

Illuminating the dark side of cosmic star formation and stellar mass assembly at $z > 3$ (Margherita Talia)

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One of the key open questions in galaxy evolution is how efficiently galaxies form stars as a function of cosmic time. In order to solve this problem, it is crucial to reconstruct the star formation rate density (SFRD) and its integral (the stellar mass assembly history) to the highest possible redshifts. However, the available information at $z > 3$ is limited and biased towards UV-luminous galaxies. One approach is to search for star-forming galaxies (SFGs) at $z > 3$ missed by optical/NIR surveys because of dust obscuration, and detect them in the FIR/mm. However, this is not trivial because of the limited sensitivity at $z > 3$ and/or the source blending issues of current data. Another possibility is offered by radio surveys with excellent sensitivity and angular resolution. In this project we have used radio data from the VLA-COSMOS survey (Smolcic et al., 2017a) to search for dusty SFGs at $z > 3$. We selected a subsample of 286 galaxies without optical/NIR counterpart in COSMOS2015 photometric catalogue (Laigle et al., 2016). We reconstructed the median Spectral Energy Distribution (SED) of this sample (Talia, Giulietti et al. in prep) performing a stack in each band from the optical to 24 μ m and combining the results with FIR data (Herschel+SCUBA from Jin et al., 2018). The median SED shows no detection in optical bands, while significant emission emerges from NIR to sub-mm. Moreover the SED fitting allow us to provide an estimate of a photometric redshift of ~ 2.6 and to derive an infrared luminosity (LIR; 8-1000 μ m) of $10^{12.2} L_{\odot}$, consistent with ULIRG's range luminosity. For a subsample of 169 (out of 286) galaxies it was possible to recover a few detections from NIR-to-FIR and to construct the individual SEDs. From the individual SED-fitting we derived a distribution of photometric redshifts that peaks at $z \sim 3$ with a tail at $z > 4$ and a mean extinction value $A_V = 5$ mag. These results suggest the existence of a significant population of obscured high redshift galaxies completely missed in the available NIR surveys, and that our approach based on radio selection is very efficient to find them.

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