ELAIS-N1 Spectroscopic Redshift - Selection Functions and Completness - Version 1.0

The ELIAS-N1 field is covered by only a few surveys each with different selection criteria. We have discussed about the Selection and Completeness Sections for each survey below.

1 Berta et al. (2007) - Source 1

Berta et al. (2007) use the Keck telescope with the LRIS instrument to obtain optical spectroscopy of 35 $z \geq 1.4$ ULIRGs across the Lockman-Hole, ELAIS-N1 and ELAIS-N2 fields. High redshift ULIRGs were targeted by choosing objects which peak at 4.5 or 5.8 μm. In addition a r' magnitude limit of 24.5 (Vega) was imposed to ensure targets were detectable but also objects with $r' < 21$ were avoided. In addition to the primary selection spare slits were chosen to look at interesting photometric sources, such as red optical-NIR colors, X-ray/radio detections etc... The fall sample of Berta et al. (2007) includes 233 objects and in total 139 reliable redshifts were measured. For our catalogue of the ELAIS-N1 field we used 56 observations of which we classified 36 as reliable.

2 SDSS DR12 - Source 2

The SDSS data covers the entirety of the Bootes field and provides measurements of 4283 redshifts of which 4274 are considered reliable. As the SDSS contains many different surveys with different selection criteria we refer the reader to the SDSS DR12 webpages. However, the main galaxy sample consists of galaxies with r-band Petrosian magnitudes $r \leq 17.77$ and r-band Petrosian half-light surface brightnesses $\mu_{50} \leq 24.5\,\mathrm{mag\,arcsec^{-2}}$ and are essentially ($\sim 99\%$) complete.

3 Trichas (2010) - Source 4

The aim of the Trichas et al. (2010) study was to test the AGN selection methods in IR, by getting optical spectroscopy with both WIYN and Gemini-North in the ELAIS-N1 field. For Gemini GMOS targets sources were selected with $21.5 < r < 23.5\,\mathrm{mag}$ and for WIYN $r < 21\,\mathrm{mag}$. For Gemini sources were chosen if they were X-ray sources in the Chandra fields. The priortity was assigned firstly whether they had optical or IR SEDs identified them as AGNs (45 observed), secondly if they had a redshift greater than one (101 observed); all other sources in the magnitude range was given the lowest priority (63 observed). For WIYN targets the following priority was used: (i) bright cluster galaxies (23 observed), (ii) X-ray detected (34 observed), (iii) AGN-selected IR sources (48 observed), (iv) galaxies between two clusters (12 observed) and (v) 24 μm sources (50 observed). The paper states that 89% of observed targets have a realiable redshift. For our catalogue we obtain 211 reliable redshifts (we do not use redshifts marked as single-bright line).

4 Swinbank et al. (2007) - Source 8

The study of Swinbank et al. (2007) was to spectroscopically follow up galaxy over-densities in the ELAIS-N1 field with Gemini/GMOS observations. Cluster candidates were found by looking for a passive red galaxy sequence from colour-magnitude diagrams using infrared photometry and then a search for an over-density of this population performed. A fried-of-friend check on their targets was performed to

try to ensure clusters were targeted. Out of 134 targets, 111 reliable redshifts were found (onlt 109 made it into our catalogue).

5 Rowan-Robinson Catalogue (2013) - Sources 16 & 32

A study by Smith et al. 2004 of WIYN/Keck/Gemini observations was listed in the Rowan-Robinson catalogue but the original data or paper could not be found. We have assumed the redshifts are reliable but no information on selection or completeness is known. We also use the NED information provided in the same catalogue but only include unique sources as some data in NED maybe present in our other redshift sources.