Galaxies and high redshift and their evolution over cosmic time
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Properties of high z galaxies in the ELTs era

L. Greggio, M. Gullieuszik, R. Falomo, D. Fantinel[1] and M. Uslenghi[2]

[1]INAF, Osservatorio Astronomico di Padova, Vicolo dell'Osservatorio 5, 35122 Padova, Italy
[2]INAF, Istituto di Astrofisica Spaziale e Fisica Cosmica, Via Bassini 15, 20133 Milano, Italy

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The extraordinary sensitivity and spatial resolution of the future extremely large telescopes will allow us to extensively characterize the photometrical and structural properties of high redshift galaxies in spite of their very small size. With such future facilities it will be possible to derive both accurate photometry and detailed morphology of very distant galaxies that are mandatory to tackle fundamental problems on the processes of galaxy formation and evolution.

In order to evaluate the ELT capabilities in this context we have produced a large set of simulated images of high redshift galaxies, and performed image analysis with GALFIT to retrieve the basic galaxy parameters: Sersic index, half light radius and total magnitude. The accuracy of the results was estimated by comparing the retrieved measurements with the input values. The simulations adopt the expected performances of the near-IR imager MICADO at the E-ELT and of NIRcam at JWST, and have been produced for galaxies at $z \sim 2$ and $z \sim 3$, spanning a mass range from 10^9 to $10^{11} M_\odot$. Galaxy sizes, magnitudes and colors as function of mass are obtained from the presently available scaling relations for high z objects.

We found that MICADO will provide extremely accurate measurements of the structural parameters of high redshift galaxies. For galaxies at $z = 2$ it will be possible to determine their effective radii and morphology (Sersic index) with an accuracy of few percent for galaxies with stellar mass down to $10^9 M_\odot$ and angular size > 20 mas (corresponding to only 0.15 kpc). Also for galaxies at $z = 3$ a similar accuracy is found down to $10^{9.5} M_\odot$. Such great accuracy for the structural parameters allows to probe the color gradient of these galaxies with unprecedented reliability (see Figure 1). Full details of these simulation are given in Gullieuszik et al. (2015, in preparation).

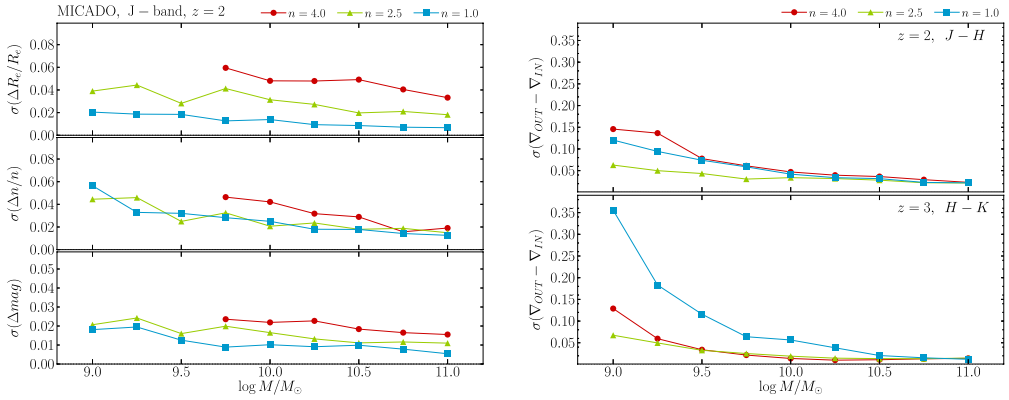

Figure 1. *Left panel*: Uncertainty on the effective radius, Sersic index (n), and total magnitude obtained from simulated MICADO@E-ELT observations in the J-band of galaxies at $z = 2$ with various morphology. *Right panel*: Uncertainty on the color gradient ($J-H$ and $H-K$) measured on galaxies at redshift 2 and 3.