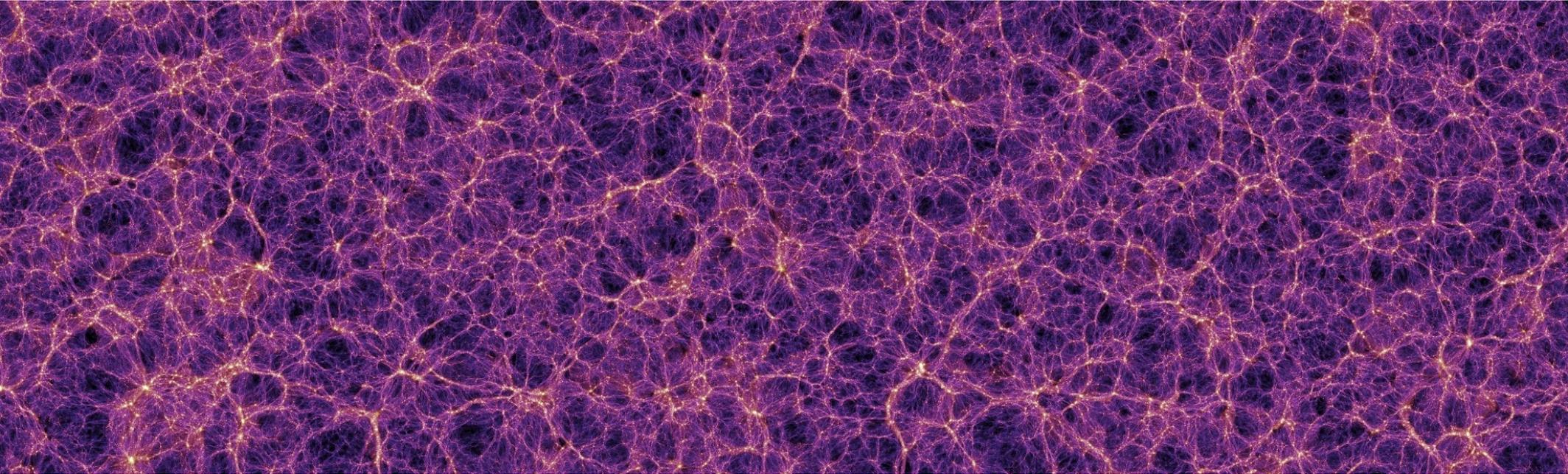


SCIENCE ORGANISATION AND OUTREACH WITH CAVITY



UNIVERSIDAD
DE GRANADA

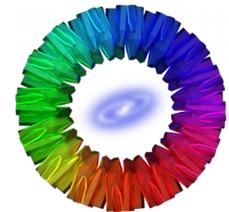


Calar Alto



university of
 groningen

Tomás Ruiz-Lara
Kapteyn Astronomical Institute
CAVITY Virtual Kick-off meeting
10th September, 2020



 Cavity Survey

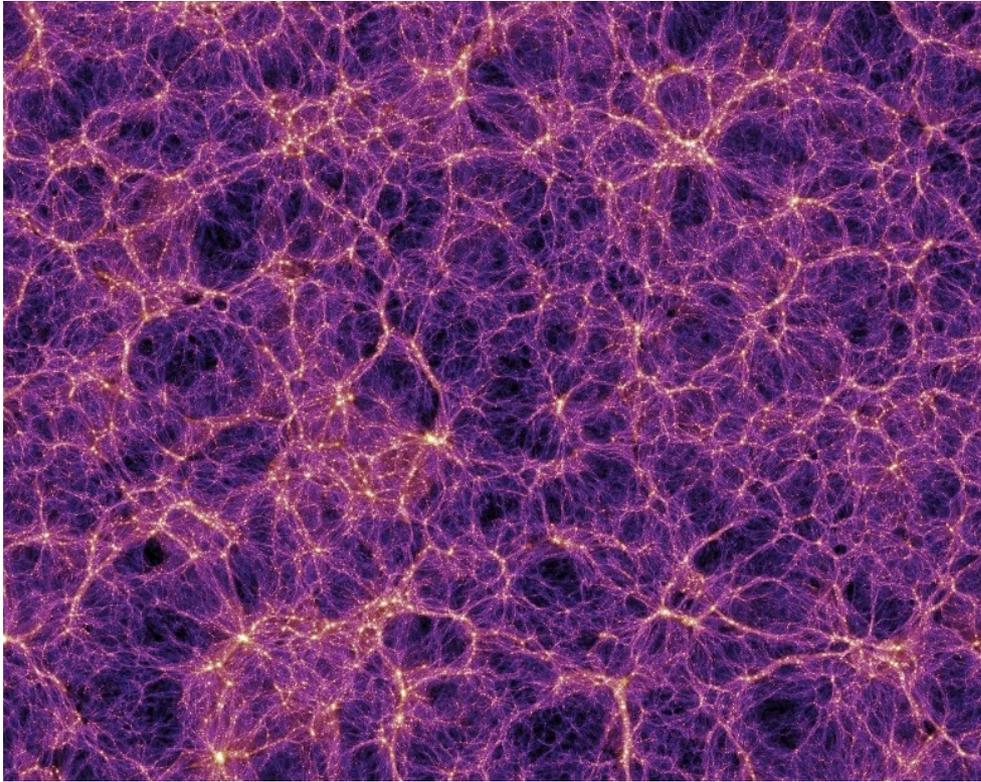
 @cavity_survey

 cavity_survey

 cavity.survey@gmail.com

Calar Alto Void Integral-field Treasury survey

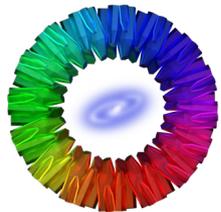
Calar Alto Void Integral-field Treasury survey



- Large scale structure of the Universe
 - Clusters, filaments, walls...
 - Voids
- Galaxy Formation and Evolution
 - Secular, internal processes
 - Violent, external processes
- Environmental effects
 - Role of void galaxies within this picture

CAVITY OBJECTIVES

(“reminder”)



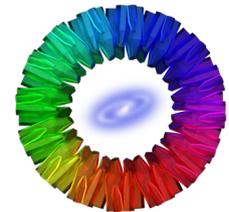
Calar Alto Void Integral-field Treasury survey

CAVITY Science Goals

Goal 1: Determine how the environment has influenced the mass assembly (baryonic and dark) of void galaxies.

Goal 2: Establish how galaxy formation and its properties are dependent on the larger-scale environment.

Goal 3: Find the main driver of galaxy transformation, from star-forming to quiescent, passive systems in voids.



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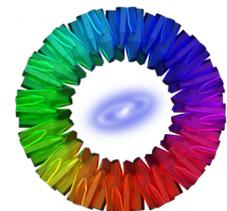
Goal 3: Find the main driver of galaxy transformation, from star-forming to quiescent, passive systems in voids.

Some Science topics/projects to touch

Arrangement of the large scale structure of the Cosmic Web
Early halo assembly
Transition between external to internal processes
Role of secular processes in the absence of interactions
Cold accretion
Differences between voids and non-voids
Baryonic mass assembly
Star formation histories in void galaxies (fossil records)
Dark matter content in void galaxies
Void galaxies assembly history
Transition from star forming to quiescent systems in a ‘simplified’ environment
Why their enhanced sSFR?
Atomic and molecular gas content
Testing Lambda-CDM

Inminent actions:

Spatially-resolved SFHs
Ionised gas in 1D and 2D (SFR)
SFR from H α
Rotation maps
Kinematic modelling (optical vs HI)
Mass distributions of different components
Atomic and molecular gas content (see ancillary data)
Cosmological Simulations



Calar Alto Void Integral-field Treasury survey

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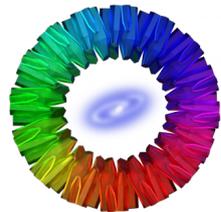
Some Science topics/projects to be addressed

- Arrangement of the voids in the Cosmic Web
- Early halo assembly
- Transition from external to internal processes
- Role of secular processes in the absence of interactions
- Cold accretion
- Differences between voids and non-voids
- Baryonic mass assembly
- Star formation histories in void galaxies (fossil records)
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The CAVITY Approach

Inminent actions:

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Calar Alto Void Integral-field Treasury survey

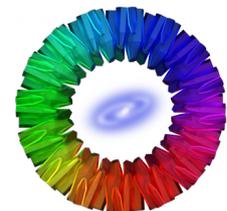
The CAVITY Approach

Statistical characterisation of galaxies populating “Voids”:

Sample:

Data:

TEAM:



Calar Alto Void Integral-field Treasury survey

The CAVITY Approach

Statistical characterisation of galaxies populating “Voids”:

Sample:

Key properties to cover:

Stellar Mass, Optical Colours, and HI masses

→ 3x3x2

→ ~ 9 galaxies per bin

→ ~160 galaxies in Voids

VGS

Kreckel+2012

59 galaxies living in the center of voids ($z < 0.02$)

Well defined sample. HI data

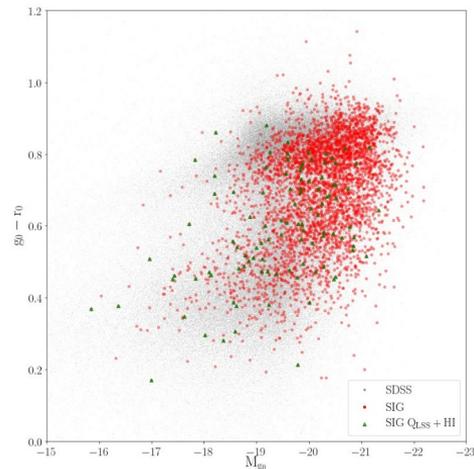
SIGS

Argudo-Fernández+2015

Large-scale tidal strength parameter (Q_{LSS})

VGS $Q_{LSS} < -6$

Data:



Preselection of 104 galaxies:

$Q_{LSS} < -6$

HI from literature

CALIFA
SAMI
MANGA
...

Calar Alto Void Integral-field Treasury survey



The CAVITY Approach

Statistical characterisation of galaxies populating “Voids”:

Sample:

Key properties to cover:

Stellar Mass, Optical Colours, and HI masses

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To be Discussed

VGS

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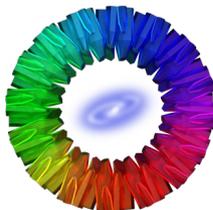
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Calar Alto Void Integral-field Treasury survey

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Stellar Mass, Optical Colours, and HI masses

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→ ~ 9 galaxies per void

→ ~ 100 voids

To be Discussed

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SIGS
Argudo-Fernández+2015

Preselection of 104 galaxies:
Q LSS < -6
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Data:

CAVITY: **OCTOBER 2020!!**

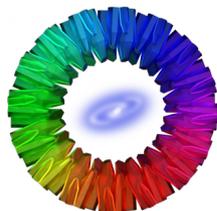
PMAS/PPAK (V500 and V1200) on the 3.5 m of CAHA
3700-7000 Å – R=850 and R=1700
Total observing time: 110 nights
(García-Benito’s talk)

Ancillary:

HI → VGS (Kreckel’s talk) + WALLABY + Apertif

CO → CO-CAVITY (IRAM, Domínguez-Gómez’s talk)

Calar Alto Void Integral-field Treasury survey



The CAVITY Approach

Statistical characterisation of galaxies populating “Voids”:

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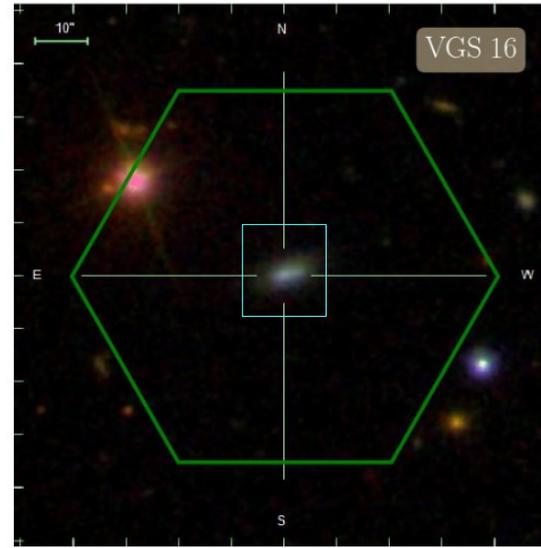
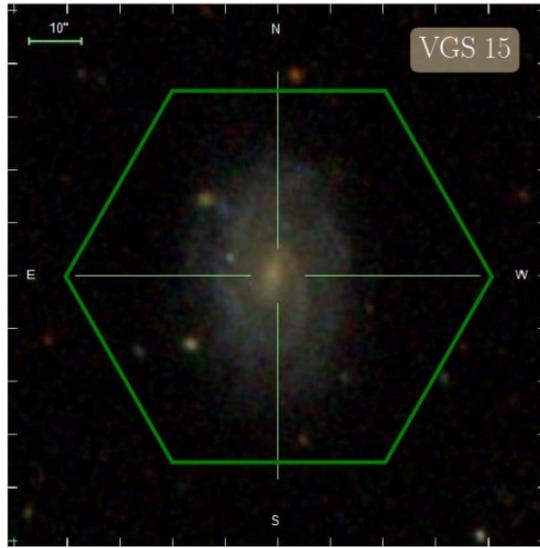
VGS
Kreckel+2012

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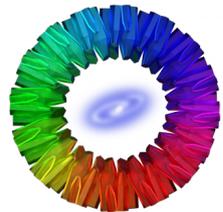
!20!!

00) on

R=1700
lights

Verley's talk

WALLABY + APERTUR
CO → CO-CAVITY (IRAM,
Domínguez-Gómez's talk)



Calar Alto Void Integral-field Treasury survey

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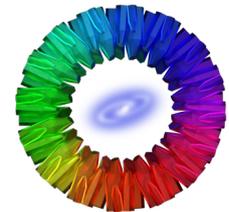
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Calar Alto Void Integral-field Treasury survey

CAVITY Science Goals

Goal 1: Determine how the environment has influenced the mass assembly (baryonic and dark) of void galaxies

Goal 2: Establish how galaxy formation is dependent on the environment

Goal 3: Determine the star formation rate (SFR) and the evolution of the star formation rate (SFR) in void galaxies

Some science topics/projects to touch

Arrangement

Early halo

Transition

Role of se

Cold acce

Differences

Baryonic m

Star format

Dark matter

Void galaxie

Transition fr

environment

Why their en

Atomic and molecular gas content

Testing Lambda-CDM

1st request :)

- a- What Science do you want to do within CAVITY?
 - b- How do you plan to do it?
 - c- PhD students?
 - d- (probably for discussion today?)
- What do we have to accomplish our goals? Do we need further workforce? Ideas for future fundings?

TEAM

We are 30+ people from 12 different institutions

COORDINATION



Calar Alto Void Integral-field Treasury survey

OUTREACH WITHIN CAVITY

Laura Sánchez-Menguiano
Tomás Ruiz-Lara
Anyone willing to help?

CAVITY commitment with Science Communication

Social Media: We are on Twitter and Facebook (Instagram, work in progress)

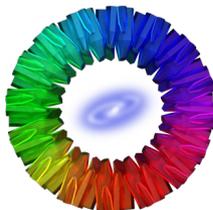
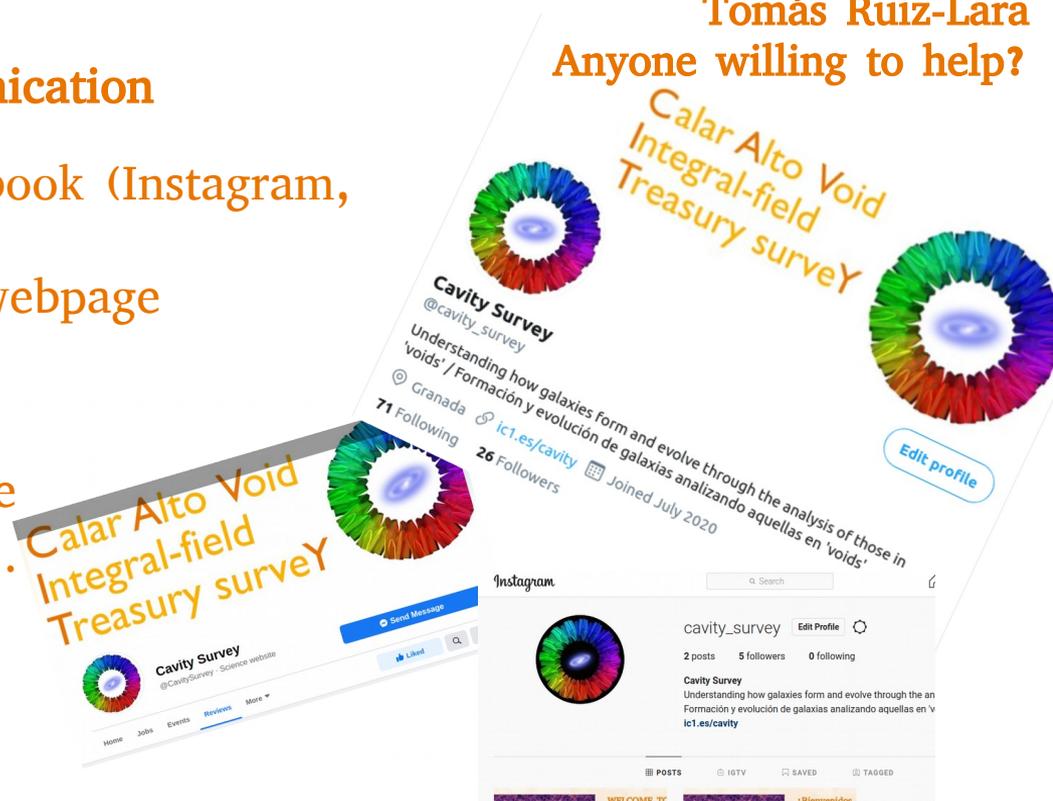
Blog: integrated in the public part of the webpage

Language: English and Spanish

Material: Factsheets, articles...

Coming-up: Meet the team, CAVITY Science

More? Open to suggestions, members, etc...
(Other languages, format, simulations)



 Cavity Survey

 @cavity_survey

 cavity_survey

 cavity.survey@gmail.com

Calar Alto Void Integral-field Treasury survey

The Calar Alto Observatory, the largest astronomical complex in continental Europe, is located in the Sierra de Los Filabres (Andalucía, Southern Spain) and hosts the 3.5m telescope that will be used by CAVITY to observe ~160 galaxies in 'voids'. Credit: Centro Astronómico Hispano-Alemán, Calar Alto Ob (CAHA).

What is CAVITY? (I)

CAVITY is the Calar Alto Void Integral-field Treasury survey, a Legacy project of the Calar Alto Observatory to keep the excellence of the science done in the observatory. CAVITY is composed by more than 30 researchers from 12 different international institutions. It will generate the first statistically complete data set of galaxies in voids exploring the mass assembly -dark and baryonic- and gas properties of galaxies inhabiting these very low density regions.



 Cavity Survey

 @cavity_survey

 cavity_survey

 cavity.survey@gmail.com

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TAKE-AWAY MESSAGE

It's time to fill the CAVITY!

Discussion

- a- What do we have to accomplish our goals? Do we need further workforce? Ideas for future fundings?
- b- CAVITY sample selection
- c- CAVITY colour-maps or presentation template?

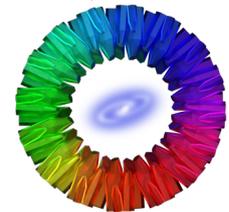
Requests

1st request (Science, “mandatory”)

- a- What Science do you want to do within CAVITY?
- b- How do you plan to do it?
- c- PhD students?

2nd request (Outreach, “voluntary”)

- a- Meet the team
- b- What science do you want to do?



Cavity Survey



@cavity_survey



cavity_survey



cavity.survey@gmail.com

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