



The Capodimonte Deep Field: research projects

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Abstract. The Capodimonte Deep Field (OACDF) is a multi-colour imaging survey on two 0.5×0.5 square degree fields performed in the *BVR* bands and in six medium-band filters (700 - 900 nm) using the Wide Field Imager (WFI) at the ESO 2.2 m telescope at La Silla, Chile. In this contribution we give a summary of the current OACDF scientific projects.

Key words. surveys – galaxies: clusters: general – galaxies: active – quasars: general

1. Introduction

In order to be ready for the scientific exploitation of VST, and in view of the proposal for the realization of a 200 square degree OAC-VST survey, the INAF-OAC performed a pilot survey project called the Capodimonte Deep Field (OACDF), which is a multicolor imaging survey covering 0.5 square degree. The OACDF data were acquired with the Wide Field Imager (WFI) at the ESO 2.2-m telescope. The OACDF provides targets for a variety of extragalactic projects. This database will be also relevant for galactic and planetary studies. The 5σ and 10σ limiting magnitudes of the OACDF are 25.5 and 24.3 in the *R*-band

respectively. Here, we present a summary of the current OACDF scientific projects. A more detailed description of the OACDF project can be found in the OACDF web page¹.

2. Search for clusters of galaxies

The extracted catalogs for the extended sources are being used to identify a number of candidate clusters, using an algorithm developed at the INAF-OAC (see Puddu et al. 2001 for details). A dozen of candidates for clusters of galaxies have been identified so far. The early type galaxies sequence has been determined for these candidates and estimates of the photometric redshifts has been done using the HYPERZ package. One of these new clusters, at $z_{ph} = 0.2$,

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¹ See <http://www.na.astro.it/oacdf-bin/cdfcgi>

has been studied in more detail by obtaining spectra for some cluster members, using EMMI-MOS at the ESO-NTT. The RMS between the spectroscopic and the photometric redshifts is of the order of 0.036. The results and analysis of these data will be published in a forthcoming paper.

3. Early type galaxies at intermediate redshift

The major goal of this project is to confirm predicted photometric redshifts for a fair sample of candidates for early type galaxies at $z < 1$ in the OACDF. This aims at the study of possible differences in the scaling and photometric properties of objects in the field and the cluster populations, as well as to study their luminosity function (LF) and compare it with the predicted one, either from passive evolution or from cold dark matter (CDM) models. The candidates are selected from colour-colour diagrams, based on population synthesis codes. Observations were performed for some 95 candidates during two nights using EMMI-MOS at the ESO-NTT. The resulting spectroscopic redshifts are in good agreement with the photometric redshifts. See the OACDF web page for more details.

4. Search for AGNs

The main goal is to have a well defined sample of AGNs for a detailed study of their environment as a function of redshift and AGN type. A preliminary selection and classification of AGNs in the OACDF is based on the comparison between observed colours and theoretical colours at a given redshift. Future spectroscopy of our candidates will allow the identification and redshift estimates. The analysis of spectra will also allow to classify AGNs (Seyfert 1, Seyfert 2, NLS1, QSOs) and derive physical parameters through emission line ratios. The combination of imaging and spectroscopic data will allow to derive the AGN-galaxy correlation function over a wide range of redshifts. For more details see the OACDF web page.

5. Variable objects and transients

The dithering character of the OACDF observations allows to have a time resolution and, hence, to search for variable objects and transients. Some hundred asteroid traces and several variable stars have been found in the OACDF using this technique. The pipeline for the detection of these type of objects is still under development.

6. Search for high-redshift Quasars

The main goal of this project is to search for QSOs at $z > 3$ and study their clustering, as well as their environment in order to determine the faint luminosity function and the two-point correlation function at $z \approx 4$. A new QSO at $z = 3.15$ has been found and we expect to find some 10 to 15 more QSOs in the OACDF.

7. Gravitational lens candidates

Some candidates for gravitational lens were also discovered in the OACDF. Spectra of the components of one of the candidates, obtained using the TNG and EMMI-MOS at the ESO-NTT, are identical to about 99% confidence level, but the spectra are typical for elliptical galaxies and no emission lines are detected. The results of this research will be published in a forthcoming paper.

8. Interacting galaxies

A number of interacting galaxies have also been identified in the field of the OACDF. Some examples of images of these objects and their spectra can be seen in the OACDF web page. Studies of these systems, using star formation indicators like $H\alpha$, [O III] and [O II] are currently being done at the INAF-OAC.

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References

Puddu, E., et al. 2001, A&A, 379, 426