

# An unprecedented view of two hundred galaxies of the local universe

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Galaxies are the result of an evolutionary process started thousands of millions of years ago, and their history is coded in their distinct components. The CALIFA project is intended to decode the galaxies' history in a sort of galactic archaeology, through the 3D observations of a sample of six hundred galaxies. With this second data release corresponding to two hundred galaxies, the project reaches its halfway point with important results behind.

"The data corresponding to the hundred [galaxies](#) included in the first data release of November 2012 have already been downloaded more than seven thousand times and they have produced a wide variety of results, both from inside and outside the CALIFA collaboration – underlines Sebastián Sánchez, principal investigator of the project. With more than thirty peer review publications, more than hundred contributions to scientific meetings and five PhD theses already submitted, this project is one of the most productive among those ever carried out at Calar Alto. This data release is a new milestone of the project, which already can be considered an international reference in the field of extragalactic surveys".

## Results

The CALIFA Project allows astronomers not only to inspect the galaxies in detail, but it also provides data on the evolution of each particular galaxy with time, allowing astronomers to answer questions such as: how

much gas and when was it converted into stars along each phase of the galaxy's life? And how did each region of the galaxies evolve along the more than ten thousand million years of cosmic evolution?

Thanks to the CALIFA data, the astronomers have been able to deduce the history of the mass, luminosity and chemical evolution of the CALIFA sample of galaxies, and thus they have found that more [massive galaxies](#) grow faster than less massive ones, and that they form their central regions earlier than their outer regions (this is called "inside-out mass assembly").

CALIFA has also shed light on how chemical elements needed for life are produced within the galaxies or on the physical processes involved on galactic collisions, and it has even observed the last generation of stars still in their birth cocoon.

"CALIFA is an international Project that will be a reference in the field, for the next decade. This legacy is offered to the scientific community from the Calar Alto observatory, and it demonstrates the huge potential of the observatory for top level astrophysical research", says Prof. José Manuel Vílchez, director of the IAA-CSIC.

## **A unique survey**

The CALIFA Project, conceived at the IAA-CSIC and carried out at Calar Alto observatory, combines the advantages of two observational techniques: imaging - which provides detailed information on galactic structure - and spectroscopy – which reveals the physical properties of galaxies (kinematics, mass, chemical composition, age, etc).

CALIFA makes use of IFS technology – Integral Field Spectroscopy – a method of obtaining some one thousand spectra per galaxy, which has resulted in a panoramic view of galaxies. It is the first IFS study

explicitly designed as a legacy project, and after completion it will be the greatest IFS study ever accomplished. This project, unique in the world, was made possible by the of the light collecting power of the 3.5m telescope at Calar Alto, the large field-of-view of the spectrograph PMAS/PPAK, and the granting of 250 observing nights offered by the owner institutions CSIC and MPG.

**More information:** R. García-Benito et al. CALIFA, the Calar Alto Legacy Integral Field Area survey. III. Second public data release [arxiv.org/abs/1409.8302](https://arxiv.org/abs/1409.8302)

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