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A CATALOGUE OF HIGH REDSHIFT CLUSTERS

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Distant clusters of galaxies provide a powerful method to study the formation and evolution of galaxies and large scale structure of the Universe. However, the number of known clusters at high redshift (z > 0.5) is still limited. As a preparatory work for detailed studies with GTC, we are building a catalogue of such objects analyzing public deep wide optical and near-IR surveys. In a region of ∼ 9 square degrees, ∼ 100 new clusters (∼ 60 of them at z > 0.5) have been detected.

INTRODUCTION. Several methods have been traditionally used in the optical and near infrared to detect clusters of galaxies, most of them based on the detection of surface density enhancements in the 2-dimensional galaxy distribution and, when possible, information in two or more filters: counts in cell techniques, application of different filters (Postman et al. 1996), color selection (Gladders & Yee 2000), Voronoi tessellations (Ramella et al. 2001), etc. However, the detection of high redshift clusters (those at $z > 0.5$) is still challenging, and requires large efforts to get adequate samples for statistical studies.

DATA. We have used the public data from the NOAO Deep Wide Field Survey (NDWFS, Januzzi et al. 2002, http://www.noao.edu/noao/noaodeep) and the Deep Lens Survey (DLS, Wittman et al. 2002). The main properties of the NDWFS are summarized in Table 1.

TABLE 1

MAIN PROPERTIES OF THE NDWFS

Area covered	9 sq. deg. released (18 total)
Photometry	Bw, R, I, J, H, K
Completeness limit	R ∼ 25.5

METHOD. We use the publicly released catalogues of the survey. Photometric redshifts have been computed using the code by Fernández-Soto et al. (1999). Then, we look for overdensities in the (α, δ, redshift) plane, filtering the distribution of objects in each redshift slice with a kernel with the expected size of a cluster at that redshift. We indentify the most statistically significant peaks as cluster candidates.

TESTS. The reliability of the method has been tested extensively using Monte Carlo simulations. These have demonstrated that typical clusters are detected with high significance up to redshifts ∼ 1.0. The capability of the method has been proved also with the clear detection of the previously known cluster J105511.6-050416 (z ∼ 0.68, Wittman et al. 2003).

RESULTS. We have detected ∼ 100 cluster candidates, ∼ 60 of them at z > 0.5 (Juncosa et al., in preparation).

SCIENCE WITH GTC. The catalogue of high redshift clusters will constitute a large and homogeneus sample for detailed studies with GTC. In particular OSIRIS, one of the first light instruments, has optimum configurations to study morphology and luminosity function (broad band imaging), star formation (tunable filters), kinematics (MOS), etc.

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