

The nature and evolution of star-forming galaxies over the last 11 Gyrs with a single, homogeneous selection

David Sobral^{1,2,3}

¹ *Instituto de Astrofísica e Ciências do Espaço, Universidade de Lisboa, OAL, Tapada da Ajuda, PT1349-018 Lisboa, Portugal*

² *Centro de Astronomia e Astrofísica da Universidade de Lisboa, Observatório Astronómico de Lisboa, Tapada da Ajuda, 1349-018 Lisboa, Portugal*

³ *Leiden Observatory, Leiden University, P.O. Box 9513, NL-2300 RA Leiden, The Netherlands*

Abstract

I will present the results from the deepest and widest narrow-band surveys ever undertaken with the best 4-8 m telescopes (CFHT, UKIRT, Subaru and the VLT); a unique combined effort to select large, robust samples of (mostly) H α star-forming galaxies at $z = 0.20, 0.40, 0.8, 0.84, 1.47$ and 2.23 (corresponding to look-back times of 2, 4.2, 7.0, 9.2 and 10.6 Gyrs) in a uniform manner over $\sim 2\text{-}10\text{ deg}^2$ in the COSMOS, UDS and SA22 fields. We are able to fully evaluate and overcome cosmic/sample variance with our large, multiple volumes. Our results reveal the exponential decline of the typical star-formation rate of galaxies (SFR*) over the last 11 billion years, and very little evolution in the stellar mass function of star-forming galaxies, with strong implications to the main drivers of galaxy evolution. Our H α star formation history also implies a stellar mass density growth which is in perfect agreement with independent observations of the stellar mass density growth over the last 11 billion years, finally resolving the worrying disagreement seen in the literature.

I will finish by showing how our large and homogeneously selected samples of H α emitters across cosmic time are ideal to unveil the evolution (by comparing like with like) of the dynamics (e.g. SINFONI, KMOS), dust (e.g. Herschel, Spitzer, ALMA), clustering, environment, and (resolved) metallicity (e.g. KMOS, FMOS) of typical star-forming galaxies since the peak of the star formation history.