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Galaxy Zoo: Star Formation Histories in the COSMOS Survey

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ABSTRACT

Key words: keyword1 – keyword2 – keyword3

1 INTRODUCTION

2 METHODS

Starpy from becky's paper Smethurst et al. (2015). Becky's group environment paper Smethurst et al. (2017). UltraVista catalogue paper Muzzin et al. (2013)

3 DATA

3.1 Multi-wavelength data

This study is based on a K_s-selected catalog of the COSMOS/UltraVISTA field from Muzzin et al. (2013). The catalog contains PSF-matched photometry in 30 photometric bands covering the wavelength range 0.15μm $\rightarrow$ 24μm and includes the available *GALEX* (Martin et al. 2005), CFHT/Subaru (Capak et al. 2007), UltraVISTA (McCracken et al. 2012), S-COSMOS (Sanders et al. 2007), and zCOSMOS (Lilly et al. 2009) datasets.

- Used rest frame U-V and V-J colours provided by Muzzin et al. (2013)
- These were calculated using the EAZY code Brammer et al. (2008), and the errors obtained from the error template in this paper.
- Filters for the bands: U,V Johnson filtres from Maíz Apellániz (2006), J - 2Mass Filter.

3.2 Environment data

Environment data from Darvish et al. (2015).

- Method used is Weighted Voronoi Tessellation
- Quote from darvish: Unlike the nearest neighbor, Voronoi tessellation is scale-independent and is able to span a wide range of physical lengths. Also, it does not make any assumptions about the geometry and morphology of the structures in the density field. This characteristic makes it superior to adaptive kernel and nearest neighbor methods.
- Quote from Darvish: However, this comes at the expense of a computationally expensive process by making several Monte-Carlo samples. Apart from its computational time, it is a robust estimator.
- formula:

$$\Sigma(r_i) = \frac{1}{A_i} \tag{1}$$

3.3 Galaxy Zoo Hubble Morphological classifications

In this investigation we use morphological classifications obtained from the Galaxy Zoo Hubble[1] (GZH) citizen science project (Willett et al. 2017). GZH allowed serveral independant visual classifications of each galaxy image by volunteers, the question flowchart for each image is shown in figure 4 of Willett et al. (2017).

The GZH project consists of 119,849 images

4 STAR FORMATION HISTORY MODEL

- we use the publicaly available STARPY code [2].
- stellar population models from Bruzual & Charlot (2003)
- implemented using solar metallicity
- implement with a Chabrier IMF Chabrier (2003)
- does not model for intrinsic dust.
- assumption that all galaxies formed at t = 0 Gyr with an initial burst of star formation

$$\mathrm{SFR}(t) = \begin{cases} \mathrm{SFR}_0(t_q) & t \leq t_q \\ \mathrm{SFR}_0(t_q) \exp\left[-\frac{(t-t_q)}{\tau}\right] & t > t_q \end{cases} \tag{2}$$

[1] https://hubble.galaxyzoo.org
[2] http://github.com/zooniverse/starpy/

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$$P(\theta_k) = \begin{cases} 1 & 0 \leq t_q \text{ [Gyr]} \leq 13.8 \text{ and } 0 \leq \tau \text{ [Gyr]} \leq 4 \\ 0 & \text{otherwise} \end{cases} \quad (3)$$

5 CONCLUSIONS

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