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Star formation rate at multiple physical scales using CALIFA and TYPHOON data

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Abstract

Both good spatial resolution and sample statistics are key to properly determine (and calibrate) the star formation rate in galaxies. Nevertheless, having an extensive number of objects and high spatial resolution at the same time is a challenge. To address this issue we have combined a well-characterized sample of 380 nearby galaxies from the CALIFA IFS survey and HII Regions from Local Group galaxies using TYPHOON.
Firstly, we derive integrated extinction-corrected Hα-based SFRs of 380 nearby galaxies in CALIFA. Then, we provide updated single and hybrid SFRs tracers using our integrated extinction-corrected Hα SFR as a reference. Despite the quality of our attenuation correction via Balmer decrement, this parameter remains one of the main sources of uncertainty in deriving the SFR from Hα. Other major sources of systematic error are the IMF and the escape fraction. To understand the role that the escape fraction plays in the SFR derivations we perform a detail analysis using high spatial resolution around individual HII regions. The aim is to study the Hα ionized gas and dust structure, and resolve the total population of young massive stars in these regions responsible for the ionizing emission. For that purpose, we use TYPHOON observations at the 6.5 m Baade Telescope in Las Campanas (Chile). TYPHOON is a newly methodology for producing highly resolved spectrophotometric datacubes in the optical range. This double approach will allow us to dramatically reduce the uncertainties in the spatially-resolved SFR in galaxies.