

OTELO SURVEY: OPTIMAL EMISSION-LINE FLUX AND METALLICITY ESTIMATION WITH OSIRIS/GTC

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The present work has been developed within the context of the OTELO project, an emission line survey using the Tunable Filters (TF) of OSIRIS-GTC.

As part of the OTELO preparatory activities, we performed simulations finding that, for the red TF, a FWHM of 12 Å and a sampling of 5 Å is an optimal combination that allow deblending H α from the [NII] λ 6583 line with a flux error lower than 20%. This combination will allow estimating SFRs and metallicities using the H α flux and the N2 method, respectively.

One of the aims of the OTELO survey is to estimate metallicities of ELGs. A detailed description of the different metallicity methods and calibrations are given in Kewley & Ellison (2008) and Lara-López et al. (2009a,b, 2010a). The N2 $\equiv$ [NII] λ 6583/H α method has been used and calibrated by several authors (Denicoló et al. 2002; Kewley & Ellison 2008), and has demonstrated to work accurately estimating metallicities from 1/50th to twice the solar value (Denicoló et al. 2002). One of the most important advantages of this method is that an extinction correction is not required because it only uses the H α and [NII] λ 6583 lines, both close in wavelength. It requires only a narrow spectral range, making it suitable for surveys of limited spectral coverage like OTELO. Finally, the N2 method has demonstrated to work accurately at high redshift, making it suitable for detecting evolution (Lara-López et al. 2010b).

We generated spectra of typical star forming galaxies with different EWs (5, 10, 20, 30, 40, 50 Å;

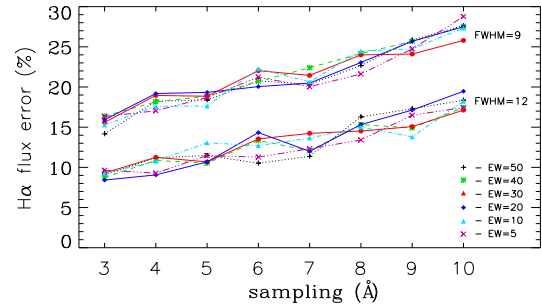


Fig. 1. H α flux errors obtained using a spectrum with EW(H α) of 50, 40, 30, 20, 10, and 5 Å, convolved with an Airy function of FWHM of 12 and 9 Å, and sampling from 3–10 Å. Symbols are indicated in the figure.

Figure 1), at redshifts 0.24 and 0.4, the two windows of the OTELO survey for the H α line. We convolved those spectra with the tunable filter response of the OSIRIS instrument of FWHM of 12 and 9 Å, subtracting the continuum, and estimating the relative errors of the recovered H α and [NII] λ 6583 fluxes. We conclude that using an Airy function with FWHM >15 Å, the errors of the recovered fluxes are larger than $\sim 25\%$. Therefore, the convolutions were performed using a FWHM of 9 and 12 Å.

As a result of our simulations we concluded that with the OSIRIS's TF is possible to estimate metallicities using the N2 method in galaxies spanning a wide range of EWs and morphological types, to discriminate star forming from AGN galaxies, and to estimate the SFR using the H α flux. The selected combination of TF FWHM and sampling that will allow deblending H α and [NII] λ 6583 lines, and estimating their fluxes with an error lower than 20%, is a TF FWHM of 12 Å and a sampling of 5 Å. For more details see Lara-López et al. (2010c).

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