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Star Formation in the Local Universe from the CALIFA sample: calibration and contribution of disks to the SFR density

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Abstract. The study of the star formation rate (SFR) is crucial for understanding the birth and evolution of the galaxies (Kennicutt 1998), with this aim in mind, we make use of a well-characterized sample of 380 nearby galaxies from the CALIFA survey that fill the entire color-magnitude diagram in the Local Universe. The availability of wide-field CALIFA IFS ensures a proper determination of the underlying stellar continuum and, consequently, of the extiction-corrected Hα luminosity. We compare our integrated Hα-based SFRs with single and hybrids tracers at other wavelengths found in the literature (Calzetti 2013). Then, we provide a new set of single-band and hybrid calibrators anchored to the extinction-corrected Hα luminosities. In the case of the hybrid calibrators we determine the best fitting a_{IR} coefficients for different combinations of observed (UV or Hα) and dust-reprocessed (22μm or TIR) SFR contributions (where SFR $\propto$ L$_{obs}$ + a_{IR} $\times$ L[IR]). This analysis allow us to provide, for the first time, a set of hybrid calibrations for different morphological types and masses. These are particularly useful in case that the sample to be analyzed shows a different bias in terms of morphology or, more commonly, luminosity or stellar mass. We also study the dependence of this coefficient with color and ionized-gas attenuation. The distributions of a_{IR} values are quite wide in all cases. We found that not single physical property can by itself explain the variation found in a_{IR}.

Finally, we explore the spatial distribution of the SFR by measuring the contribution of disks to the total SFR in the Local Universe. Our preliminary spatially-resolved analysis shows that the disk to total (disk + spheroidal component) SFR ratio is on average $\sim$ 88%. The use of the 2D spectroscopic data is critical to properly determine the Hα luminosity function and SFR density in the Local Universe per galaxy components, the ultimate goal of this project.

Keywords. galaxies: spiral - galaxies: evolution - galaxies: star formation

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References

Kennicutt, R. C. 1998, *ARA&A*, 36, 189
Calzetti, D. 2013, *Star Formation Rate Indicators*, ed. J. Falcón-Barroso & J. H. Knapen, 419