

The LEGA-C Survey of 4000 Galaxies at z 1: stellar populations and stellar kinematics

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The LEGA-C Survey of 4000 z~1 Galaxies

Stellar Populations and Stellar Kinematics

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Star Formation History (& Future)



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I 28 night allocation on VLT; 20h integrations; typical S/N = 20/Å at R~4500



DR2 in July 2018 (Straatman et al. 2018); DR3 in May/June 2021 (van der Wel et al, in prep.)

2707 spectra of z~0.8 galaxies



- All spectra with measured stellar velocity dispersions and H γ absorption index
- Sorted by strength of H γ . Blue: strong (young age); Red: weak (old age)
- Polynomials removed: effect of dust taken out

Example spectra: a post-starburst galaxy



- Spectra in black
- Conroy SPS model in red; broadened by velocity dispersion (pPXF; Cappellari 2017)

Example spectra: an old elliptical



- Spectra in black
- Conroy SPS model (theoretical templates) in red has higher spectral resolution
- Vazdekis SPS model (empirical templates) in green fits better for old galaxies

Example spectra: a young spiral



- Spectra in black
- Conroy SPS model in red
- + Emission lines in blue (joint SPS+lines fit with pPXF)

Before LEGA-C



van der Wel+05;Treu+05, Gallazzi+14, Bezanson+14

After LEGA-C



50-fold increase in sample size

Before LEGA-C



van der Wel+05;Treu+05, Gallazzi+14, Bezanson+14

Quiescent Galaxies



Before LEGA-C



van der Wel+05;Treu+05, Gallazzi+14, Bezanson+14

Star-forming Galaxies



Quiescent Galaxies



Reconstruction of Star Formation Histories



Chauke, van der Wel+18, 19

Reconstruction of Star Formation Histories



- Down-sizing at z~l
- Star-forming galaxies at $z\sim0.6$ -I are in the middle of their main formation phase
- Mass weighted ages of most massive z~0.8 quiescent galaxies are 5 Gyr

Chauke, van der Wel+18

Spatially Resolved Kinematics



Jeans dynamical modeling



Jeans dynamical modeling



Stellar Dynamical Structure at z=0.6-1



- Spatial structure (round shape and high Sercic index) is a weak proxy for lack of rotation
- Star-forming galaxies are oblate rotators

Stellar Dynamical Structure at z=0.6-1



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Dynamical Structure



- Mass and dynamical structure are weak proxies for star-formation activity
- The fastest rotating galaxies are quiescent

Dynamical Structure



- Mass and dynamical structure are weak proxies for star-formation activity
- The fastest rotating galaxies are quiescent

Concluding Remarks

- LEGA-C: first probe at z>0 of
 - Stellar populations
 - Stellar kinematics
- Third Data Release coming soon (May 2021)
- Stay tuned for LEGA-C contributions by
 - Francesco D'Eugenio
 - Tania Barone
 - Po-Feng Wu
 - Anna de Graaff