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Oxygen abundance profiles with MUSE: Radial gradients and widespread deviations

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Abstract. This study has been published in Sánchez-Menguiano *et al.* (2018). We encourage the reader to that article for more details on the study and the results.

In this study we characterise the oxygen abundance radial distribution of a sample of 102 spiral galaxies observed with VLT/MUSE for which a total of 14345 H II regions are detected. We develop a new methodology to automatically fit the abundance radial profiles, that are derived using the calibration proposed in Marino *et al.* (2013) for the O3N2 indicator. We find that 55 galaxies of the sample exhibit a single negative gradient. In addition to this negative trend, 47 galaxies also display either an inner drop in the abundances (21), an outer flattening (10), or both (16), which suggests that these features are a common property of disc galaxies. The presence and depth of the inner drop depends on the galaxy mass, with the most massive systems presenting the deepest drops, while there is no such dependence for the outer flattening. The inner drop appears always around $0.5\,r_e$, while the position of the outer flattening varies over a wide range of galactocentric distances. Regarding the main negative gradient, we find a characteristic slope in the sample of $\alpha_{\rm O/H} = -0.10 \pm 0.03\,{\rm dex/r_e}$. This slope is independent of the presence of bars and the density of the environment. However, when inner drops or outer flattenings are detected, slightly steeper gradients are observed, suggesting that radial motions might play an important role in shaping the abundance profiles. We define a new normalisation scale $r_{O/H}$ for these profiles (tightly correlated with r_e) based on the characteristic abundance gradient, with which all the galaxies show a similar position for the inner drop ($0.5\,r_{O/H}$) and the outer flattening ($1.5\,r_{O/H}$). Finally, we find no significant dependence of the dispersion around the gradient with any galaxy property, with values compatible with the uncertainties associated with the derivation of the abundances.

We have reproduced the analysis using the calibration described in Dopita *et al.* (2016), and the one proposed in Marino *et al.* (2013) for the N2 index. In general, we obtain a very good agreement between the results based on the three calibrators. The most significant difference lies on the number of inner drops and outer flattenings detected in the abundance distribution, that is reduced when using these two calibrators. However, the overall distributions are rather similar in the three cases, strengthening our conclusions.

References

Dopita, M. A., Kewley, L. J., Sutherland, R. S., & Nicholls, D. C. 2016, *Ap&SS*, 361, 61
Marino, R. A., Rosales-Ortega, F. F., Sánchez, S. F., *et al.* 2013, *A&A*, 559, A114
Sánchez-Menguiano, L., Sánchez, S. F., Pérez, I., Ruiz-Lara, T., *et al.* 2018, *A&A*, 609, A119