The deep SWIRE VLA field: faint radio populations

Veronica Strazzullo
Maurilio Pannella & Frazer Owen

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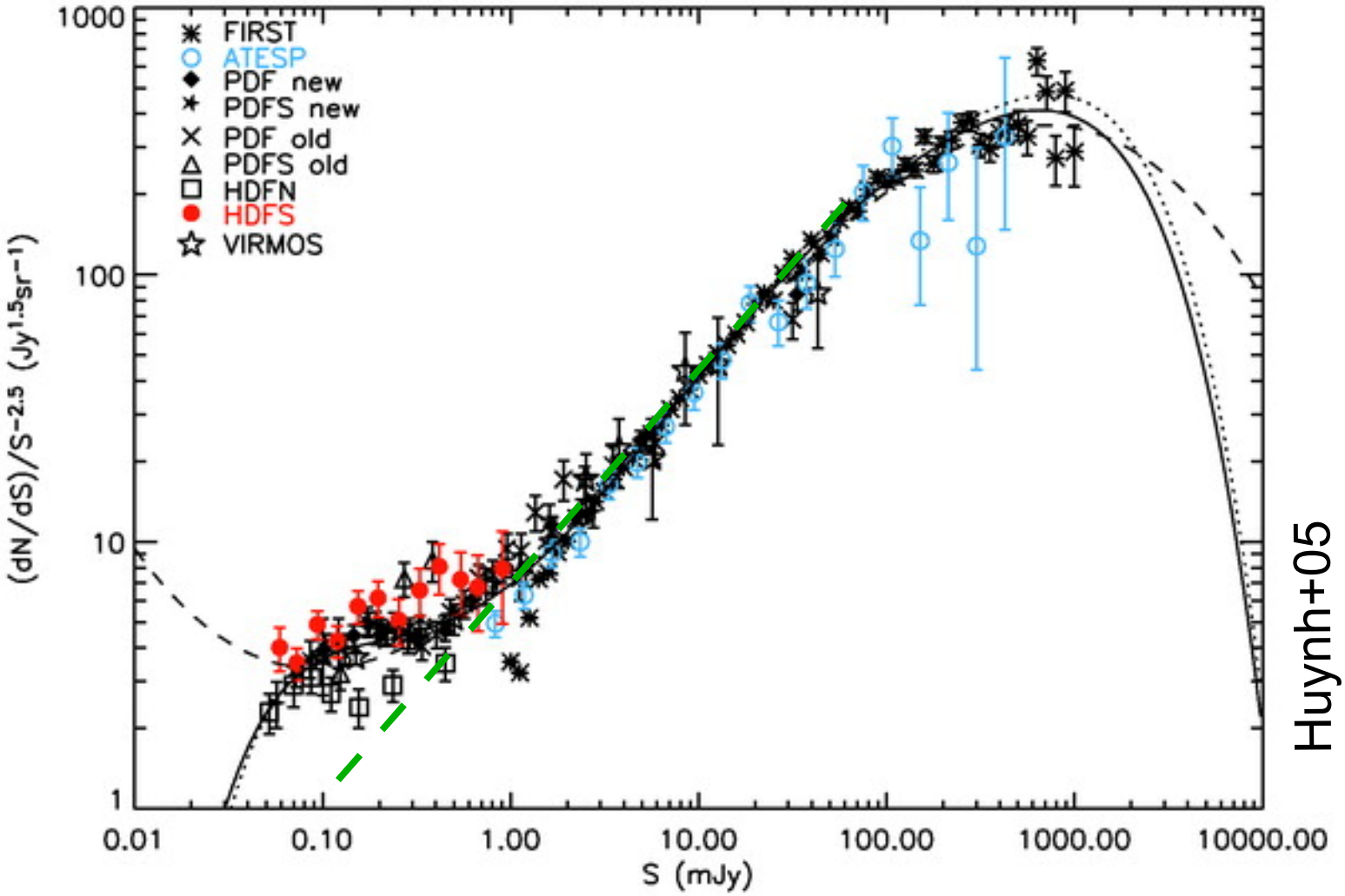
Faint radio populations

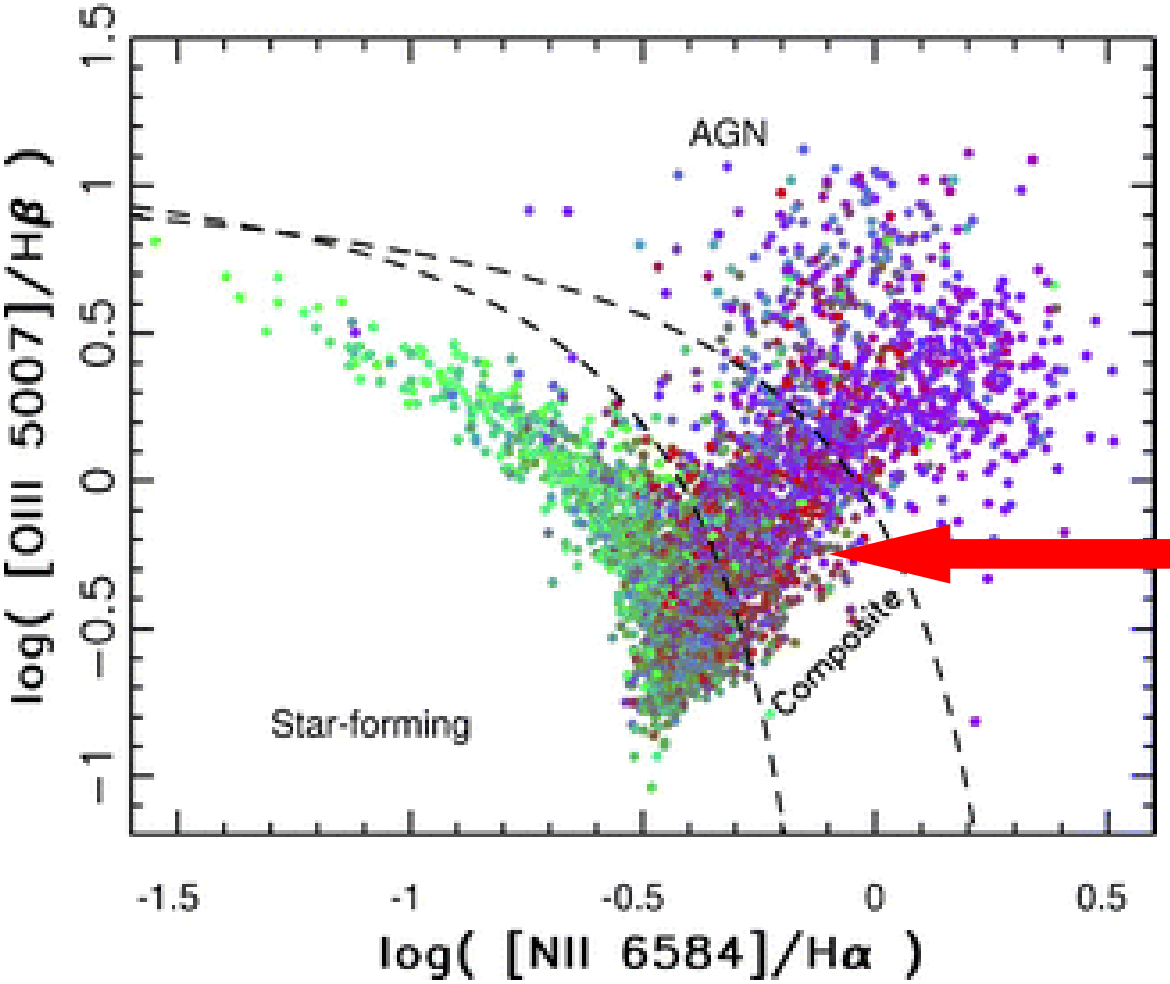
The rising of a new population



Huynh+05

Faint radio populations

not just “AGNs” or “starbursts”?

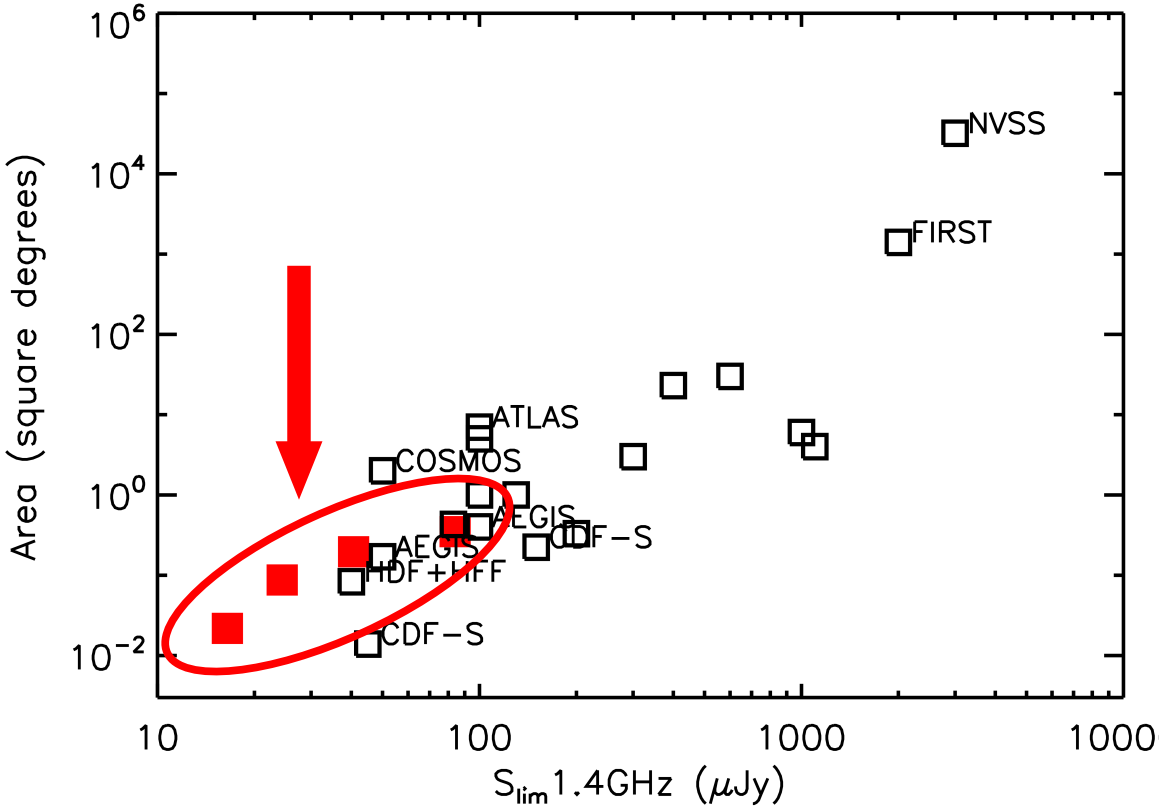


composite sources

3400 SDSS galaxies in Smolcic+ 2008 classified in the BPT (Baldwin+ 1981) diagram

The deep SWIRE VLA field

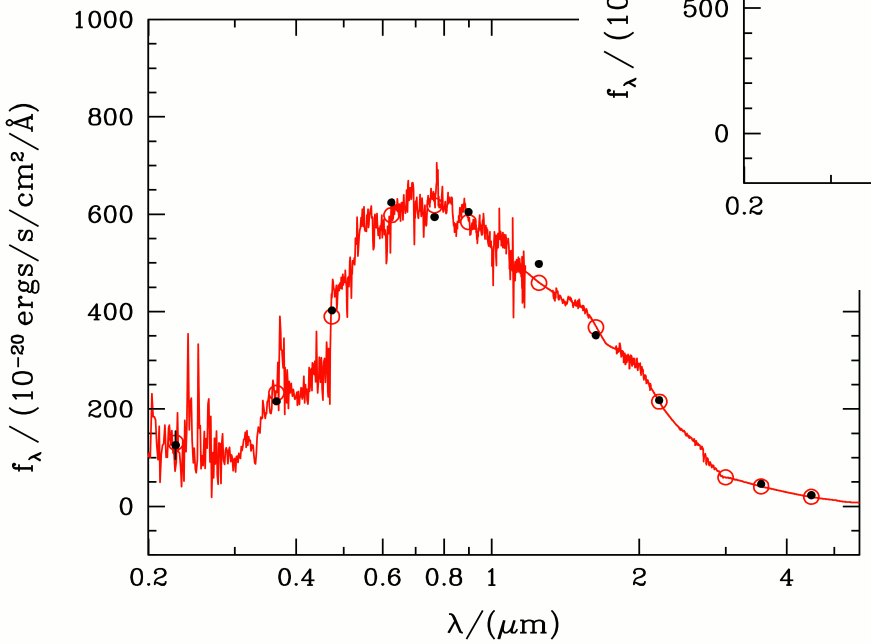
- a deep 20cm-selected sample
  - rms at image center ~2.7 μJy
  - 1.6” resolution
    (Owen & Morrison 2008)
- 0.6 x 0.6 square degrees
- 490 spectroscopic redshifts

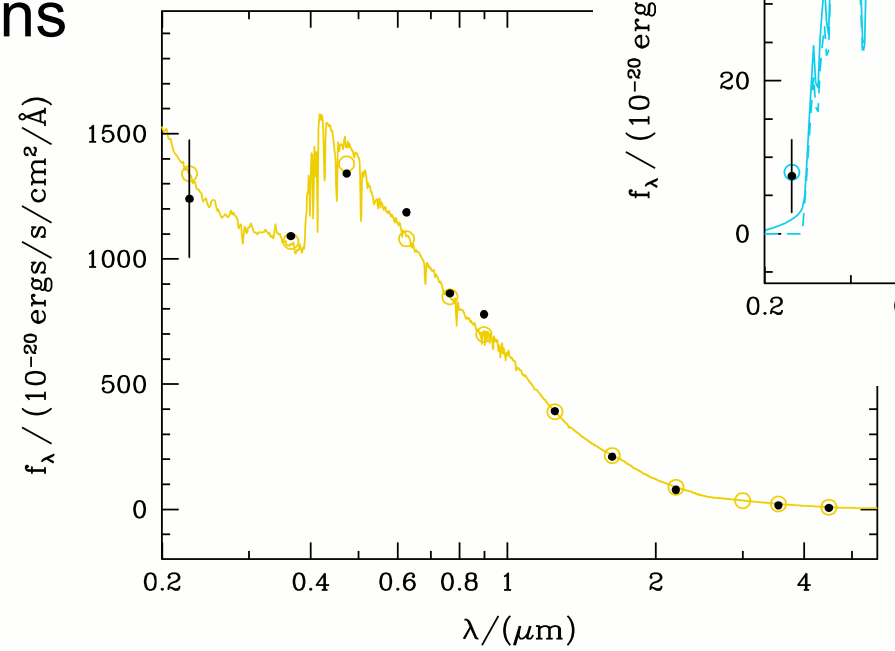


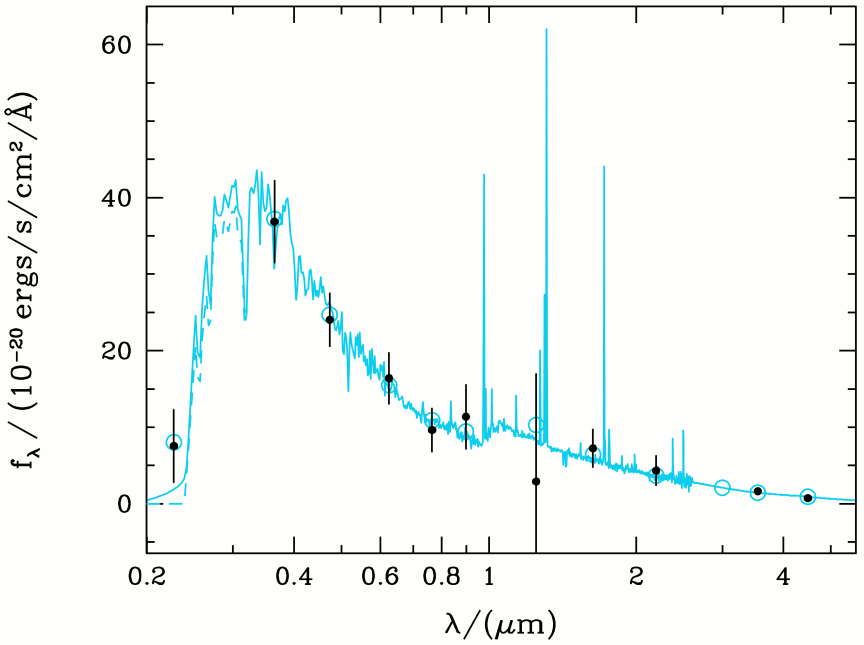
- extensive multiwavelength photometry: X-ray, FUV, NUV, U, g, r, i, z, J, H, K, IRAC (3.6, 4.5, 5.8, 8μm), MIPS(20, 70, 160μm), radio (20cm, 50cm, 90cm)

The deep SWIRE VLA field

Sampling of the Spectral Energy Distribution in the whole restframe range relevant to the study of the stellar populations







Photometric redshifts

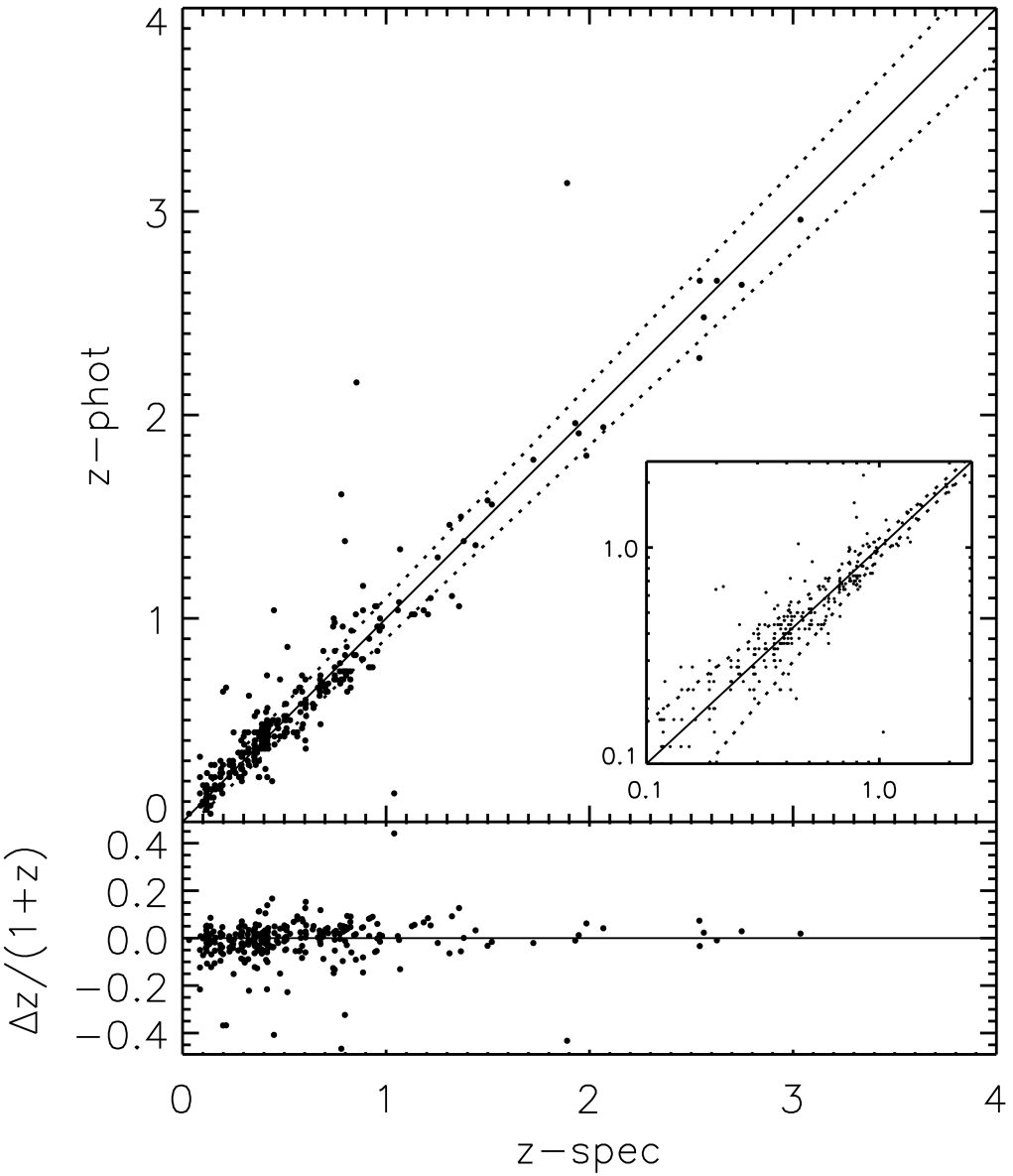


photo-zs for the radio sample

- 1610 sources
- 86% of the identified counterparts
- 83% of the whole radio sample

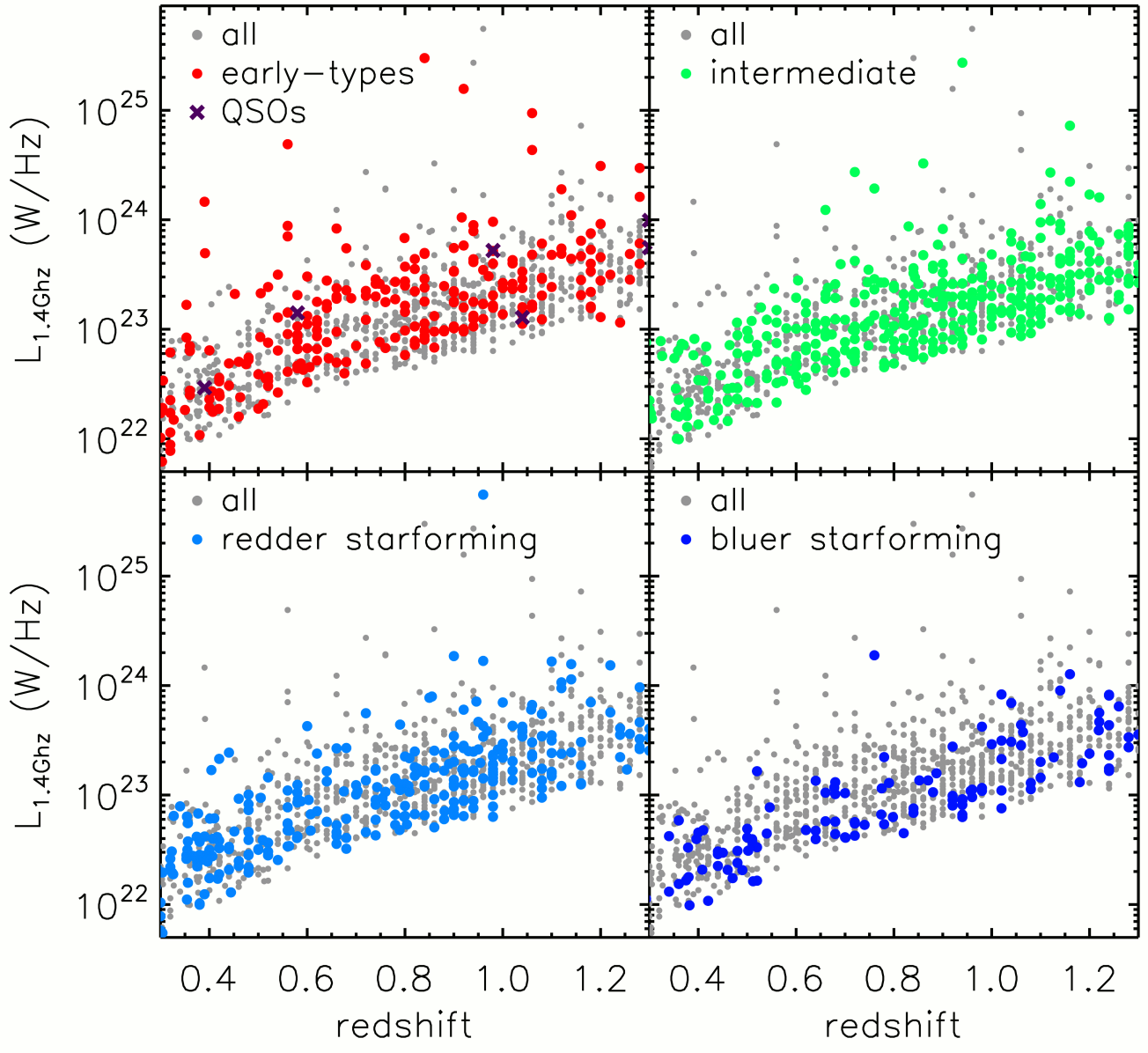
photo-z vs spec-z for radio sources

- ~300 IDs with spec-z
- median Dz/(1+z) ~ 0.0008
- RMS Dz/(1+z) ~ 5.5%
- 4% outliers

photo-z vs spec-z for the whole opt/IR parent sample

- median Dz/(1+z) < 0.003
- RMS Dz/(1+z) ~ 5%
- ≤3.5% outliers

SED properties of host galaxies



- Different SED types in different locations of the $L_{1.4GHz}$ vs redshift plot

- Simplest, expected explanation is: different $L_{1.4GHz}$ are associated with different processes

- Remind: <u>non-evolving templates</u> describe the stellar populations at the time of observations. <u>*Galaxies may change class as time goes by*</u>

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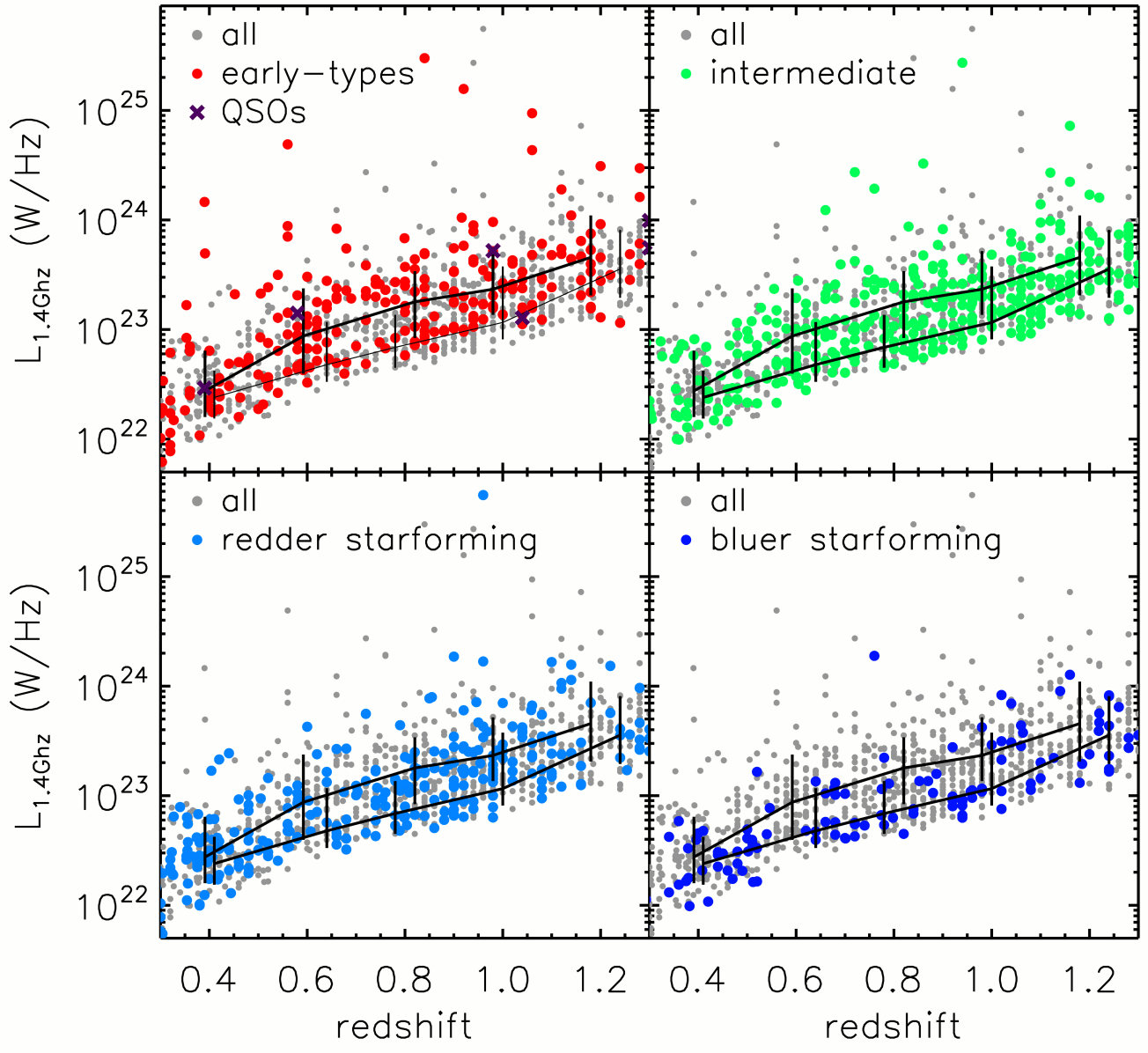

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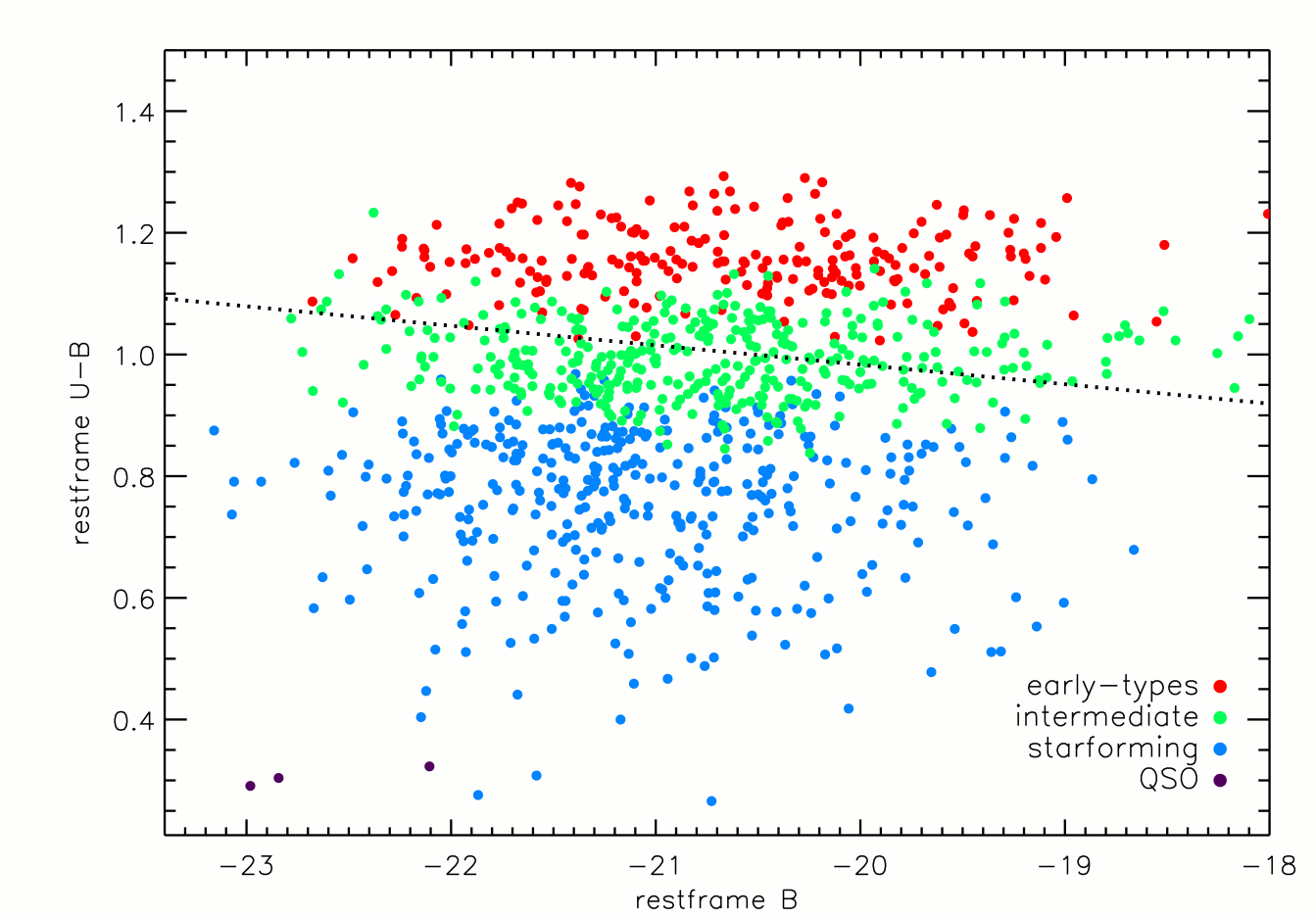
Color-magnitude of host galaxies



- all sources at 0.3<z<1.3 (not a flux limited sample)
- early-types in red sequence, star-forming galaxies in blue cloud

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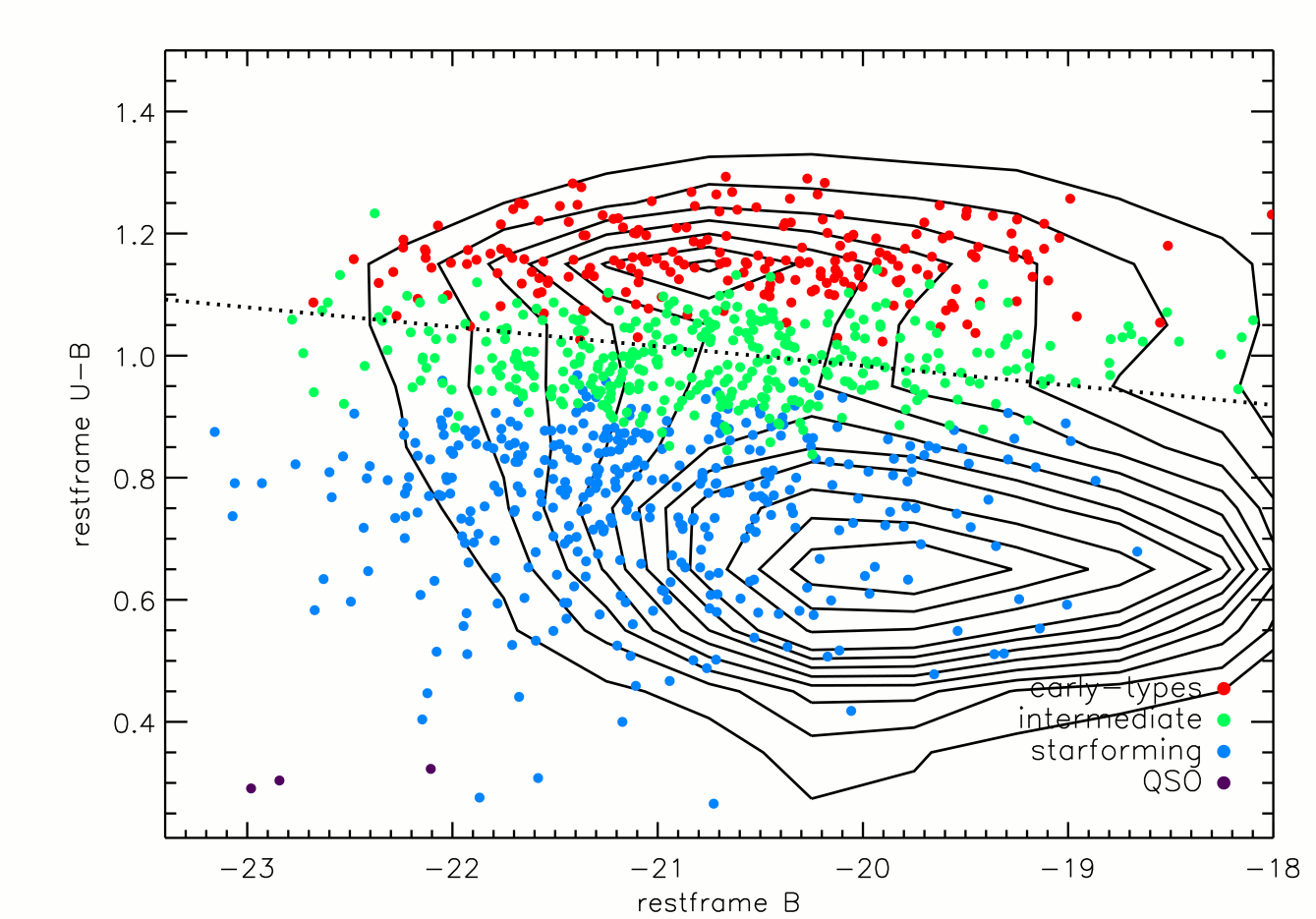
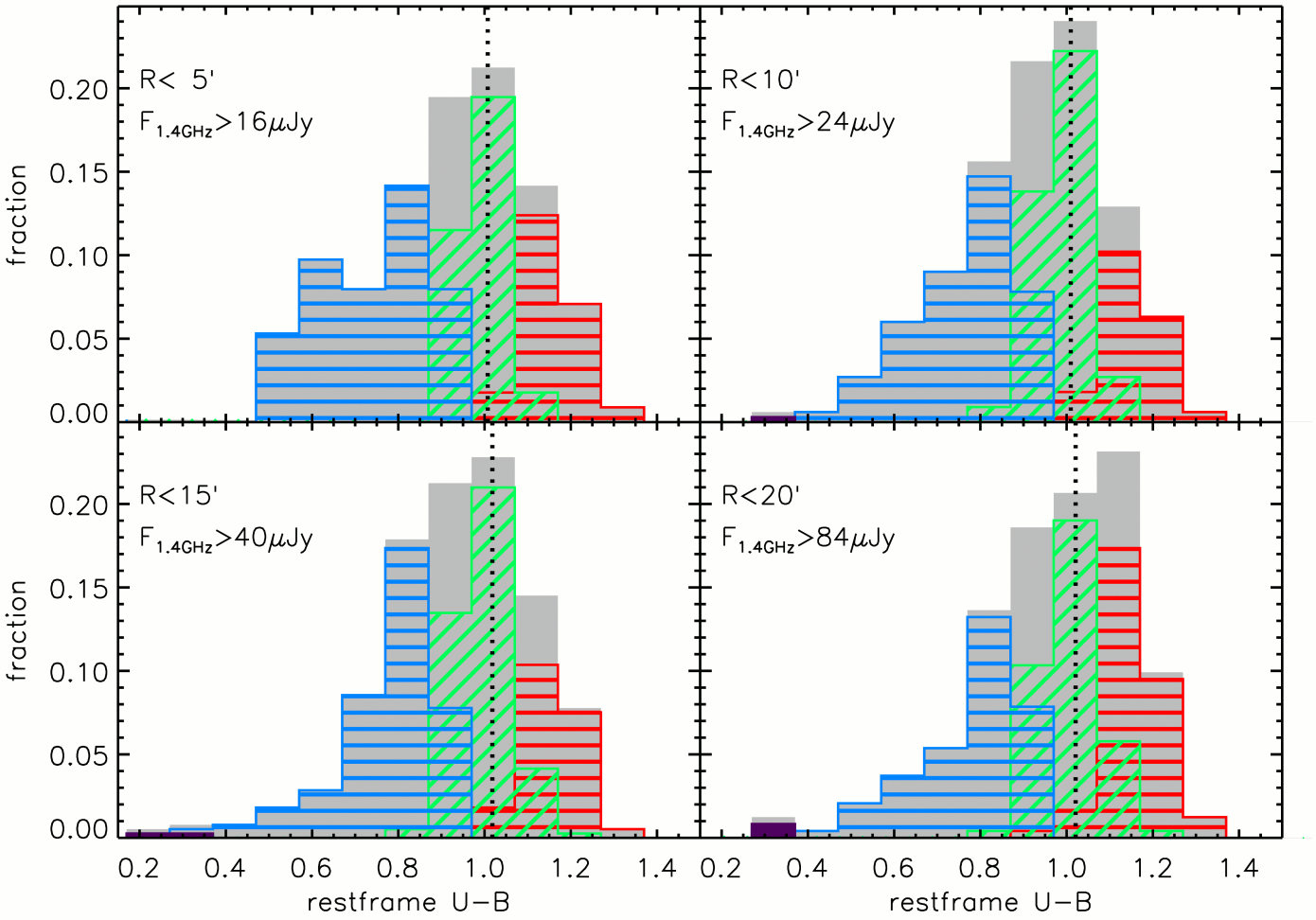


- all sources at 0.3<z<1.3 (not a flux limited sample)
- early-types in red sequence, star-forming galaxies in blue cloud
- high density of intermediate “green valley” galaxies

The nature of the host galaxies



- flux limited samples
- as expected, the nature of the host galaxies depends on the survey limiting flux

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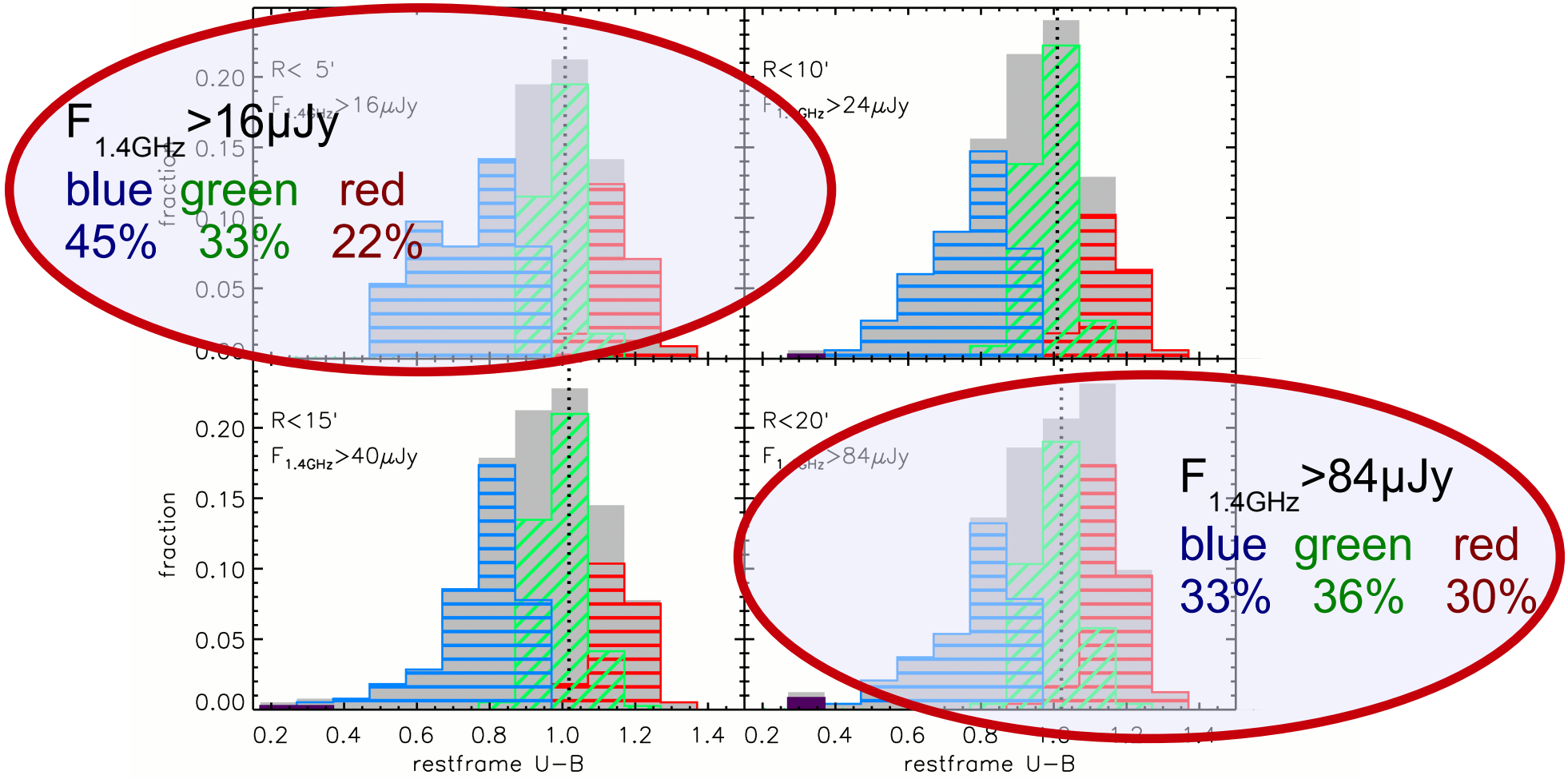

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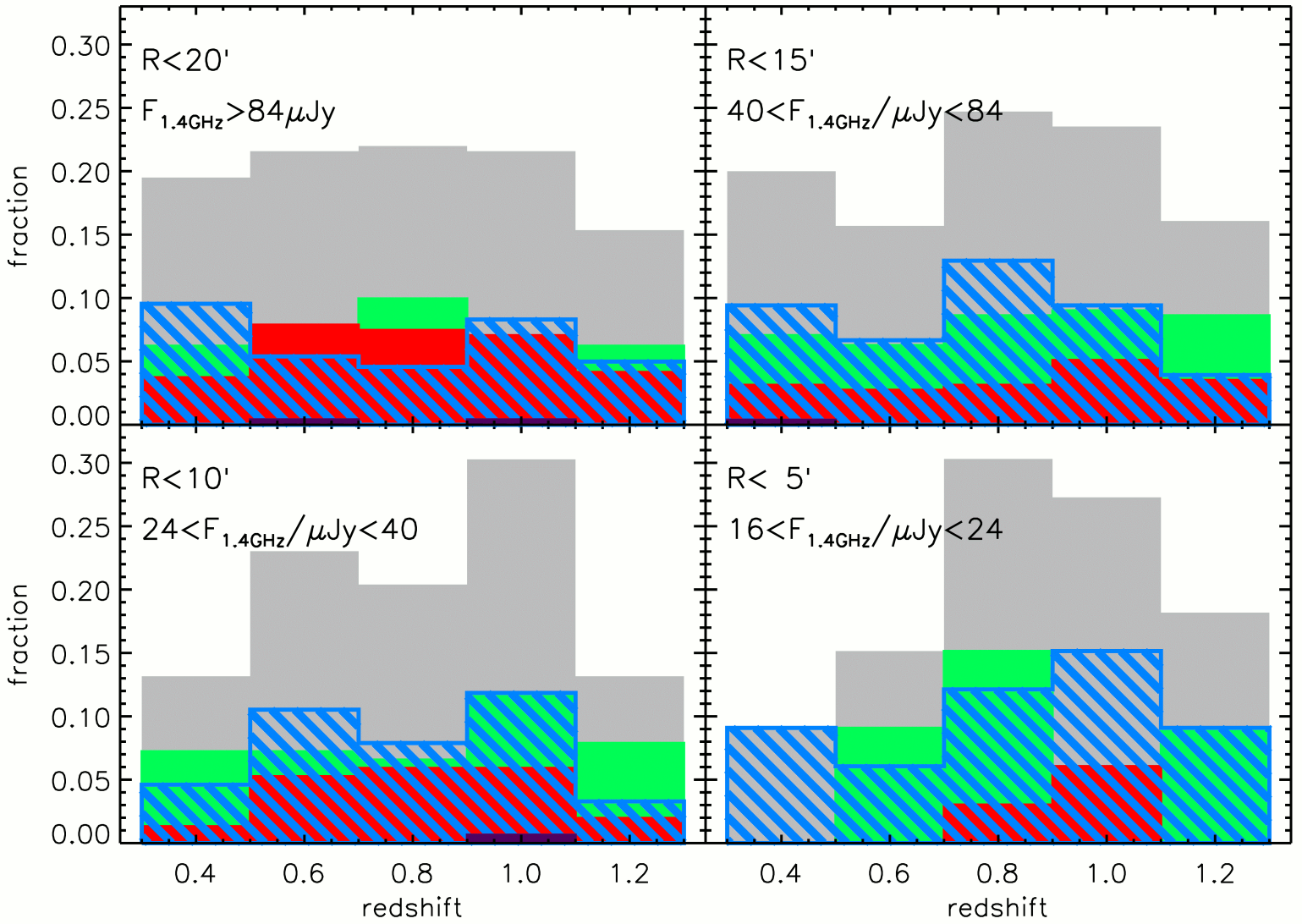

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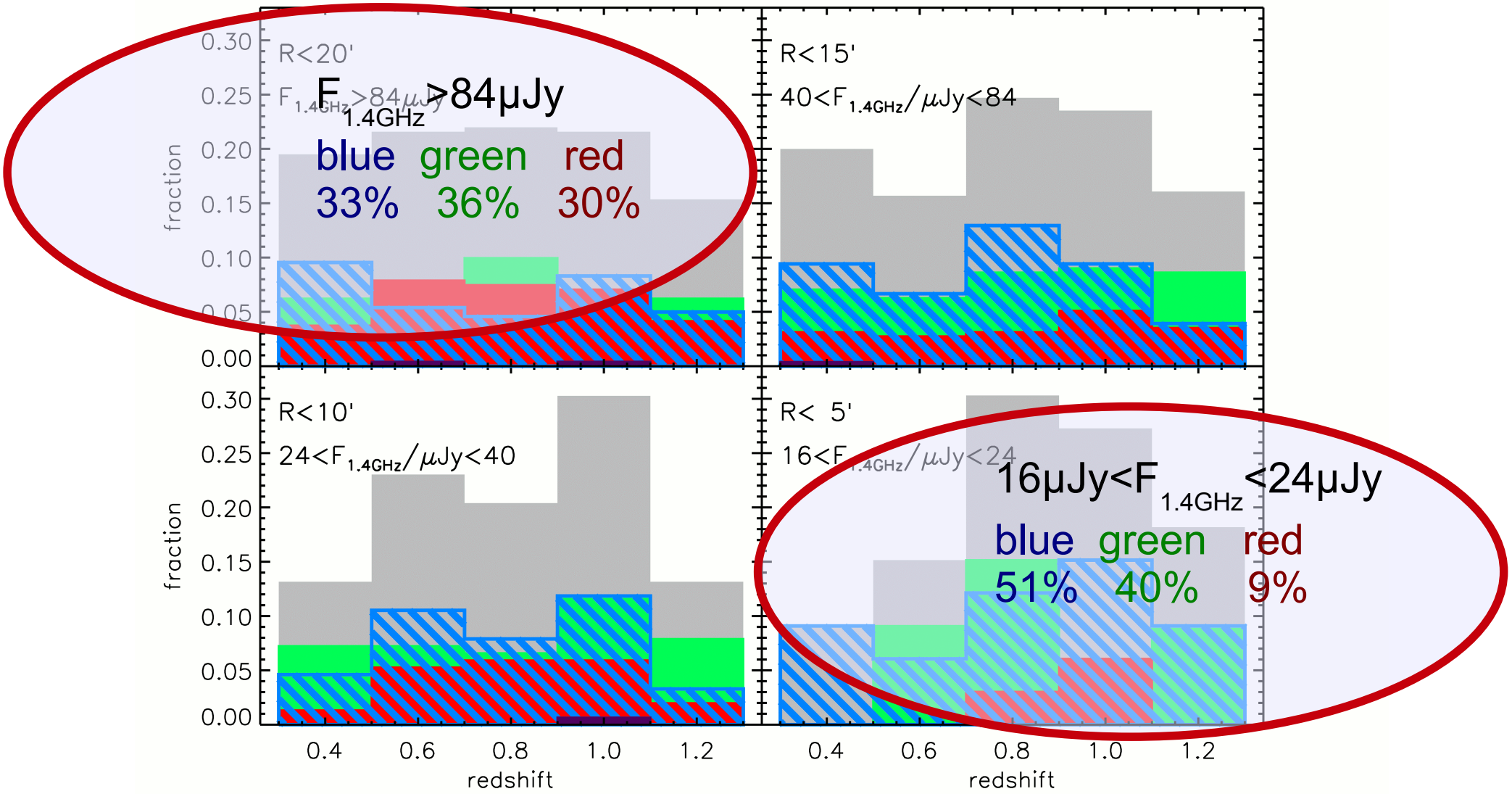
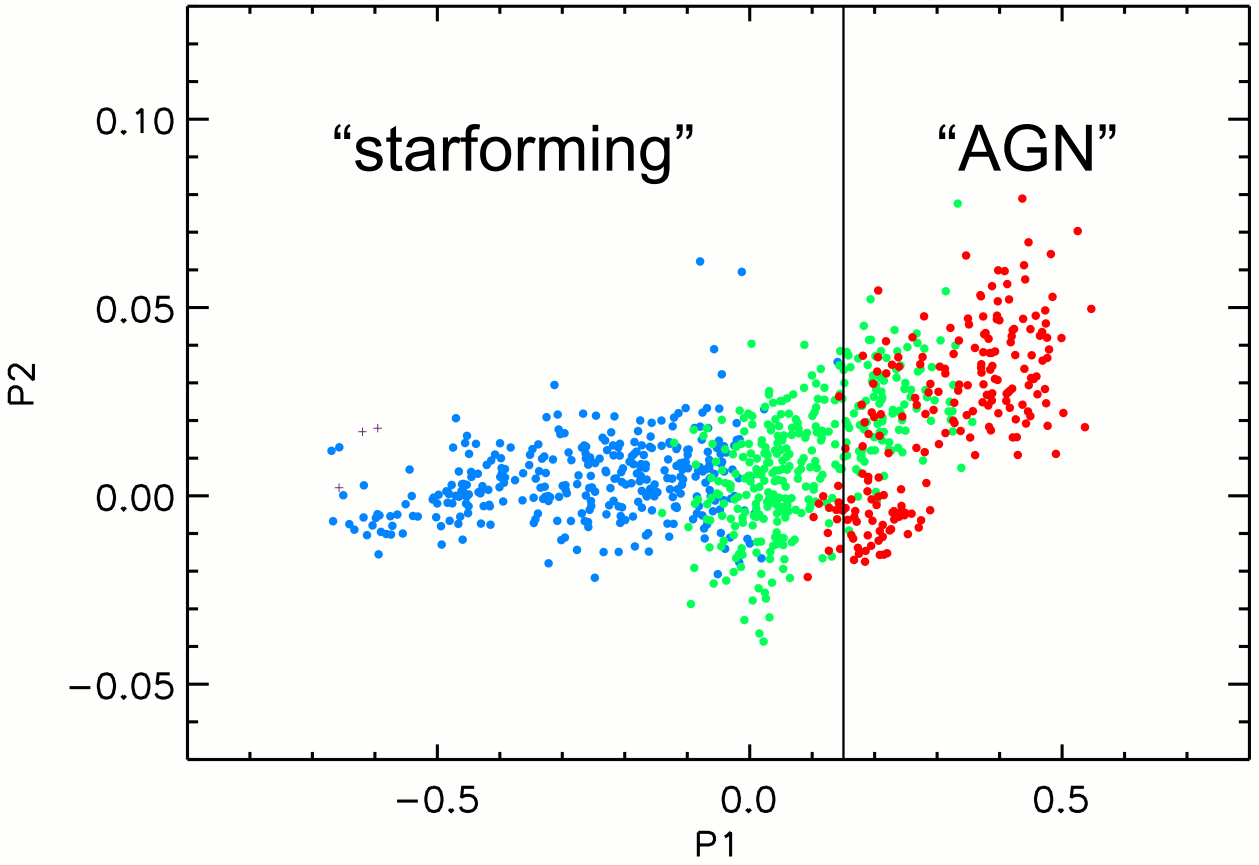
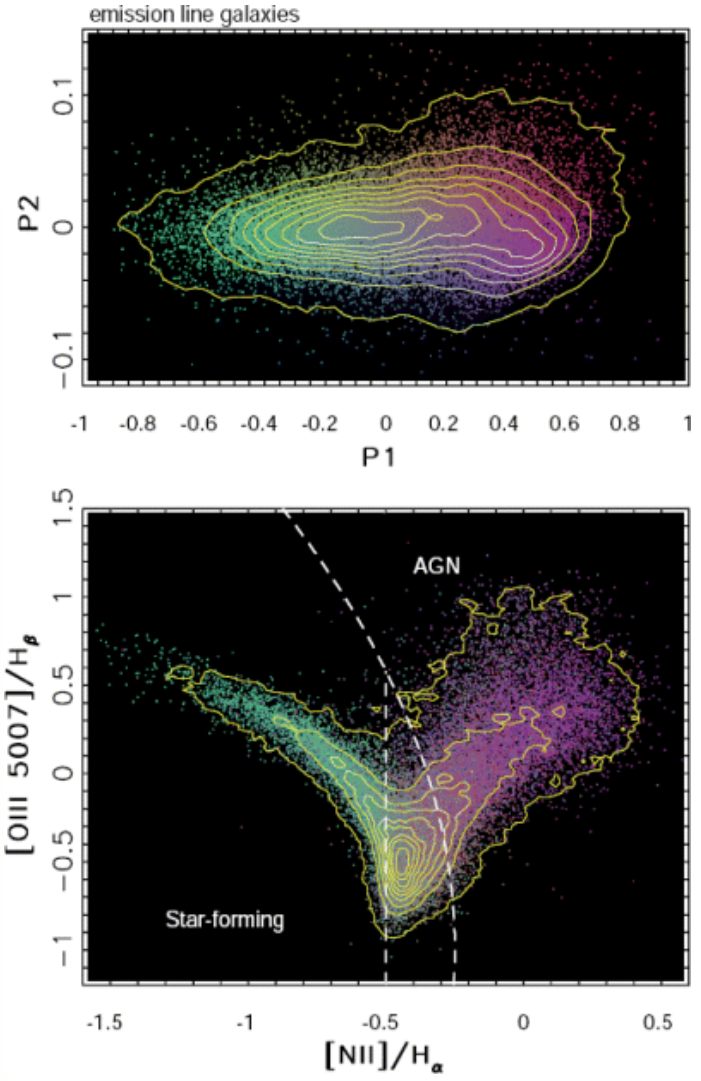


The nature of the host galaxies

Comparison with other classifications

The restframe P1-P2 color-color plot (combination of restframe colors in the wavelength range 3500-5800Å)



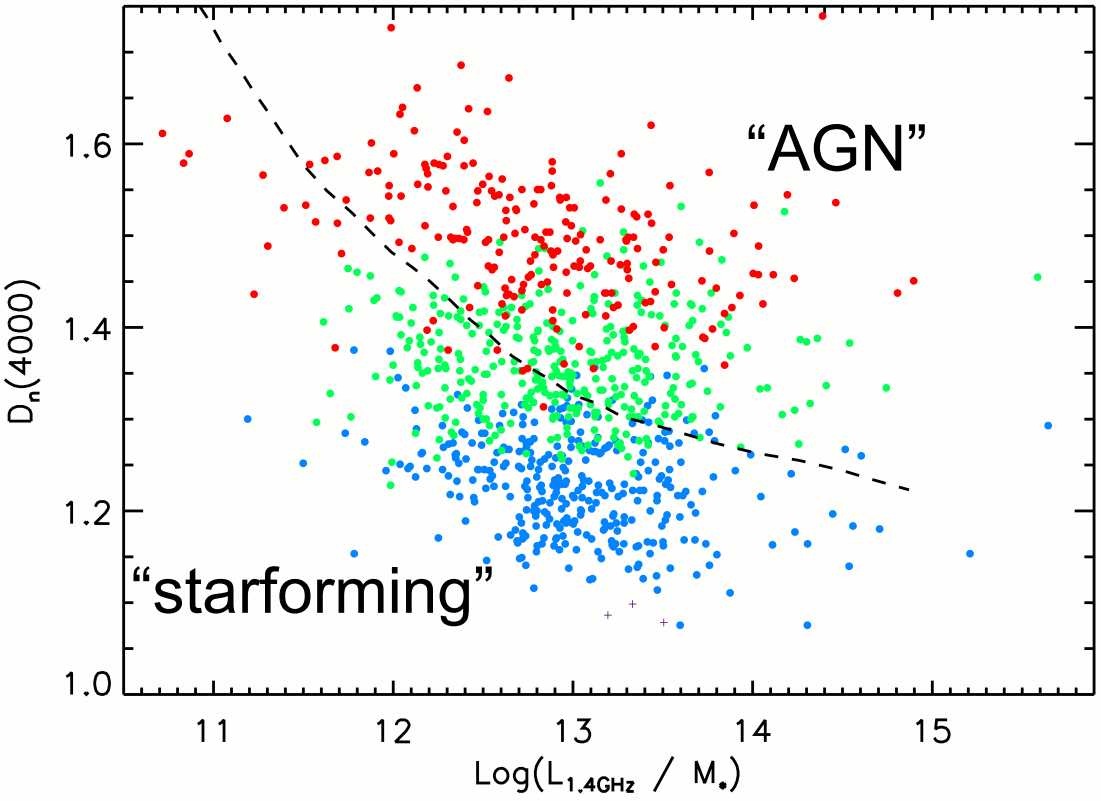


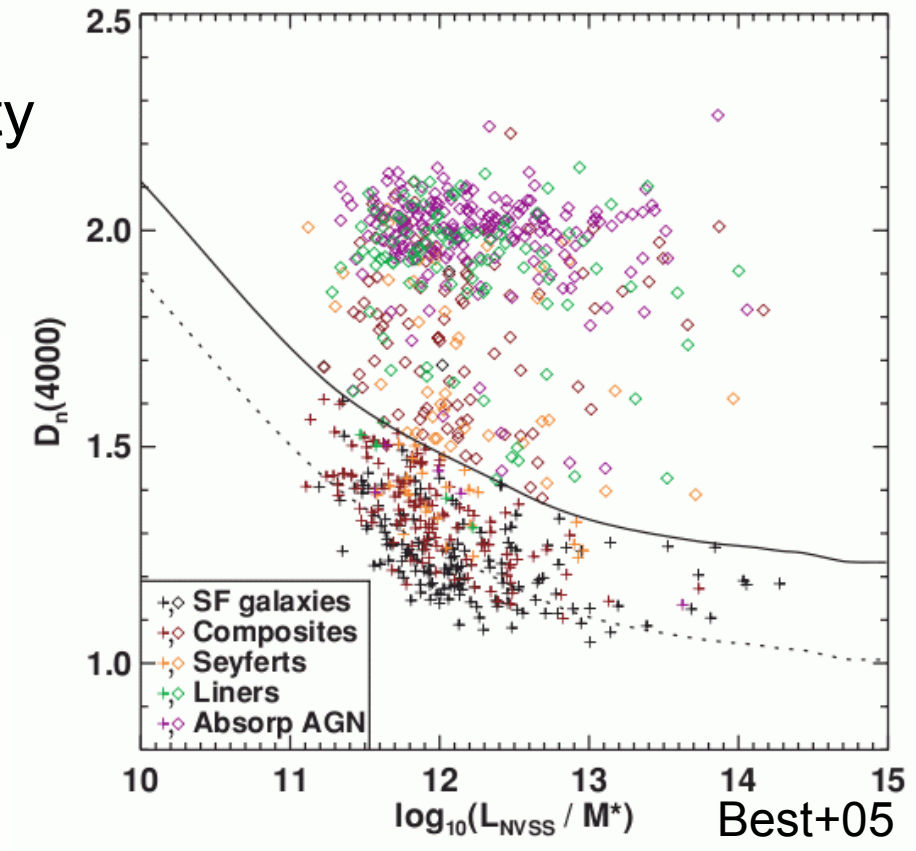
Smolcic+06

The nature of the host galaxies

Comparison with other classifications

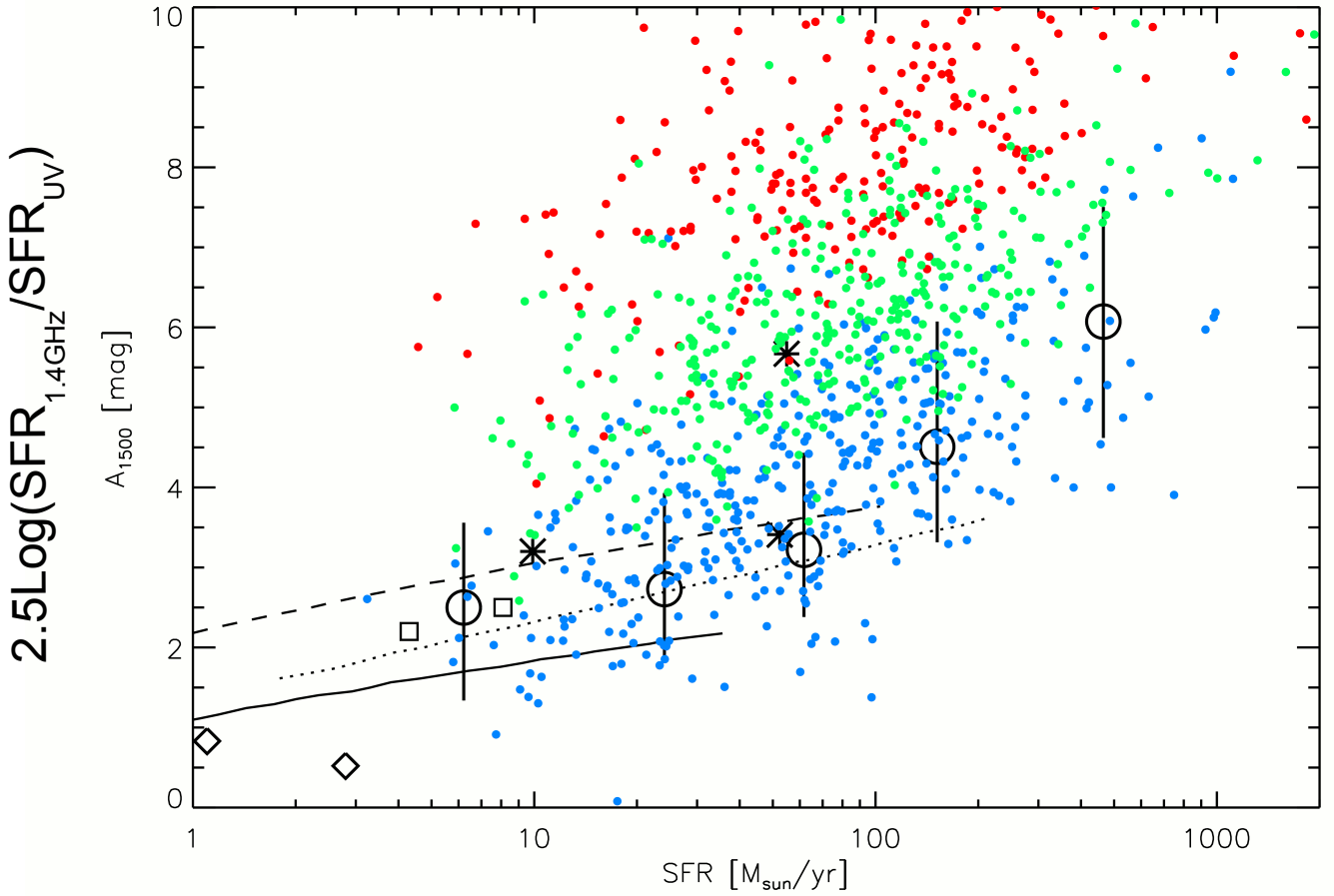
4000Å break vs specific radio luminosity





The nature of the host galaxies

Comparison with star-forming galaxy samples

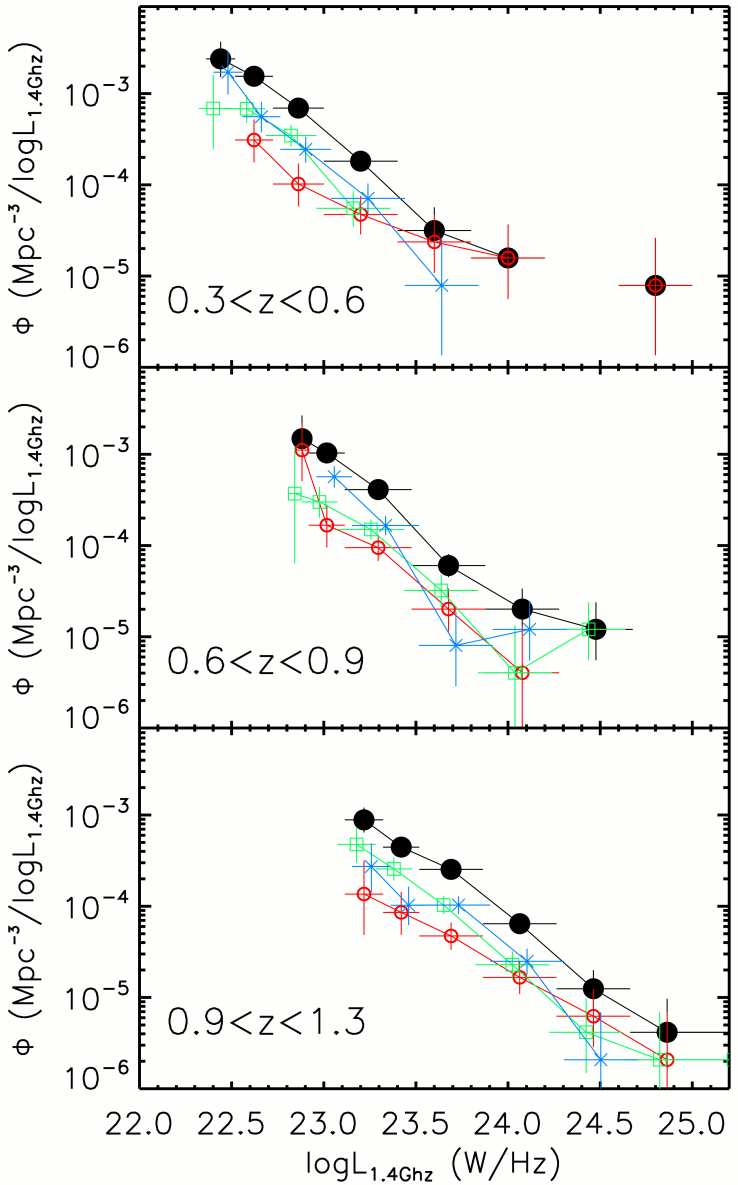


SF samples data from:
Calzetti+ 2000
Calzetti 2001
Hopkins+ 2001
Afonso+ 2003
Choi+ 2006
Pannella+ 2009

- blue galaxies in agreement with other star-forming samples
- red and green galaxies have *on average* too high radio/UV fluxes as compared to star-forming samples

The nature of the host galaxies

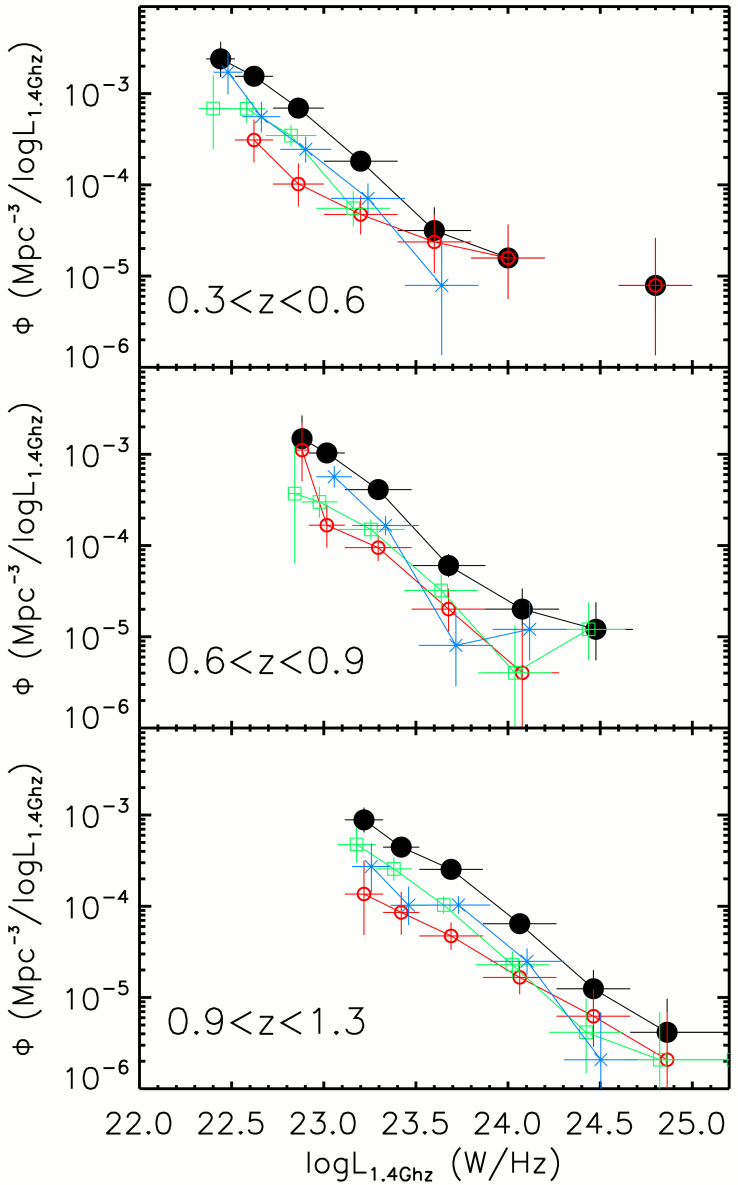
Luminosity distributions and redshift evolution



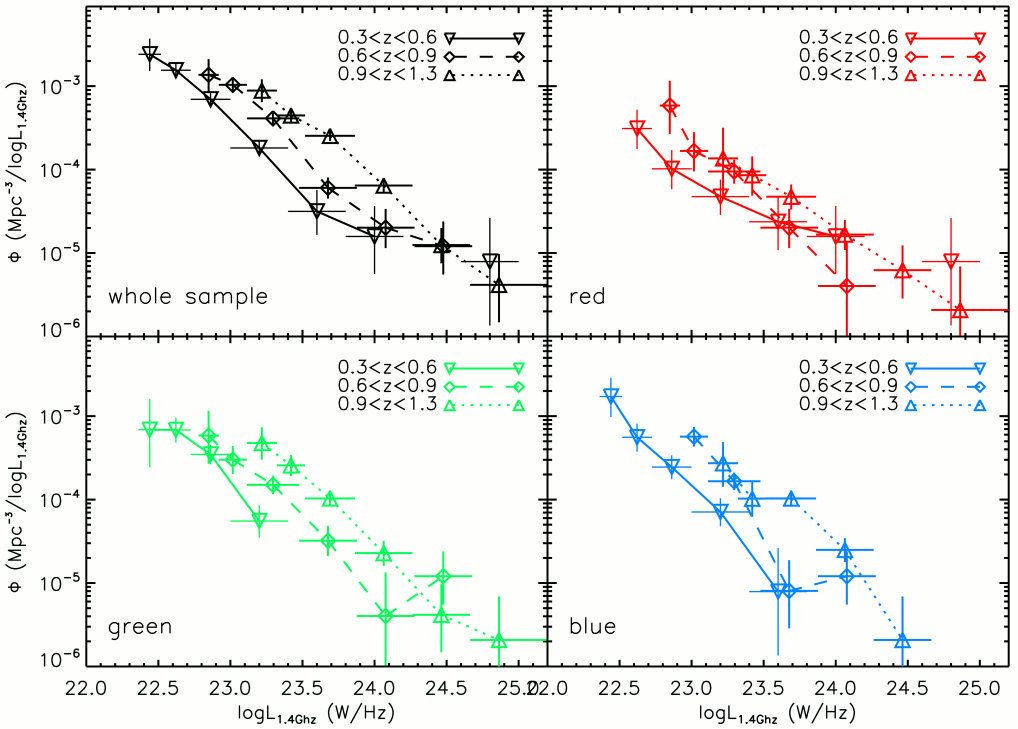
- Volume-limited samples
- At all redshifts, there is a significant "green population"
- All populations of faint radio galaxies evolve with redshift

The nature of the host galaxies

Luminosity distributions and redshift evolution



Both AGN- and SF-powered sources are consistent with evolving at a similar rate, implying (in a PLE scenario) a decrease of radio luminosities of a factor ~10 since z~1.3



Looking forward

- equivalent multi-wavelength and redshift information for the radio-undetected sources in the field
- **more data to study** (Chandra, Spitzer IRAC+MIPS, 50cm and 90cm)

→ more valuable insights into the actual nature of faint radio populations

→ a comparison of samples of radio vs non-radio sources in terms of stellar populations and stellar masses, with homogeneous data and analysis procedures

→ a parent sample for stacking analyses to study average radio properties of radio-undetected galaxy populations