S. F. Sanchez

CALIFA: Calar Alto Legacy IFs Astronomical Survey

We present CALIFA, an IFS survey of ~600 galaxies in the local Universe (z<0.003), to be performed with PPAK@3.5m telescope at Calar Alto, aimed to study the spatial resolved properties of the stellar populations and ionized gas within the ~90% of the area covered by the galaxies, by sampling the optical wavelength range between 3700-7100 A with a resolution of R~1000/2000. The main goals of this survey would be to understand the details of the star formation history, galaxy growth and evolution within the Hubble sequence, fixing the anchor point of the cosmological evolution of galaxies.

CALIFA: **C**alar **A**lto **L**egacy **I**ntegral **F**ield spectroscopy **A**rea survey

Sebastián F. Sánchez

ARAID-EUPT

CAHA (CSIC-MPG)

Extreme Starburst Worshop

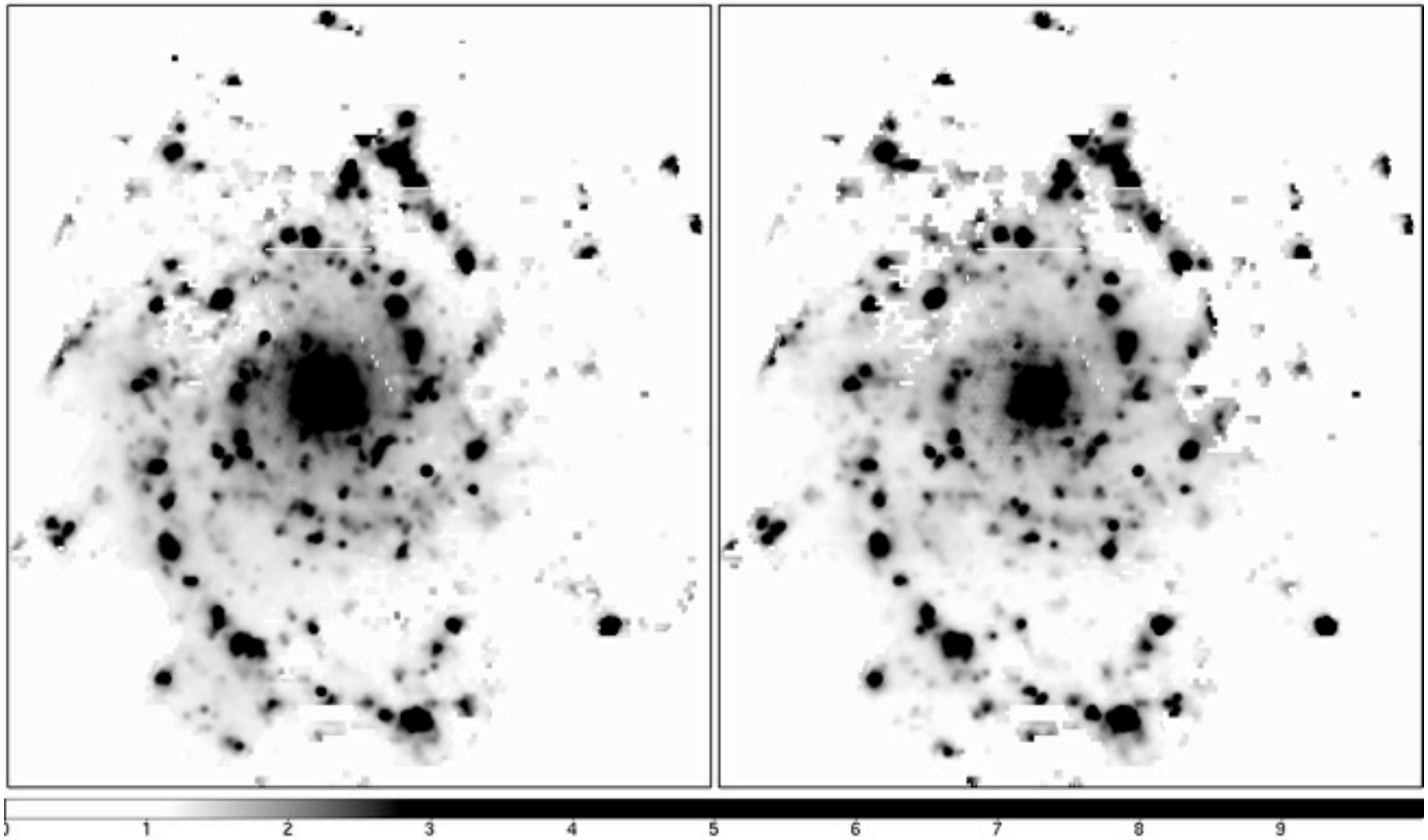
CALIFA: Summary I

- Survey of ~600 Galaxies in the Local Universe (0.0005<z<0.03), i.e., D<120Mpc.
- IFS using PPAK@3.5m Calar Alto.
- Mid-resolution (R~1000/2000) spectroscopic data between 3700-7000AA.
- Covering a 90% of the size of the galaxies.
- Multiwavelength coverage of the targets.

CALIFA: Science Goals

- Model the resolved stellar population in galaxies of any kind and trace the star formation history.
- Determine the nature of the ionized gas and its chemical abundance gradients.
- Determine the 2D kinematic structure of galaxies in the local Universe.

CALIFA: Secondary Goals.

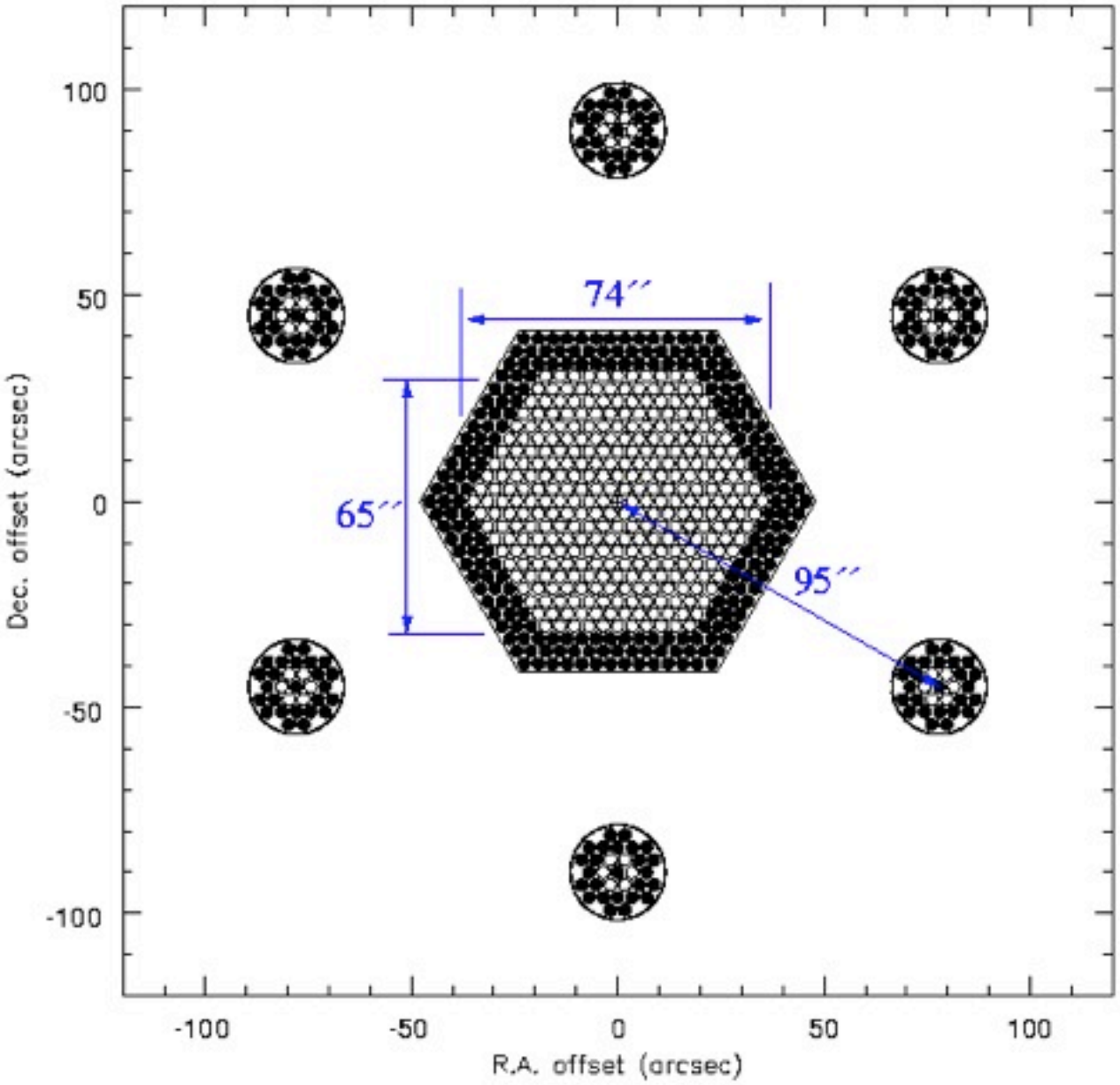


CALIFA: Legacy

- Data will be freely distributed to the community once they have been accurately reduced.
- A carefull quality control scheme will be developed to validate the data in terms of:
  - S/N and depth.
  - Wavelength Calibration.
  - Flux Calibration.

CALIFA: Legacy

- Required tools to analyze the data will be also distributed:
  - Visualization tools.
  - Fitting tools.
- Multi-wavelength follow-ups has been foreseen:
  - Wise/Spitzer.
  - Radio.
  - Galex.



undle.
Three

//
DV of

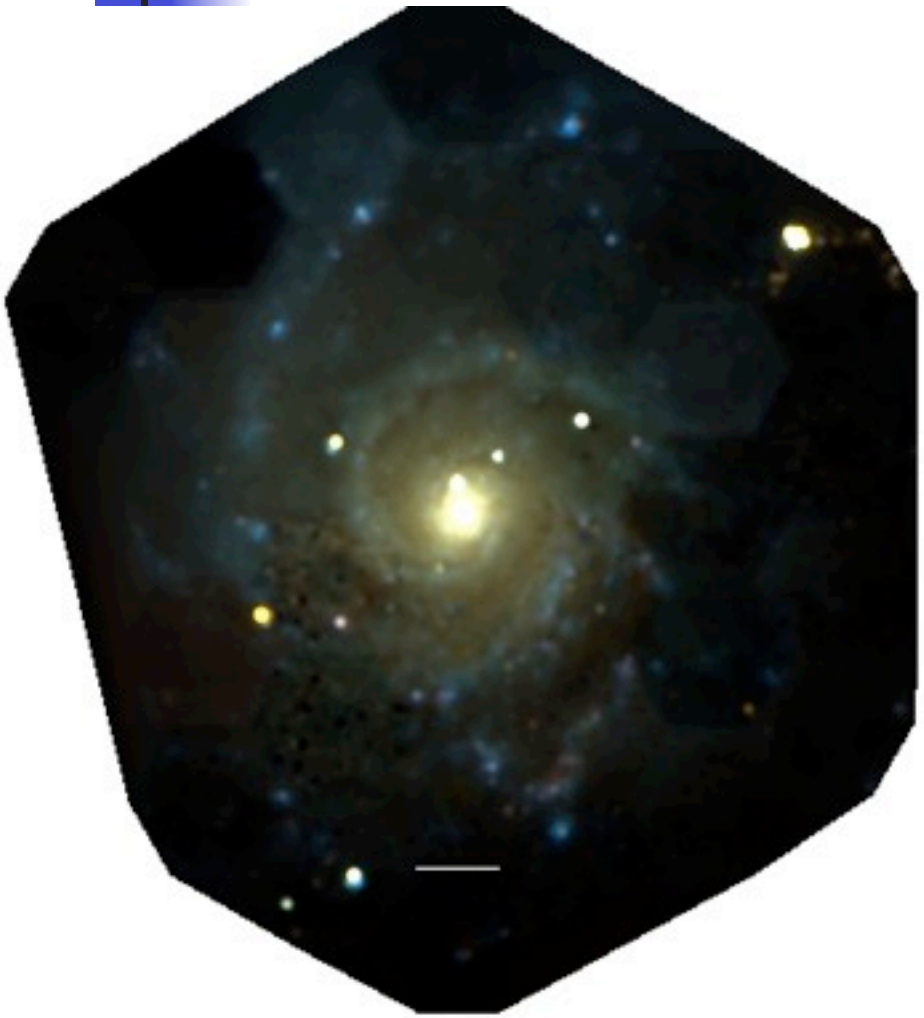
PMAS: R3D, the pipeline

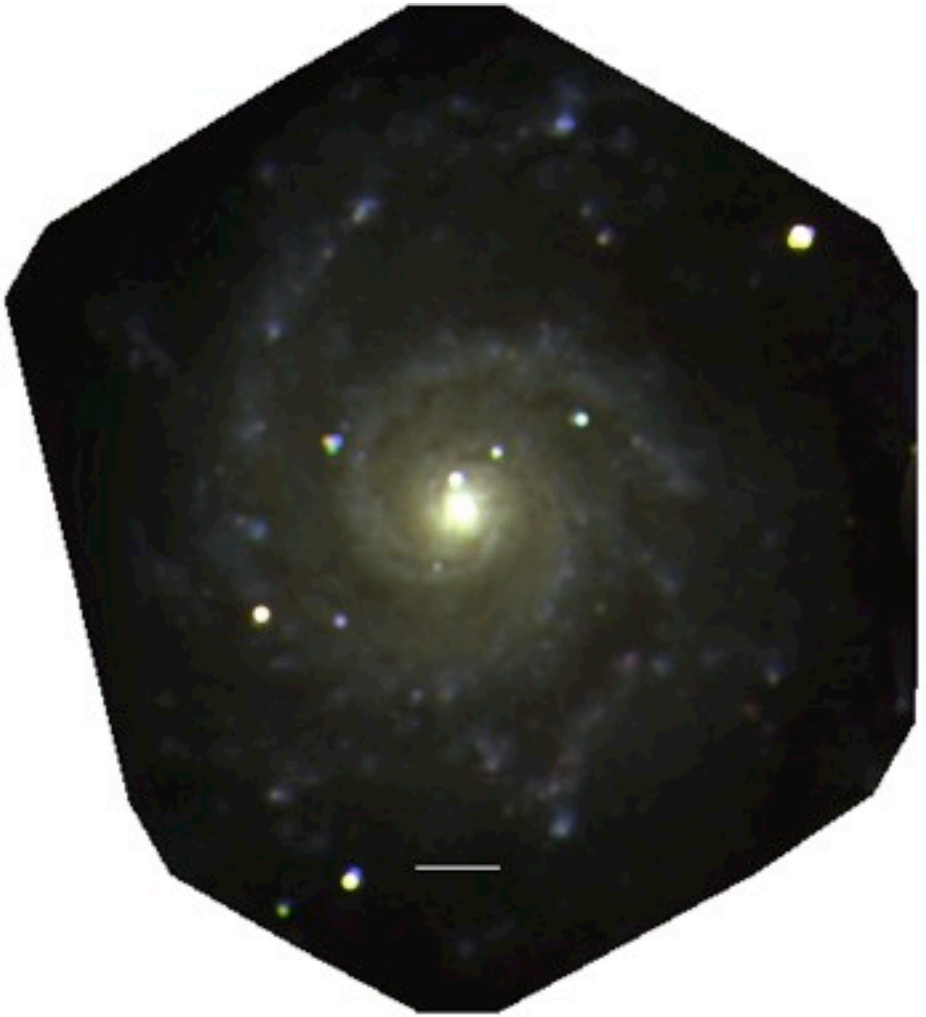
- Full reduction in a single package:
  - Bias subtraction, CCD flat-field correction.
  - Spectra extraction.
  - Wavelength calibration.
  - Fiber-to-fiber transmission correction.
  - Flux calibration (spectrophotometry).
  - Rearranging the spectra in their spatial position.
  - Fully automatic (for a fix setup).

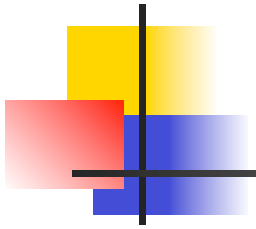
CALIFA: Software Tools.

- R3D, the pipeline is completely implemented (80% of the PMAS articles used it).
- FIT3D. A program to fit SSP and emission lines to derive 2D distributions of the different properties:
  - Age/Met/Dust distributions.
  - Flux, Velocity and Dispersion maps for the different emission line spices.
- Calar Alto Archive operational already.

Eg, M74, PPAK vs. SINGS





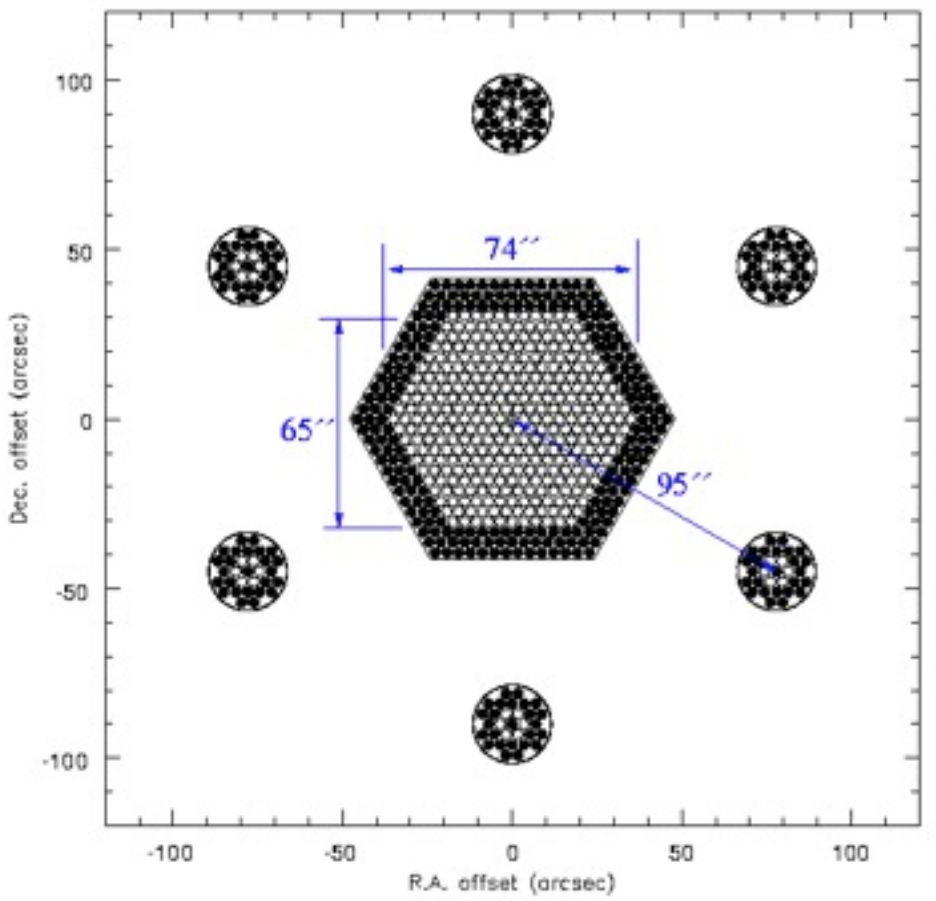


CALIFA: Comparison

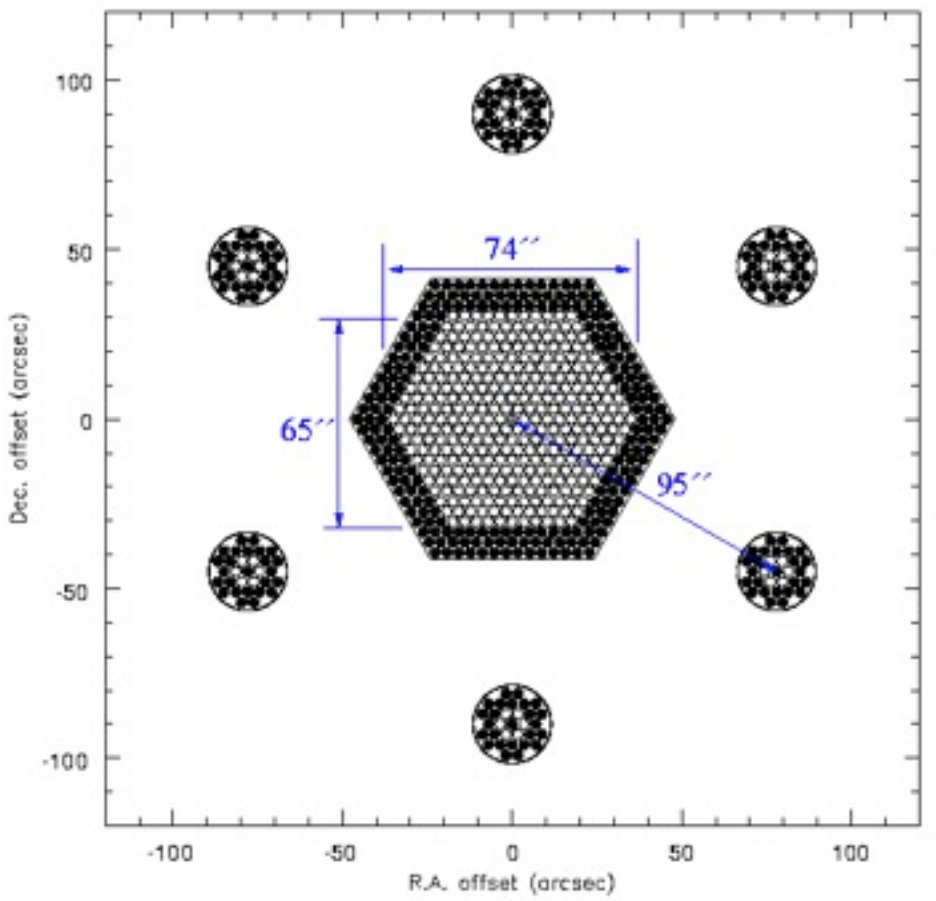
CALIFA: Comparison

- SAURON@WHT (North Hemisphere):
  - PPAK FOV is 300% larger (33”x41”).
  - The spectral coverage for the same resolution is much larger in PPAK.
  - The spatial resolution of SAURON is better (0.94”). Complete coverage of the FOV.
  - Efficiency is similar.
  - It is a propietary instrument, only accesible to the SAURON team.
  - It has performed the largest IFU survey, so far: 50 E/SO and Sa with bulge galaxies.
  - Only samples the central few Kpc of each galaxy.

PMAS/PPAK: Dithering.

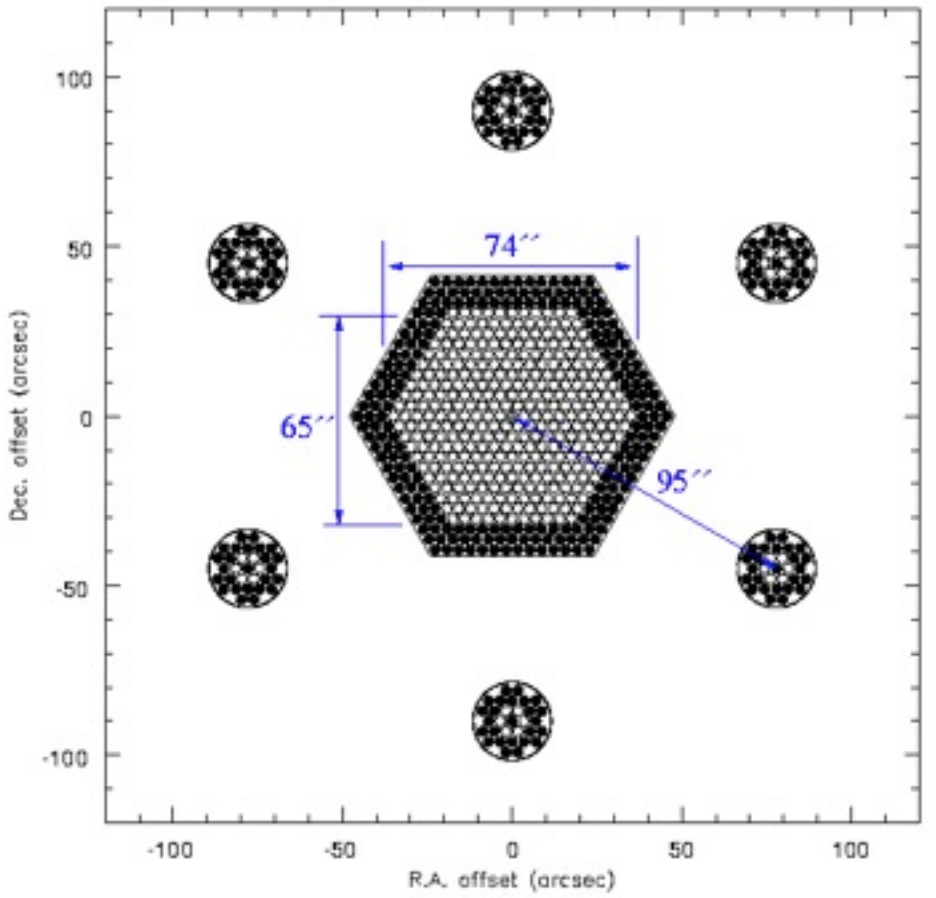


PMAS/PPAK: Dithering.



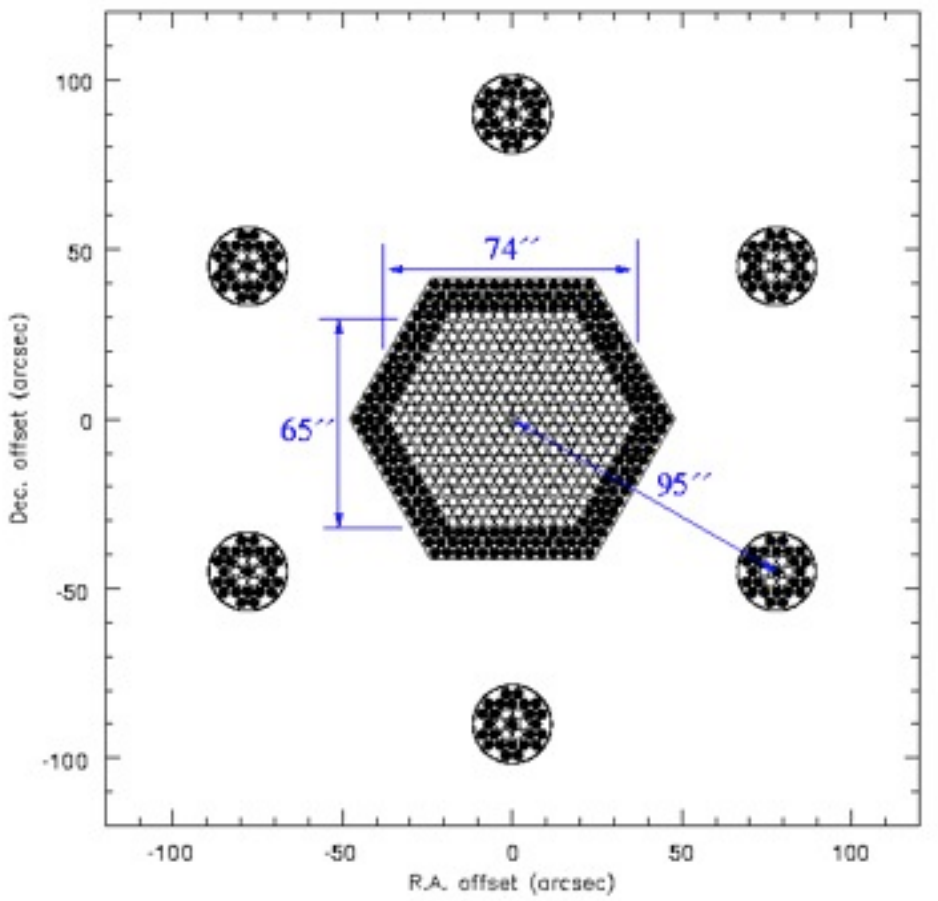
PMAS/PPAK: Dithering.

- 3 position dither pattern per pointing.



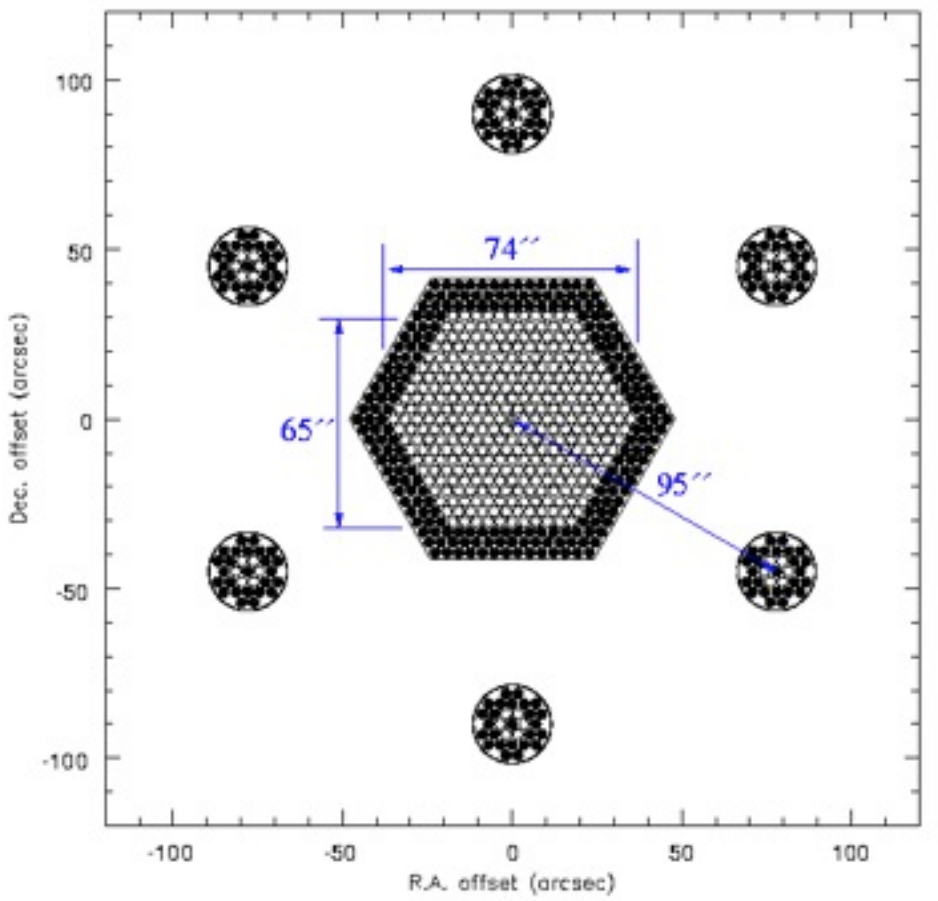
PMAS/PPAK: Dithering.

- 3 position dither pattern per pointing.
- Complete spatial covering of the FOV.



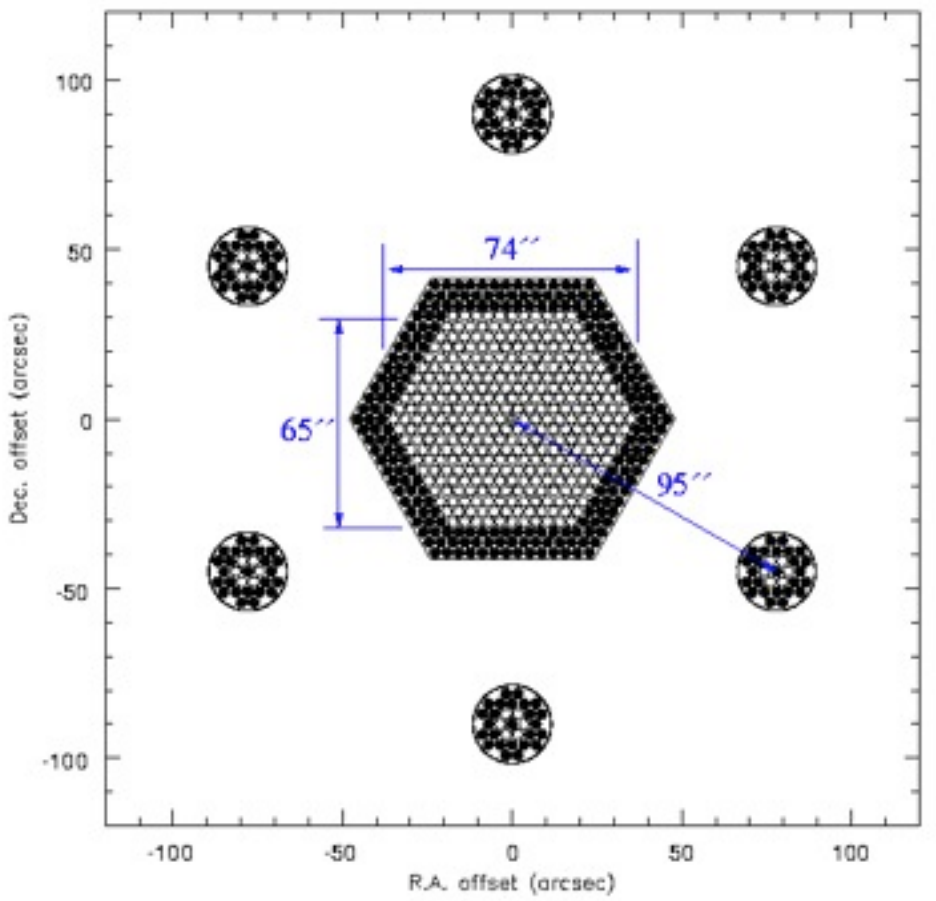
PMAS/PPAK: Dithering.

- 3 position dither pattern per pointing.
- Complete spatial covering of the FOV.
- Increase of the spatial resolution.



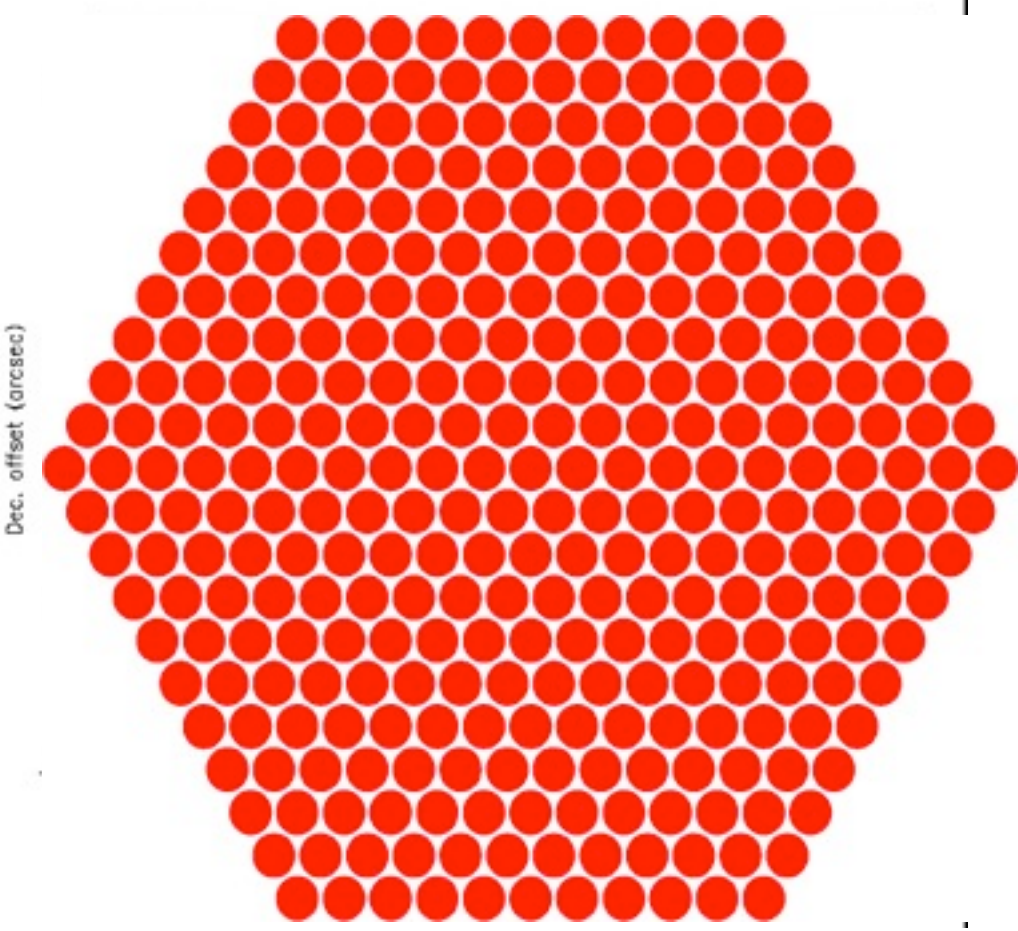
PMAS/PPAK: Dithering.

- 3 position dither pattern per pointing.
- Complete spatial covering of the FOV.
- Increase of the spatial resolution.
- Fully implemented in the pipeline.



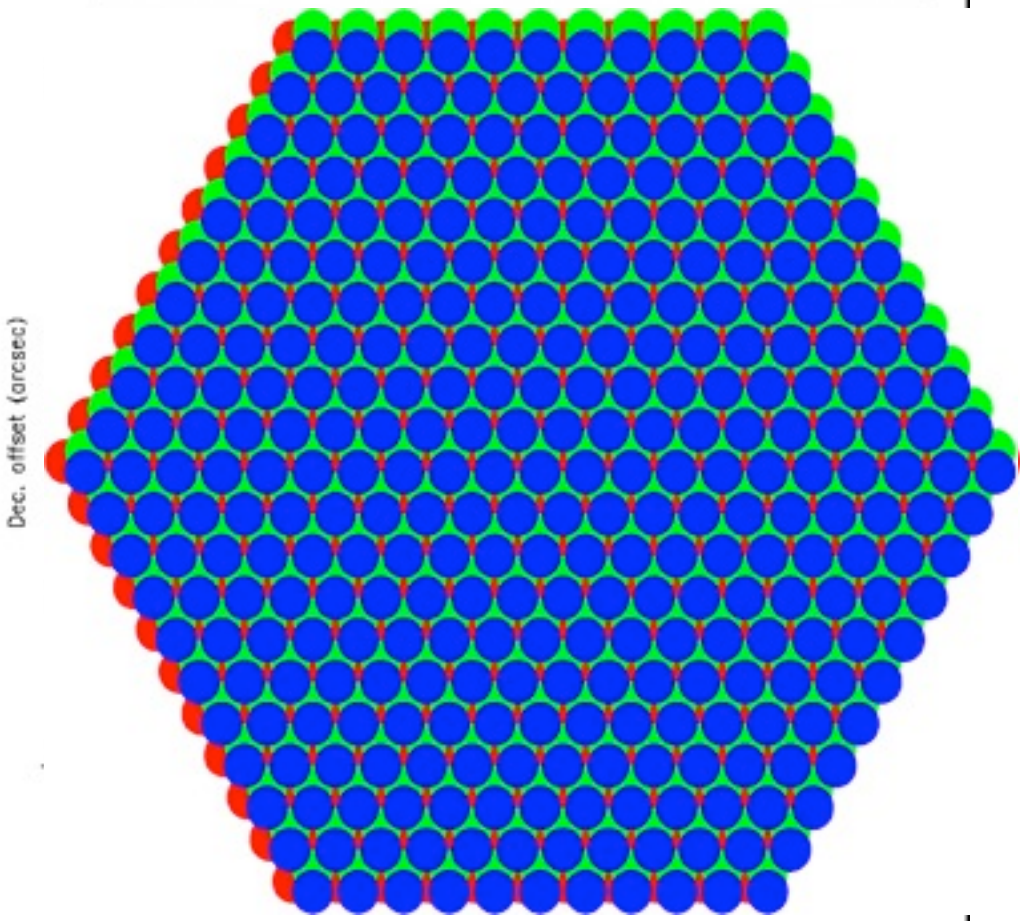
PMAS/PPAK: Dithering.

- 3 position dither pattern per pointing.
- Complete spatial covering of the FOV.
- Increase of the spatial resolution.
- Fully implemented in the pipeline.

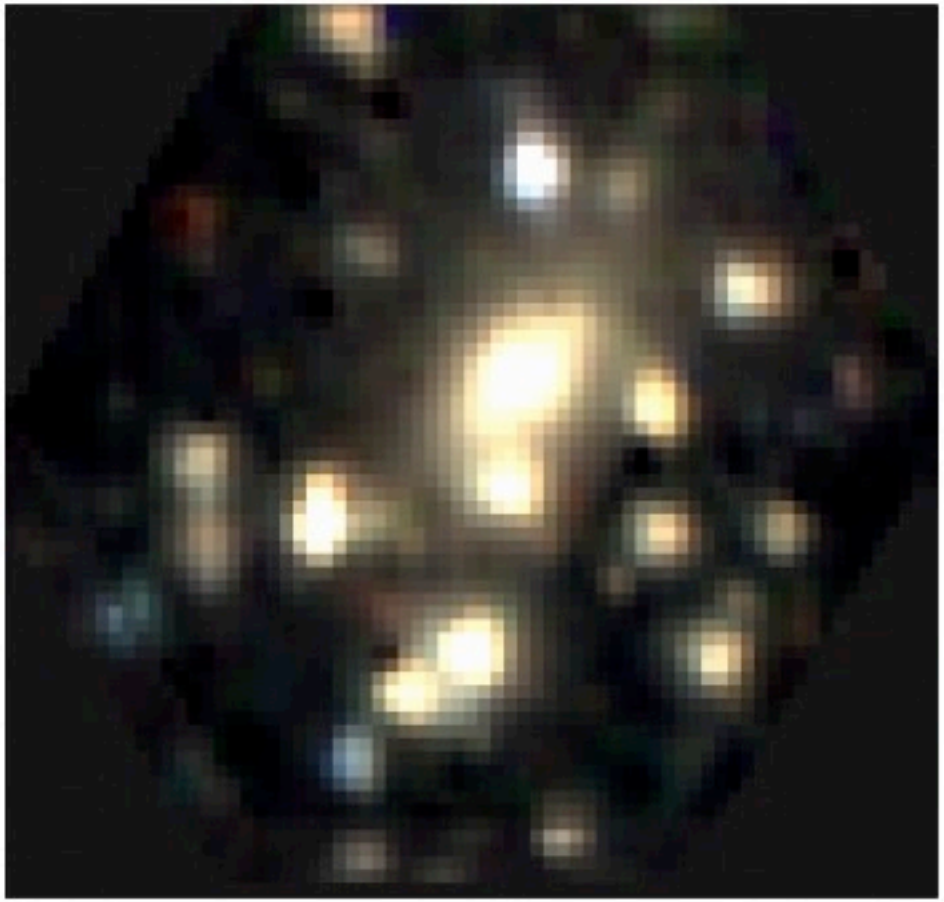


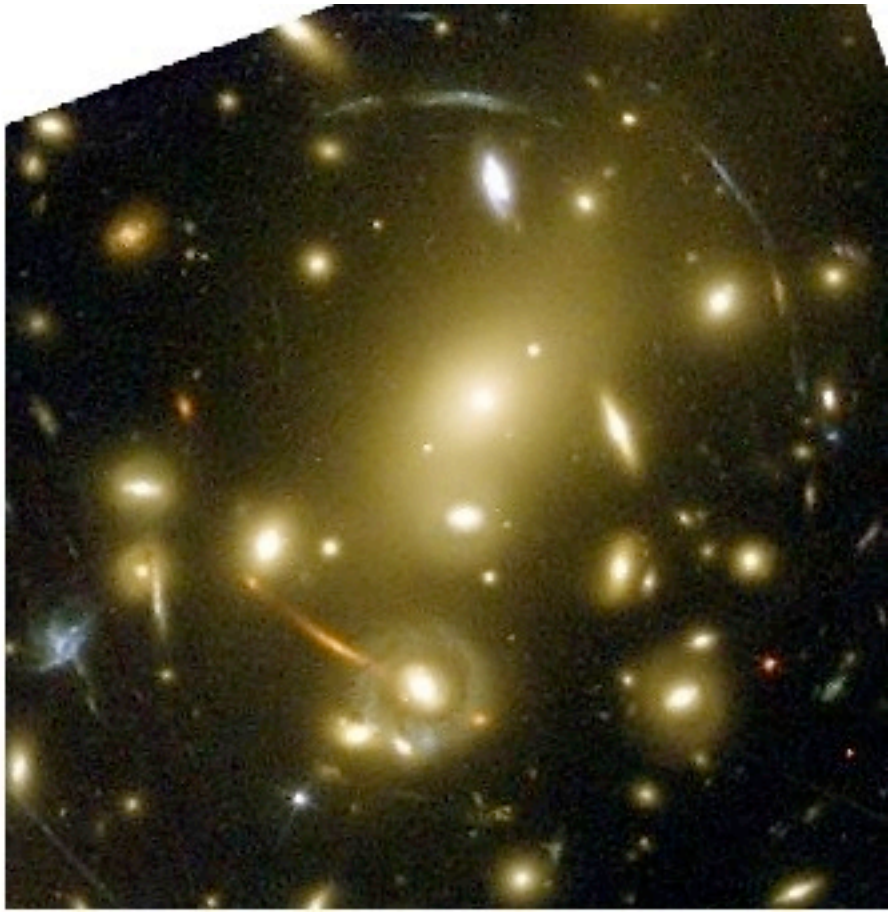
PMAS/PPAK: Dithering.

- 3 position dither pattern per pointing.
- Complete spatial covering of the FOV.
- Increase of the spatial resolution.
- Fully implemented in the pipeline.



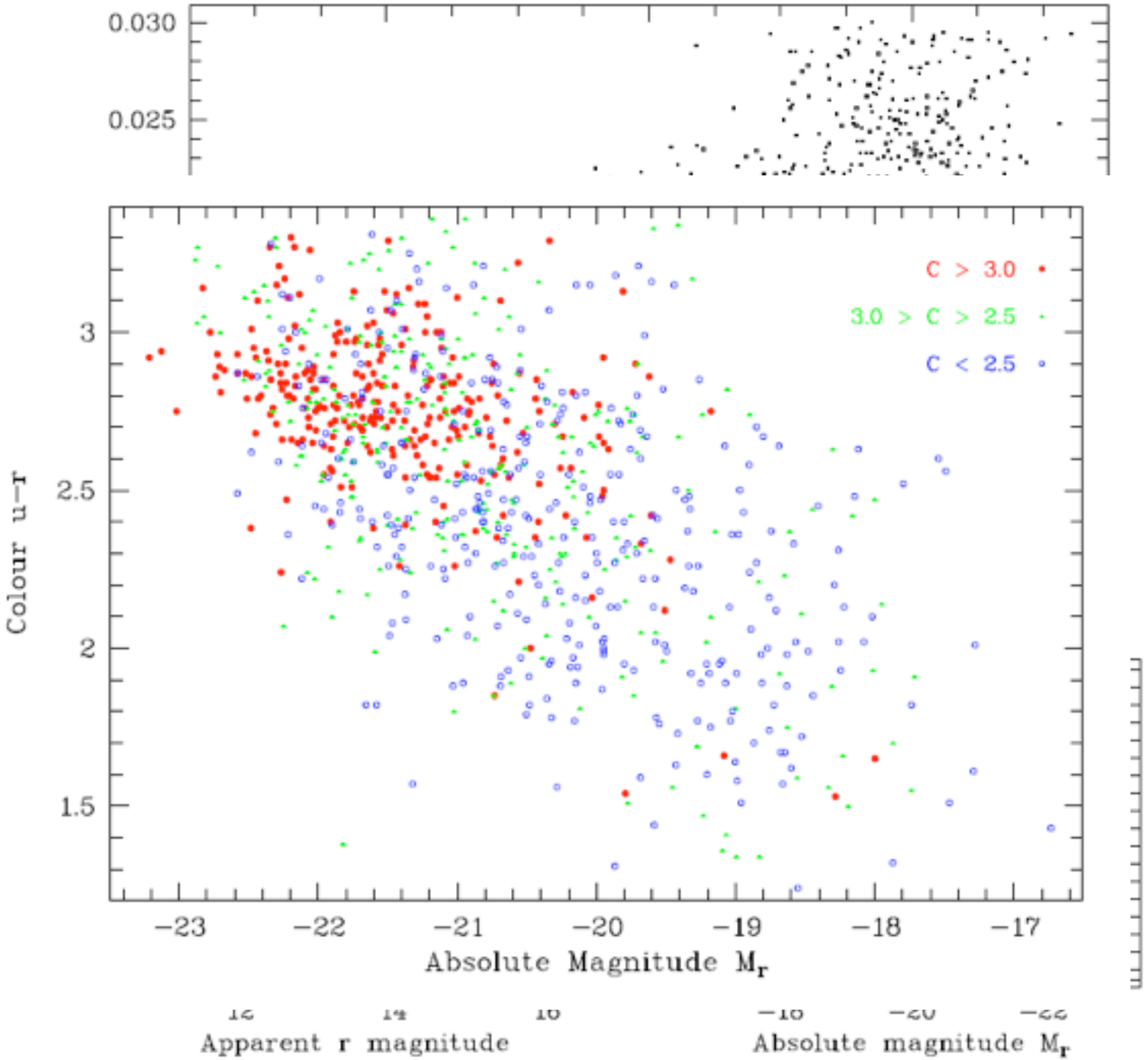
Eg, Abell2218 IFS datacube

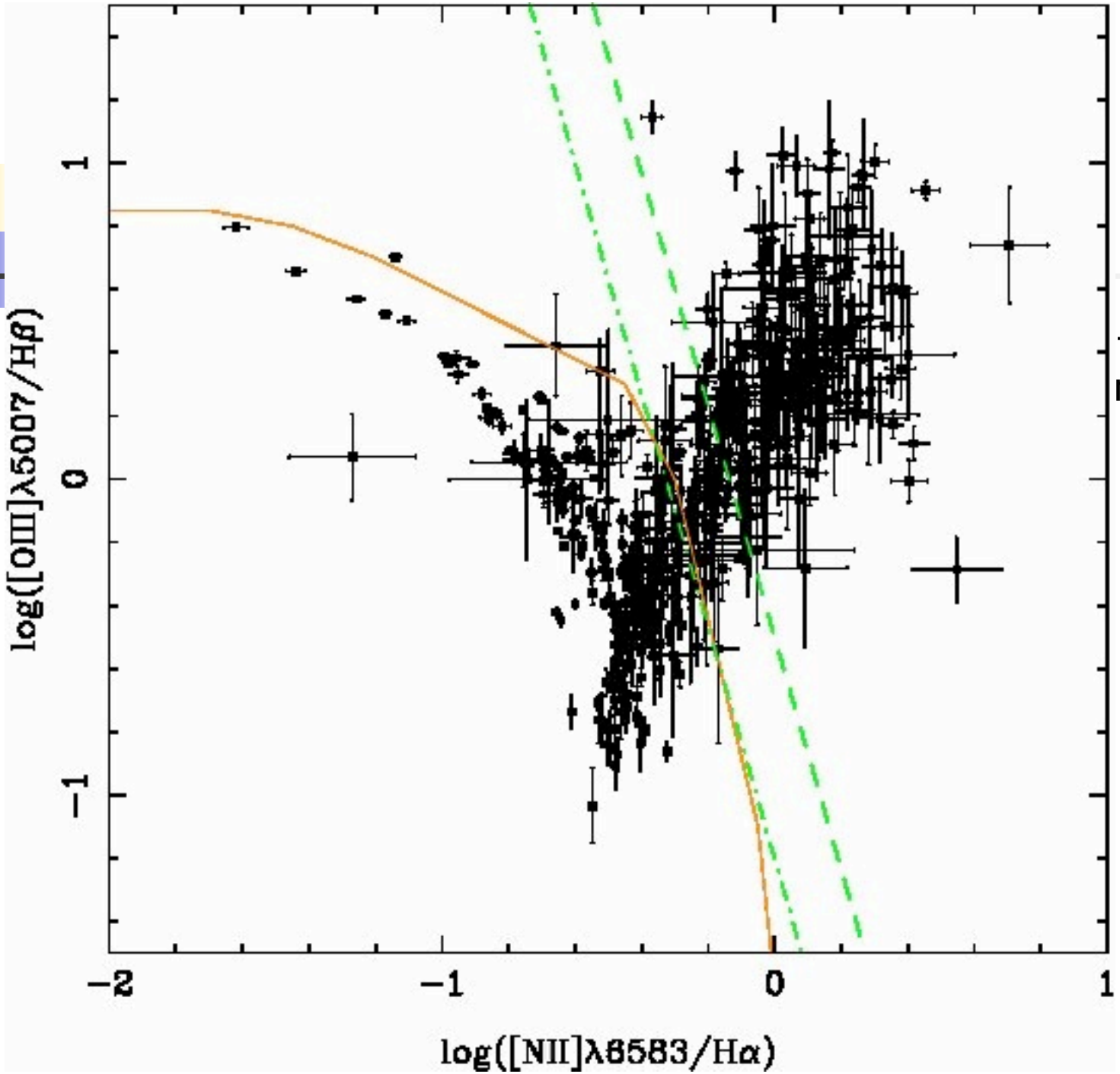




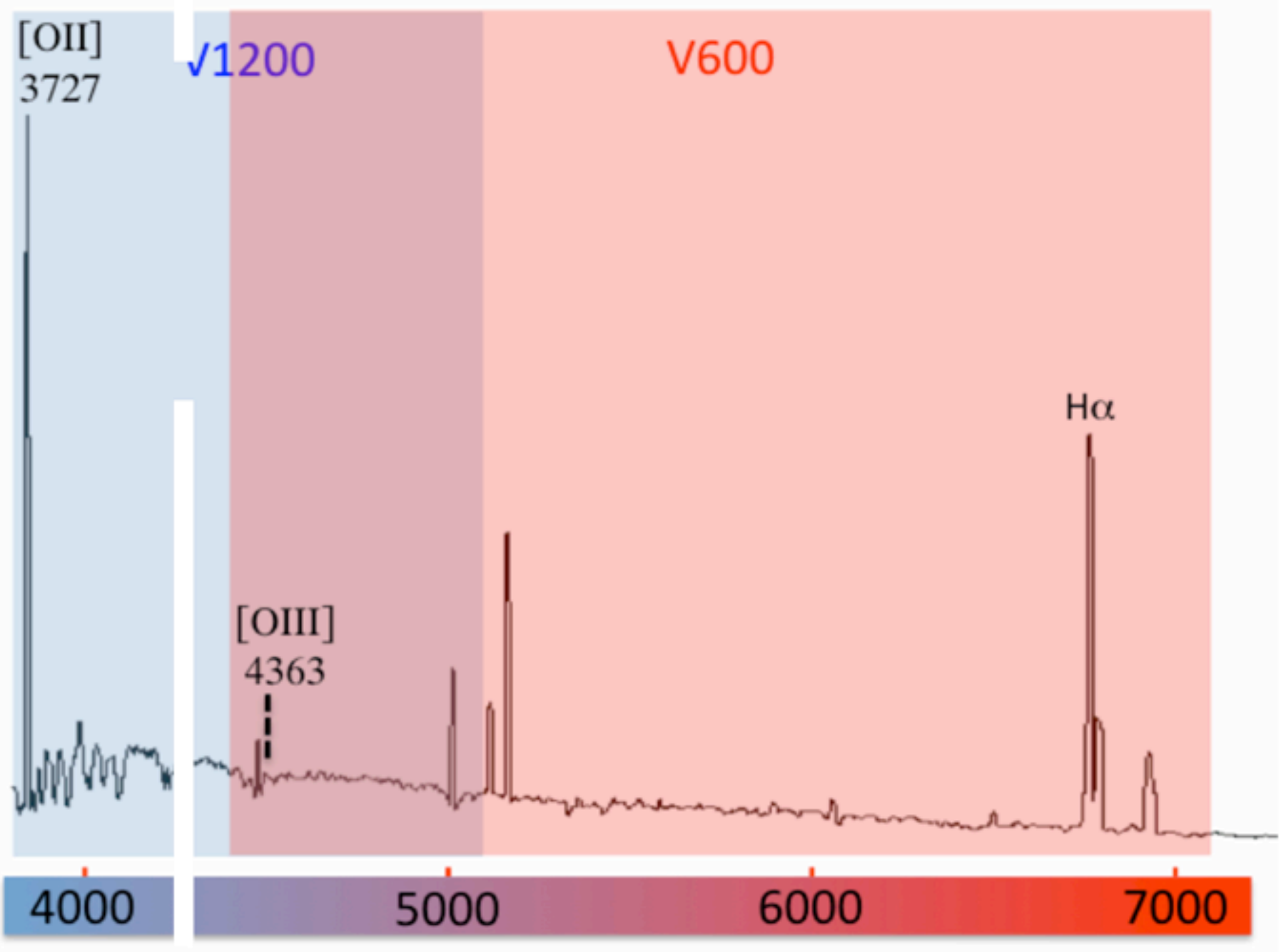
CALIFA: Sample Selection Criteria.

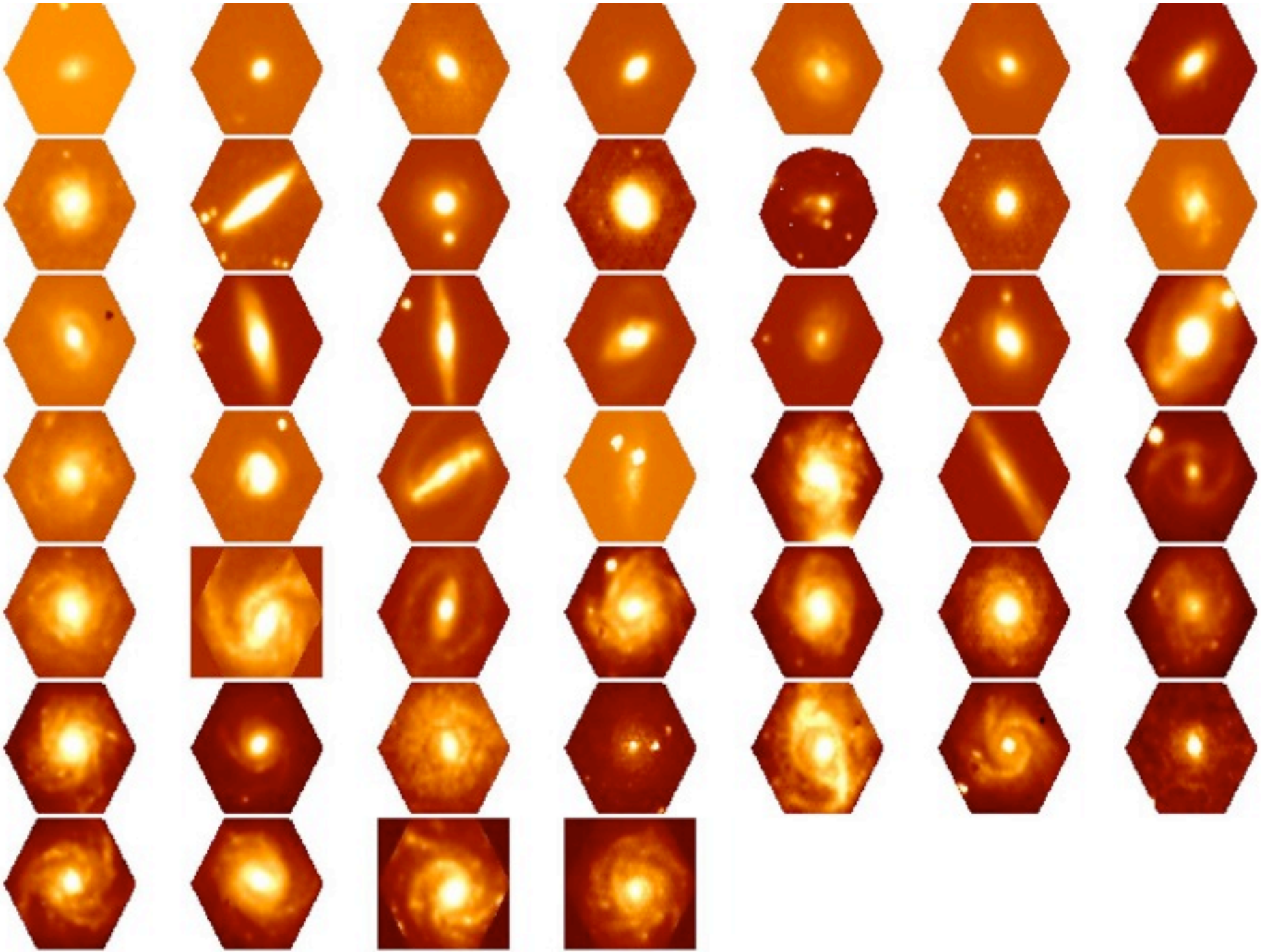
- Match the Science Goals:
  - No type selection.
  - Homogeneous covering of the Color-Magnitude Diagram.
- Maximize the 2D information.
- Cover the maximum of the galaxy size.
- Ensure the proper sky-subtraction.
- Ensure the proper S/N.

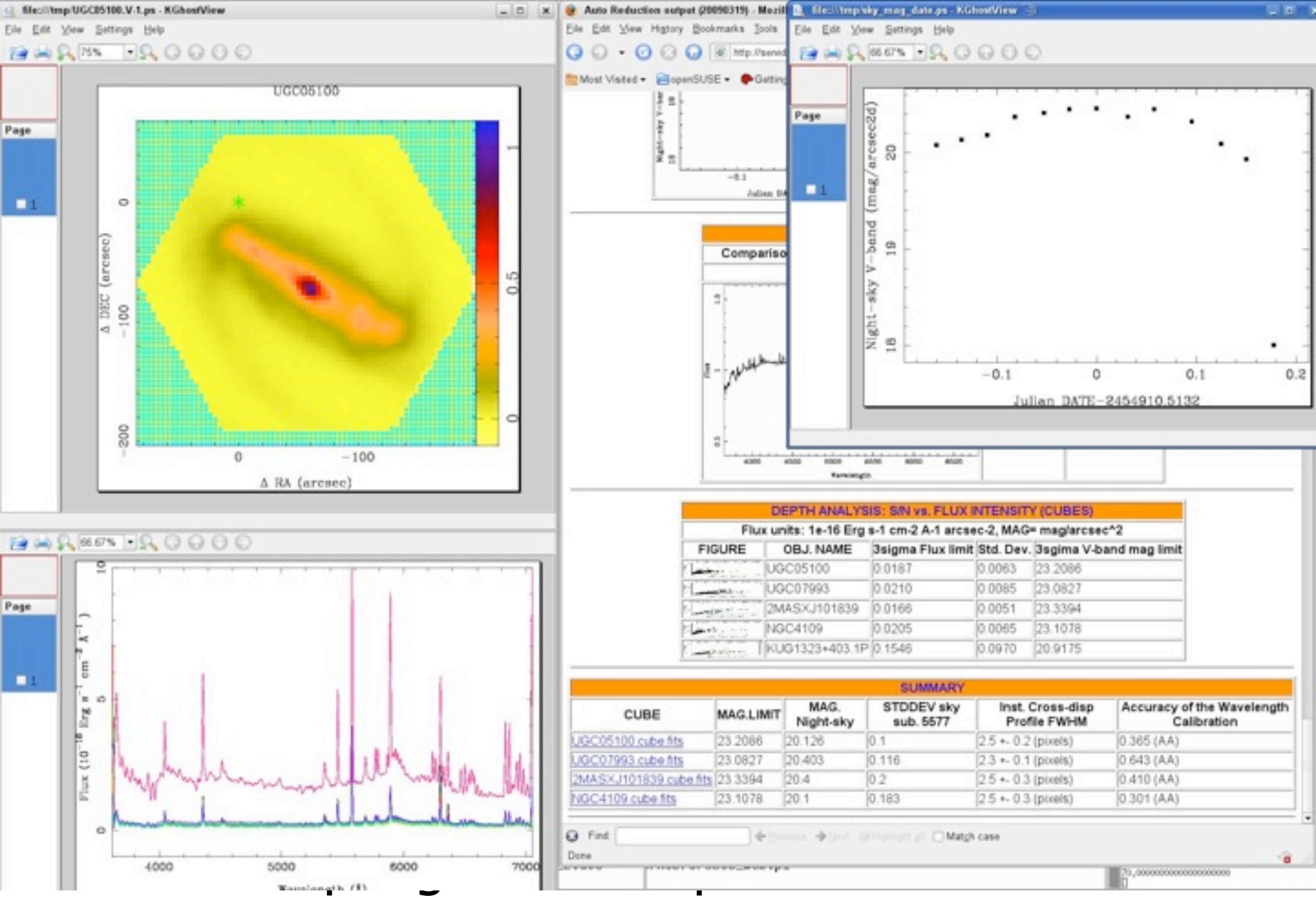

0.030
0.025
C > 3.0
3.0 > C > 2.5
C < 2.5
3
2.5
2
1.5
Colour u−r
−23
−22
−21
−20
−19
−18
−17
Absolute Magnitude M_r
Apparent r magnitude
Absolute magnitude M_r



from mag.


[OII]
3727
√1200
V600
Hα
[OIII]
4363
4000
5000
6000
7000





analysis on the data.

Z=0.001

Z=0.05

Z=0.2

Z=0.5

Z=1.0

NGC3820

NGC4109

Flux (10^{-16} Erg s^{-1} cm^{-2} Å^{-1})

UGC1087 Flux

0.1 0.2 0.3 0.4

7 S/N

60 80 100

Flux (10^{-16} Erg s^{-1} cm^{-2} Å^{-1})

50 100 150

4000 4500 5000 5500 6000 6500

Wavelength (Å)

Astronomy & Astrophysics manuscript no. teksti
May 21, 2010
© ESO 2010

CALIFA Pilot Studies: I. Exploring UGC9837

K. Viironen[1,2], S. Sánchez[2,1], E. Marmol[1,2], D. Mast[1], and Many More[2]

[1] Centro Astronómico Hispano Alemán, E-04004, Almeria, Spain
e-mail: kerttu@cefca.es
[2] Centro de Estudios de Física del Cosmos de Aragón (CEFCA), E-41001 Teruel, Spain

Received September 15, 1996; accepted March 16, 1997

ABSTRACT

Context. A detailed study of the spiral galaxy UGC9837 is carried out based on the IFU spectroscopic data from the CALIFA pilot survey. The integrated, radial and spatially resolved properties of the ionized gas are studied as well as the properties of the best fitting simple stellar population (SSP) models to the integrated spectra. In addition the possible biases caused by using a fixed aperture in studying galaxy properties at different redshift are simulated.
Aims. As a pilot study for an extended CALIFA survey our aim here is to demonstrate the possibilities provided by the survey in the study of the spatial and integrated properties of the ionized gas in galaxies. We also compare these results with the ones derived from the Sloan Digital Sky Survey data in order to explore the possible differences caused by the lack of spatial coverage of the latter.
Methods. UGC9837 was observed as part of the CALIFA pilot survey using the PMAS PPAK integral field unit. The spectra is reduced and calibrated and the stellar and ionized components separated. Using typical strong emission line ratios of the ionized gas, the source of ionization, the dust extinction, the star formation rate, the electron density and the oxygen abundance are studied. From the best fitting SSP models, the equivalent age and metalicity of the SSPs are derived.
Results. We find out that the lack of spatial coverage indeed causes biases in the derived galaxy properties. We also demonstrate that use of fixed aperture in studying the properties of galaxies at different redshift can cause important biases distorting the results derived for the lower redshift objects. CALIFA will remove these biases in ~ 600 galaxies of the Local Universe.

Key words. Galaxies –

1. Introduction

The ongoing Calar Alto Large Integral Field Area Survey (CALIFA) aims at observing a statistically well-defined sample of ~ 600 galaxies in the local universe with the PMAS/PPAK integral field spectrophotometer, mounted on the 3.5 m telescope at the Calar Alto Observatory (Spain). CALIFA is thus the largest and the most comprehensive wide-field IFU survey of galaxies carried out to date. The spectral range covered by CALIFA is 3700-7000 Å, obtained in two overlapping setups, one in the blue (3700-5000 Å) and one in the red (4300-7000 Å). The spectral resolutions in the blue and red are R~1650 and

aperture surveys such as SDSS and more detailed studies of individual galaxies with PPAK (e.g. the PINGS survey Rosales-Ortega et al. 2010), SAURON, VIRUS-P (VENGA, Blanc et al. 2010), and other instruments.

The defining science drivers for the CALIFA project are: (i) Model the stellar population and constrain the star formation histories; (ii) trace the distribution of ionized gas and estimate chemical abundances for the gas phase; and (iii) measure the kinematic properties of the galaxies, both from emission and from absorption lines. All these quantities will be reconstructed in maps covering the entire luminous extent of the galaxies in

Astronomy & Astrophysics manuscript no. teksti
May 21, 2010
© ESO 2010

CALIFA Pilot Studies: I. Exploring UGC9837

K. Viironen[1,2], S. Sánchez[2,1], E. Marmol[1,2], D. Mast[1], and Many More[2]

[1] Centro Astronómico Hispano Alemán, E-04004, Almeria, Spain
e-mail: kerttu@cefca.es
[2] Centro de Estudios de Física del Cosmos de Aragón (CEFCA), E-41001 Teruel, Spain

Received September 15, 1996; accepted March 16, 1997

ABSTRACT

Context. A detailed study of the spiral galaxy UGC9837 is carried out based on the IFU spectroscopic data from the CALIFA pilot survey. The integrated, radial and spatially resolved properties of the ionized gas are studied as well as the properties of the best fitting simple stellar population (SSP) models to the integrated spectra. In addition the possible biases caused by using a fixed aperture in studying galaxy properties at different redshift are simulated.
Aims. As a pilot study for an extended CALIFA survey our aim here is to demonstrate the possibilities provided by the survey in the study of the spatial and integrated properties of the ionized gas in galaxies. We also compare these results with the ones derived from the Sloan Digital Sky Survey data in order to explore the possible differences caused by the lack of spatial coverage of the latter.
Methods. UGC9837 was observed as part of the CALIFA pilot survey using the PMAS PPAK integral field unit. The spectra is reduced and calibrated and the stellar and ionized components separated. Using typical strong emission line ratios of the ionized gas, the source of ionization, the dust extinction, the star formation rate, the electron density and the oxygen abundance are studied. From the best fitting SSP models, the equivalent age and metalicity of the SSPs are derived.
Results. We find out that the lack of spatial coverage indeed causes biases in the derived galaxy properties. We also demonstrate that use of fixed aperture in studying the properties of galaxies at different redshift can cause important biases distorting the results derived for the lower redshift objects. CALIFA will remove these biases in ~ 600 galaxies of the Local Universe.

Key words. Galaxies –

1. Introduction

The ongoing Calar Alto Large Integral Field Area Survey (CALIFA) aims at observing a statistically well-defined sample of ~ 600 galaxies in the local universe with the PMAS/PPAK integral field spectrophotometer, mounted on the 3.5 m telescope at the Calar Alto Observatory (Spain). CALIFA is thus the largest and the most comprehensive wide-field IFU survey of galaxies carried out to date. The spectral range covered by CALIFA is 3700-7000 Å, obtained in two overlapping setups, one in the blue (3700-5000 Å) and one in the red (4300-7000 Å). The spectral resolutions in the blue and red are R~1650 and

aperture surveys such as SDSS and more detailed studies of individual galaxies with PPAK (e.g. the PINGS survey Rosales-Ortega et al. 2010), SAURON, VIRUS-P (VENGA, Blanc et al. 2010), and other instruments.

The defining science drivers for the CALIFA project are: (i) Model the stellar population and constrain the star formation histories; (ii) trace the distribution of ionized gas and estimate chemical abundances for the gas phase; and (iii) measure the kinematic properties of the galaxies, both from emission and from absorption lines. All these quantities will be reconstructed in maps covering the entire luminous extent of the galaxies in

Astronomy & Astrophysics manuscript no. teksti
May 21, 2010
© ESO 2010

CALIFA Pilot Studies: I. Exploring UGC9837

K. Viironen[1,2], S. Sánchez[2,1], E. Marmol[1,2], D. Mast[1], and Many More[2]

[1] Centro Astronómico Hispano Alemán, E-04004, Almeria, Spain
e-mail: kerttu@cefca.es
[2] Centro de Estudios de Física del Cosmos de Aragón (CEFCA), E-41001 Teruel, Spain

Received September 15, 1996; accepted March 16, 1997

ABSTRACT

Context. A detailed study of the spiral galaxy UGC9837 is carried out based on the IFU spectroscopic data from the CALIFA pilot survey. The integrated, radial and spatially resolved properties of the ionized gas are studied as well as the properties of the best fitting simple stellar population (SSP) models to the integrated spectra. In addition the possible biases caused by using a fixed aperture in studying galaxy properties at different redshift are simulated.
Aims. As a pilot study for an extended CALIFA survey our aim here is to demonstrate the possibilities provided by the survey in the study of the spatial and integrated properties of the ionized gas in galaxies. We also compare these results with the ones derived from the Sloan Digital Sky Survey data in order to explore the possible differences caused by the lack of spatial coverage of the latter.
Methods. UGC9837 was observed as part of the CALIFA pilot survey using the PMAS PPAK integral field unit. The spectra is reduced and calibrated and the stellar and ionized components separated. Using typical strong emission line ratios of the ionized gas, the source of ionization, the dust extinction, the star formation rate, the electron density and the oxygen abundance are studied. From the best fitting SSP models, the equivalent age and metalicity of the SSPs are derived.
Results. We find out that the lack of spatial coverage indeed causes biases in the derived galaxy properties. We also demonstrate that use of fixed aperture in studying the properties of galaxies at different redshift can cause important biases distorting the results derived for the lower redshift objects. CALIFA will remove these biases in ~ 600 galaxies of the Local Universe.

Key words. Galaxies –

1. Introduction

The ongoing Calar Alto Large Integral Field Area Survey (CALIFA) aims at observing a statistically well-defined sample of ~ 600 galaxies in the local universe with the PMAS/PPAK integral field spectrophotometer, mounted on the 3.5 m telescope at the Calar Alto Observatory (Spain). CALIFA is thus the largest and the most comprehensive wide-field IFU survey of galaxies carried out to date. The spectral range covered by CALIFA is 3700-7000 Å, obtained in two overlapping setups, one in the blue (3700-5000 Å) and one in the red (4300-7000 Å). The spectral resolutions in the blue and red are R~1650 and

aperture surveys such as SDSS and more detailed studies of individual galaxies with PPAK (e.g. the PINGS survey Rosales-Ortega et al. 2010), SAURON, VIRUS-P (VENGA, Blanc et al. 2010), and other instruments.

The defining science drivers for the CALIFA project are: (i) Model the stellar population and constrain the star formation histories; (ii) trace the distribution of ionized gas and estimate chemical abundances for the gas phase; and (iii) measure the kinematic properties of the galaxies, both from emission and from absorption lines. All these quantities will be reconstructed in maps covering the entire luminous extent of the galaxies in

Astronomy & Astrophysics manuscript no. teksti
May 21, 2010
© ESO 2010

CALIFA Pilot Studies: I. Exploring UGC9837

K. Viironen[1,2], S. Sánchez[2,1], E. Marmol[1,2], D. Mast[1], and Many More[2]

[1] Centro Astronómico Hispano Alemán, E-04004, Almeria, Spain
e-mail: kerttu@cefca.es
[2] Centro de Estudios de Física del Cosmos de Aragón (CEFCA), E-41001 Teruel, Spain

Received September 15, 1996; accepted March 16, 1997

ABSTRACT

Context. A detailed study of the spiral galaxy UGC9837 is carried out based on the IFU spectroscopic data from the CALIFA pilot survey. The integrated, radial and spatially resolved properties of the ionized gas are studied as well as the properties of the best fitting simple stellar population (SSP) models to the integrated spectra. In addition the possible biases caused by using a fixed aperture in studying galaxy properties at different redshift are simulated.
Aims. As a pilot study for an extended CALIFA survey our aim here is to demonstrate the possibilities provided by the survey in the study of the spatial and integrated properties of the ionized gas in galaxies. We also compare these results with the ones derived from the Sloan Digital Sky Survey data in order to explore the possible differences caused by the lack of spatial coverage of the latter.
Methods. UGC9837 was observed as part of the CALIFA pilot survey using the PMAS PPAK integral field unit. The spectra is reduced and calibrated and the stellar and ionized components separated. Using typical strong emission line ratios of the ionized gas, the source of ionization, the dust extinction, the star formation rate, the electron density and the oxygen abundance are studied. From the best fitting SSP models, the equivalent age and metalicity of the SSPs are derived.
Results. We find out that the lack of spatial coverage indeed causes biases in the derived galaxy properties. We also demonstrate that use of fixed aperture in studying the properties of galaxies at different redshift can cause important biases distorting the results derived for the lower redshift objects. CALIFA will remove these biases in ~ 600 galaxies of the Local Universe.

Key words. Galaxies –

1. Introduction

The ongoing Calar Alto Large Integral Field Area Survey (CALIFA) aims at observing a statistically well-defined sample of ~ 600 galaxies in the local universe with the PMAS/PPAK integral field spectrophotometer, mounted on the 3.5 m telescope at the Calar Alto Observatory (Spain). CALIFA is thus the largest and the most comprehensive wide-field IFU survey of galaxies carried out to date. The spectral range covered by CALIFA is 3700-7000 Å, obtained in two overlapping setups, one in the blue (3700-5000 Å) and one in the red (4300-7000 Å). The spectral resolutions in the blue and red are R~1650 and

aperture surveys such as SDSS and more detailed studies of individual galaxies with PPAK (e.g. the PINGS survey Rosales-Ortega et al. 2010), SAURON, VIRUS-P (VENGA, Blanc et al. 2010), and other instruments.

The defining science drivers for the CALIFA project are: (i) Model the stellar population and constrain the star formation histories; (ii) trace the distribution of ionized gas and estimate chemical abundances for the gas phase; and (iii) measure the kinematic properties of the galaxies, both from emission and from absorption lines. All these quantities will be reconstructed in maps covering the entire luminous extent of the galaxies in

m,
A/

Astronomy & Astrophysics manuscript no. teksti
May 21, 2010
© ESO 2010

CALIFA Pilot Studies: I. Exploring UGC9837

K. Viironen[1,2], S. Sánchez[2,1], E. Marmol[1,2], D. Mast[1], and Many More[2]

[1] Centro Astronómico Hispano Alemán, E-04004, Almeria, Spain
e-mail: kerttu@cefca.es
[2] Centro de Estudios de Física del Cosmos de Aragón (CEFCA), E-41001 Teruel, Spain

Received September 15, 1996; accepted March 16, 1997

ABSTRACT

Context. A detailed study of the spiral galaxy UGC9837 is carried out based on the IFU spectroscopic data from the CALIFA pilot survey. The integrated, radial and spatially resolved properties of the ionized gas are studied as well as the properties of the best fitting simple stellar population (SSP) models to the integrated spectra. In addition the possible biases caused by using a fixed aperture in studying galaxy properties at different redshift are simulated.
Aims. As a pilot study for an extended CALIFA survey our aim here is to demonstrate the possibilities provided by the survey in the study of the spatial and integrated properties of the ionized gas in galaxies. We also compare these results with the ones derived from the Sloan Digital Sky Survey data in order to explore the possible differences caused by the lack of spatial coverage of the latter.
Methods. UGC9837 was observed as part of the CALIFA pilot survey using the PMAS PPAK integral field unit. The spectra is reduced and calibrated and the stellar and ionized components separated. Using typical strong emission line ratios of the ionized gas, the source of ionization, the dust extinction, the star formation rate, the electron density and the oxygen abundance are studied. From the best fitting SSP models, the equivalent age and metalicity of the SSPs are derived.
Results. We find out that the lack of spatial coverage indeed causes biases in the derived galaxy properties. We also demonstrate that use of fixed aperture in studying the properties of galaxies at different redshift can cause important biases distorting the results derived for the lower redshift objects. CALIFA will remove these biases in ~ 600 galaxies of the Local Universe.

Key words. Galaxies –

1. Introduction

The ongoing Calar Alto Large Integral Field Area Survey (CALIFA) aims at observing a statistically well-defined sample of ~ 600 galaxies in the local universe with the PMAS/PPAK integral field spectrophotometer, mounted on the 3.5 m telescope at the Calar Alto Observatory (Spain). CALIFA is thus the largest and the most comprehensive wide-field IFU survey of galaxies carried out to date. The spectral range covered by CALIFA is 3700-7000 Å, obtained in two overlapping setups, one in the blue (3700-5000 Å) and one in the red (4300-7000 Å). The spectral resolutions in the blue and red are R~1650 and

aperture surveys such as SDSS and more detailed studies of individual galaxies with PPAK (e.g. the PINGS survey Rosales-Ortega et al. 2010), SAURON, VIRUS-P (VENGA, Blanc et al. 2010), and other instruments.

The defining science drivers for the CALIFA project are: (i) Model the stellar population and constrain the star formation histories; (ii) trace the distribution of ionized gas and estimate chemical abundances for the gas phase; and (iii) measure the kinematic properties of the galaxies, both from emission and from absorption lines. All these quantities will be reconstructed in maps covering the entire luminous extent of the galaxies in

m,
A/

Astronomy & Astrophysics manuscript no. teksti
May 21, 2010
© ESO 2010

CALIFA Pilot Studies: I. Exploring UGC9837

K. Viironen[1,2], S. Sánchez[2,1], E. Marmol[1,2], D. Mast[1], and Many More[2]

[1] Centro Astronómico Hispano Alemán, E-04004, Almeria, Spain
e-mail: kerttu@cefca.es
[2] Centro de Estudios de Física del Cosmos de Aragón (CEFCA), E-41001 Teruel, Spain

Received September 15, 1996; accepted March 16, 1997

ABSTRACT

Context. A detailed study of the spiral galaxy UGC9837 is carried out based on the IFU spectroscopic data from the CALIFA pilot survey. The integrated, radial and spatially resolved properties of the ionized gas are studied as well as the properties of the best fitting simple stellar population (SSP) models to the integrated spectra. In addition the possible biases caused by using a fixed aperture in studying galaxy properties at different redshift are simulated.
Aims. As a pilot study for an extended CALIFA survey our aim here is to demonstrate the possibilities provided by the survey in the study of the spatial and integrated properties of the ionized gas in galaxies. We also compare these results with the ones derived from the Sloan Digital Sky Survey data in order to explore the possible differences caused by the lack of spatial coverage of the latter.
Methods. UGC9837 was observed as part of the CALIFA pilot survey using the PMAS PPAK integral field unit. The spectra is reduced and calibrated and the stellar and ionized components separated. Using typical strong emission line ratios of the ionized gas, the source of ionization, the dust extinction, the star formation rate, the electron density and the oxygen abundance are studied. From the best fitting SSP models, the equivalent age and metalicity of the SSPs are derived.
Results. We find out that the lack of spatial coverage indeed causes biases in the derived galaxy properties. We also demonstrate that use of fixed aperture in studying the properties of galaxies at different redshift can cause important biases distorting the results derived for the lower redshift objects. CALIFA will remove these biases in ~ 600 galaxies of the Local Universe.

Key words. Galaxies –

1. Introduction

The ongoing Calar Alto Large Integral Field Area Survey (CALIFA) aims at observing a statistically well-defined sample of ~ 600 galaxies in the local universe with the PMAS/PPAK integral field spectrophotometer, mounted on the 3.5 m telescope at the Calar Alto Observatory (Spain). CALIFA is thus the largest and the most comprehensive wide-field IFU survey of galaxies carried out to date. The spectral range covered by CALIFA is 3700-7000 Å, obtained in two overlapping setups, one in the blue (3700-5000 Å) and one in the red (4300-7000 Å). The spectral resolutions in the blue and red are R~1650 and

aperture surveys such as SDSS and more detailed studies of individual galaxies with PPAK (e.g. the PINGS survey Rosales-Ortega et al. 2010), SAURON, VIRUS-P (VENGA, Blanc et al. 2010), and other instruments.

The defining science drivers for the CALIFA project are: (i) Model the stellar population and constrain the star formation histories; (ii) trace the distribution of ionized gas and estimate chemical abundances for the gas phase; and (iii) measure the kinematic properties of the galaxies, both from emission and from absorption lines. All these quantities will be reconstructed in maps covering the entire luminous extent of the galaxies in

m,
A/

Astronomy & Astrophysics manuscript no. teksti
May 21, 2010
© ESO 2010

CALIFA Pilot Studies: I. Exploring UGC9837

K. Viironen[1,2], S. Sánchez[2,1], E. Marmol[1,2], D. Mast[1], and Many More[2]

[1] Centro Astronómico Hispano Alemán, E-04004, Almeria, Spain
e-mail: kerttu@cefca.es
[2] Centro de Estudios de Física del Cosmos de Aragón (CEFCA), E-41001 Teruel, Spain

Received September 15, 1996; accepted March 16, 1997

ABSTRACT

Context. A detailed study of the spiral galaxy UGC9837 is carried out based on the IFU spectroscopic data from the CALIFA pilot survey. The integrated, radial and spatially resolved properties of the ionized gas are studied as well as the properties of the best fitting simple stellar population (SSP) models to the integrated spectra. In addition the possible biases caused by using a fixed aperture in studying galaxy properties at different redshift are simulated.
Aims. As a pilot study for an extended CALIFA survey our aim here is to demonstrate the possibilities provided by the survey in the study of the spatial and integrated properties of the ionized gas in galaxies. We also compare these results with the ones derived from the Sloan Digital Sky Survey data in order to explore the possible differences caused by the lack of spatial coverage of the latter.
Methods. UGC9837 was observed as part of the CALIFA pilot survey using the PMAS PPAK integral field unit. The spectra is reduced and calibrated and the stellar and ionized components separated. Using typical strong emission line ratios of the ionized gas, the source of ionization, the dust extinction, the star formation rate, the electron density and the oxygen abundance are studied. From the best fitting SSP models, the equivalent age and metalicity of the SSPs are derived.
Results. We find out that the lack of spatial coverage indeed causes biases in the derived galaxy properties. We also demonstrate that use of fixed aperture in studying the properties of galaxies at different redshift can cause important biases distorting the results derived for the lower redshift objects. CALIFA will remove these biases in ~ 600 galaxies of the Local Universe.

Key words. Galaxies –

1. Introduction

The ongoing Calar Alto Large Integral Field Area Survey (CALIFA) aims at observing a statistically well-defined sample of ~ 600 galaxies in the local universe with the PMAS/PPAK integral field spectrophotometer, mounted on the 3.5 m telescope at the Calar Alto Observatory (Spain). CALIFA is thus the largest and the most comprehensive wide-field IFU survey of galaxies carried out to date. The spectral range covered by CALIFA is 3700-7000 Å, obtained in two overlapping setups, one in the blue (3700-5000 Å) and one in the red (4300-7000 Å). The spectral resolutions in the blue and red are R~1650 and

aperture surveys such as SDSS and more detailed studies of individual galaxies with PPAK (e.g. the PINGS survey Rosales-Ortega et al. 2010), SAURON, VIRUS-P (VENGA, Blanc et al. 2010), and other instruments.

The defining science drivers for the CALIFA project are: (i) Model the stellar population and constrain the star formation histories; (ii) trace the distribution of ionized gas and estimate chemical abundances for the gas phase; and (iii) measure the kinematic properties of the galaxies, both from emission and from absorption lines. All these quantities will be reconstructed in maps covering the entire luminous extent of the galaxies in

m,
A/

Astronomy & Astrophysics manuscript no. teksti
May 21, 2010
© ESO 2010

CALIFA Pilot Studies: I. Exploring UGC9837

K. Viironen[1,2], S. Sánchez[2,1], E. Marmol[1,2], D. Mast[1], and Many More[2]

[1] Centro Astronómico Hispano Alemán, E-04004, Almeria, Spain
e-mail: kerttu@cefca.es
[2] Centro de Estudios de Física del Cosmos de Aragón (CEFCA), E-41001 Teruel, Spain

Received September 15, 1996; accepted March 16, 1997

ABSTRACT

Context. A detailed study of the spiral galaxy UGC9837 is carried out based on the IFU spectroscopic data from the CALIFA pilot survey. The integrated, radial and spatially resolved properties of the ionized gas are studied as well as the properties of the best fitting simple stellar population (SSP) models to the integrated spectra. In addition the possible biases caused by using a fixed aperture in studying galaxy properties at different redshift are simulated.
Aims. As a pilot study for an extended CALIFA survey our aim here is to demonstrate the possibilities provided by the survey in the study of the spatial and integrated properties of the ionized gas in galaxies. We also compare these results with the ones derived from the Sloan Digital Sky Survey data in order to explore the possible differences caused by the lack of spatial coverage of the latter.
Methods. UGC9837 was observed as part of the CALIFA pilot survey using the PMAS PPAK integral field unit. The spectra is reduced and calibrated and the stellar and ionized components separated. Using typical strong emission line ratios of the ionized gas, the source of ionization, the dust extinction, the star formation rate, the electron density and the oxygen abundance are studied. From the best fitting SSP models, the equivalent age and metalicity of the SSPs are derived.
Results. We find out that the lack of spatial coverage indeed causes biases in the derived galaxy properties. We also demonstrate that use of fixed aperture in studying the properties of galaxies at different redshift can cause important biases distorting the results derived for the lower redshift objects. CALIFA will remove these biases in ~ 600 galaxies of the Local Universe.

Key words. Galaxies –

1. Introduction

The ongoing Calar Alto Large Integral Field Area Survey (CALIFA) aims at observing a statistically well-defined sample of ~ 600 galaxies in the local universe with the PMAS/PPAK integral field spectrophotometer, mounted on the 3.5 m telescope at the Calar Alto Observatory (Spain). CALIFA is thus the largest and the most comprehensive wide-field IFU survey of galaxies carried out to date. The spectral range covered by CALIFA is 3700-7000 Å, obtained in two overlapping setups, one in the blue (3700-5000 Å) and one in the red (4300-7000 Å). The spectral resolutions in the blue and red are R~1650 and

aperture surveys such as SDSS and more detailed studies of individual galaxies with PPAK (e.g. the PINGS survey Rosales-Ortega et al. 2010), SAURON, VIRUS-P (VENGA, Blanc et al. 2010), and other instruments.

The defining science drivers for the CALIFA project are: (i) Model the stellar population and constrain the star formation histories; (ii) trace the distribution of ionized gas and estimate chemical abundances for the gas phase; and (iii) measure the kinematic properties of the galaxies, both from emission and from absorption lines. All these quantities will be reconstructed in maps covering the entire luminous extent of the galaxies in

m,
A/