Revista Mexicana de Astronomía y Astrofísica Serie de Conferencias, 60, 206-207, (2026)

OPEN ACCESS https://doi.org/10.22201/ia.14052059p.2026.60.180

Stellar population and emission line properties in S-PLUS galaxies with AlStar

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Keywords: *astronomical data bases: miscellaneous, galaxies, galaxies: stellar content, methods: data analysis, techniques: photometric*

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We present tests of a new method to simultaneously estimate stellar population and emission line (EL) properties of galaxies out of S-PLUS photometry. The technique uses the AlStar code, updated with an empirical prior which greatly improves its ability to estimate ELs using only the survey's 12 bands. The tests compare the output of (noise-perturbed) synthetic photometry of SDSS galaxies to properties derived from previous full spectral fitting and detailed EL analysis. For realistic signal-to-noise ratios, stellar population properties are recovered to better than 0.2 dex in masses, mean ages, metallicities and ±0.2 mag for the extinction. More importantly, ELs are recovered remarkably well for a photometric survey. We obtain input − output dispersions of 0.05–0.2 dex for the equivalent widths of [O II], [O III], Hβ, Hα, [N II], and [S II], and even better for lines stronger than ∼ 5 Å. These excellent results are achieved by combining two empirical facts into a prior which restricts the EL space available for the fits: (1) Because, for the redshifts explored here, Hα and [N II] fall in a single narrow band (J0660), their combined equivalent width is always well recovered, even when [N II]/Hα is not. (2) We know from SDSS that $W_{\mathrm{H}\alpha+[\mathrm{N\,II}]}$ correlates with [N II]/Hα, which can be used to tell if a galaxy belongs to the left or right wings in the classical BPT diagnostic diagram. Example applications of spatially resolved data are also presented. Comparisons of it with independent results obtained with MUSE data (also to integrated light with VST data) further confirm a good agreement for the properties.

In this work, we explore the potential of the S-PLUS data (Mendes de Oliveira et al., 2019). We have two kinds of comparisons: first our results with those from SDSS spectroscopy (Werle et al., 2019); and second our results from integrated photometry and datacube with those from VST and MUSE respectively. Figure 1 shows some RGB composites of stellar and nebular properties obtained with

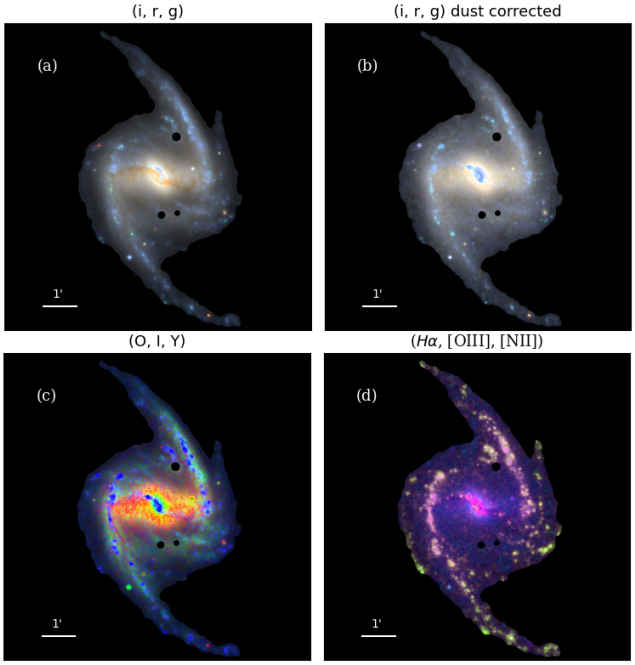

Figure 1. RGB composites combining respectively the (a) observed i, r, and g band fluxes, (b) the dust-corrected i, r, g fluxes, (c) the 5635 Å continuum fluxes associated with old, intermediate, and young populations, (d) the Hα, [O III], and [N II] fluxes.

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AlStar for the galaxy NGC 1365. The complete work is presented in Thainá-Batista et al. (2023).

References

Mendes de Oliveira, C., Ribeiro, T., Schoenell, W., et al. 2019, MNRAS, 489, 241, doi: 10.1093/mnras/stz1985
Thainá-Batista, J., Cid Fernandes, R., Herpich, F. R., et al. 2023, MNRAS, 526, 1874, doi: 10.1093/mnras/stad2698
Werle, A., Cid Fernandes, R., Vale Asari, N., et al. 2019, MNRAS, 483, 2382, doi: 10.1093/mnras/sty3264

"XVII LARIM", Montevideo, Uruguay, November 27 - December 1, 2023.Volume Editors: Gonzalo Tancredi, Cecilia Mateu & Juan José Downes