

MUFFIT: A Multi-Filter FITting code to explore the stellar content of galaxies in photometric surveys

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Abstract

We briefly present the generic tool MUFFIT (Multi-Filter FITting code; Díaz-García et al. 2015, arXiv:1505.07555), specifically designed to determine the main stellar population parameters of galaxies only employing photometric data from large-scale multi-filter surveys, as well as a set of tests to check the reliability of its results.

MUFFIT compares the fluxes of any galaxy with the photometric predictions of a smart mixture of two SSPs (one main old population plus a younger one), to automatically provide the likely stellar population parameters by a χ^2 -test weighted by errors. MUFFIT smartly identifies and removes the bands that are significantly affected by nebular emissions. The uncertainties of the parameters are constrained by a Monte-Carlo approach, using the proper signal-to-noise ratio in each band.

The colour-magnitude diagram retrieved by MUFFIT for all the galaxies in the ALHAMBRA survey up to $m_{F814W} = 23$ (AB), quantitatively reproduces the bimodal distribution of red-sequence and blue-cloud galaxies. The stellar masses derived from MUFFIT show an excellent agreement with the COSMOS and SDSS values. In addition, using MUFFIT we obtain that massive ALHAMBRA ellipticals are, on average, more metal rich and older than their low-mass counterparts, a well known result from SDSS spectroscopic diagnostics in the nearby Universe $z < 0.22$. A one-to-one comparison between spectroscopic ages, metallicities, and stellar masses from SDSS and the ones derived from ALHAMBRA with MUFFIT reveals an excellent qualitative agreement. Our results reveals that, using multi-photometric data and the appropriate techniques, as MUFFIT, we are able to address reliable stellar population studies.

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