The connexion between galaxy morphology and spectrophotometric properties since z∼6

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Abstract

The global properties of galaxies show a strong evolution of the star formation rate and stellar mass density at the epoch of galaxy assembly, driven by several competing physical processes (merging, accretion, feedback, environment,...). The morphological properties of galaxies are also strongly evolving over the same timescales. We investigate how the evolution of the morphological properties is connected to the spectrophotometric properties of galaxies since z∼6.

The spectroscopic data obtained within the VIMOS Ultra Deep Survey, a new unique spectroscopic survey of ∼10000 galaxies between redshifts $z \sim 2$ and $z \sim 6$ conducted at the ESO-VLT (Le Févre et al. 2014), combined with the available Hubble Space Telescope imaging surveys COSMOS (Scoville et al. 2006), GEMS (Giavalisco et al. 2004) and CANDELS (Grogin et al. 2011, Koekemoer et al. 2011) provide a great way of probing galactic evolution across that cosmic epoch.

We make use of a three methods approach to quantify morphological properties by combining visual classification with parametric fitting via GALFIT (Peng et al. 2002, 2010) and with non-parametric quantification - CAS (Conselice 2003), GM_{20} (Lotz et al. 2004), T$\psi\xi$ (adapted from Law et al. 2007), F (adapted from Matsuda et al. 2011) and MID (Newman et al. 2013) - to constrain the evolution of morphological properties of galaxies. The results are then combined with the physical properties of galaxies derived from the VUDS spectra (e.g. EW of lines including Ly-α and CIV, continuum slope β, ...) and from the spectral energy distribution derived from multi-wavelength photometry, using the exact knowledge of the spectroscopic redshift.