Revolutionising our understanding of distant Lyman-α emitters: calibrating Lyα and the evolution of the LF from $z \sim 9$ to $z \sim 2$

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Abstract

I will present results from our recent largest narrow-band surveys in order to improve our understanding of the early Universe ($z > 2$) using the Lyα emission line. Using a matched Hα-Lyα survey at $z = 2.23$, we calibrate the Lyα escape fraction for different subsets of galaxies. We find a Lyα escape fraction of 4 ± 3 % for all star-forming galaxies, but 30 % for Lyα selected galaxies. We use this knowledge to study in depth the evolution of the bright end of the Lyα luminosity function from $z = 2 - 9$, using our INT WFCAM data at $z = 2$ and $z = 3$, new, archival, and published Subaru Suprime-Cam data at $z = 6.6$ and our CFHT WIRCAM + VLT SINFONI study of $z = 8.8$ Lyα candidates. While our depth is similar to previous surveys, the probed area is increased by more than an order of magnitude, allowing the study of the brightest Lyα emitters and overcoming cosmic variance. Based on our $z = 2.23$ findings, we are able to apply a much more complete selection of Lyα emitters and comment on published results. I will finish by highlighting the implications of our results for the cosmic history of star formation and for the study of the epoch of reionization.