Highlights of Astronomy, Volume 14
IAU XXVI General Assembly, 14-25 August 2006
Karel A. van der Hucht, ed.

doi:10.1017/S1743921307010356

Properties of Lyα emitters at $z \simeq 6$

Crystal L. Martin[1], Marcin Sawicki[1], Alan Dressler[2] and Patrick J. McCarthy[2]

[1]Department of Physics, UCSB, Santa Barbara, CA 93106, USA
email: cmartin@physics.ucsb.edu

[2]OCIW, 813 Santa Barbara Street, Pasadena, CA 91101-1292, USA

Abstract. We confirm the redshift of several $z \simeq 6$ objects discovered by our IMACS multislit emission-line survey. Their Lyα luminosities are lower than those of galaxies previously discovered using narrow-band imaging, as expected due to the excellent sky-supression inherent to this technique. Based on the line profiles of these objects, we argue that they are extremely young starbursts and find strong evidence for prominent galactic winds. This population of young galaxies is largely beyond the reach of current large surveys that use continuum selection.

Keywords. galaxies:high-redshift, line: identification, techniques: miscellaneous

---

Using the Inamori Magellan Areal Camera and Spectrograph (IMACS) on the Baade Telescope, we carried out a spectroscopic, emission-line survey through the OH-free atmospheric window at 8200 Å. A custom blocking filter and multislit mask allowed us to search 50 square arcminutes of *blank sky* per pointing. The total survey area to date is 200 square arcminutes, a significantly larger area than that covered by previous multislit surveys (Martin & Sawicki 2004; Tran *et al.* 2004).

We discovered nearly 300 emission-line galaxies and identified $\sim 90\,\%$ of them as foreground objects in our follow-up observations. From the spectra of the confirmed Lyα emitters, we derive physical properties of galaxies at redshift 5.7. For example, we detect N v $\lambda\lambda 1239, 43$ in the spectrum of MSDM 29.5 + 5.1 in addition to a 280 km s^{-1} wide Lyα line. We argue that this object is either a very young starburst (light dominated by O and WR stars) or a Type II AGN. Higher resolution spectra of this object and that of MSDM 80.0+3 reveal structure in the Lyα line profiles characteristic of radiative transfer effects in galactic winds (Hansen & Oh 2006; Verhamme *et al.* 2006).

These Lyα emitters are the first discovered using the multislit search technique. They are drawn from a much larger volume than lensed searches. Typical line fluxes, $F \approx 6 \times 10^{-18}$ ergs s^{-1} cm^{-2} or $\log L \approx 42.32$ erg s^{-1}, are fainter than those from narrow-band imaging surveys. Addition of our results to those from these techniques will better determine the luminosity of the knee in the Lyα luminosity distribution near redshift 6. Measurement of the Lyα luminosity function will impact the outstanding question of whether the objects that ionize the intergalactic medium have been identified and make it possible to trace the progression of re-ionization via evolution in the luminosity function.

References

Hansen, M., & Peng Oh, S. 2006, *MNRAS*, 367, 979
Martin, C. L., & Sawicki, M. 2004, *ApJ*, 603, 414
Tran, K. H., Lilly, S. J., Crampton, D., & Brodwin, M. 2004, *ApJ*, 612, 89
Verhamme, A., Schaerer, D., & Maselli, A. 2006, *A&A*, 460, 397