A MULTI-BAND SURVEY FOR LBGS AND Z < 2 QUASARS IN THE EXTENDED HDF-S

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Abstract. We present new observations in the UV and R-band of the extended (E)HDF-S, to enable searches for Lyman break galaxies (LBGs) at $z \sim 1 - 2$ and quasars at $z \lesssim 2$. This will pave the way for tracing large scale structure (LSS) in the region via galaxy filaments and also permit tomography via quasar absorbers. The EHDF-S is the southernmost public deep field: (1) the mostly easily accessible from planned Antarctic facilities, and (2) one of the few in the HST continuous viewing zone (CVZ). Continued surveys in the region will also prepare for future exploitation with ALMA, SKA etc.

Keywords: quasars, deep fields, Lyman break galaxies, surveys

1 Introduction

The HDF-S was chosen to complement the HDF-N, to help characterise cosmic variance, and to provide a deep field for southern observatories. ADS in June 2012 shows at least 339 refereed papers with HDF-S in the abstract. HST coverage spans a few arcmin each for STIS, NICMOS, WFPC2 etc. A number of wide-field imaging observations have been done of the EHDF-S, from FUV to 20 cm (Table 1). In addition, there are $\sim 500$ spectroscopic or photometric redshifts available e.g. Sawicki et al. (2003) and Glazebrook et al. (2006), which show redshift spikes at $z \sim 0.50$ and 0.57.

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<th>study</th>
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<td>BTC</td>
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<td>10$'$ $\times$ 20$'$</td>
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<td>MUSYC</td>
<td>10$'$ $\times$ 20$'$</td>
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<td>3.6,11,20 cm</td>
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2 Observations

GALEX: We combined GALEX EHDF-S data from our program with images from MAST. Altogether, we have 12 ksec of FUV images, 25 ksec of NUV images and 45 ksec of NUV slitless spectroscopy. We find 17 NUV-bright quasars with $0.4 < z < 1.3$ (see Fig. 1 for an example).
Fig. 1. Sample NUV slitless spectrum from GALEX for quasar with $z = 1.16$. Note strong absorption at 2290 Å, possibly damped Lyα at $z = 0.88$.

**LCO R-images:** About half our NUV-bright quasars are outside the BTC/MUSIC fields. We used the Las Campanas 2.5 m Dupont + WFCCD to image 4x25′ diameter fields in $R$-band over 2011 Dec 28–30 to $R \sim 25$ ($\sim 1.1$ Å FWHM).

**SALT, Warsaw Telescope Observations:** We have obtained $\sim 8$ hours on SALT multi-object spectroscopy for quasar confirmation, and 3 nights of Warsaw 1.3 m telescope time for deep $VI$ imaging over 1.2°, in 2012 Jun–Sep (Fig. 2).

3 Results and Discussion

**UV-Optical Quasar Candidates:** We used $FUV - NUV - u - g - r$ transformed colours from [Hutchings & Bianchi (2010)] and Hutchings (2012 private comm.) to isolate on the order of at least 1000 $z < 2$ quasar candidates with $R < 22.5$ from the stellar and galactic loci in the BTC and MUSYC fields.

**$z \sim 1$ Lyman Break Galaxies:** We identified $\sim 1900$ $FUV$ dropouts ($FUV - NUV \geq 1.5, R < 22.5$) in the BTC and MUSYC fields. We are calculating their 7-band photometric redshifts to identify any concentrations/indications of structures, similar to [Haberzettl et al. (2009)].

**Future Exploitation:** A number of southern/Antarctic facilities are coming online in the near future. ALMA and SKA will revolutionise mm and radio astronomy. Several Antarctic observatories are proposed/planned to profit from the superior seeing and low water column:

- China: 4 m KDUST IR and 10 m submm
- France/Italy: 2.5 m Polar Large Telescope
- Japan/China: 2.5 m PLATO-type telescope

See [Burton (2010)] for details. The HDF-S remains a field with unique potential due to its accessibility from Antarctica, and its potential for doubly efficient HST observations in the CVZ.
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References