

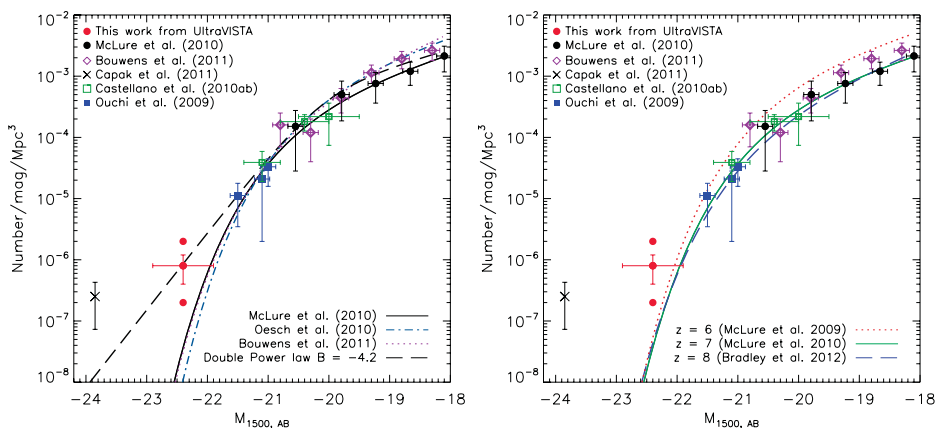
# Discovery of bright $z \sim 7$ galaxies in the UltraVISTA survey

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**Abstract.** We have exploited the new, deep, near-infrared  $Y, J, H, K_s$  UltraVISTA imaging of the COSMOS field, in tandem with deep optical and mid-infrared imaging, to conduct a new search for luminous galaxies at redshifts  $z \simeq 7$ . We have utilised this unique multi-wavelength dataset to select galaxy candidates at redshifts  $z > 6.5$  by searching first for  $Y+J$ -detected objects which are undetected in the CFHT and HST optical data. This sample was then refined using a photometric redshift fitting code, enabling the rejection of lower-redshift galaxy contaminants and cool galactic M, L, T dwarf stars. The final result of this process is a small sample of (at most) ten credible galaxy candidates at  $z > 6.5$  (from over 200,000 galaxies detected in the year-one UltraVISTA data). The new  $z \simeq 7$  galaxies reported here are the first credible  $z \simeq 7$  Lyman-break galaxies discovered in the COSMOS field and, as the most UV-luminous discovered to date at these redshifts, are prime targets for deep follow-up spectroscopy. We explore their physical properties, and briefly consider the implications of their inferred number density for the form of the galaxy luminosity function at  $z \simeq 7$ .

**Keywords.** galaxies: evolution, galaxies: formation, galaxies: high-redshift



**Figure 1.** The above plots show a compilation of the current Schechter function determinations and data points for the  $z = 7$  galaxy UV ( $\simeq 1500 \text{ \AA}$ ) luminosity function. The estimated data-point from our new UltraVISTA study is shown in red, with Poissonian errors on the number density, with the upper, central and lower point given by ten, four or only one candidate in our sample being confirmed as a  $z > 6.5$  galaxy. A double power-law curve is also included for comparison. In the right-hand plot we show the same data, but this time compared with the  $z = 6, 7, 8$  luminosity functions.

## References

Bowler, R. A. A., *et al.* 2012, *MNRAS*, 426, 2772