

The $[\text{NII}]/\text{H}\alpha$ calibration of the metallicity of galaxies from T_e -based abundances

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Abstract. We gather a sample of both metal-rich and metal-poor galaxies. Both samples have oxygen abundances estimated from electron temperature (T_e). The calibration of the emission-line ratio, $N2(\equiv \log([\text{NII}]\lambda 6583/\text{H}\alpha))$, to oxygen abundances is then re-derived from this combined sample, finding good agreement for the wide metallicity and line-ratio ranges considered.

Keywords. galaxies: abundances, galaxies: evolution, galaxies: spiral, galaxies: starburst

The index of $N2(\equiv \log([\text{NII}]\lambda 6583/\text{H}\alpha))$ is very useful for metallicity estimates. Fig. 1 shows the re-derived calibrations of $N2$ to O/H from a sample of both metal-rich and metal-poor galaxies, both of them have T_e -based abundances.

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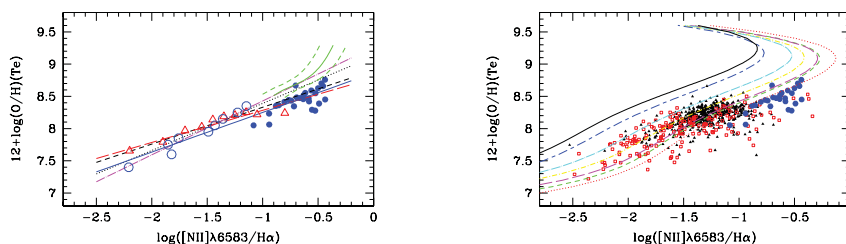


Figure 1. New $N2$ indicator for metallicity calibration of galaxies. **Left:** the filled blue circles are from Liang *et al.* (2007) for metal-rich ones, where the O/H abundances are derived from T_e by measuring $[\text{OII}]\lambda 7320, 7330$ on stacked spectra from thousand galaxies in each mass bin; The small data points are from Yin *et al.* (2007, Y07) with T_e -derived from $[\text{OIII}]\lambda 4363$ (filled triangles for SDSS galaxies, and open squares from the literature). The model lines are from Kewley & Dopita (2002). **Right:** both the open circles and triangles are median values of the data from Y07, binning in O/H and $N2$, respectively. The solid line ($12+\log(\text{O}/\text{H})=8.78 + 0.50 \times N2$) refers to the least-square fitting for the combined data of filled circles plus open circles; the long dashed-line ($12+\log(\text{O}/\text{H})=8.86 + 0.61 \times N2$) is for the combined data of filled circles plus open triangles. Other lines are from the literature: dashed from Pettini & Pagel (2004), dotted from Denicolo *et al.* (2002), dot-dashed from Y07; 3 green curves are from Liang *et al.* (2006) for metal-rich galaxies with O/H from the strong-line method.

References

- Denicolo, G., Terlevich, R., & Terlevich, E. 2002, *MNRAS*, 330, 69
 Kewley, L. J. & Dopita, M. A. 2002, *ApJS*, 142, 35
 Liang, Y. C., Yin, S. Y., Hammer, F., *et al.* 2006, *ApJ*, 652, 257
 Liang, Y. C., Hammer, F., Yin, S. Y., Flores, H., *et al.* 2007, *A&A*, 473, 411
 Pettini, M. & Pagel, B. E. J. 2004, *MNRAS*, 348, L59
 Yin, S. Y., Liang, Y. C., Hammer, F., Brinchmann, J., *et al.* 2007, *A&A*, 462, 535 (Y07)