

**An on-going multi-wavelength survey of Ly α -emitters at
redshifts $z \approx 2 - 8.8$**

Kim Nilsson^{1,2}

Johan P.U. Fynbo², Palle Møller¹

¹ *European Southern Observatory, Garching, GERMANY*

² *DARK Cosmology Centre, Copenhagen, DENMARK*

Abstract

We present our on-going survey strategy to investigate the properties of Ly α -emitters (LEGOs) over a large redshift range, including narrow-band imaging in the GOODS-S and GOODS-N fields at intermediate redshift ($z \sim 2 - 3$). We especially focus on our latest results in the GOODS-S field where we have found a sample of LEGOs at redshift $z = 3.15$. From the multi-wavelength data-set available in the GOODS-S, we conclude that LEGOs at this redshift are small, blue, AGN-free, moderately star forming galaxies. In this survey, we also found an extended Ly α “blob”. A large number of blobs have been found to date, but the explanations for their existence are diverse. Is it star formation driven “super-winds”, AGNs or cold accretion? The blob in our survey is the first to be best explained by cold accretion onto a dark matter halo. Finally, we mention our future survey plans, including a narrow-band filter survey for Ly α -emitters at redshift $z = 8.8$ (ELVIS - Emission Line galaxies with VISTA Survey). For this survey, the DARK Cosmology Centre is procuring a full set of narrow-band filters for the VISTA telescope. The VISTA camera consists of 16 infrared detectors, with a mosaiced field-of-view of 1.5 deg^2 , three times larger than UKIRT/WFCAM and six times larger than CFHT/WIRCam. With our survey, we expect to find several tens of LEGOs at redshift $z = 8.8$, revealing the state of re-ionisation at this very high redshift and giving unique insights into galaxy formation and evolution.