The HAWK-I Distant Cluster Survey


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Abstract

Distant galaxy clusters allow us to study the processes that drive galaxy evolution in the densest environments of the Universe. At these distances, near-IR observations are essential, as the rest frame optical is redshifted into the near-IR. However, with one or two exceptions, there is a distinct lack of high-quality imaging data at these wavelengths. To overcome this limitation, we have obtained a uniform set of deep near-IR images of some of the most distant galaxy clusters currently known. We summarize the current status of the survey and present a first look at some of the data.

The Cluster Sample

During 2005 and 2006, the Supernova Cosmology Project (SCP) used the ACS camera on HST to search for Type Ia supernovae in 25 distant galaxy clusters [1]. The observations consisted of multi-epoch i and z band images that were taken over the duration of the search.

Our HAWK-I sample consists of a subsample of clusters that were targeted by the SCP together with the addition of two other clusters. The redshift range of the clusters is broad (covering 2 Gyr of cosmic time) and each cluster contains between 10 and 100 spectroscopically confirmed cluster members. All of the clusters, except RDCS J1252-2927, were targeted with HAWK-I.

HAWK-I

HAWK-I is ESO’s wide-field near-IR imager on the VLT. Its wide field-of-view, high throughput and excellent image quality combine to make it one of the most powerful ground–based near-IR images.

Our program was completed earlier this year. The data are now being processed. An initial inspection of the data shows that the image quality is excellent, with values as low as 0.25 arc seconds in the fully processed images. The image quality is good enough to morphologically classify galaxies, and to look for evidence of major merging, as we will demonstrate with SpARCS J0035-4312, which is the only cluster in the sample lacking deep ACS data.

SpARCS J0035-4312

SpARCS J0035-4312 was discovered in the Spitzer Adaptation of the Red Sequence Cluster Survey (SpARCS) [2-4]. Based on the cluster red-sequence technique of Gladders and Yee [5], SpARCS extends the redshift limit of this technique to higher redshifts by combining ground based optical and Spitzer data. With a redshift of z=1.34, SpARCS J0035-4312 is one of the most distant clusters currently known.

Evidence for two major mergers. One merger is detected in the MIPS 24 micron image; the other is not.

References and Acknowledgements


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