

# The role of cold gas on the stellar mass - metallicity relation of nearby galaxies

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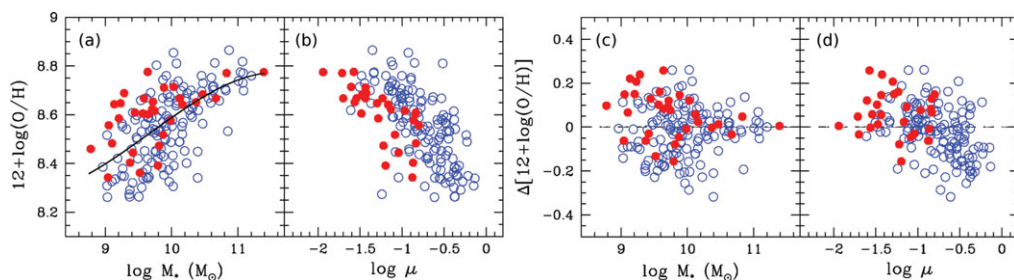
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**Abstract.** We investigate the relationship between stellar mass, metallicity and gas content for a magnitude- and volume-limited sample of 260 nearby late-type galaxies in different environments. Combining new oxygen abundance measurements with ultraviolet to near-infrared photometry and HI 21 cm line observations, we observe the relationship between stellar mass and metallicity. We also find that, at fixed stellar mass, galaxies with lower gas fractions typically possess higher oxygen abundances. Gas-poor galaxies are typically more metal-rich. Our results indicate that internal evolutionary processes, rather than environmental effects, play a key role in shaping the stellar mass-metallicity relation.

**Keywords.** cosmology: observations, galaxies: evolution, galaxies: spiral

## 1. What governs the scatter of the M-Z relation?

We derive gas-phase oxygen abundance estimates using new integrated, drift-scan optical spectroscopy (Boselli *et al.* 2012) of galaxies in the Herschel Reference Survey (Boselli *et al.* 2010), and the base metallicity calibrations of Kewley & Ellison (2008). Details of our analysis and results can be found in Hughes *et al.* (2012). To briefly summarize, the observed correlations between metallicity and gas content (see Fig. 1) suggest that the gas content governs the shape and scatter of the stellar mass - metallicity relation.



**Figure 1.** The relationships between oxygen abundance and (a) stellar mass, and (b) gas fraction, where  $\mu = M_{\text{HI}}/(M_* + M_{\text{HI}})$ . Dividing the sample by HI content demonstrates that gas content is anti-correlated with metallicity for HI normal galaxies (blue open circles). Furthermore HI deficient systems (red solid circles) are preferentially found at higher metallicities. Using a best fit polynomial (solid black line) to define the (c) residual oxygen abundance as the scatter in the M-Z relation, we find (d) a correlation between residual metallicity and the gas fraction.

## References

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