ABSTRACT

CONTENT: We present the initial stages to a study of bulge morphological and spectral evolution within disc/spiral galaxies over the redshift range $0 < z \leq 1$. 
AIMS: A set of statistical constraints on the demographics of the various different types of bulges over the last 8 Gyrs. 
METHOD: The use of a new mock galaxy imager (called MOGAL) developed to gain an understanding on the advantages and drawback of our morphological approach. Starting with a well characterised sample of local galaxies extracted from SDSS, mock galaxy samples were created at different redshifts and analysed using the state-of-the-art photometric decomposition tools. 
RESULTS: It is suggested that the new generation of HST-WFC3 surveys (i.e., CANDELS) are suitable to study the evolution of bulges in relatively massive galaxies ($M^* > 10^9 M_\odot$) since $z \sim 1.3$. We have demonstrated that to obtain accurate structural parameters, the study should focus on lower mass bulges $M^* \sim 10^9 M_\odot$, this was shown through the use of a set of sophisticated mock galaxy simulations.

MOCK GALAXY SIMULATION

PURPOSE: To better quantify the systematic and random uncertainties in the decomposition procedure and to help define the sample. 

a) SDSS disc galaxies images, identified by Gadotti 2009. 
b) Using a parameter set, mock galaxies are created.

b) Example of the photometric profiles used. (Dotted red = disc & dashed blue = bulge/sersic)

b ii) Shapshot of the spectral energy distribution using GALAXEV library of evolutionary stellar population synthesis models from Bruzual & Charlot (2003).

c - d) Mock galaxy results for galaxies modeled in the c) SDSS i-band, d) CANDELS WFC3 F125/J band and d) in the CANDELS F160/H band. Final redshift regimes for i-band rest-frame measurements in the J and H-band are $0.34 < z < 1.0$ and $0.70 < z < 1.43$. Galaxy total = 3420.

SAMPLE SELECTION

f) Using the GASP2D code developed in Méndez-Abreu et al. (2008) to disentangle bulges, bars and discs accurately, within the high redshift range. The parameters used to build the models vs. the output fitting results are shown as a function of z.

g) Detailed inspection of where the disc galaxies may lie in the CANDELS/COSMOS survey.

h) Sample of galaxies ready for 2D photometric decomposition and stellar population/Kinematic study.

FINAL REMARKS

CONCLUSIONS: It has been demonstrated that bulge parameters within a 10% accuracy can be recovered for bulges more massive that $M^* = 10^9 M_\odot$ till redshift 1.3. Our tests allowed us to select a mass matched sample of galaxies at different redshift ($0 < z < 1.3$), to study the evolution of their properties over the last 8 Gyrs.

FUTURE WORK: We will apply GASP2D to the high-redshift sample in CANDELS. The structural parameters calculated will form three dimensional intrinsic shapes of bulges at high-redshift. These will then be compared to local galaxies to identify any evolutionary trends. Using a new method highlighted in Wild et al. (2014), we will isolate the bulge luminosity to study the spatially resolved spectral energy distributions.

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