Constraints on reionization from a multi-wavelength analysis of $z > 6.5$ galaxies

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Abstract

Our understanding of the epoch of re-ionization has progressed in these last years thanks to IR instruments from space and ground enabling the selection and study of large galaxy samples at z> 6. In particular, the first spectroscopic observations of z∼7 galaxies have shown a marked decrease in the fraction of Lyα emitting galaxies at z>6.5 that can be interpreted as evidence of an increase of the neutral hydrogen fraction in the IGM. Unfortunately, the interpretation of these findings is plagued by our lack of understanding of the physical properties of the sources. Indeed, the measured lack of Lyα emission can be also explained by a combination of factors such as an increase in the escape fraction of inizing photons (f_{esc}), or an higher dust coverage in star-forming regions.

I will present the latest results from our ESO FORS2 large program aimed at constraining the Lyα emission properties of z>6.5 galaxies in the CANDELS fields. I will show that an accurate multi-wavelength analysis of these sources enabled by the deepest IR data available in these fields allows to break the degeneracies among different factors (f_{esc}, dust) explaining their lack of Lyα emission. In particular, I will present constraints on the Ly-continuum escape fraction obtained by measuring mid-infrared colors affected by optical rest-frame emission lines in stacked samples of both photometric and spectroscopic z∼7 galaxies.