CALIFA: THE LOCAL EXTRAGALACTIC UNIVERSE UNVEILED

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Through the huge success of spectroscopic single-fiber, statistical surveys of the Local Universe in the last decade, it has become clear, that an authoritative observational description of galaxies will involve measuring their spatially resolved properties over their full optical extent for a statistically significant sample. The Calar Alto Legacy Integral Field Area Survey (CALIFA) survey was designed to provide a first step in this direction.

This survey is obtaining spatially resolved spectroscopic information of a diameter selected, statistically well-defined sample of ∼600 galaxies in the Local Universe ($0.005 < z < 0.03$) using the PMAS/PPAK IFU, mounted on the Calar Alto 3.5m telescope (Sánchez et al. 2012). CALIFA has been designed to allow the building of two-dimensional maps of the following quantities: (a) stellar populations: ages and metallicities; (b) ionized gas: distribution, excitation mechanism and chemical abundances; and (c) kinematic properties: both from stellar and ionized gas components. The optical wavelength range is covered from 3700 to 7000 Å, using two overlapping setups (V500 and V1200), with different resolutions: $R \sim 850$ and $R \sim 1650$, respectively. CALIFA is a legacy survey, intended for the community. The reduced data will be released, once the quality has been guaranteed.

CALIFA published its first Data Release (DR1, `http://califa.caha.es/DR1`) in November 2012, providing freely to the community fully reduced and quality control tested datacubes of 100 objects in two spectral resolutions (Husemann et al. 2013). The galaxies in DR1 already cover a wide range of properties in color–magnitude space, morphological type, stellar mass, and gas ionization conditions. This data offers the potential to tackle a variety of open questions in galaxy evolution using spatially resolved spectroscopy. The release also includes software interfaces and tools that allow easy access and friendly visualization to the data.
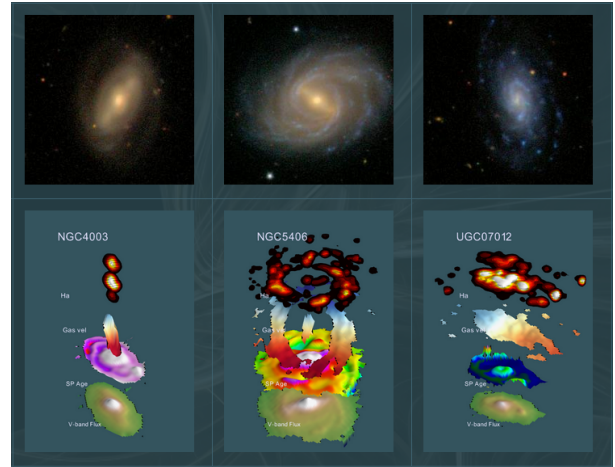

Fig. 1. Example of CALIFA galaxies included in the DR1. The top-row shows RGB composite images from SDSS. The bottom-row shows observables derived from the IFS datacubes, from bottom to top: V-band flux, stellar populations age map, gas velocity and Hα emission maps.

We also present the highlights in the study of the gas-phase using the CALIFA galaxies: a) a statistical approach to the abundance gradients of spiral galaxies, which indicates an universal radial gradient for oxygen abundance (Sánchez et al., 2014); the mass-metallicity relation explored with CALIFA and its controversial dependence on the star-formation rate (Sánchez et al., 2013); the description of a new scaling relation of H II regions in spiral galaxies, the *local mass-metallicity* relation of star-forming galaxies (Rosales-Ortega et al., 2012), and the improved N2 and O3N2 abundance calibrations for the high-metallicity regime (Marino et al., 2013).

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