New constraints on the abundance of very massive galaxies at $4 < z < 7$ from UltraVISTA and S-COSMOS

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Abstract

We study the population of massive (i.e., $\log(M_*/M_\odot) > 11$) galaxies at $4 < z < 7$ using a Spitzer IRAC 4.5μm-complete sample obtained complementing the Ks-band selected UltraVISTA catalog with detections in the residual images resulting from the photometry in the IRAC 3.6μm and 4.5μm bands.

We investigate the systematic effects of the bayesian prior, the specific SED template sets, the contamination by nebular emission lines and different star-formation histories in the measurement of photometric redshifts and stellar population parameters. We find that these measurements are mostly affected by the introduction of the bayesian prior, while the other factors introduce small dispersions.

We study the evolution of the stellar mass function (SMF) in three redshift bins, $4 < z < 5$, $5 < z < 6$ and $6 < z < 7$. The SMFs obtained without the introduction of the bayesian prior do not show any evolution from $z \sim 6.5$ to $z \sim 3.5$, suggesting that massive galaxies could already be present when the Universe was ~ 0.9 Gyr old. However, the introduction of the bayesian prior drastically reduced the number of $z > 4$ massive galaxies implying a rapid growth in the first 1.5 Gyr of cosmic history.