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Resolving gas-phase metallicity gradients of $0.1 \lesssim z \lesssim 0.8$ galaxies

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Abstract. We present gas-phase metallicity gradients of 84 star-forming galaxies between $0.08 < z < 0.84$. Using the galaxies with reliably determined metallicity gradients, we measure the median metallicity gradient to be negative ($-0.039^{+0.007}_{-0.009}$ dex/kpc). Underlying this, however, is significant scatter: $(8 \pm 3)\%$ [7] of galaxies have significantly positive metallicity gradients, $(38 \pm 5)\%$ [32] have significantly negative gradients, $(31 \pm 5)\%$ [26] have gradients consistent with being flat. (The remaining $(23 \pm 5)\%$ [19] have unreliable gradient estimates.)

Keywords. galaxies: evolution – galaxies: abundances – galaxies: ISM

In Carton *et al.* (2018) we present the first sample of metallicity gradients from intermediate redshift galaxies ($0.1 \lesssim z \lesssim 0.8$). Galaxies at higher redshifts are typically are found to have flat or positive metallicity gradients (e.g. Queyrel *et al.* 2012), whereas here we find the average metallicity gradient to be negative. While we do observe some galaxies with inverted metallicity gradients, we do not recover a previously identified trend between metallicity gradient and the star-formation intensity in a galaxy. The lack of trend does not preclude the ability of mergers to flatten metallicity gradients, but suggests that this flattening may only occur on a much shorter timescale than that for which we might observe an elevated star formation rate.

Instead, we identify a curious trend between the metallicity gradient and the size of the galaxy (Fig. 1); we identify no large galaxies ($r_d > 3$ kpc) with inverted metallcity

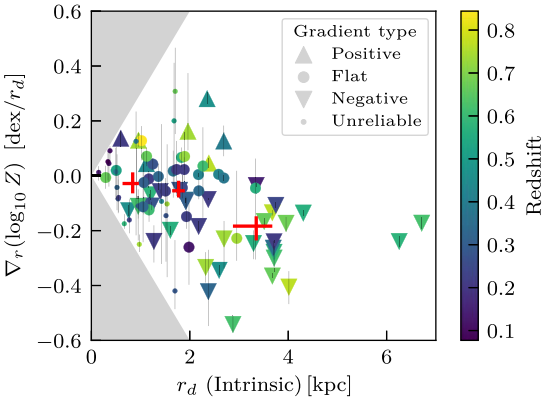

Figure 1. Metallicity gradients of galaxies as a function of their disc scale-length. Red crosses, which indicate the median trend. A grey shading denotes the region disallowed by our prior on the metallicity gradient.

gradients. We speculate that these large galaxies might be more similar to galaxies we observe at low-redshifts (where almost all have negative metallicity gradients), suggesting that a common negative metallicity gradient is only established in well-evolved systems.

References

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