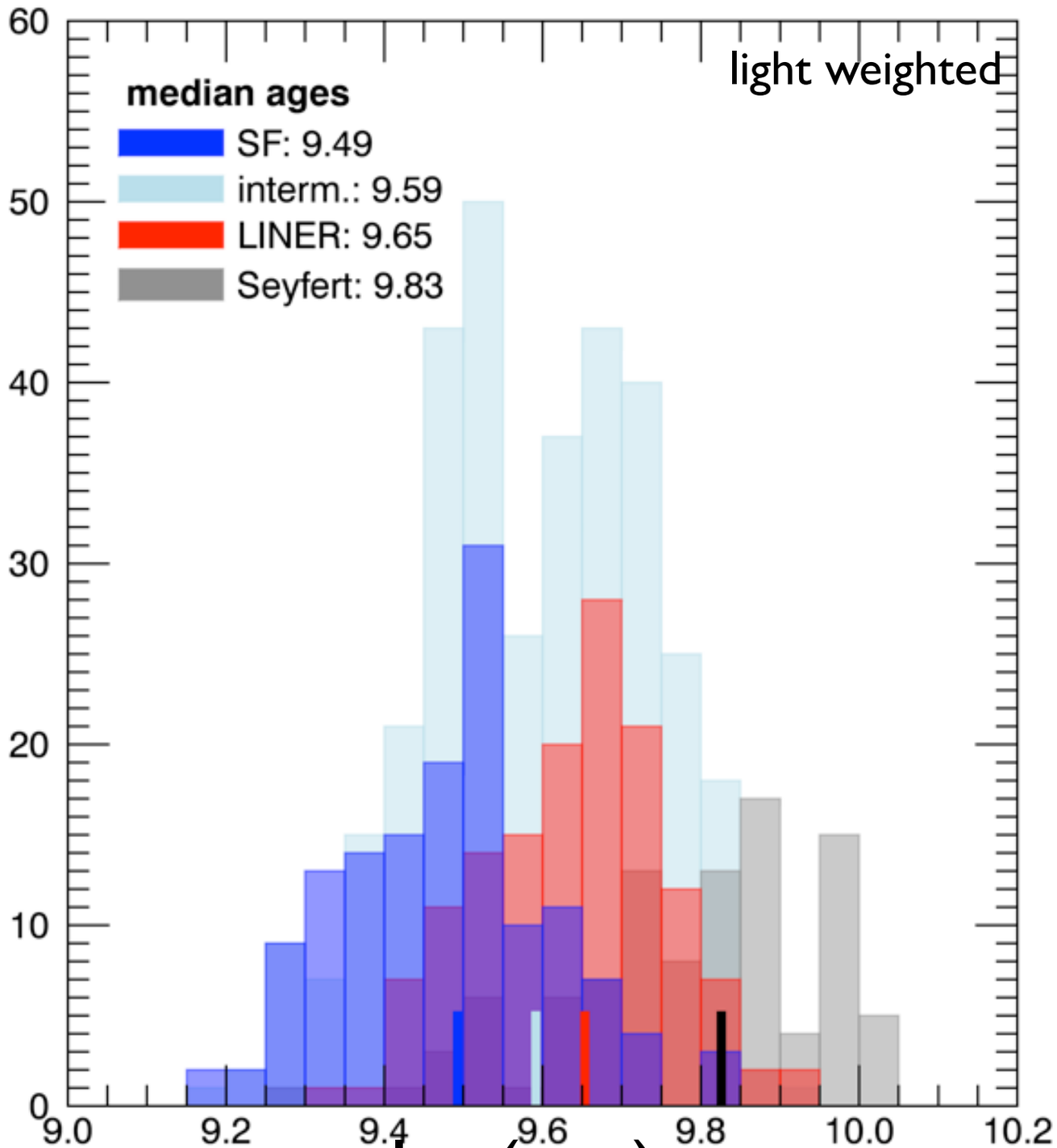
star-formation histories



star-formation histories



star-formation histories



conclusion

- Explanation of low-power AGN is not reconcilable with our results.
- LINER signatures are not a good tool for finding AGN.
- LINERs can host an AGN.
- AGN activity does not explain non-nuclear LINER emission.
- Ample evidence for hot old stars
  - spatial extend of LINER like emission
  - spatial correlation with low EW(Ha)
  - spatial correlation with older stellar ages