Investigating star-forming galaxies in the first billion years with deep spectroscopy

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Abstract

The investigation of faint luminosity regimes ($L < L^*$) within the first billion years is essential to characterize the early generation of star-forming systems and their role in the cosmic hydrogen reionization. The combination of high-quality ESO archival data and the ongoing ESO VLT/FORS2 large program (P.I. Pentericci) has allowed us to collect the deepest spectroscopic observations of $z > 5$ galaxies in their UV domain. I will present results from 15-30 hours integration (and up to ∼50hr for a few cases) on $z > 5$ candidate galaxies lying in the CANDELS fields. Composite spectra of hundreds of hours ($100 - 400hr$) will be presented and linked to the physical properties extracted from their observed spectral energy distribution and colors. For the first time a stacked spectrum of $z \simeq 6$ $non - Ly\alpha$ emitters has been computed. The spectroscopic investigation of even fainter luminosity regimes ($L << L^*$) is severely limited by current facilities. However, a first glance of the properties in the faint luminosity domain, down to a few percent of L^*, is feasible through strong lensing magnification. In this regard, the discovery of sources with $L \sim 0.01 - 0.07L^*$, low stellar mass and steep ultraviolet spectral slope ($\beta_{UV} < -2.5$) at spectroscopic redshift $3.0 - 6.5$ in the CLASH and Frontier Fields galaxy cluster surveys will be also reported and their possible ionizing nature discussed.