

The WHIQII Survey



Metallicities and Spectroscopic Properties of Luminous Compact Blue Galaxies

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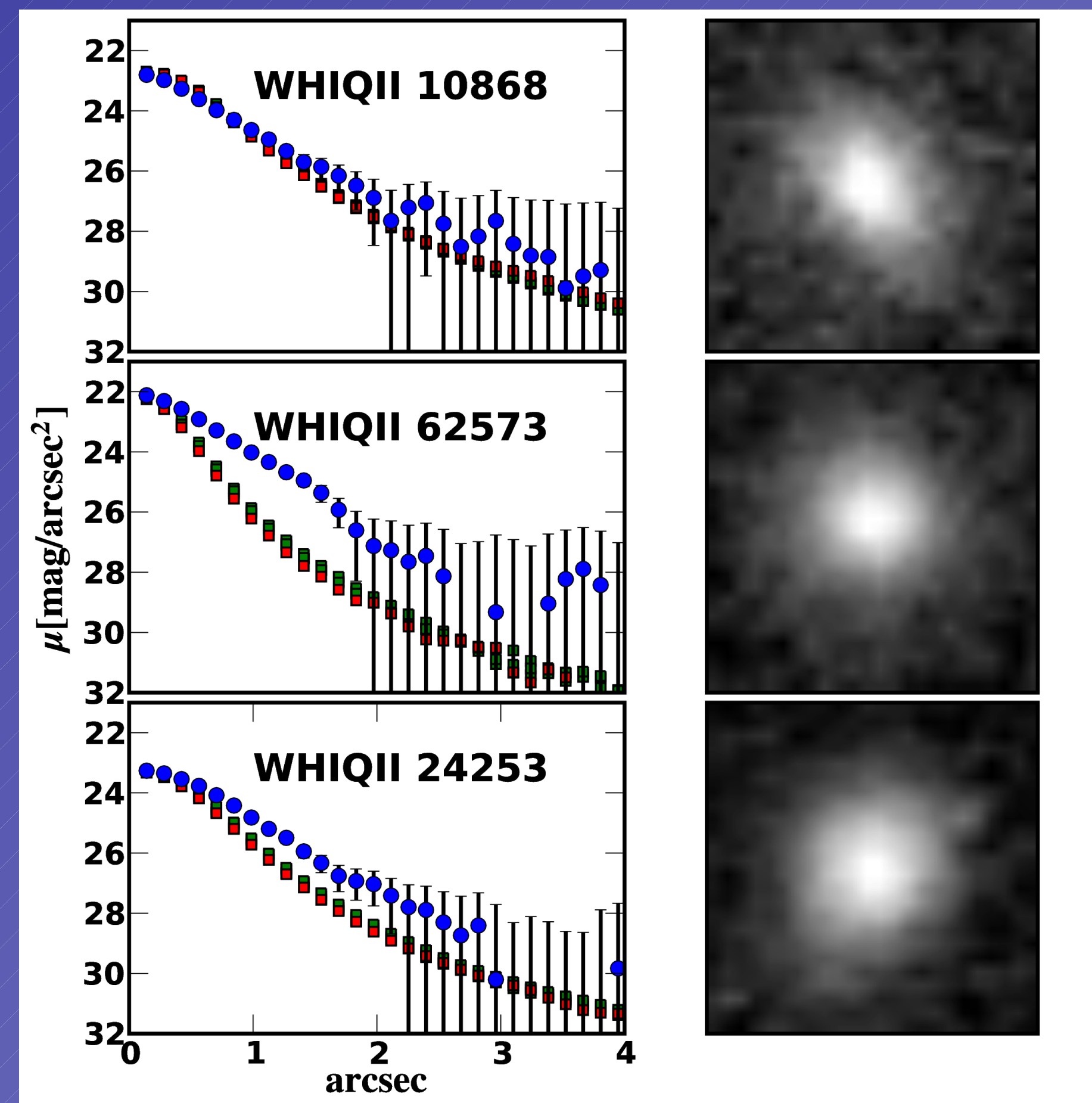
ApJ submitted

We present 104 emission line spectra of galaxies at intermediate redshift selected on galaxies with blue colors that appear physically compact, focusing on Luminous Compact Blue Galaxies (LCBGs). We confirm that LCBGs are a heterogeneous population, but we observe evolution in the luminosity-metallicity relation at intermediate redshift in the full population. Furthermore, our sample is more consistent with present epoch dwarf Irregulars, suggesting that cosmic "downsizing" is observable in even the fundamental parameters that describe star formation. Surprisingly, our entire intermediate redshift sample exhibits no detectable correlation between compactness and metallicity, indicating that the morphology of compact star forming galaxies is largely transient.

Survey

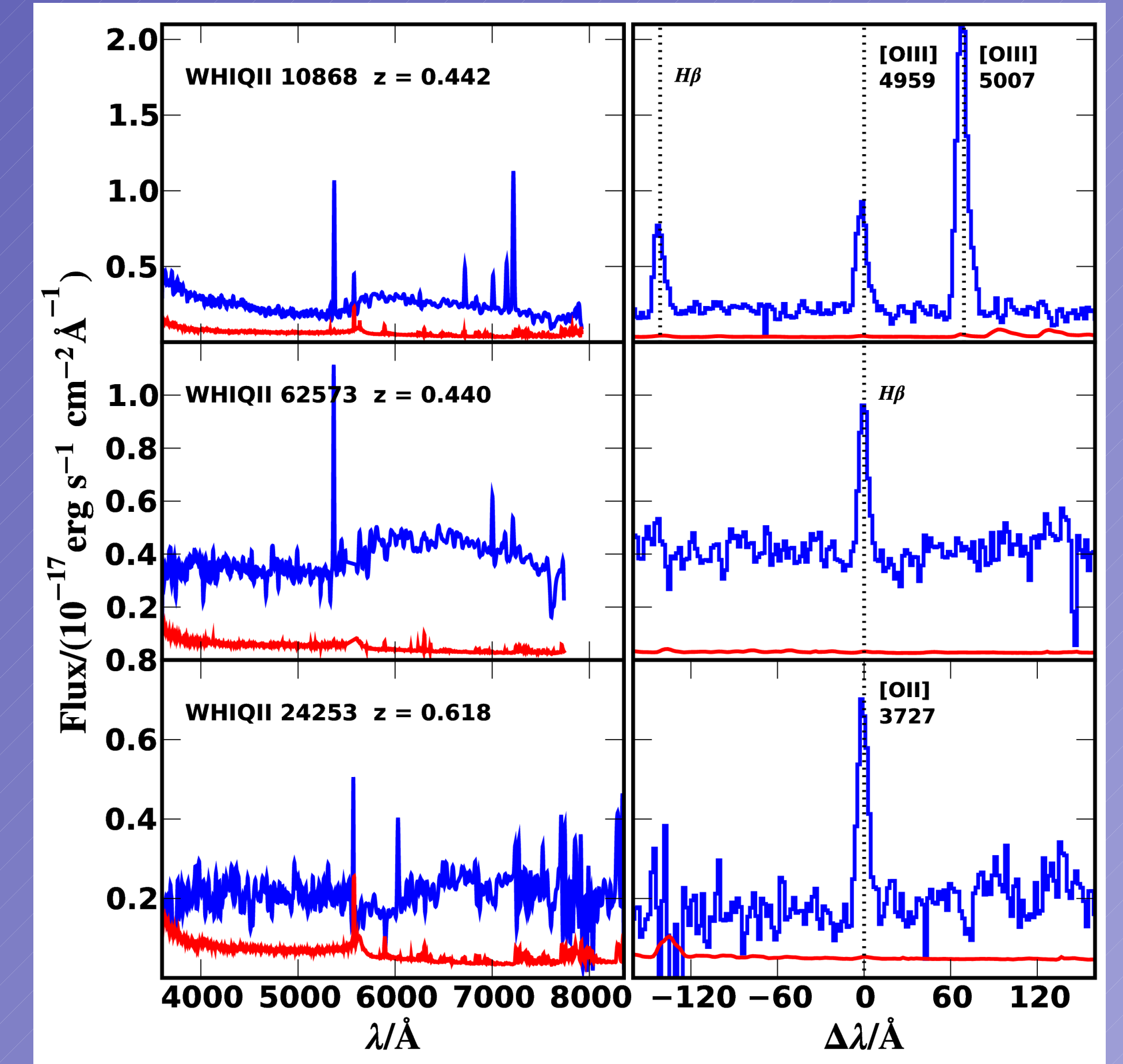


Imaging with WIYN Mini-Mosaic Imager in excellent (median 0.7") seeing.



Selection Criteria chosen to target Luminous Compact Blue Galaxies (LCBGs):

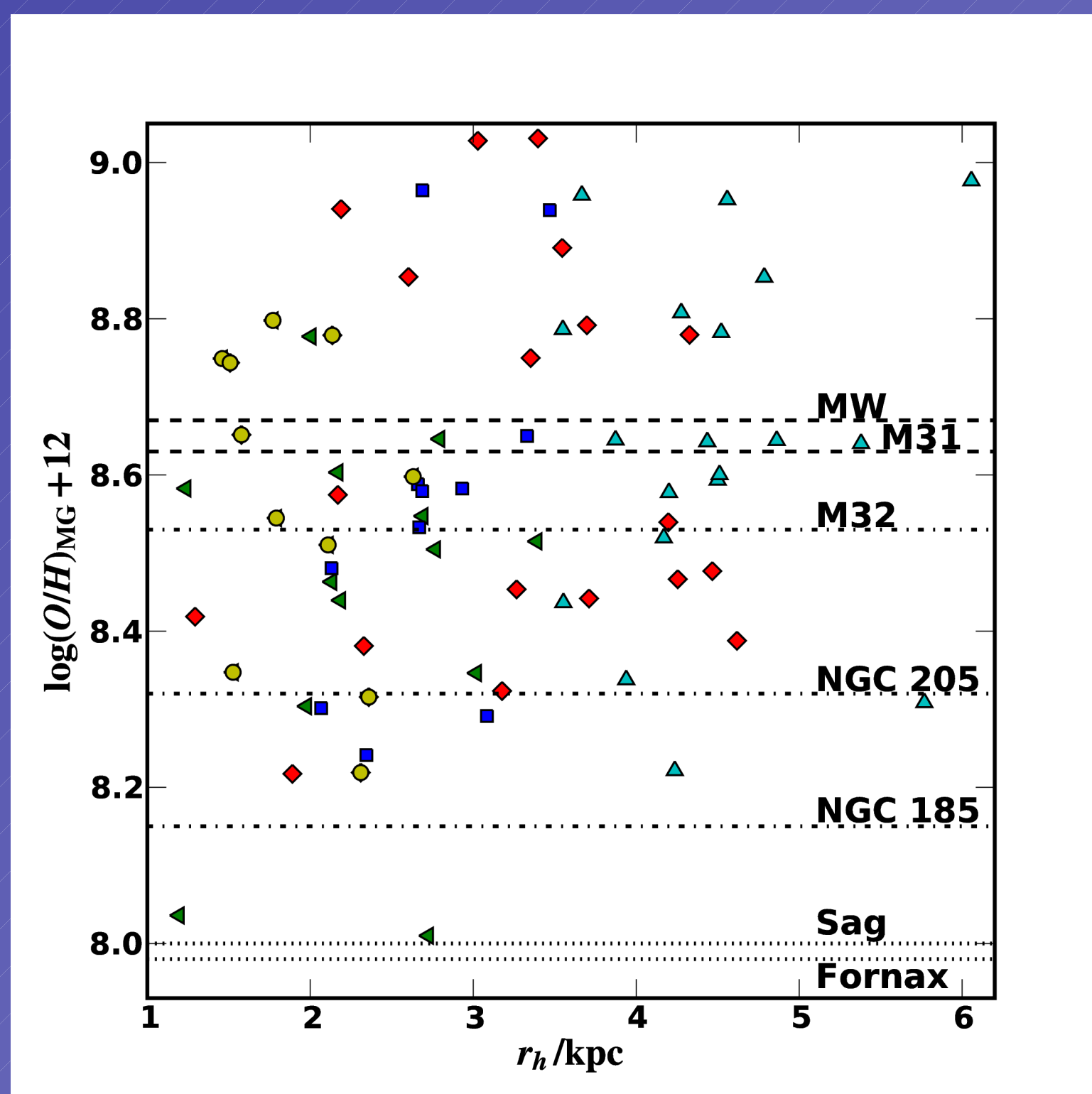
- B-V < 0.65
- B < -18.5
- r_half < 3.5 kpc
- Intermediate redshift (0.4 < z < 0.7)



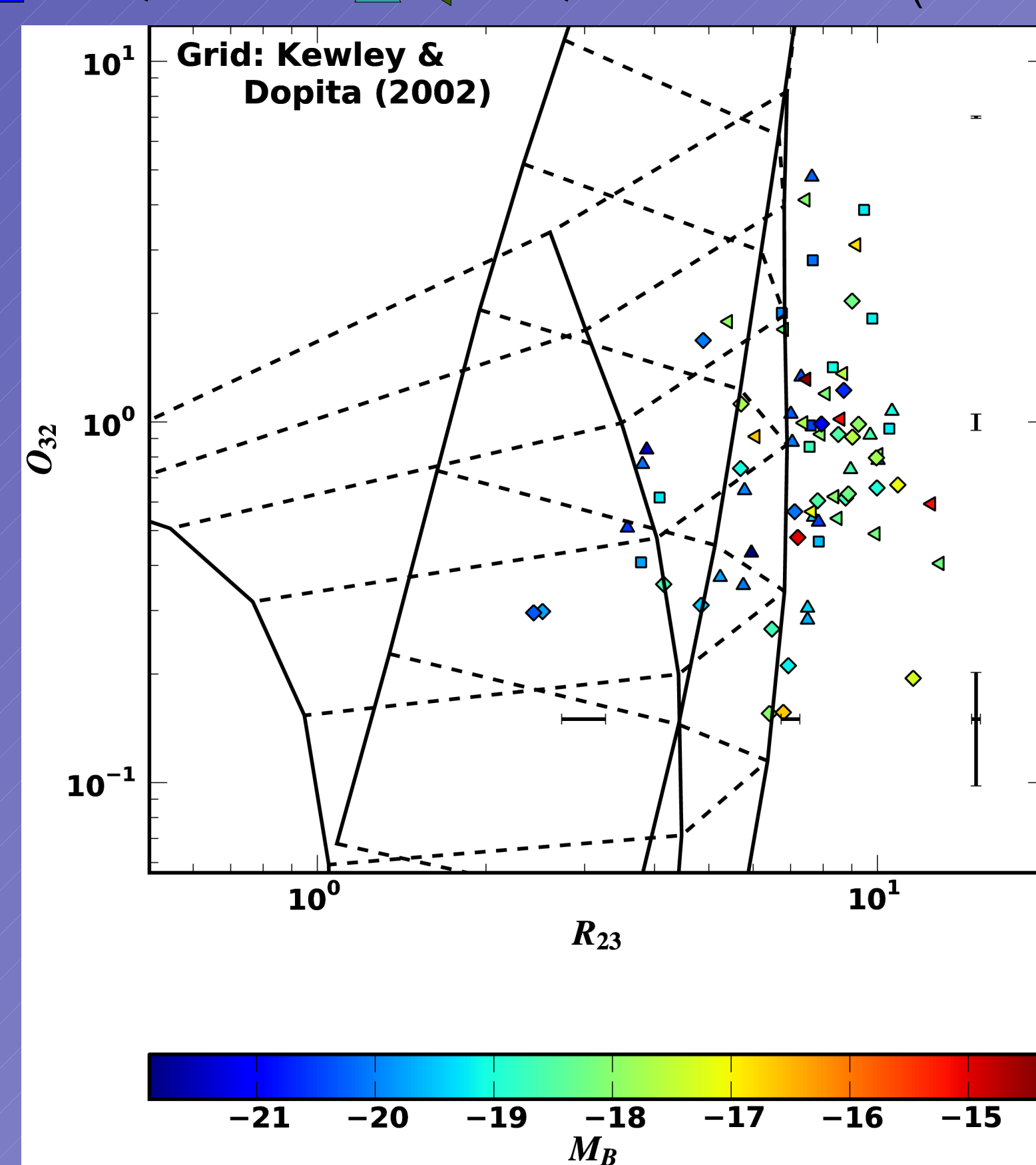
Keck/LRIS Spectra obtained to confirm redshift and determine metallicity with R23 diagnostic. 104 intermediate redshift emission line objects identified, 15 true LCBGs, 27 very close to LCBG criteria.

Results

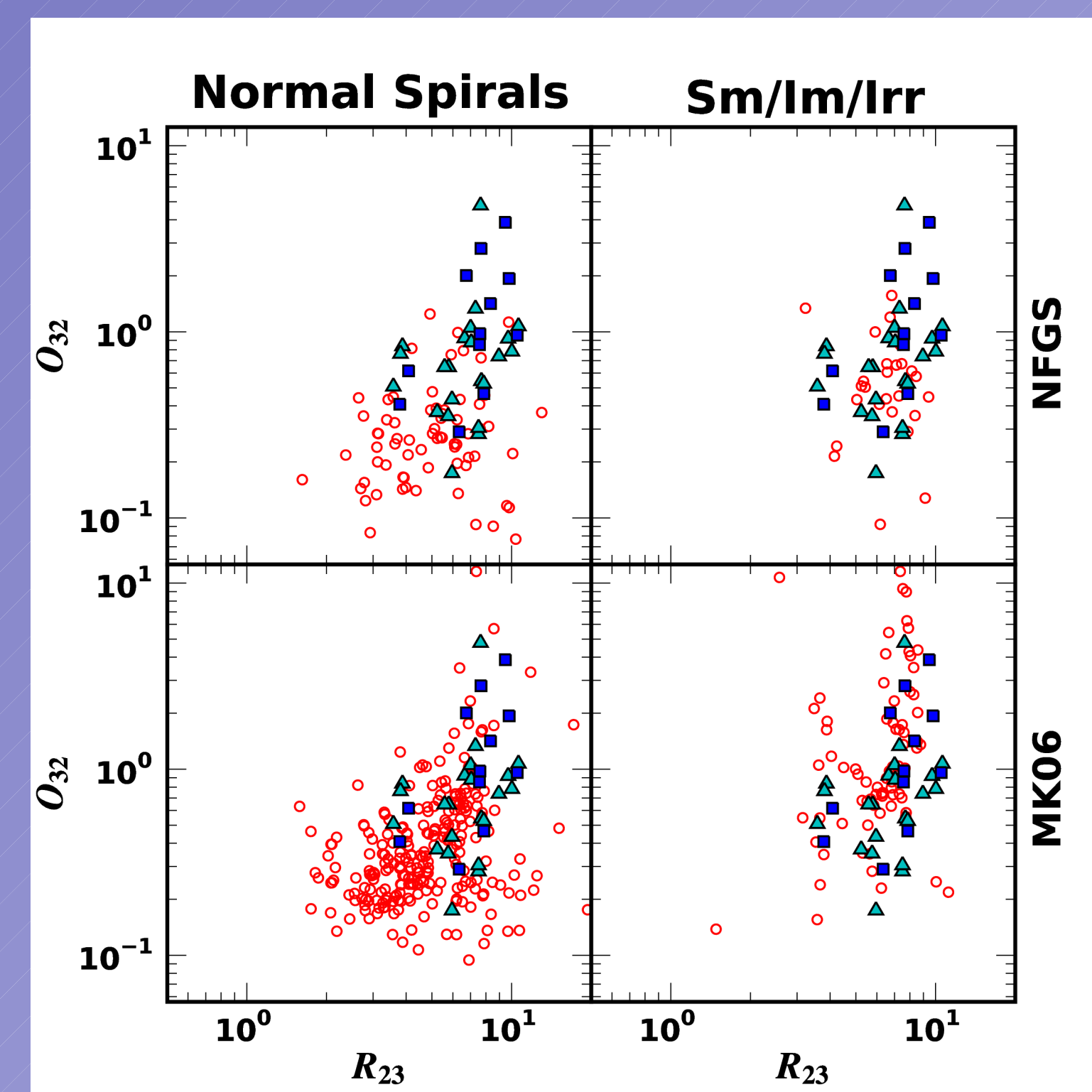
■ WHIQII LCBGs ▲ WHIQII Near-LCBGs (Other filled symbols) WHIQII other (Open symbols) Other Samples



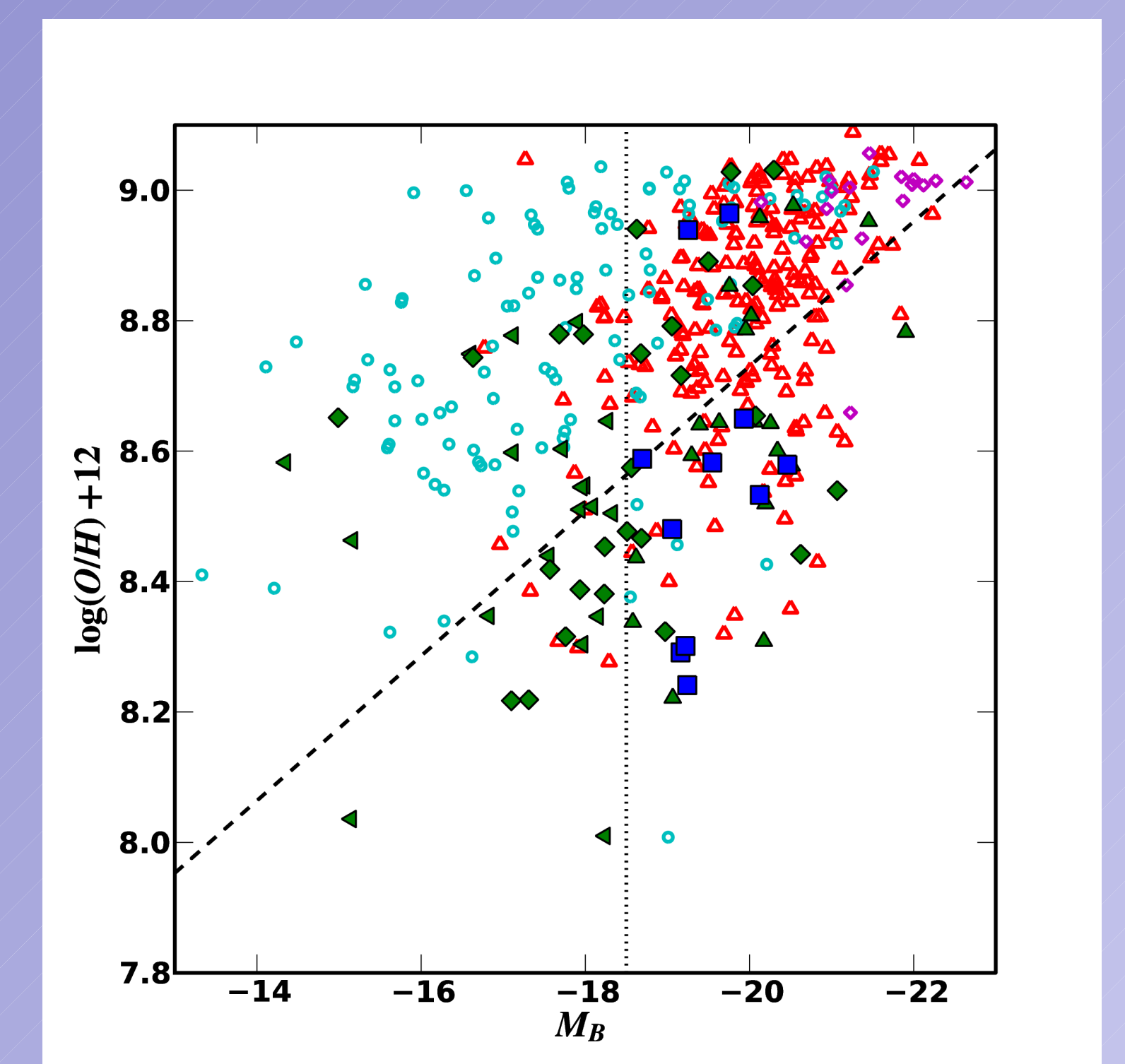
No correlation between size of galaxy and metallicity. Furthermore, spread in metallicities of LCBG and nearly-LCBG objects too large to be primarily dwarfs or primarily bulges-in-formation (the main evolutionary hypotheses).



Metallicities derived from Kewley & Dopita 02 R23/O32 relation as parameterized in Kobulnicky & Kewley 04. All comparisons performed with same calibration – absolute metallicity calibrations for these estimators are suspect, but relative calibrations are sound.



Emission line region properties of WHIQII LCBGs are more consistent with local star forming dwarfs/irregulars than spirals. Star formation mode likely more compact and localized than typical for present epoch.



WHIQII LCBGs consistent with intermediate redshift luminosity-metallicity relation, but not local LZR. Suggests LCBGs are rare now due to changing scale of star formation efficiencies (downsizing).

Key Points

- Compactness does **not** correlate with dwarf-like metallicities
- LCBGs are **heterogeneous**
- Consistent with expected **typical** intermediate-redshift galaxies on LZ relation – “Downsizing” in action

References:

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