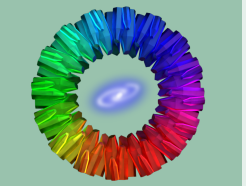

CAVITY, Calar Alto Void Integral-field Treasury surveY

Isabel Pérez, Universidad de Granada

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UNIVERSIDAD DE GRANADA

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GOBIERNO DE ESPAÑA

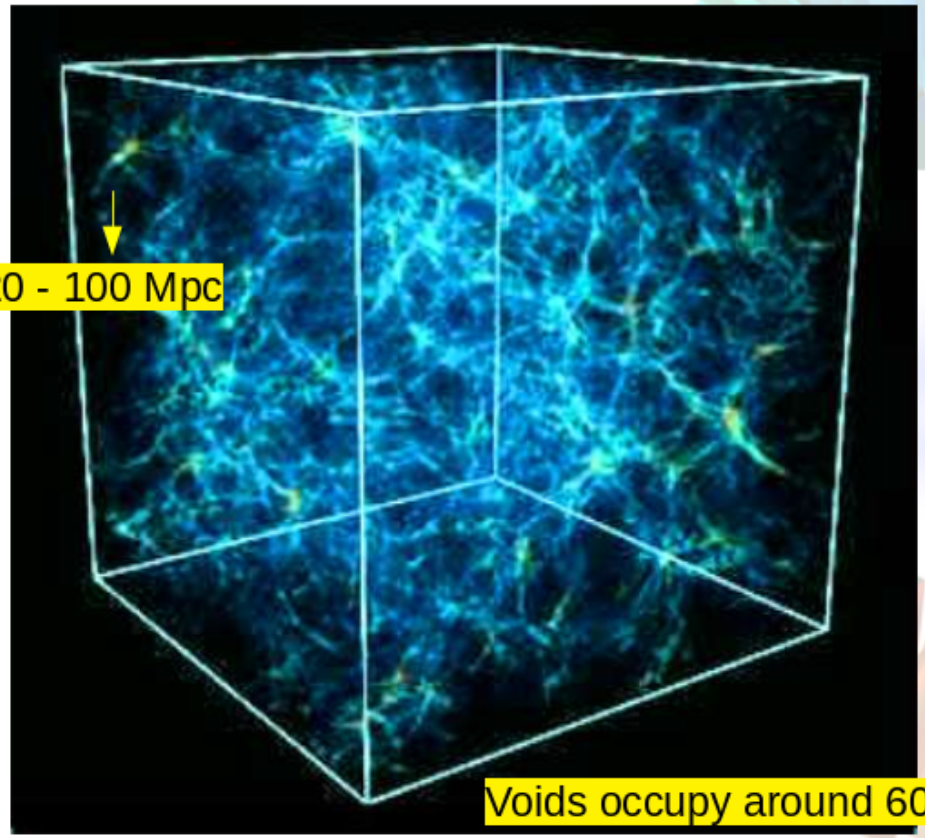
Plan de Recuperación, Transformación y Resiliencia

Calar Alto Void Integral-field Treasurey surveY
CAVITY aims and motivation

CAVITY main goals:

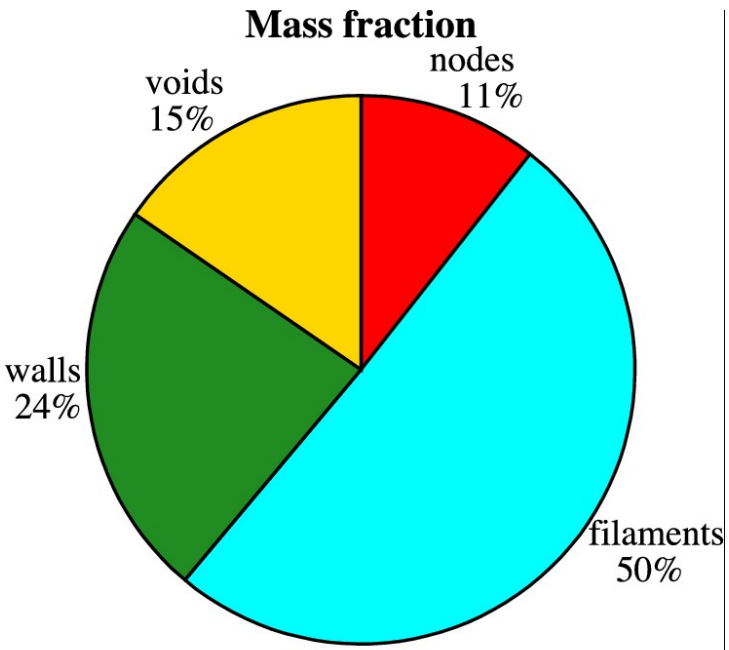
- Determine how the environment has influenced the mass assembly of void galaxies
- Establish how galaxy formation and its properties are dependent on the large-scale environment
- Find the main drivers of galaxy transformation

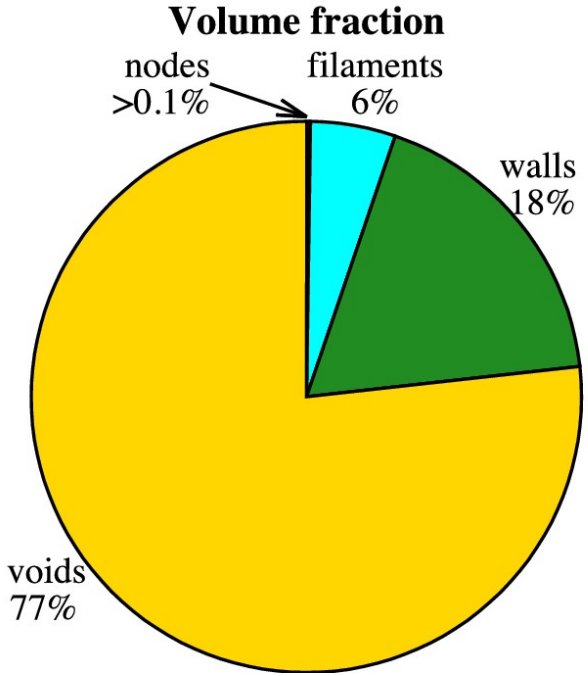
Voids



Voids

Mass and volume fraction occupied by cosmic web environments



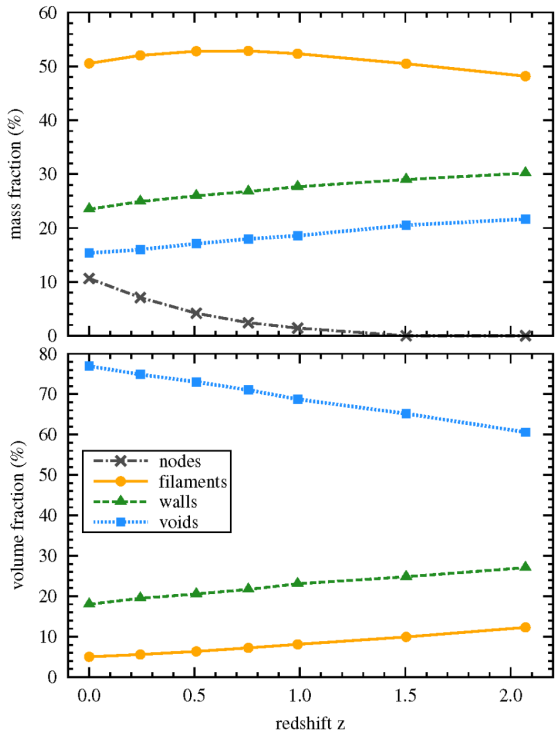


Cautun et al. 2014

Voids

Void evolution: dynamics dominated by large scale tidal environment

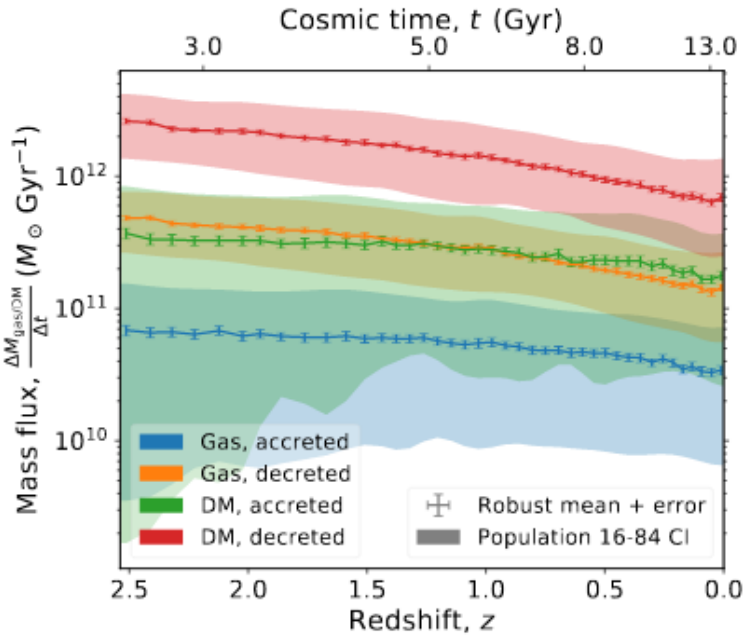
- Volume fractions increases with time
- Mass fraction decreases with time



Cautun et al. 2014

Void evolution

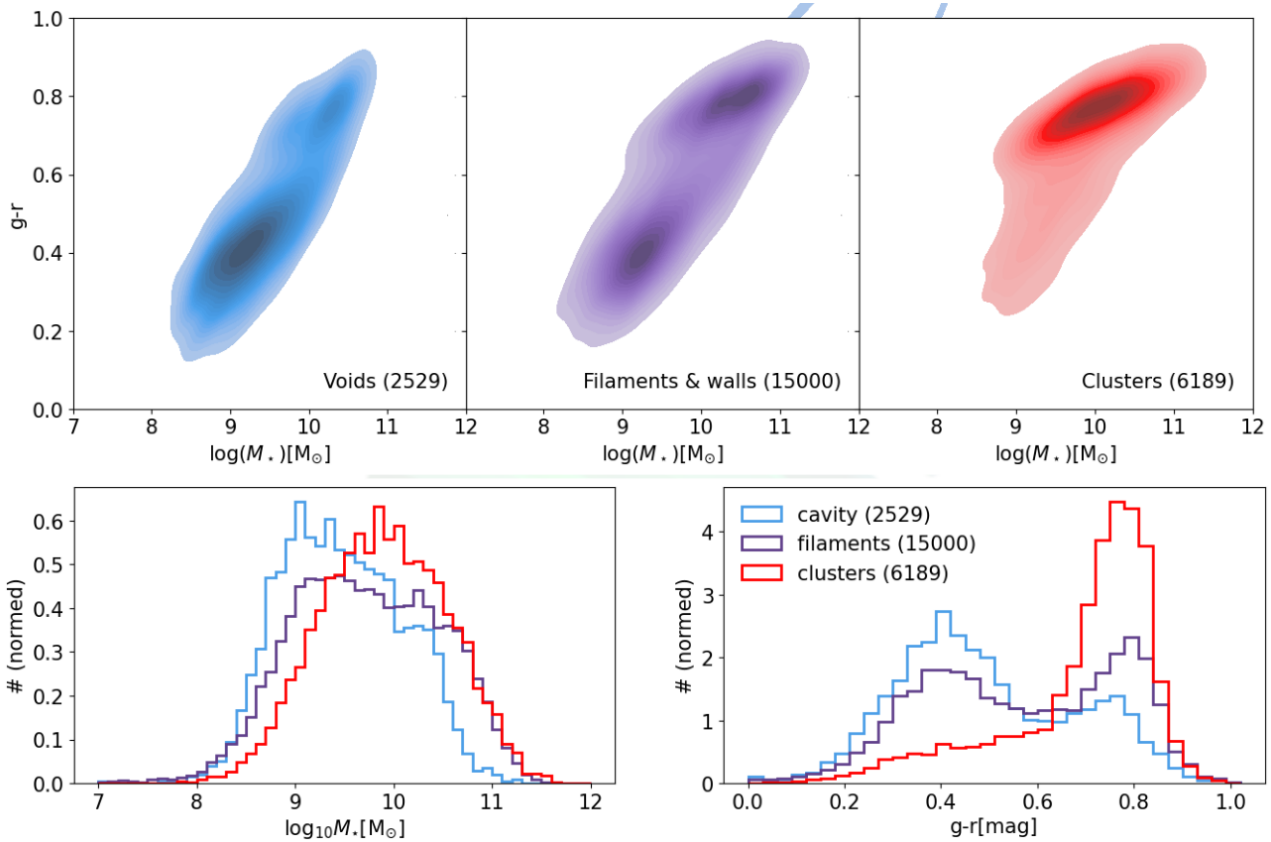
- on average 10% of void mass at z=0 is accreted from overdense regions



Vallés-Pérez, Quillis, and Planelles 2021

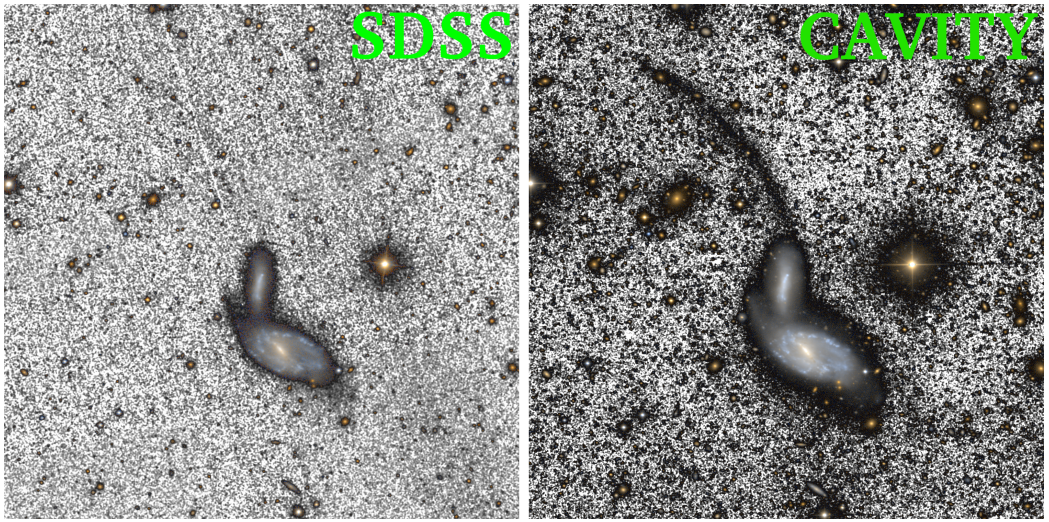
Void galaxies

Mass distribution - Morphology



Domínguez-Gómez et al. 2023

Void galaxies



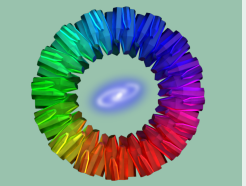
Color composite image with g and r bands and high contrast background with the sum image. CAVITY INT data.

Román, IP+ in prep.

Void galaxies

Void galaxy properties

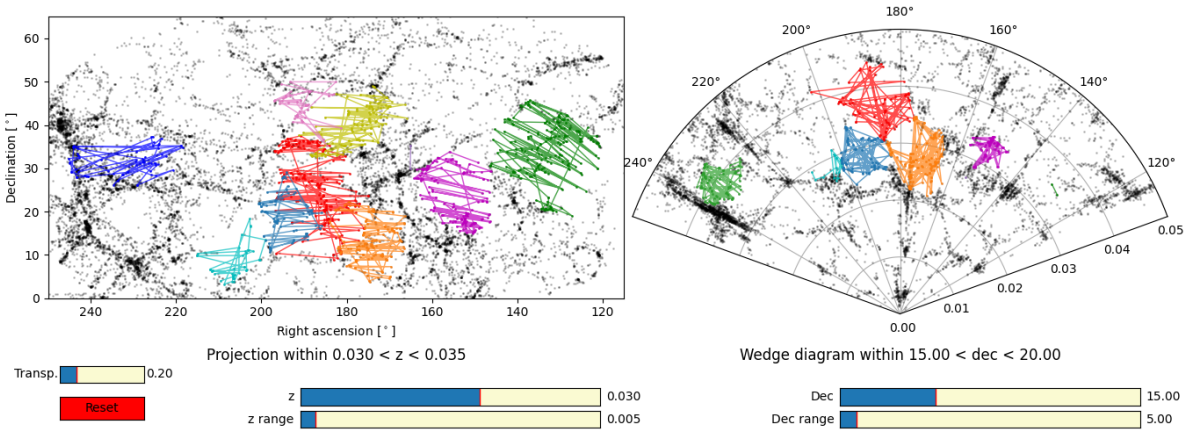
- Not clear as yet whether void galaxy's SFRs are similar to their counterparts in denser regions (e.g Beygu et al. 2016; Moorman et al. 2016; Ricciardelli et al 2014)
- Discrepancies about the present metallicity content of the gas in void galaxies (e.g. Pustilnik et al. 2011; Kreckel et al. 2015)
- No difference between dark matter/ stellar mass between void and non-void galaxies? (Douglass et al. 2020)
- No stellar population studies



Calar Alto legacy survey - Línea 4.4: Grandes cartografiados astronómicos - CCAAs: Andalucía, Valencia, Madrid, Cataluña, Canarias

- Awarded 110 useful nights with the PMAS/PPaK spectrograph on the 3.5m (CAHA Legacy) - started 2021
- Analise IFU data of around 300 void galaxies (200 observed up-to-date)
- 400 hours awarded IRAM CO data, 146 hours GBT time
- 100 nights awarded of WFC/INT deep optical imaging data
- ALMA data (40 hours)

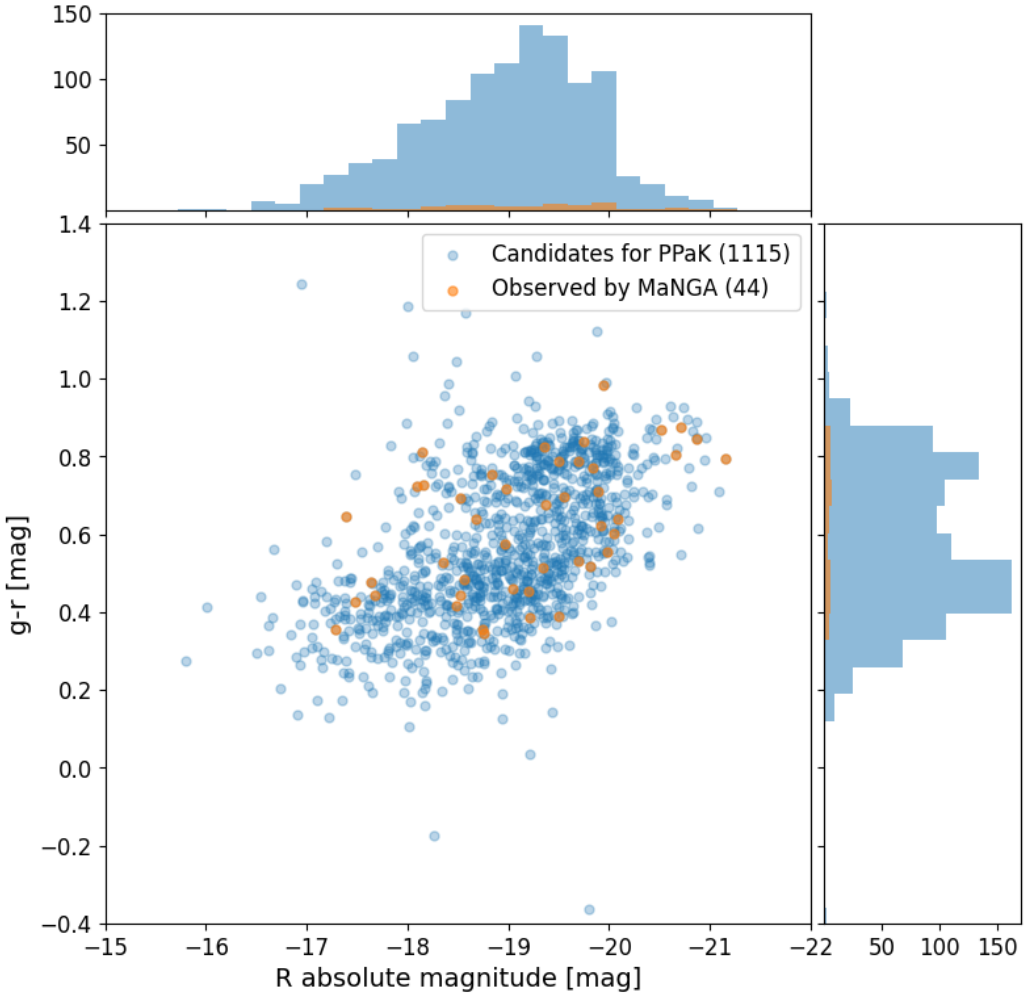
CAVITY sample



1115 galaxies

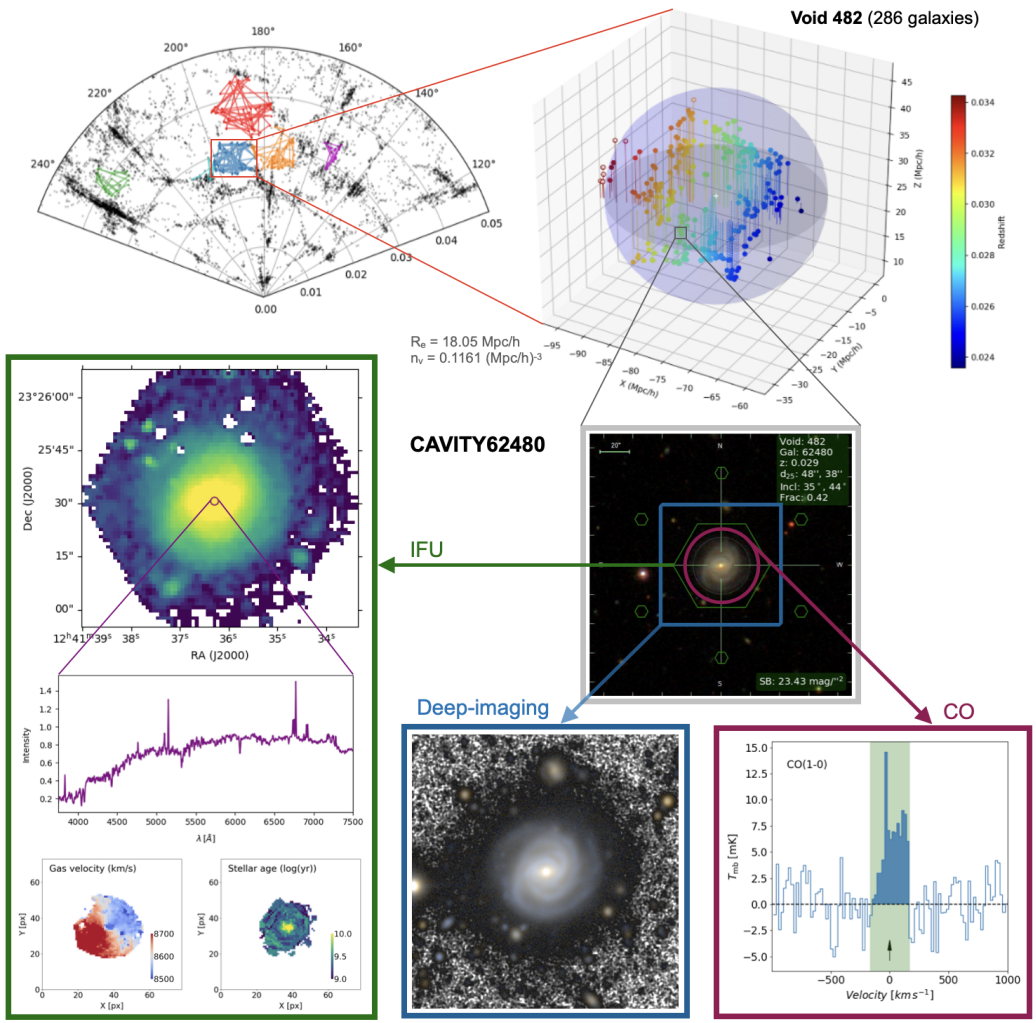
- Starting from the void catalog of Pan et al. 2012
- 15 voids covering different dynamical stages
- Avoiding the SDSS edges
- $z < 0.050$
- 24th isophote fitting the FoV and intermediate inclination

CAVITY sample



Pérez et al. 2024 (Presentation paper)

CAVITY products



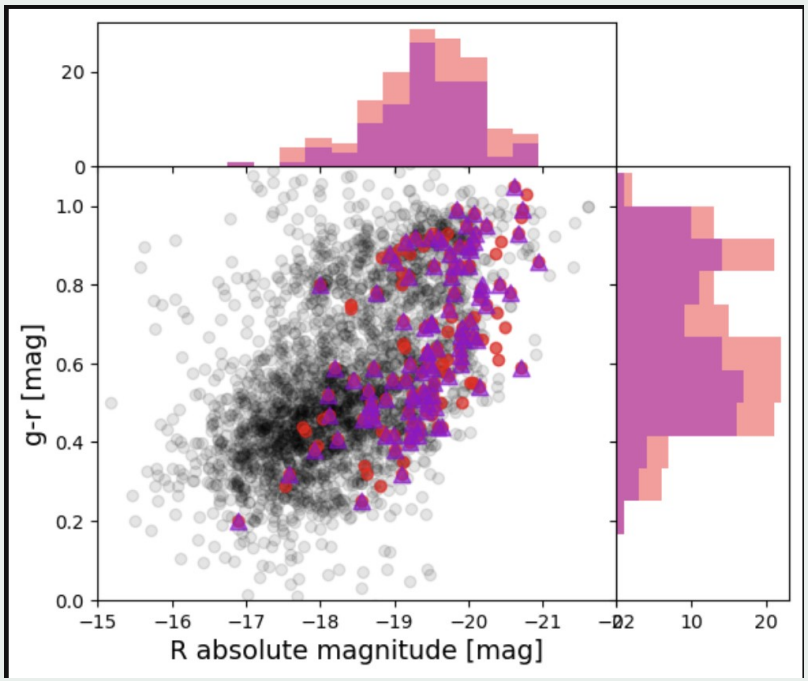
Pérez et al. 2024 (Presentation paper)

Status of the project

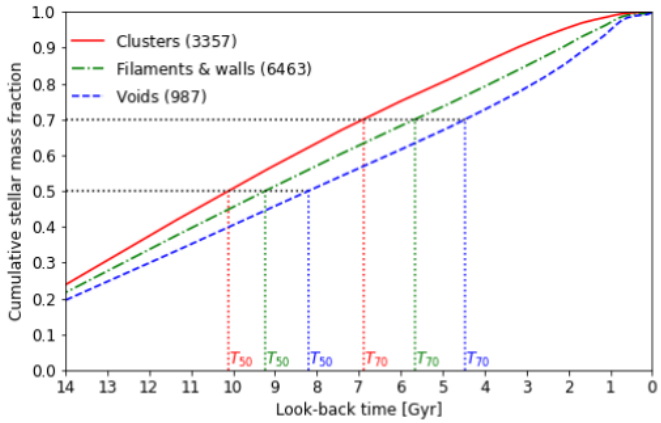
- 200 datacubes observed up-to-date (successful observing strategy)
- CO, HI, and deep-imaging data fully reduced
- QC teams and strategies in place
- Working pipe-line
- Working database (powered by Daiquiri, work lead by A. Jimenez)
- https://www.cavity.caha.es
- Open collaboration (cavity@ugr.es)
- PPCC: Follow-up contracts for two postdoctoral researchers, and a computing manager (database), plus two undergraduate researchers (one-year contracts)

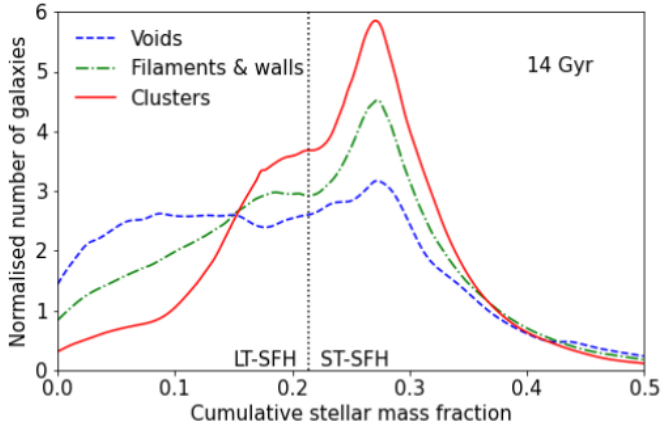
Status of the project - DR1

- First data release (100 cubes) July 2024 (SEA meeting)



Average star formation history





Dominguez-Gómez, 2023 Nature

- On average galaxies in voids evolve slower than galaxies in filaments (1Gyr) and much slower than in clusters (2Gyr)
- The SFHs at early times have a bimodal distribution around the average