The CFH Optical PDCS survey (COP) I: The Data

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This paper presents and gives the COP (COP: CFHT Optical PDCS; CFHT: Canada-France-Hawaii Telescope; PDCS: Palomar Distant Cluster Survey) survey data. We describe our photometric and spectroscopic observations with the MOS multi-slit spectrograph at the CFH telescope.

A comparison of the photometry from the PDCS (Postman et al. 1996) catalogs and from the new images we have obtained at the CFH telescope shows that the different magnitude systems can be cross-calibrated. After identification between the PDCS catalogues and our new images, we built catalogues with redshift, coordinates and $V_{PDCS}$, $I_{PDCS}$ and $R_{COP}$ magnitudes. We have classified the galaxies along the lines of sight into field and structure galaxies using a gap technique (Katgert et al. 1996). In total we have observed 18 significant structures along the 10 lines of sight.

Subject headings: galaxies: clusters: general — cosmology: observations — cosmology: large scale structure of universe

1. Introduction

One of the main goals of the study of distant rich clusters of galaxies is to understand their origin and evolution. Clusters are invaluable cosmological probes, since the evolution of cluster abundances is strongly dependent on the underlying cosmology and therefore can constrain cosmological models (e.g. Bahcall et al. 1997, Oukbir & Blanchard 1992 and 1997, Reichart et al 1999, Nichol et al. 1999). In order to be able to exploit this potential, large statistically representative spectroscopic samples are, however, required.

There are two types of samples that are being developed: those based on optical selection criteria and those based on X-ray detections. Below $z$ of about 0.1, optically selected studies (e.g. ENACS: Katgert et al. 1996) have had about as many clusters in them as those selected via their X-ray fluxes. Up until recently, however, the higher redshift work has been dominated by X-ray selection techniques (e.g. CNOC: Carlberg et al. 1996 SHARC: Romer et al. 2000; RDCS: Rosati et al. 1998; WARPS: Jones et al. 1998; Vikhlinin et al. 1998). To greatly enlarge the sample of detailed studies of redshift about 0.4 optically selected clusters, we have embarked on a photometric and redshift campaign based on the Palomar Distant Cluster survey (Postman et al. 1996, see also Holden et al. 1999). We have observed a significant number of regions on the sky (10) and obtained about 70 redshifts per line of sight. These pointings were known to contain candidate clusters of galaxies based on the PDCS studies (e.g. Postman et al. 1996, Holden et al. 1997).
The main purpose of this paper is to publish the COP survey data and to describe the data reduction so as to lay a foundation for future papers. The interpretation of the results is, therefore, given in later papers (e.g. Holden et al. 2000). The outline of this paper is as follows. In Section 2, we give the observational strategy. In Section 3, we describe the way we have reduced and analyzed our photometry. In Section 4, we describe the way we have reduced and analyzed our spectroscopy. In the last section, we give an analysis of the redshift and spatial distribution of the galaxies in our sample. The data are given in tables 6-15.

2. Target Selection and Observations

2.1. Observing strategy

Our project required the measurement of a large number of redshifts (∼ 100) of faint galaxies (\(V_{PDCS} \leq 23\)) for a significant number of clusters (∼ 10). It was necessary, therefore, to optimize our spectroscopic observations to get as many useful spectra as possible per night. We had photometric data in our fields (the PDCS catalog: Postman et al. 1996) prior to our CFH observations which considerably reduced the number of nights necessary to produce the spectroscopic catalogue (compared for example to the time needed to achieve the CNOC survey, Yee et al. 1996).

The first goal of the survey was to study the reality of the selected cluster candidates: are these real physical systems or are these only galaxy number count enhancements due to superposition effects (see Holden et al. 2000)? This placed a requirement on the number of redshifts we needed along the line of sight (Katgert et al. 1996). Moreover, we wanted to compute a global velocity dispersion for each cluster. This required ∼10 redshifts in the main groups (the clusters) to allow us to use robust estimators (see e.g. Adami et al. 1998c).

Assuming a line-of-sight contamination between 50 and 75% for a cluster at \(z \sim 0.4\) (see e.g. Carlberg et al. 1996) and a success rate of 70% (see Adami et al. 1998b) for our magnitude ranges, we needed to obtain between 50 and 60 spectra for each line of sight in the ideal situation of 1 cluster per line of sight. Since there could be 2 structures (or more) per pointing, however, we set a goal of measuring 100 spectra for each pointing (to yield about 70 redshifts).

In order to have a statistically representative set of more than 10 lines of sight with more than 70 redshifts, we have used the CFH-MOS multi-slits spectrograph for its high multiplex gain.

We wanted to measure the radial velocity of our targets with an uncertainty of less than 150 km s\(^{-1}\) because this precision is almost the same as the one obtained for ENACS and CNOC galaxies (e.g. Katgert et al 1996, Mazure et al 1996, Yee et al. 1996). This allows an accurate comparison with these two surveys. Following Adami et al. (1998b) and Yee et al. (1996), we have used the CFH O300 grism, which provides a dispersion of about 5 Å px\(^{-1}\) with the STIS2 CFH CCD (pixels of 0.43″). The precision in the velocity measurement depends of both the resolution given by the grism and slit width (theoretical limiting factor) and the observational conditions.
(observational limiting factor). The resolution of the O300 grism allowed us to reach the required velocity accuracy.

We observed extended objects that were a few arcsecs in diameter. In order to properly subtract the sky in our spectra, we used slitlet lengths of 11 arcsecs. This setup allowed us to place about 40 slitlets per mask for the full spectral range of about 6500 Å delivered by the grism to be used. The setup would require about 3 masks per pointing to reach our goal of 100, however. In this case, the amount of time needed to observe 10 line of sights would have been prohibitive. To reduce the amount of time required and increase the multiplexing capabilities of the instrument to place $\sim$70 slitlets on each mask, we used CFH blocking filters (see Table 1 and see also the CNOC survey: Yee et al. 1996). This was effective, since we had estimates of the cluster redshifts (Postman et al. 1996), which have been confirmed to be accurate (see Holden et al. 1997) enough for our purposes. These estimates allowed us to chose the right CFH filter so as to span a spectral range that included at least 3 lines for each spectrum (typically selected from [OII], H&K, G band, H$\beta$, [OIII] and H$\alpha$). For each of the two filters used, Table 1 shows the redshift range that gives dispersed spectra of galaxies at that redshift that include the [OII], H&K and G band spectral features. Table 2 gives the filter used for each line of sight.

2.2. Cluster candidate selection

We selected cluster candidates to match the CFH telescope capabilities. It was impossible with the telescope time availability to sample structures at redshifts significantly greater than 0.5 (see Lubin et al. 1998 and references therein for such a study). We decided, therefore, to restrict our sample to cluster candidates in the estimated redshift range $0.3 < z < 0.5$. We also selected clusters so as to be able to complete the sample in only two semesters at the CFHT. Therefore, targets were selected from the PDCS fields at 9 and 13 hours for the Spring semester and from the PDCS fields at 16, 0 and 2 hours for the Autumn semester. We selected also the candidate clusters with both a richness class 1 or greater and significant density peaks in the galaxy distribution (see Fig. 1, 2 and 3) and we used the highest galaxy density areas. These densest areas coincided with or were close to the cluster centers given in Lubin et al. (1996) in most cases. PDCS34 was the exception. We observed at a position about 5’ to the North of the given cluster center, slightly different from Lubin et al. (1996), as we found no galaxy concentration at the exact coordinates of PDCS34.

In order to describe the galaxy distribution on the sky, we have computed the local projected galaxy density and produced isodensity contours for the PDCS galaxies using an adaptative kernel technique (e.g. Adami et al 1998a and ref. therein) for each line of sight. This technique adapts the size of the map window to the local density of objects. The same technique has been used in Adami et al (1998a) to study the ENACS clusters. Where the galaxy density is higher, the window used to compute the density of objects is reduced to a value consistent with producing a statistically significant number of galaxies. Where the galaxy density is lower, the window is larger so as to
produce a similarly valid statistic for the density estimate. We have then produced the Figures 1, 2 and 3.

Finally, among the cluster candidates matching the previous conditions, we selected those ones that were detected in X-rays (Holden et al. 1997, 1999) whenever possible (only 3 of the 10 lines of sight).

2.3. Mask design

We optimized the number of slitlets per mask to increase the efficiency of the survey. It is possible to show that for a field with a very high density of targets, the optimal configuration is to place the slitlets in band configurations. With our limiting magnitude and slitlet width, however, this is not the best method to use because the density of targets is not always the same. To take this into account, we have adapted the Minimal Spanning Tree (MST hereafter) method (e.g. Dussert et al. 1986) in order to find the optimal configuration according to the filter used. We only give a brief description here: for a given set of points, the MST process finds the minimal total length of a tree covering this set (without a loop). If we fix the area (thus the length of tree) the MST exactly finds the maximum number of slits that can be put in that area (according to the constraints: size of the slits, magnitudes, filter .etc...). We have checked this method by showing that it gives a band configuration for a high density of targets. We show in Figures 4 and 5 the typical configuration given by this method for 2 of the lines of sight: PDCS62 and PDCS67. PDCS62 has a high density of targets (3.97 gal arcmin$^2$) while PDCS67 has a lower target density (2.20 gal arcmin$^2$). The slit distribution for PDCS62 is close to a band configuration.

Practically, we designed the masks in three steps. First, the primary potential targets were selected from the galaxies with a low enough magnitude to provide a reasonable success rate (percentage of observed galaxies with a redshift successfully measured) according to the planned exposure time. This exposure time was chosen to observe galaxies brighter than $V_{PDCS} \sim -19$ at the mean redshift of the survey ($z \sim 0.4$). This is about 1.5 magnitude fainter than the typical values of $M^*$ in nearby clusters (see e.g. Rauzy et al. 1998).

We used the MST selection for these galaxies first. Table 2 gives these magnitude ranges with the real success rates. The mean value is 66%, only slightly lower than the expected value. Then, the secondary potential targets were selected from the galaxies in the next 0.5 magnitude bin (in principle too faint to provide the same S/N, see Table 2 for the $V_{PDCS}$ magnitude range). Finally, if some space remained on the mask after selecting these two types of targets, we also assigned slitlets to contain other objects, typically in the $V_{PDCS}$ magnitude range [22,23] or selected by "eye" during the night (tertiary targets).

We did not select the galaxies on the basis of their color, in order to avoid selection effects along the line of sight. Also, the second mask for PDCS62 has been partially designed by hand (during the night with the image acquired at the CFH telescope) because the PDCS photometric
3. The photometry

3.1. The PDCS data

We selected 10 lines of sight (see Table 2 and Fig. 1-3 and 6) for our observations which include 14 PDCS cluster candidates that are described in Postman et al. (1996). We have used the original PDCS photometry to select the galaxy targets. The PDCS photometry was carried out in the 4-shooter Palomar $V$ and $I$ filters and calibrated in the AB system. We will refer to it as $V_{PDCS}$ and $I_{PDCS}$ from now on. Postman et al. (1996) showed how this photometry compared to the Vega-system standard system. Here, we briefly describe the comparison between systems: the effective wavelength of the $V_{PDCS}$ filter is $\approx 100$ Å bluer and about 50% wider than the standard Johnson’s $V$. $I_{PDCS}$ has nearly the same width as the Kron-Cousins $I$ filter, but the effective wavelength is about 500 Å redder. The zero points of the $V_{PDCS}$ and $I_{PDCS}$ magnitudes are based on the $AB$ magnitude system of Oke & Gunn (1983). The magnitudes of Vega are $V_{PDCS}=+0.03$ and $I_{PDCS}=+0.46$. The relation between ($V_{PDCS}$, $I_{PDCS}$) and ($V$, $I$) are:

$$V = V_{PDCS} - 0.02 - 0.056(V_{PDCS} - I_{PDCS}) + 0.012(V_{PDCS} - I_{PDCS})^2$$

and

$$I = I_{PDCS} - 0.43 + 0.089(V_{PDCS} - I_{PDCS})$$

The uncertainty for $V_{PDCS} - I_{PDCS}$ is almost 0.2 magnitude (Lubin 1996).

Since we used the PDCS star/galaxy classification to select the galaxies to observe, it is of interest to determine how well this selection performed. Given our observational strategy with blocking filters, faint stars remain unidentified because no obvious spectral feature falls within our spectral coverage. The same is true for faint galaxies at redshifts outside the optimal range of the filter used and for galaxies only detected at low signal-to-noise. The validity of the star/galaxy separation can only then be tested against other methods for these cases. We have thus compared the PDCS star/galaxy selection against the classification scheme of Sextractor (Bertin & Arnouts 1996). Figure 7 shows the comparison for the West PDCS62 spectroscopic field using a $V$ image taken at CFH (see below). We have plotted the ANN (Artificial Neural Network) parameter of Sextractor characterizing the nature of the objects versus the $V_{PDCS}$ magnitude for the PDCS objects classified as galaxies. The objects in Figure 7 are, therefore, only galaxies according to the PDCS classification. The Sextractor ANN parameter spans the range $[0,1]$, being close to 1 if the object is classified by Sextractor as a star and moving closer to 0 if the object resembles a galaxy. There is a low contamination rate at faint magnitudes: a few number of objects classified as galaxies by the PDCS are interpreted as stars if we use Sextractor. We conclude, therefore, that we optimized the selection of our targets as can be seen by the ”ridge line” near 0 in Figure 7.
However, according to the mask design technique, we targeted sometimes, in the tertiary-target-class, objects that were classified as stars by the PDCS, but which were later found to be galaxies. These objects represent, however, less than 3% of the sample and are not a significant source of error.

3.2. The CFH photometry

Besides the multislit spectroscopy, we have also imaged the fields of study with the CFHT. The field of view of the frames obtained was 10' × 10'. The imaged areas are shown in Fig. 6 (the photometric fields are slightly larger than the spectroscopic fields of Fig. 6 which cover about 8' × 8'). We used the R, V, 2503 and 4611 filters. The 2503 and 4611 filters were the blocking filters used for the spectroscopy (to limit the extent of the spectra) and are described in Table 1. They are, respectively, a very wide V filter and a filter similar to a combination of the V + R filters. The V filter is a standard Johnson filter (centered at 5470 Å, and FWHM of 880 Å) and the R filter is similar to the Kron-Cousins R but somewhat narrower without the red tail. It is centered at 6500 Å, and has a FWHM of 1280 Å. From now on we will refer to these filters as $V_{COP}$ and $R_{COP}$.

All fields were imaged for 5 minutes, except for PDCS16 and the two first fields of PDCS38 that were exposed for 15 and 8 minutes, respectively (see Table 3). The images have been photometrically calibrated in the Vega system using several Landolt standard fields (Landolt 1992). Given that most of the fields were observed in only one filter, the photometric calibrations only include a extinction term and a zero point but not a color term. The uncertainties in our photometry were dominated by the fluctuations of the zero points, computed at different airmasses throughout the night, due to imperfect photometric conditions. The internal statistical errors within a field are negligible, except for the faintest objects. We estimate the systematic zero-point error in our measured magnitudes to be less than 0.15 mag for the observations taken in February 1998 (see Table 3) and less than 0.10 mag for the August 1998 observations. Table 3 summarizes our observations.

We used the $V_{COP}$ exposure for the second field of PDCS62 to complete the $V_{PDCS}$ data. This cluster was not completely covered by the PDCS photometry. To transform our magnitudes into a $V_{PDCS}$, we have computed the relation between $V_{PDCS}$ and our $V_{COP}$ for the first field of PDCS62 and applied it to the second field where the $V_{COP}$ magnitudes were also available. The best fit obtained was:

$$V_{PDCS} - V_{COP} = -0.28(V_{COP} - block_{4611}) + 0.14$$

We plot finally on Fig. 8 the relations between $V_{PDCS}$ and $I_{PDCS}$, and between $V_{PDCS}$ and $R_{COP}$ for all the galaxies in our sample.
3.3. Galactic extinction

The fields chosen for the PDCS were selected from high-latitude Gun & Oke (1975) survey areas. We avoided regions of high extinction. As expected, the galactic extinction values obtained from the Burstein & Heiles (1982) and Schlegel et al. (1998) reddening maps are low. The mean extinction in the $V_{PDCS}$ band is 0.027 and lower than this value for the $I_{PDCS}$ filter in all the fields (Postman et al. 1996). Given the small extinction values and our photometric errors we have chosen not to correct for extinction.

4. The CFH spectroscopy

4.1. Computing the redshifts

We have used both the MIDAS (public ESO reduction package) and IRAF (see e.g. Kurtz & Mink 1998) packages to reduce the 2-Dimensional spectra to 1-Dimensional spectra. The details of the method used can be found in Holden et al. (1999). We computed the redshift from the 1-dimensional spectra from emission lines and from cross-correlation techniques (e.g. Tonry & Davis 1979). If there were more than two emission lines (“only”), we computed the emission line redshift measuring the centroid of the identified lines using gaussian fits and averaging the redshifts. For absorption line dominated spectra, we cross-correlated the spectra with 4 different spectroscopic templates (M31, M32, a 20 Gyear old E/So Bruzual & Charlot (1993) model and finally a spectrum resulting from the combination of 1959 low-z high quality absorption line spectra: Kurtz & Mink 1998). We used the IRAF/RVSAO package to compute the redshifts. For absorption line dominated galaxies, we produced 4 estimates of the redshift, one from each template. To select a unique value, we proceeded as follows:

- 1st: eliminated all the redshift estimates lower than -0.015 assuming that even the infalling galaxies of the Virgo cluster have velocities greater than -4500 km s$^{-1}$. This limit is clearly an extreme value.

- 2nd: eliminated all the redshift estimates with a cross-correlation coefficient lower than 3 (see Kurtz & Mink 1998, Tonry & Davis 1979).

- 3rd: selected as the true redshift the estimate with the best cross-correlation coefficient if there was a gap of more than 1 with the second best coefficient.

- 4th: assumed the mean value of the redshifts with the best cross-correlation coefficients if they were in agreement (difference less than 300 km s$^{-1}$).

- 5th: if neither the 3rd nor 4th conditions were fulfilled, we have simply assumed the value of the redshift with the best cross-correlation coefficient.

Using this approach, we obtained 636 redshifts (see Table 2 and 4 for details). We present a
sub-sample of 4 spectra in Fig 9. The lower left spectrum is typical of our best signal to noise. It represents a galaxy at z=0.462 with a cross-correlation coefficient of 13.26. The lower right spectrum is a galaxy where we have used emission lines to deduce the redshift (z=0.658), e.g. the [OII] line shown on the figure (at \( \sim 6180\)\AA). This spectrum is typical of the worse spectra we used, but the cross-correlation method also was able to detect the CaII H&K lines around 6600\AA. The upper spectra (left and right) are typical of all our sample. The upper left spectrum is a galaxy at z=0.461 (cross-correlation coefficient of 4.33) and the upper right spectrum is a galaxy at z=0.459 with both absorption line features (cross-correlation coefficient of 3.54) and emission line features ([OII]).

4.2. Checking the redshifts

To check the validity of the assigned redshifts we have "eye-balled" all the emission line redshifts and also checked a randomly selected sample of absorption line dominated spectra. Our visual inspection confirmed the validity of our computationally derived redshifts.

For 19 objects, we also had two separate spectra and, hence, two independent measurements of the redshift. These objects were observed twice due to overlaps in observing runs done at CFH and at the 4 meter Mayall telescope (see Holden et al. 1997). In order to estimate the uncertainties of our redshifts, we have then plotted the percentage difference between the two estimates versus the cross-correlation coefficient \( r \) (Tonry & Davis 1979). Fig. 10 shows the 18 galaxies with less than 2.5\% of difference. The mean error for the redshift estimate is 0.7\% of the redshift (or 0.0016 in redshift). The 19\textsuperscript{th} galaxy, although having a cross-correlation coefficient of \( r=4.2 \), had a discrepancy of 42\%. This is clearly due to one wrong redshift. This galaxy was observed twice at CFHT. The first observation provides a redshift of 0.15364 and a correlation coefficient of 4.2. The second observation yielded a redshift of 0.08958 and a correlation coefficient of 4.2. However, for this observation, the second best estimate (with another template) of the redshift is 0.15673 with a correlation coefficient of 3.71, still acceptable. Using the second value of the redshift, the difference is only 2\% for the initially discrepant galaxy. Assuming that these 19 galaxies are representative of our entire sample, we estimate that less than about 5\% of our sample has a false redshift assignment. This has a negligible effect on conclusions we draw based on these results.

5. Analysis

5.1. Final catalogues

We identified the objects we measured at CFH (redshift + R\textsubscript{COP} magnitude) with the galaxies in the PDCS survey in order to build catalogues with position (measured at CFH), redshift, R\textsubscript{COP} magnitude and V\textsubscript{PDCS} and I\textsubscript{PDCS} magnitude (Tables 6-15). This is also a way to estimate the
uncertainty for the coordinates of the galaxies. We found a mean difference between the PDCS coordinates and the coordinates measured at CFH of 3.5" ± 2.3". This is typically the uncertainty for the coordinates we give in Table 6-15.

We also classified the galaxies in redshift space as members of a structure or as field galaxies. This was a first step. A more detailed classification is discussed in Holden et al. (2000), but we give these results in order to present a complete overview of the data. In order to make this classification, we have searched the velocity distribution of each line of sight for gaps of more than 1000 km s$^{-1}$. If we had more than 5 galaxies between two successive gaps, we have called these galaxies a structure. This is exactly the same method used to define the structures in the ENACS catalog (Katgert et al. 1996). The method does not completely avoid the inclusion of some interlopers, but, to a first approximation, it defines the compact structures (gravitationally bound) in redshift space. We summarize the results in Table 4, Table 6 to 15 and in Figures 11 and 12.

5.2. Completeness and spatial representativity

We show in Fig. 13 the variation of the completeness level of the spectroscopic catalogue compared to the photometric catalogue. This completeness level $C$ is defined as the ratio between the number of galaxies with a measured redshift (galaxies targeted and successfully measured) and the total number of galaxies. It is different from the success rate, which is only the ability to deduce the redshift of a target. We see on Fig. 13 that this level is constant around 35% from $V_{PDCS} = 16.5$ to $V_{PDCS} = 21.0$. This relatively low level is because we did not have time to put a slit on all the available galaxies. The percentages of the 2 brightest bins of Fig. 13 are based on a low number of galaxies, since, we targeted more faint galaxies than bright galaxies explicitly to try to keep constant the completeness level $C$. This constant sampling is important for studying the galaxy distribution along the line of sights because it prevents us from severe redshift selection effects. For the faintest galaxies, the completeness level drops down to 6% for $V_{PDCS} = 22.5$. These percentages were computed using all the lines of sight put together except PDCS61 for which the exposure time was very short. These percentages do not change considerably from pointing to pointing (except for PDCS61). For several types of analysis, it may be useful to give an analytical expression of the variation of the completeness level $C$. For the magnitudes brighter than $V_{PDCS} = 20.5$, $C = 35.5\%$. For the fainter magnitudes, assuming a power law model, the best fit is:

$$C = 10^{-0.44(V_{PDCS} - 24.07)}\%$$

To test for selection effects in the spatial distribution of the galaxies for which we measured redshift, we compared the spatial distribution of our redshift measured sample to that of all the PDCS galaxies. For this comparison, we have used a bidimensional Kolmogorov-Smirnov test as a function of the V limiting magnitude to determine the variation of this representativity level as a function of the photometric depth of the sample. A value of the representativity level given by the Kolmogorov-Smirnov test close to 100% means that the two distributions on the sky are very
similar: the galaxies with a measured redshift are a statistically representative sub-sample in terms of spatial distribution. A value lower than 90% means that this sub-sample is statistically different at the level of 10%. We see in Tab. 5 that, except for PDCS30-45, the two spatial distributions are indistinguishable for the magnitudes brighter than 21. Note that the case of PDCS30-45 is not easily explained (see Tab. 5).

6. Summary

We have presented and given the data gathered in the COP survey. The spectroscopic and photometric observations were performed with the MOS/STIS2 instrument during 6 nights at the CFH telescope with the grism O300 and 2 blocking filters to enhance the multiplex gain of MOS. We have used a method based on the MST theory to optimize the number of slits per mask. This allowed us to measure 636 redshifts for 10 PDCS lines of sight. These lines of sight were selected to hold PDCS candidate clusters, with significant peaks in the galaxy density distribution.

The success rate (percentage of targeted galaxies with a successfully measured redshift) was close to 70% for the primary targets (typically brighter than $V_{PDCS}=22$). The completeness level (percentage of all galaxies with a measured redshift) was about 35% down to $V_{PDCS}=20.5$. The galaxies with a redshift were proved to be a spatially representative sub-sample down to $V_{PDCS}=20.5$ (no significant spatial selection effects). Finally, the percentage of false redshifts was about 5%, based on 19 galaxies observed twice.

A comparison of the photometry from the PDCS (Postman et al. 1996) catalogs and from the new images we have obtained at the CFH telescope shows that the different magnitude systems can be cross-calibrated. This confirmation is important for the reliability of future works based on the multi-color photometry of COP. After identification between the PDCS catalogues and our new images, we built catalogues with redshift, coordinates and $V_{PDCS}$, $I_{PDCS}$ and $R_{COP}$ magnitude (Tab. 6-15).

We have classified the galaxies along the lines of sight into field and structure galaxies using a gap technique (Katgert et al. 1996). In total we have observed 18 significant structures along the 10 lines of sight (Tab. 4). As noted in the introduction, the interpretation of the results is given elsewhere (e.g. Holden et al. 2000).

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Fig. 1.— upper left: galaxy isodensity contours for PDCS04. The position of the galaxies with a measured redshift are also plotted. The small squares are the field objects, the larger symbols (circles, squares, triangles) are the different structures defined in Tab. 4.; upper right: PDCS16 ; lower left: PDCS30/45 ; lower right: PDCS33. We note that East is to the right and that some field galaxies appear to be very close to cluster galaxies, but we checked that they were not the same objects.

Fig. 2.— upper left: PDCS34 ; upper right: PDCS38 ; lower left: PDCS57 ; lower right: PDCS61.

Fig. 3.— left: PDCS62 ; right: PDCS67.

Fig. 4.— Slit distribution for mask number 1 of PDCS62. The points are all the PDCS galaxies available in this field, the circled points and the crosses are the spectroscopic targets. Circles denote primary and secondary targets. Crosses are the tertiary targets. We show the region occupied by the spectrum and the region where the zero-order of the spectrum lies on the CCD (thick small rectangles along the bottom of the figure, visible only for the galaxies higher than 30.405 deg in declination). The x-axis is in hours and the y-axis is in degrees (equinox 2000).

Fig. 5.— Slit distribution for mask number 1 of PDCS67. The points are all the PDCS galaxies available in this field, the circled points and the crosses are the spectroscopic targets. Circles denote primary and secondary targets. Crosses are the tertiary targets. We show the region occupied by the spectrum and the region where the zero-order of the spectrum lies on the CCD (thick small rectangles along the bottom of the figure, visible only for the galaxies higher than 41.215 deg in declination). The x-axis is in hours and the y-axis is in degrees (equinox 2000). There are fewer slitlets then in Fig. 1 due to the lower target density.

Fig. 6.— The 9 PDCS lines of sight which are the most sampled by the COP survey. We note that the East is to the right. The x-axes are in hours and the y-axes in degrees (equinox 2000). Each small box in the four fields is the area sampled by one spectroscopic mask. The small labelled circles are the position of the candidate clusters of galaxies as given in Postman et al. (1996).

Fig. 7.— Sextractor star-galaxy separation only for the objects classified as galaxies by the PDCS for PDCS62 (all the points on the figure are galaxies according to the PDCS: this gives raise to the narrow distribution at the bright end). The y-axis is the ANN parameter from sextractor. A value close to 0 means that the object is likely to be a galaxy and a value close to 1 means that the object is likely to be a star (according now to Sextractor). The x-axis is the V_{PDCS} magnitude. We see that the PDCS and Sextractor classifications only disagree partially at faint magnitudes.

Fig. 8.— Relations between the V, I and R magnitudes for the 10 lines of sight of this paper. The two x-axis are the V_{PDCS} magnitude. The left yaxis is the I_{PDCS} magnitude and the right y-axis is the R_{COP} magnitude. The number of galaxies used in each graph is indicated. The two straight lines show the 1-σ envelope of the relations.
Fig. 9.— The lower left spectrum represents a galaxy at $z=0.4621\pm0.0002$ with a cross-correlation coefficient of 13.26. The lower right spectrum is a galaxy where we have used emission lines to deduce the redshift ($z=0.6579\pm0.0004$), e.g., the [OII] line at $\sim6180\text{Å}$. The cross-correlation method detects also the H&K lines around 6600Å. The upper spectra (left and right) are two galaxies at $z=0.4610\pm0.0003$ (cross-correlation coefficient of 4.33) and at $z=0.4587\pm0.0004$ with both absorption line features (cross-correlation coefficient of 3.54) and emission line features ([OII]). The caption of each spectrum is the name of the line of sight (for example PDCS62) and the sequence of the spectrum in the observation process (for example 48) plus the mask number (for example .1 for the first mask of PDCS62).

Fig. 10.— Error percentage of the redshift estimation for 18 galaxies observed twice. The zero level is symbolized with a thick dotted line. The x-axis is the Beers & Tonry cross-correlation coefficient computed with RVSAO and the y-axis is the percentage of difference between the two estimations of the redshift.

Fig. 11.— Redshift distribution along the lines of sight of PDCS04, PDCS16, PDCS30-45, PDCS33 and PDCS34. The x-axis is the redshift and the y-axis, the number of redshifts. The significant structures (detected with the gap method described in Section 5.1) are marked with an arrow.

Fig. 12.— Same caption as for Fig. 13, but for PDCS38, PDCS57, PDCS61, PDCS62 and PDCS67.

Fig. 13.— Figure of the variation of the completeness level $C$ as a function of the $V_{PDCS}$ magnitude. $C$ is the ratio of the number of galaxies with a measured redshift (given inside parentheses) and of the total number of galaxies in the fields. We note that for the magnitudes fainter than 22.5, the completeness level is very low and not plotted on this figure.
Table 1. Transmission level, spectral range and redshift range for the 2 blocking filters. We note that filter 2503 is limited on the blue side by the spectral range of STIS2: $\sim 4400\,\text{Å}$. The redshift range is computed to include [OII], H&K and the G band in the spectrum.

| CFH number | Transmission | Wavelength range | Redshift range |
|------------|--------------|------------------|----------------|
| 2503       | 83%          | [4089;6835]Å     | [0.20;0.56]    |
| 4611       | 93%          | [5262;7042]Å     | [0.43;0.61]    |
Table 2. Name of the PDCS cluster, number of redshifts along the line of sight, number of masks, blocking filter, percentage of Emission Line Galaxies along the line of sight, exposure time in minutes and 3-σ X-ray emission detection. The last three columns are the $V_{PDCS}$ magnitude ranges where we selected the primary (1$^{st}$), secondary (2$^{nd}$) and tertiary targets (3$^{rd}$). We give the success rate (percentage of targets with a successfully measured redshift) for the first magnitude bin, except for PDCS61 where the exposure time was drastically lower than expected.

| Name    | z     | mask | filter | ELG | time | X-ray | 1$^{st}$ | 2$^{nd}$ | 3$^{rd}$ |
|---------|-------|------|--------|-----|------|-------|---------|---------|---------|
| PDCS04  | 74    | 2    | 4611   | 15% | 120m | -     | [-;22.3] (65%) | [22.3;22.8] | [22.8;23] |
| PDCS16  | 53    | 2    | 4611   | 13% | 120m | -     | [-;22.3] (42%) | [22.3;22.8] | [22.8;23] |
| PDCS30/45 | 88   | 4    | 2503   | 23% | 90m  | -     | [-;21.2] (55%) | [21.2;21.7] | [21.7;23] |
| PDCS33/32 | 71   | 2    | 4611   | 30% | 120m | yes   | [-;22.3] (71%) | [22.3;22.8] | [22.8;23] |
| PDCS34  | 51    | 2    | 2503   | 20% | 100m | -     | [-;21.5] (88%) | [21.5;22]  | [22.3]   |
| PDCS38/39 | 75  | 3    | 2503   | 29% | 80m  | -     | [-;21.1] (62%) | [21.1;21.6] | [21.6;23] |
| PDCS57  | 77    | 2    | 4611   | 32% | 100m | -     | [-;22.1] (66%) | [22.1;22.6] | [22.6;23] |
| PDCS61  | 22    | 1    | 2503   | 25% | 20m  | yes   | [-;21.1] (-)   | [21.1;21.6] | [21.6;23] |
| PDCS62  | 84    | 2    | 4611   | 25% | 100m | yes   | [-;22.3] (81%) | [22.3;22.8] | [22.8;23] |
| PDCS67  | 41    | 1    | 4611   | 39% | 180m | -     | [-;22.3] (60%) | [22.3;22.8] | [22.8;23] |
Table 3. Table of the images observed at CFH with number of exposures, filter, exposure time, observation date and seeing.

| Name     | field | filter | time | Date  | seeing |
|----------|-------|--------|------|-------|--------|
| PDCS04   | 1     | $R_{COP}$ | 5mn  | 08/98 | 1.0"   |
| PDCS16   | 1     | $R_{COP}$ | 7+8mn | 08/98 | 1.0"+1.0" |
| PDCS30-45| 1     | $R_{COP}$ | 5mn  | 02/98 | 1.0"   |
| PDCS30-45| 2     | $R_{COP}$ | 5mn  | 02/98 | 1.0"   |
| PDCS30-45| 3     | $R_{COP}$ | 5mn  | 02/98 | 1.3"   |
| PDCS30-45| 3     | 2503    | 5mn  | 02/98 | 1.2"   |
| PDCS30-45| 4     | $R_{COP}$ | 5mn  | 02/98 | 1.0"   |
| PDCS33-32| 1     | $R_{COP}$ | 5mn  | 02/98 | 1.8"   |
| PDCS33-32| 1     | 4611    | 5mn  | 02/98 | 0.9"   |
| PDCS33-32| 2     | 4611    | 5mn  | 02/98 | 0.8"   |
| PDCS34   | 1     | $R_{COP}$ | 5mn  | 02/98 | 1.4"   |
| PDCS34   | 1     | 2503    | 5mn  | 02/98 | 1.1"   |
| PDCS34   | 2     | 2503    | 5mn  | 02/98 | 1.1"   |
| PDCS37-38-39 | 1 | $R_{COP}$ | 8mn  | 02/98 | 0.8"   |
| PDCS37-38-39 | 2 | $R_{COP}$ | 8mn  | 02/98 | 0.9"   |
| PDCS37-38-39 | 3 | $R_{COP}$ | 5mn  | 02/98 | 1.1"   |
| PDCS57   | 1     | $R_{COP}$ | 5mn  | 02/98 | 0.8"   |
| PDCS57   | 1     | 4611    | 5mn  | 02/98 | 1.1"   |
| PDCS57   | 2     | 4611    | 5mn  | 02/98 | 1.0"   |
| PDCS61   | 1     | 2503    | 5mn  | 02/98 | 1.0"   |
| PDCS62   | 1     | $R_{COP}$ | 5mn  | 02/98 | 0.9"   |
| PDCS62   | 1     | $V_{COP}$ | 5mn  | 02/98 | 1.0"   |
| PDCS62   | 1     | 4611    | 5mn  | 02/98 | 1.0"   |
| PDCS62   | 2     | $V_{COP}$ | 5mn  | 02/98 | 1.2"   |
| PDCS62   | 2     | 4611    | 5mn  | 02/98 | 1.0"   |
| PDCS67   | 1     | $R_{COP}$ | 5mn  | 08/98 | 2.1"   |
Table 4. Table of the detected structures along the 10 PDCS lines of sight. The columns are the name of the line of sight (los), the structure number, the mean redshift of this structure, the total number of redshifts in each structure and the number of emission lines galaxies in these structures are given. We note that the structures of this table are sampled with more than 5 galaxies.

| los       | struct. | mean z   | number of z | em. lines galaxies |
|-----------|---------|----------|-------------|--------------------|
| PDCS04    | 1       | 0.4608   | 5           | 0                  |
| PDCS04    | 2       | 0.5486   | 5           | 0                  |
| PDCS16    | 1       | 0.3984   | 12          | 0                  |
| PDCS30-45 | 1       | 0.2017   | 9           | 1                  |
| PDCS30-45 | 2       | 0.2500   | 14          | 4                  |
| PDCS30-45 | 3       | 0.3312   | 9           | 1                  |
| PDCS33    | 1       | 0.2106   | 5           | 2                  |
| PDCS33    | 2       | 0.5530   | 5           | 3                  |
| PDCS34    | 1       | 0.5541   | 5           | 0                  |
| PDCS38    | 1       | 0.3316   | 13          | 4                  |
| PDCS38    | 2       | 0.4691   | 13          | 4                  |
| PDCS57    | 1       | 0.1605   | 6           | 5                  |
| PDCS57    | 2       | 0.3033   | 6           | 2                  |
| PDCS57    | 3       | 0.4586   | 7           | 2                  |
| PDCS62    | 1       | 0.2948   | 5           | 0                  |
| PDCS62    | 2       | 0.4619   | 19          | 3                  |
| PDCS67    | 1       | 0.1686   | 6           | 0                  |
| PDCS67    | 2       | 0.4675   | 6           | 4                  |
Table 5. Table of the spatial representativity levels of the sample of galaxies with a measured redshift compared to the sample of all the PDCS galaxies (as a function of the limiting magnitude). We have used a bidimensional Kolmogorov-Smirnov test as a function of the V limiting magnitude. A value close to 100 means that the two distributions (sample with redshift versus total sample) have a very similar spatial distribution. A value lower than 90 means that the 2 distributions are spatially differently distributed at the level of 10%. We have tested each of the masks of the PDCS30/45 line of sight to see if the low representativity level of this line of sight was due to one peculiar mask. We give also for each representativity level the number of galaxies with a measured redshift (only when we used more than 10 galaxies).

| Mask          | <20   | <20.5 | <21   | <21.5 | <22   | <22.5 |
|---------------|-------|-------|-------|-------|-------|-------|
| PDCS04        | -     | 99.9  | (10)  | 99.9  | (22)  | 99.9  | (36)  | 99.9  | (49)  | 99.9  | (63)  |
| PDCS16        | -     | -     | 99.9  | (11)  | 99.9  | (21)  | 99.9  | (34)  | 65.9  | (42)  |
| PDCS30-45 all | 61.0  | 58.0  | 48.0  | 24.9  | 30.4  | 14.5  |
| PDCS30-45 1   | -     | 57.7  | 11.5  | 2.8   | 2.2   |
| PDCS30-45 2   | -     | 76.5  | 46.4  | 22.7  | 37.6  | 36.6  |
| PDCS30-45 3   | -     | -     | 77.0  | 2.2   |
| PDCS30-45 4   | -     | 71.8  | 30.8  | 16.9  | 3.6   |
| PDCS33        | -     | 99.9  | (13)  | 99.9  | (19)  | 99.9  | (26)  | 99.9  | (36)  | 68.3  | (48)  |
| PDCS34        | -     | 99.9  | (12)  | 99.9  | (26)  | 99.9  | (36)  | 74.4  | (44)  | 99.9  | (47)  |
| PDCS38        | -     | 99.9  | (11)  | 48.2  | 51.1  | 17.8  | 36.8  |
| PDCS57        | 99.9  | 99.9  | 99.9  | 83.4  | 83.1  | 84.0  |
| PDCS61        | -     | 99.9  | (10)  | 99.9  | (12)  | 68.7  | (12)  | 89.5  | (17)  | 75.8  |
| PDCS62        | -     | 69.3  | (17)  | 99.9  | (30)  | 48.3  | (47)  | 57.5  | (62)  | 48.5  |
| PDCS67        | -     | 99.9  | (12)  | 99.3  | (16)  | 71.4  | (20)  | 52.9  | (32)  | 69.8  | (37)  |
Table 6. Data for the line of sight PDCS04.

| Num. | group | z    | err-z | Alpha | Delta  | V    | I    | R    | type |
|------|-------|------|-------|-------|--------|------|------|------|------|
| 58.1 | 0     | 0.03822 | 0.00016 | 26047.6 | 18830.9 | 99.99 | 99.99 | 17.17 |
| 46.1 | 0     | 0.07219 | 0.0001 | 26524.6 | 18754.9 | 20.55 | 19.70 | 19.95 | ea   |
| 32.1 | 0     | 0.07864 | 0.00045 | 26447.5 | 18625.1 | 21.32 | 21.98 | 20.40 |
| 36.2 | 0     | 0.08469 | 0.00025 | 26193.2 | 18687.7 | 22.37 | 21.09 | 21.61 |
| 5.1  | 0     | 0.08489 | 0.00018 | 26464.0 | 18476.7 | 22.95 | 22.28 | 22.09 |
| 45.2 | 0     | 0.08958 | 0.00027 | 26287.0 | 18830.3 | 18.90 | 18.76 | 18.54 |
| 38.1 | 0     | 0.09029 | 0.00042 | 26123.0 | 18675.5 | 22.35 | 20.94 | 20.92 |
| 20.2 | 0     | 0.09804 | 0.00046 | 26511.9 | 18587.9 | 20.99 | 20.54 | 20.23 |
| 39.1 | 0     | 0.09908 | 0.00025 | 26404.9 | 18673.9 | 18.54 | 17.98 | 18.17 |
| 21.1 | 0     | 0.11893 | 0.00019 | 26076.5 | 18551.4 | 22.30 | 20.90 | 21.54 |
| 55.1 | 0     | 0.12926 | 0.00069 | 26161.9 | 18813.2 | 21.45 | 21.12 | 21.35 |
| 27.1 | 0     | 0.15211 | 0.00023 | 26340.7 | 18602.1 | 20.41 | 19.79 | 20.07 |
| 57.1 | 0     | 0.15291 | 0.00027 | 26253.6 | 18822.1 | 20.95 | 19.21 | 19.21 |
| 21.2 | 0     | 0.15723 | 0.00051 | 26366.6 | 18598.7 | 20.53 | 20.16 | 20.07 |
| 19.2 | 0     | 0.16826 | 0.00017 | 26005.8 | 18590.7 | 18.50 | 17.47 | 17.90 |
| 23.1 | 0     | 0.17542 | 0.00033 | 26131.1 | 18578.9 | 21.40 | 20.39 | 20.70 |
| 38.2 | 0     | 0.17792 | 0.00022 | 26158.0 | 18704.4 | 22.88 | 22.26 | 22.32 |
| 3.1  | 0     | 0.18688 | 0.00043 | 26212.4 | 18453.5 | 22.72 | 20.98 | 22.04 |
| 35.1 | 0     | 0.18785 | 0.00015 | 26319.3 | 18658.3 | 20.81 | 20.34 | 21.80 |
| 43.2 | 0     | 0.19399 | 0.00015 | 26295.8 | 18810.8 | 20.99 | 20.82 | 20.68 |
| 1.2  | 0     | 0.22739 | 0.00019 | 26421.1 | 18424.3 | 21.18 | 19.87 | 20.61 |
| 25.2 | 0     | 0.22861 | 0.00027 | 26330.7 | 18619.3 | 20.66 | 20.24 | 20.41 |
| 65.1 | 0     | 0.23424 | 0.00029 | 26317.3 | 18871.0 | 22.78 | 21.20 | 22.09 |
| 36.1 | 0     | 0.23991 | 0.00022 | 26192.1 | 18659.1 | 19.73 | 18.59 | 18.65 |
| 15.1 | 0     | 0.25862 | 0.00020 | 26486.8 | 18508.3 | 21.65 | 19.92 | 19.91 |
| 16.1 | 0     | 0.25862 | 0.00020 | 26186.7 | 18512.8 | 22.29 | 20.36 | 21.60 |
| 64.1 | 0     | 0.28453 | 0.00028 | 26378.9 | 18863.0 | 20.17 | 18.98 | 19.49 |
| 31.1 | 0     | 0.30815 | 0.00052 | 26057.3 | 18620.3 | 21.82 | 20.22 | 20.05 |
| 29.1 | 0     | 0.32014 | 0.00052 | 26021.4 | 18608.3 | 20.77 | 20.34 | 20.41 |
| 63.1 | 0     | 0.32852 | 0.00045 | 26364.6 | 18858.2 | 21.53 | 20.64 | 20.68 |
| 20.1 | 0     | 0.33048 | 0.00037 | 26361.3 | 18540.0 | 21.45 | 21.51 | 21.03 |
| 11.1 | 0     | 0.35667 | 0.00032 | 26395.0 | 18481.1 | 22.42 | 21.35 | 21.88 |
| 12.1 | 0     | 0.36430 | 0.00028 | 26411.0 | 18486.8 | 22.60 | 21.88 | 22.11 |
| 49.1 | 0     | 0.36471 | 0.00030 | 26274.2 | 18774.8 | 20.48 | 19.28 | 19.79 |
| 51.1 | 0     | 0.36548 | 0.00025 | 26462.5 | 18795.0 | 21.22 | 19.48 | 20.12 |
| 34.1 | 0     | 0.36858 | 0.00033 | 26381.5 | 18649.5 | 20.47 | 20.22 | 19.87 |
| 11.2 | 0     | 0.37991 | 0.00043 | 26208.6 | 18513.8 | 22.09 | 21.32 | 21.74 |
| 18.2 | 0     | 0.38130 | 0.00025 | 26490.8 | 18581.6 | 22.22 | 21.26 | 20.88 |
| 15.2 | 0     | 0.38455 | 0.00027 | 26385.1 | 18553.1 | 20.90 | 19.61 | 20.20 |
| 48.1 | 0     | 0.38479 | 0.00061 | 26305.7 | 18772.2 | 21.38 | 20.07 | 20.69 |
| 9.1  | 0     | 0.39307 | 0.00056 | 26085.8 | 18484.5 | 21.86 | 21.02 | 21.28 |
| 58.1 | 0     | 0.39731 | 0.00042 | 26047.0 | 18830.9 | 99.99 | 99.99 | 17.17 |
Table 6—Continued

| Num. | group | z      | err-z   | Alpha | Delta | V   | I   | R   | type |
|------|-------|--------|---------|-------|-------|-----|-----|-----|------|
| 12.2 | 0     | 0.39788| 0.00051 | 26068.2| 18529.6| 22.20| 20.66| 21.34|
| 44.1 | 0     | 0.41919| 0.00036 | 26486.9| 18732.8| 21.05| 19.64| 20.05|
| 60.1 | 0     | 0.41953| 0.00025 | 26112.3| 18849.5| 99.99| 99.99| 22.34|
| 35.2 | 0     | 0.42944| 0.00024 | 26215.0| 18680.2| 99.99| 99.99| 23.12|
| 16.2 | 0     | 0.44758| 0.00025 | 26297.3| 18554.3| 22.16| 20.50| 21.30|
| 10.1 | 1     | 0.45835| 0.00035 | 26247.5| 18481.9| 21.08| 20.13| 20.46|
| 31.2 | 1     | 0.46039| 0.00041 | 26142.2| 18678.1| 22.08| 21.82| 21.87|
| 39.2 | 1     | 0.46065| 0.00028 | 26018.2| 18730.9| 22.27| 20.73| 21.01|
| 47.1 | 1     | 0.46155| 0.00032 | 26174.2| 18771.6| 21.06| 19.27| 21.55|
| 50.1 | 1     | 0.46262| 0.00028 | 26132.4| 18789.2| 22.84| 21.61| 22.22|
| 35.2 | 0     | 0.46830| 0.00043 | 26437.2| 18748.0| 21.52| 21.40| 21.24|
| 7.1  | 0     | 0.51588| 0.00028 | 26066.4| 18481.9| 21.90| 21.65| 21.56|
| 30.1 | 2     | 0.54633| 0.00032 | 26516.3| 18611.5| 21.68| 20.56| 20.68|
| 26.1 | 2     | 0.54633| 0.00026 | 26500.2| 18589.6| 22.32| 20.25| 20.92|
| 14.2 | 2     | 0.54929| 0.00031 | 26252.1| 18549.8| 22.26| 20.61| 21.05|
| 17.2 | 2     | 0.55017| 0.00027 | 26267.9| 18566.6| 20.85| 19.60| 21.22|
| 18.1 | 2     | 0.55084| 0.00107 | 26265.5| 18525.2| 21.32| 19.82| 20.46|
| 4.1  | 0     | 0.56125| 0.00023 | 26523.1| 18467.7| 21.84| 20.57| 21.28|
| 2.1  | 0     | 0.56304| 0.00032 | 26279.2| 18448.4| 22.98| 21.67| 22.58|
| 3.2  | 0     | 0.57251| 0.00017 | 26358.9| 18439.2| 21.73| 21.26| 21.51|
| 44.2 | 0     | 0.59975| 0.00039 | 26265.3| 18829.3| 20.99| 19.61| 19.52|
| 61.1 | 0     | 0.61101| 0.00049 | 26148.3| 18852.2| 20.33| 19.42| 19.95|
| 9.2  | 0     | 0.61803| 0.00021 | 26462.6| 18505.8| 22.70| 22.01| 21.98|
| 52.1 | 0     | 0.62239| 0.00022 | 26063.1| 18803.7| 22.83| 22.00| 22.46|
| 6.2  | 0     | 0.62694| 0.00031 | 26446.1| 18492.6| 22.60| 21.33| 21.89|
| 13.1 | 0     | 0.65787| 0.00044 | 26303.9| 18502.3| 21.84| 21.12| 22.85|
| 34.2 | 0     | 0.69069| 0.00036 | 26060.7| 18682.5| 21.14| 20.42| 20.56|
| 28.1 | 0     | 0.69525| 0.00026 | 26147.6| 18606.1| 21.10| 19.57| 20.31|
| 45.1 | 0     | 0.70461| 0.00044 | 26034.2| 18740.5| 21.61| 20.80| 20.83|
| 29.2 | 0     | 0.73380| 0.00032 | 26310.7| 18670.7| 20.99| 19.99| 20.36|
| 10.2 | 0     | 0.75738| 0.00043 | 26282.8| 18511.6| 22.49| 21.56| 22.06|

*a 1st column: observed galaxy sequence (58.1 means 58th galaxy observed in the mask 1). 2nd column: field/group classification, 0 means field galaxy, 1 means first group ... etc... 3rd column: redshift (the last digit is given only for information, but is not significant according to the error). 4th column: redshift error. 5th column: alpha coordinates from the CFH observations in arcsec (equinox 2000). 6th column: delta coordinates from the CFH observations in arcsec (equinox 2000). 7th column: PDCS V magnitude. 8th column: PDCS I magnitude. 9th column: CFH R magnitude. 10th column: spectral features: "em" means redshift from only emission lines, "ea" means redshift from emission lines but consistent with absorption line features, " " means redshift only from absorption line features."
Table 7. Data for the line of sight PDCS16.

| Num. group | z    | err-z | Alpha  | Delta | V     | I     | R     | type |
|------------|------|-------|--------|-------|-------|-------|-------|------|
| 2.35       | 0    | 0.01236 | 133519.9 | 2008.3 | 17.22 | 18.65 |
| 2.30       | 0    | 0.02487 | 133484.2 | 2148.5 | 19.59 | 20.22 |
| 2.51       | 0    | 0.02856 | 133654.9 | 2059.6 | 20.30 | 20.32 |
| 1.20       | 0    | 0.07260 | 133377.8 | 1978.0 | 21.30 | 21.45 |
| 1.52       | 0    | 0.07968 | 133640.3 | 1932.0 | 20.14 | 20.09 |
| 1.45       | 0    | 0.08275 | 133592.8 | 2041.8 | 20.32 | 20.71 |
| 1.15       | 0    | 0.12853 | 133302.8 | 1803.6 | 22.15 | 21.74 |
| 2.49       | 0    | 0.15218 | 133643.0 | 2145.9 | 21.16 | 21.27 |
| 1.36       | 0    | 0.16186 | 133514.5 | 1860.9 | 18.44 | 23.57 |
| 1.1        | 0    | 0.18858 | 133190.5 | 1800.0 | 20.70 | 19.57 |
| 2.8        | 0    | 0.23391 | 133258.5 | 1915.4 | 21.86 | 21.22 |
| 2.32       | 0    | 0.25228 | 133496.6 | 2063.1 | 21.72 | 21.96 |
| 1.4        | 0    | 0.26209 | 133220.2 | 1808.0 | 20.70 | 19.90 |
| 2.23       | 0    | 0.26248 | 133415.1 | 2041.6 | 20.46 | 21.27 |
| 2.3        | 0    | 0.27340 | 133227.2 | 2023.9 | 20.41 | 20.68 |
| 2.33       | 0    | 0.28879 | 133509.1 | 1964.8 | 23.21 | 19.47 |
| 2.4        | 0    | 0.29124 | 133226.6 | 1797.6 | 19.68 | 20.04 |
| 2.11       | 0    | 0.30205 | 133279.0 | 2106.8 | 21.70 | 21.06 |
| 2.7        | 0    | 0.30223 | 133247.7 | 1717.4 | 18.19 | 18.65 |
| 1.11       | 0    | 0.30250 | 133422.1 | 2113.4 | 99.99 | 99.99 |
| 2.15       | 0    | 0.32883 | 133315.7 | 2131.0 | 21.35 | 21.86 |
| 1.14       | 0    | 0.36257 | 133297.9 | 2040.1 | 18.46 | 19.21 |
| 2.12       | 0    | 0.38681 | 133285.5 | 1805.0 | 22.75 | 21.95 |
| 2.1        | 1    | 0.39258 | 133340.4 | 1940.4 | 99.99 | 99.99 |
| 2.46       | 1    | 0.39459 | 133617.1 | 1863.3 | 21.17 | 21.87 |
| 2.41       | 1    | 0.39612 | 133572.2 | 1946.6 | 21.02 | 19.92 |
| 1.29       | 1    | 0.39623 | 133452.4 | 1974.5 | 22.59 | 21.36 |
| 2.38       | 1    | 0.39682 | 133540.9 | 2135.4 | 19.68 | 20.34 |
| 2.58       | 1    | 0.39831 | 133716.4 | 2133.0 | 19.11 | 19.90 |
| 2.45       | 1    | 0.39931 | 133602.5 | 1766.1 | 20.37 | 18.86 |
| 2.48       | 1    | 0.39959 | 133631.1 | 1955.4 | 21.38 | 20.13 |
| 1.46       | 1    | 0.40072 | 133598.2 | 1749.0 | 17.99 | 18.46 |
| 2.50       | 1    | 0.40092 | 133639.7 | 1729.6 | 21.49 | 20.37 |
| 2.59       | 1    | 0.40191 | 133718.0 | 1790.9 | 20.32 | 20.45 |
| 2.43       | 1    | 0.40232 | 133587.9 | 2123.8 | 21.41 | 19.96 |
| 2.36       | 0    | 0.41871 | 133532.8 | 1905.0 | 21.70 | 20.53 |
| 1.42       | 0    | 0.42010 | 133716.2 | 2146.4 | 99.99 | 99.99 |
| 2.6        | 0    | 0.42539 | 133244.5 | 1916.9 | 21.50 | 20.24 |
| 2.18       | 0    | 0.44978 | 133348.1 | 2050.8 | 20.92 | 21.72 |
| 2.13       | 0    | 0.46602 | 133293.6 | 2003.4 | 19.92 | 20.63 |
| 2.25       | 0    | 0.47141 | 133425.4 | 1983.7 | 21.56 | 21.45 |
| 2.0        | 0    | 0.51587 | 133742.8 | 2108.9 | 20.97 | 21.43 |
Table 7—Continued

| Num. | group | z     | err-z  | Alpha | Delta | V   | I   | R   | type |
|------|-------|-------|--------|-------|-------|-----|-----|-----|------|
| 2.34 | 0     | 0.47633| 0.00024| 133509.1 | 1791.9 | 22.23 | 20.44 | 21.10 |
| 2.9  | 0     | 0.48952| 0.00019| 133263.4 | 2092.9 | 22.11 | 20.14 | 20.98 |
| 2.5  | 0     | 0.49257| 0.00041| 133236.9 | 1734.8 | 20.86 | 19.88 | 20.18 |
| 1.5  | 0     | 0.49893| 0.00086| 133235.8 | 1999.4 | 21.66 | 19.79 | 20.33 |
| 1.16 | 0     | 0.51073| 0.00032| 133329.8 | 1795.3 | 22.68 | 22.24 | 22.19 |
| 1.17 | 0     | 0.51336| 0.00031| 133337.3 | 2075.1 | 22.34 | 21.26 | 21.51 |
| 2.14 | 0     | 0.56521| 0.00021| 133306.6 | 1820.3 | 22.39 | 21.90 | 22.20 |
| 1.21 | 0     | 0.60139| 0.00019| 133355.2 | 1900.4 | 22.57 | 21.28 | 21.99 |
| 2.44 | 0     | 0.61066| 0.00023| 133598.7 | 1990.3 | 21.81 | 20.01 | 20.64 |
| 1.27 | 0     | 0.65351| 0.00026| 133442.1 | 2112.8 | 21.60 | 20.22 | 20.75 |
| 2.55 | 0     | 0.65660| 0.00025| 133687.3 | 2062.0 | 22.74 | 21.53 | 22.28 |
Table 8. Data for the line of sight PDCS30/45.

| Num. group | z       | err-z  | Alpha     | Delta    | V       | I       | R       | type |
|------------|---------|--------|-----------|----------|---------|---------|---------|------|
| 1.43       | 0       | 0.02042| 535818.8  | 169644.2 | 21.63   | 20.52   | 21.00   |      |
| 2.45       | 0       | 0.03008| 535322.0  | 169621.6 | 20.76   | 20.32   | 20.39   |      |
| 3.4        | 0       | 0.05074| 535101.1  | 170261.3 | 20.45   | 20.13   | 19.85   | em   |
| 2.15       | 0       | 0.07501| 534807.9  | 169763.8 | 19.59   | 19.09   | 19.17   |      |
| 1.11       | 0       | 0.07601| 535276.6  | 169833.2 | 20.74   | 19.69   | 20.03   |      |
| 3.18       | 0       | 0.08746| 535375.4  | 170312.4 | 21.63   | 19.88   | 20.38   |      |
| 2.37       | 0       | 0.08779| 535191.3  | 170003.5 | 99.99   | 99.99   | 17.05   |      |
| 2.28       | 0       | 0.08841| 535009.9  | 169782.8 | 20.54   | 19.02   | 19.68   |      |
| 2.20       | 0       | 0.09886| 534893.8  | 169884.0 | 20.91   | 19.17   | 19.85   |      |
| 2.14       | 0       | 0.10364| 534789.0  | 169828.2 | 22.99   | 22.56   | 22.37   |      |
| 39.4       | 0       | 0.10447| 535371.7  | 169975.4 | 21.57   | 20.55   | 99.99   |      |
| 1.45       | 0       | 0.12380| 535831.7  | 169718.4 | 21.93   | 20.99   | 21.33   |      |
| 1.29       | 0       | 0.12575| 535604.4  | 170052.8 | 22.16   | 20.84   | 20.61   |      |
| 43.4       | 0       | 0.14599| 535236.7  | 170362.4 | 22.49   | 21.23   | 21.07   |      |
| 2.17       | 0       | 0.14811| 534844.6  | 170038.8 | 19.42   | 18.59   | 18.85   |      |
| 3.27       | 0       | 0.15894| 535501.3  | 170037.7 | 22.03   | 20.34   | 21.10   |      |
| 40.4       | 0       | 0.16247| 535286.9  | 170001.0 | 22.22   | 21.03   | 21.57   | em   |
| 3.39       | 0       | 0.16575| 535684.3  | 170383.3 | 21.87   | 20.58   | 20.44   |      |
| 1.34       | 0       | 0.16980| 535683.2  | 169933.0 | 22.64   | 22.16   | 22.24   |      |
| 26.4       | 0       | 0.18926| 535003.4  | 169960.3 | 21.66   | 20.45   | 20.79   |      |
| 2.9        | 1       | 0.19639| 534719.9  | 169645.7 | 20.47   | 19.39   | 19.74   |      |
| 2.41       | 1       | 0.19648| 535242.2  | 169656.5 | 18.50   | 17.19   | 17.64   |      |
| 1.9        | 1       | 0.19760| 535246.4  | 169656.5 | 18.50   | 17.19   | 17.64   |      |
| 1.48       | 1       | 0.19840| 535895.5  | 169893.7 | 22.70   | 21.54   | 21.63   | em   |
| 7.4        | 1       | 0.20075| 534674.5  | 170220.6 | 19.46   | 18.36   | 18.63   |      |
| 3.38       | 1       | 0.20321| 535196.7  | 169725.2 | 19.88   | 18.52   | 18.97   |      |
| 3.40       | 1       | 0.20548| 535689.2  | 170014.3 | 21.84   | 21.62   | 21.51   |      |
| 1.2        | 1       | 0.20782| 535138.4  | 169674.5 | 99.99   | 99.99   | 18.84   |      |
| 18.4       | 1       | 0.21064| 534856.0  | 170066.9 | 21.58   | 21.07   | 20.93   |      |
| 2.35       | 0       | 0.21475| 535152.4  | 169854.8 | 99.99   | 99.99   | 19.79   |      |
| 2.5        | 0       | 0.21986| 534649.1  | 169966.4 | 20.38   | 20.02   | 19.42   |      |
| 2.34       | 0       | 0.23850| 535141.6  | 170006.4 | 21.29   | 19.39   | 20.22   |      |
| 38.4       | 2       | 0.24768| 535371.7  | 170101.1 | 20.38   | 18.98   | 19.37   |      |
| 2.43       | 2       | 0.24893| 535281.5  | 169818.8 | 20.07   | 18.97   | 19.40   |      |
| 2.47       | 2       | 0.24933| 535359.2  | 169740.4 | 99.99   | 99.99   | 19.87   |      |
| 41.4       | 2       | 0.24959| 535225.3  | 170107.6 | 21.97   | 21.33   | 21.51   | em   |
| 13.4       | 2       | 0.24977| 534760.9  | 170219.2 | 20.75   | 19.54   | 19.97   |      |
| 2.38       | 2       | 0.25010| 535192.4  | 169724.9 | 19.88   | 18.52   | 18.97   |      |
| 1.4        | 2       | 0.25016| 535176.2  | 169825.0 | 19.20   | 18.12   | 18.37   |      |
| 28.4       | 2       | 0.25027| 535073.6  | 169957.1 | 20.10   | 19.57   | 19.66   |      |
| 1.5        | 2       | 0.25047| 535194.5  | 169724.9 | 19.88   | 18.52   | 18.97   |      |
Table 8—Continued

| Num. | group | z      | err-z  | Alpha    | Delta   | V  | I   | R     | type |
|------|-------|--------|--------|----------|---------|----|-----|-------|------|
| 1.14 | 2     | 0.253  | 0.00062| 535337.6 | 169871.4| 20.37| 19.95| 20.11 | em   |
| 1.38 | 2     | 0.256  | 0.00061| 535730.8 | 169742.9| 22.78| 22.42| 22.11 | em   |
| 3.32 | 2     | 0.258  | 0.00029| 535581.7 | 170295.8| 19.53| 18.24| 18.59 |      |
| 3.28 | 2     | 0.261  | 0.00029| 535525.0 | 170241.5| 20.72| 19.63| 19.76 |      |
| 1.12 | 0     | 0.287  | 0.00114| 535296.6 | 169810.2| 20.12| 18.77| 19.35 |      |
| 2.44 | 0     | 0.288  | 0.00041| 535293.9 | 169790.0| 19.63| 18.64| 18.96 | ea   |
| 1.10 | 0     | 0.289  | 0.00027| 535258.3 | 169841.5| 19.50| 18.07| 18.56 |      |
| 3.17 | 0     | 0.291  | 0.00036| 535355.5 | 169987.0| 21.73| 21.24| 19.99 |      |
| 24.4 | 3     | 0.331  | 0.00053| 535762.6 | 170015.8| 20.72| 20.34| 20.36 |      |
| 19.4 | 3     | 0.331  | 0.00033| 534874.3 | 170271.7| 19.73| 18.33| 18.86 |      |
| 35.4 | 3     | 0.331  | 0.00013| 535185.4 | 170147.5| 20.34| 18.77| 19.26 |      |
| 3.1  | 3     | 0.331  | 0.00024| 535128.1 | 170163.4| 20.88| 19.28| 19.74 |      |
| 2.39 | 3     | 0.332  | 0.00048| 535208.0 | 169632.7| 20.92| 19.92| 20.22 |      |
| 24.4 | 3     | 0.333  | 0.00015| 534984.5 | 170133.8| 24.65| 19.80| 19.62 |      |
| 20.4 | 0     | 0.348  | 0.00040| 534900.8 | 170149.0| 20.73| 19.66| 20.02 |      |
| 2.32 | 0     | 0.358  | 0.00033| 535109.2 | 170022.6| 22.74| 21.66| 21.38 |      |
| 2.10 | 0     | 0.359  | 0.00020| 534723.7 | 169912.8| 21.34| 19.33| 19.88 |      |
| 3.16 | 0     | 0.363  | 0.00020| 535385.7 | 170101.1| 20.38| 18.98| 19.37 |      |
| 1.41 | 0     | 0.371  | 0.00045| 535784.8 | 169997.8| 19.92| 19.10| 19.22 |      |
| 1.32 | 0     | 0.373  | 0.00021| 535655.7 | 170059.7| 21.15| 19.97| 20.30 |      |
| 1.7  | 0     | 0.379  | 0.00038| 535209.7 | 169632.7| 20.92| 19.92| 20.22 |      |
| 2.36 | 0     | 0.382  | 0.00050| 535175.1 | 169825.0| 19.20| 18.12| 18.37 |      |
| 27.4 | 0     | 0.386  | 0.00029| 535039.0 | 170009.3| 20.80| 19.29| 19.88 |      |
| 3.54 | 0     | 0.392  | 0.00026| 535855.2 | 169966.8| 99.99| 99.99| 19.57 |      |
| 2.12 | 0     | 0.393  | 0.00027| 534750.7 | 169629.5| 21.64| 20.85| 20.68 |      |
| 2.4  | 0     | 0.416  | 0.00035| 534635.1 | 169970.4| 20.74| 18.82| 18.95 |      |
| 2.42 | 0     | 0.456  | 0.00017| 535256.6 | 169724.5| 21.21| 19.30| 19.84 |      |
| 1.22 | 0     | 0.456  | 0.00028| 535486.7 | 169828.9| 21.61| 20.05| 20.70 |      |
| 2.18 | 0     | 0.458  | 0.00108| 534853.3 | 169802.6| 21.22| 20.72| 20.73 |      |
| 2.30 | 0     | 0.464  | 0.00049| 535059.5 | 169904.9| 20.39| 18.95| 19.39 |      |
| 1.47 | 0     | 0.468  | 0.00081| 535873.9 | 169719.8| 22.43| 21.42| 21.77 |      |
| 3.22 | 0     | 0.469  | 0.00034| 535417.0 | 170077.0| 21.28| 19.73| 20.34 |      |
| 29.4 | 0     | 0.470  | 0.00111| 535018.0 | 170251.9| 22.43| 20.92| 21.43 |      |
| 2.21 | 0     | 0.470  | 0.00040| 534904.0 | 169750.4| 21.52| 21.18| 21.27 |      |
| 2.26 | 0     | 0.514  | 0.00030| 534982.9 | 169647.1| 99.99| 99.99| 21.31 |      |
| 2.13 | 0     | 0.515  | 0.00026| 534766.9 | 169724.5| 22.09| 20.23| 20.77 |      |
| 2.25 | 0     | 0.545  | 0.00055| 534966.7 | 169980.1| 21.38| 20.26| 20.58 |      |
Table 8—Continued

| Num. | group | z    | err-z | Alpha    | Delta    | V   | I   | R   | type |
|------|-------|------|-------|----------|----------|-----|-----|-----|------|
| 1.23 | 0     | 0.56117 | 0.00035 | 535511.0 | 170026.2 | 22.42 | 20.86 | 21.42 |
| 1.36 | 0     | 0.66670 | 0.00027 | 535707.0 | 169780.7 | 21.71 | 20.52 | 20.81 | ea   |
| 1.31 | 0     | 0.67501 | 0.00047 | 535653.0 | 169769.5 | 20.55 | 20.41 | 20.16 |
| 1.40 | 0     | 0.69687 | 0.00030 | 535772.9 | 169622.6 | 22.05 | 21.01 | 21.49 |
Table 9. Data for the line of sight PDCS33.

| Num. group | z     | err-z | Alpha     | Delta     | V       | I       | R       | type |
|------------|-------|-------|-----------|-----------|---------|---------|---------|------|
| 1.20       | 0     | 0.01166 | 532697.0 | 170099.6 | 21.64   | 21.05   | 21.07   |      |
| 1.5        | 0     | 0.01961 | 532477.3 | 169996.3 | 21.64   | 19.91   | 20.21   |      |
| 2.35       | 0     | 0.04537 | 533225.2 | 170312.0 | 20.17   | 18.79   | 19.22   |      |
| 2.13       | 0     | 0.04622 | 532964.9 | 170368.2 | 22.86   | 21.52   | 21.95   |      |
| 2.50       | 0     | 0.07506 | 533369.3 | 170305.6 | 21.03   | 19.25   | 99.99   |      |
| 1.40       | 0     | 0.08026 | 532953.0 | 170237.9 | 20.01   | 19.14   | 19.39   |      |
| 2.67       | 0     | 0.08665 | 533558.3 | 170019.7 | 22.24   | 20.88   | 99.99   |      |
| 1.26       | 0     | 0.09783 | 532768.9 | 170374.7 | 22.71   | 22.10   | 22.41   |      |
| 2.43       | 0     | 0.10248 | 533298.1 | 170122.7 | 19.59   | 19.08   | 99.99   |      |
| 2.22       | 0     | 0.10414 | 533074.0 | 170431.9 | 20.14   | 19.56   | 19.66   |      |
| 2.7        | 0     | 0.12473 | 532976.4 | 170357.4 | 99.99   | 99.99   | 99.99   |      |
| 2.37       | 0     | 0.13344 | 533228.4 | 170292.6 | 99.99   | 99.99   | 99.99   |      |
| 2.38       | 0     | 0.13857 | 533254.3 | 170341.9 | 22.32   | 21.19   | 99.99   |      |
| 2.63       | 0     | 0.14507 | 533412.0 | 169980.5 | 99.99   | 99.99   | 99.99   |      |
| 1.22       | 0     | 0.14882 | 532717.6 | 170097.1 | 19.95   | 19.52   | 19.70   |      |
| 2.48       | 0     | 0.16380 | 533351.0 | 170346.6 | 19.03   | 18.55   | 99.99   |      |
| 2.36       | 0     | 0.17367 | 533219.8 | 170036.6 | 20.57   | 19.09   | 19.43   |      |
| 1.30       | 0     | 0.18629 | 532811.0 | 170172.7 | 20.80   | 20.12   | 20.34   |      |
| 2.27       | 0     | 0.19162 | 533145.6 | 170269.2 | 99.99   | 99.99   | 22.14   |      |
| 2.51       | 0     | 0.19690 | 533389.3 | 170353.4 | 19.23   | 18.33   | 99.99   |      |
| 1.51       | 1     | 0.20544 | 533076.7 | 170066.5 | 22.53   | 22.08   | 21.82   |      |
| 2.6        | 1     | 0.20716 | 532856.3 | 170149.0 | 21.92   | 20.78   | 20.68   |      |
| 1.41       | 1     | 0.21047 | 532948.7 | 169997.8 | 21.96   | 21.49   | 21.76   |      |
| 1.15       | 1     | 0.21437 | 532641.4 | 170057.5 | 20.43   | 19.79   | 19.96   |      |
| 1.54       | 1     | 0.21531 | 533108.5 | 170232.1 | 22.19   | 21.32   | 21.44   |      |
| 1.63       | 0     | 0.22703 | 533191.1 | 170224.6 | 22.23   | 20.95   | 21.77   |      |
| 2.40       | 0     | 0.23501 | 533277.5 | 170284.0 | 20.80   | 19.58   | 99.99   |      |
| 2.53       | 0     | 0.25263 | 533404.4 | 170420.0 | 21.32   | 21.06   | 99.99   |      |
| 2.52       | 0     | 0.25745 | 533382.8 | 170200.1 | 20.29   | 19.65   | 99.99   |      |
| 2.28       | 0     | 0.26466 | 533123.1 | 170428.0 | 20.57   | 19.34   | 19.62   |      |
| 1.55       | 0     | 0.26500 | 533120.9 | 170428.0 | 20.57   | 19.34   | 19.62   |      |
| 2.45       | 0     | 0.27810 | 533286.0 | 170158.7 | 99.99   | 99.99   | 99.99   |      |
| 2.9        | 0     | 0.27904 | 532916.3 | 170300.9 | 22.72   | 22.21   | 99.99   |      |
| 2.57       | 0     | 0.28041 | 533368.8 | 170032.7 | 99.99   | 99.99   | 99.99   |      |
| 2.26       | 0     | 0.28623 | 533109.6 | 170293.3 | 22.63   | 21.12   | 21.59   |      |
| 1.53       | 0     | 0.28985 | 533098.8 | 170012.9 | 22.73   | 21.46   | 22.61   |      |
| 1.11       | 0     | 0.30591 | 532586.3 | 170179.9 | 21.46   | 20.71   | 20.66   |      |
| 2.18       | 0     | 0.30681 | 533024.3 | 170325.7 | 22.53   | 21.83   | 22.13   |      |
| 1.60       | 0     | 0.30773 | 533164.1 | 170088.1 | 22.39   | 22.15   | 22.13   |      |
| 2.30       | 0     | 0.31917 | 533154.4 | 170234.3 | 22.58   | 22.01   | 22.72   |      |
| 2.20       | 0     | 0.34047 | 533050.7 | 170325.4 | 20.39   | 19.47   | 19.70   |      |
| Num. | group | z    | err-z  | Alpha     | Delta     | V  | I  | R   | type |
|------|-------|------|--------|-----------|-----------|----|----|-----|------|
| 2.70 | 0     | 0.36610 | 0.00076 | 533589.7  | 170001.7  | 20.70 | 19.74 | 99.99 | em   |
| 2.64 | 0     | 0.39156 | 0.00010 | 533046.4  | 170253.7  | 21.57 | 20.41 | 20.82 |      |
| 1.29 | 0     | 0.39220 | 0.00062 | 533413.1  | 170001.7  | 21.35 | 20.48 | 99.99 |      |
| 2.32 | 0     | 0.41506 | 0.00034 | 533179.8  | 170038.4  | 22.02 | 20.79 | 21.14 |      |
| 1.43 | 0     | 0.41820 | 0.00037 | 532978.9  | 170380.8  | 22.53 | 21.28 | 21.98 |      |
| 1.13 | 0     | 0.42351 | 0.00001 | 532605.2  | 170107.2  | 20.49 | 20.05 | 20.09 |      |
| 1.34 | 0     | 0.42682 | 0.00058 | 532857.6  | 170359.2  | 99.99 | 99.99 | 99.99 |      |
| 1.18 | 0     | 0.44246 | 0.00021 | 532724.4  | 170104.0  | 19.95 | 19.52 | 19.70 |      |
| 2.34 | 0     | 0.45910 | 0.00053 | 533199.6  | 170102.5  | 99.99 | 99.99 | 99.99 |      |
| 2.29 | 0     | 0.46296 | 0.00038 | 533139.3  | 170021.9  | 22.34 | 21.58 | 21.40 |      |
| 2.60 | 0     | 0.46708 | 0.00021 | 533390.4  | 170152.2  | 99.99 | 99.99 | 99.99 |      |
| 2.68 | 0     | 0.47773 | 0.00038 | 533561.0  | 170297.3  | 22.10 | 21.69 | 99.99 |      |
| 2.16 | 0     | 0.48085 | 0.00029 | 532993.5  | 170199.4  | 21.33 | 19.44 | 19.82 |      |
| 1.58 | 0     | 0.48086 | 0.00041 | 533142.0  | 170086.7  | 21.75 | 20.28 | 20.97 |      |
| 2.11 | 0     | 0.51704 | 0.00023 | 532948.7  | 170192.5  | 22.53 | 21.73 | 22.67 |      |
| 2.62 | 2     | 0.54757 | 0.00038 | 533508.7  | 170326.1  | 21.60 | 20.14 | 99.99 |      |
| 2.21 | 2     | 0.54989 | 0.00039 | 533057.8  | 170034.8  | 19.88 | 19.48 | 19.53 |      |
| 2.3  | 2     | 0.55449 | 0.00043 | 532805.0  | 170192.5  | 22.03 | 21.30 | 21.64 |      |
| 2.49 | 2     | 0.55466 | 0.00028 | 533355.8  | 169997.8  | 22.27 | 21.33 | 99.99 |      |
| 1.62 | 2     | 0.55838 | 0.00028 | 533177.6  | 170038.4  | 22.02 | 20.79 | 21.14 |      |
| 2.47 | 0     | 0.57021 | 0.00033 | 533339.6  | 170061.8  | 22.13 | 20.86 | 99.99 |      |
| 2.1  | 0     | 0.59994 | 0.00019 | 532793.2  | 170257.0  | 22.70 | 20.70 | 21.73 |      |
| 2.14 | 0     | 0.62526 | 0.00017 | 532978.4  | 170181.4  | 21.94 | 20.01 | 20.60 |      |
| 1.45 | 0     | 0.62597 | 0.00025 | 532992.4  | 170248.7  | 22.79 | 20.59 | 21.77 |      |
| 1.32 | 0     | 0.63629 | 0.00062 | 532826.1  | 170278.9  | 22.93 | 22.30 | 22.80 |      |
| 2.24 | 0     | 0.65836 | 0.00023 | 533078.8  | 170066.5  | 22.53 | 22.08 | 21.82 |      |
| 2.69 | 0     | 0.71763 | 0.00025 | 533585.9  | 170387.3  | 21.95 | 20.00 | 99.99 |      |
Table 10. Data for the line of sight PDCS34.

| Num. group | z     | err-z   | Alpha   | Delta  | V      | I      | R       | type |
|------------|-------|---------|---------|--------|--------|--------|---------|------|
| 1.29       | 0     | 0.02708 | 535659.5| 171235.1| 22.48  | 21.33  | 21.51   |      |
| 1.7        | 0     | 0.06390 | 535285.3| 171073.8| 19.85  | 19.11  | 19.30   |      |
| 1.6        | 0     | 0.07104 | 535265.3| 171346.3| 22.49  | 20.75  | 21.62   |      |
| 1.47       | 0     | 0.07899 | 535971.6| 171432.4| 21.64  | 20.71  | 21.03   |      |
| 1.16       | 0     | 0.08948 | 535415.4| 171175.0| 20.41  | 19.83  | 19.84   |      |
| 2.38       | 0     | 0.13132 | 536015.9| 171400.0| 18.94  | 17.88  | 99.99   |      |
| 2.56       | 0     | 0.15736 | 536173.2| 171367.6| 21.12  | 20.06  | 99.99   |      |
| 2.40       | 0     | 0.15866 | 536044.5| 171198.0| 17.26  | 16.18  | 99.99   |      |
| 2.42       | 0     | 0.19188 | 536097.4| 171307.4| 21.42  | 20.33  | 99.99   |      |
| 1.2        | 0     | 0.20881 | 535203.2| 171150.8| 21.75  | 20.87  | 20.83   |      |
| 1.32       | 0     | 0.21371 | 535705.3| 171357.1| 21.98  | 21.73  | 21.63   | em   |
| 2.2        | 2     | 0.21432 | 535499.6| 171238.3| 22.08  | 21.37  | 21.48   |      |
| 2.13       | 2     | 0.22087 | 535640.5| 171105.1| 99.99  | 99.99  | 99.99   |      |
| 2.33       | 0     | 0.23142 | 535705.9| 171257.4| 19.47  | 18.36  | 18.74   | em   |
| 1.25       | 0     | 0.25001 | 535569.8| 171143.3| 20.78  | 19.60  | 19.91   |      |
| 1.3        | 0     | 0.25057 | 535205.3| 171414.7| 19.92  | 18.88  | 19.27   | em   |
| 2.28       | 0     | 0.25131 | 535748.4| 171105.1| 99.99  | 99.99  | 99.99   |      |
| 2.16       | 0     | 0.25286 | 535727.0| 171183.2| 20.66  | 19.35  | 19.77   |      |
| 2.20       | 0     | 0.28382 | 535793.9| 171487.1| 21.54  | 20.70  | 20.77   |      |
| 2.35       | 0     | 0.30519 | 535980.8| 171199.4| 20.80  | 20.05  | 19.81   |      |
| 1.20       | 0     | 0.31259 | 535490.5| 171493.9| 20.93  | 19.74  | 20.18   |      |
| 2.46       | 0     | 0.31302 | 536167.1| 171365.4| 21.12  | 20.06  | 99.99   |      |
| 1.38       | 1     | 0.32952 | 535813.9| 171345.2| 20.01  | 18.65  | 99.99   |      |
| 1.12       | 1     | 0.33056 | 535351.7| 171173.9| 21.34  | 19.76  | 20.28   |      |
| 2.32       | 1     | 0.33357 | 535940.3| 171082.8| 22.78  | 21.62  | 22.10   |      |
| 1.44       | 1     | 0.33455 | 535905.2| 171159.5| 21.41  | 20.37  | 20.71   |      |
| 1.48       | 1     | 0.33554 | 535978.6| 171199.4| 20.80  | 20.05  | 19.81   |      |
| 2.9        | 0     | 0.34576 | 535604.4| 171261.0| 21.24  | 20.17  | 20.51   | ea   |
| 1.39       | 0     | 0.34975 | 535825.5| 171226.1| 20.40  | 19.46  | 19.45   | ea   |
| 2.1        | 0     | 0.35027 | 535492.1| 171493.9| 20.93  | 19.74  | 20.18   |      |
| 2.25       | 0     | 0.35307 | 535867.2| 171253.1| 99.99  | 99.99  | 99.99   |      |
| 1.14       | 0     | 0.35939 | 535405.7| 171445.0| 21.66  | 20.96  | 21.16   |      |
| 1.26       | 0     | 0.37351 | 535583.9| 171340.2| 21.36  | 20.57  | 20.81   |      |
| 1.46       | 0     | 0.38559 | 535927.3| 171416.2| 20.33  | 19.28  | 19.64   |      |
| 2.31       | 0     | 0.38593 | 535929.5| 171416.2| 20.33  | 19.28  | 19.64   |      |
| 2.54       | 0     | 0.41095 | 536278.9| 171364.7| 19.39  | 18.36  | 99.99   |      |
| 2.55       | 0     | 0.41534 | 536291.8| 171098.3| 20.24  | 19.23  | 99.99   |      |
| 1.24       | 0     | 0.44861 | 535553.6| 171493.2| 21.66  | 19.93  | 20.57   |      |
| 1.21       | 0     | 0.45031 | 535511.0| 171364.0| 20.90  | 19.55  | 19.55   |      |
| 2.27       | 0     | 0.46742 | 535876.6| 171426.6| 21.80  | 20.85  | 21.09   |      |
| 2.43       | 0     | 0.46957 | 536104.4| 171125.6| 20.56  | 19.44  | 99.99   |      |
| 0         | 2     | 0.47831 | 535832.6| 171356.9| 19.90  | 19.34  | 19.99   |      |


| Num. group | z   | err-z     | Alpha  | Delta     | V   | I   | R   | type |
|------------|-----|-----------|--------|-----------|-----|-----|-----|------|
| 2.30       | 0   | 0.51257   | 0.00070| 535906.8  | 171159.5 | 21.41 | 20.37 | 20.71 |
| 2.23       | 0   | 0.51977   | 0.00015| 535825.8  | 171196.2 | 20.53 | 19.50 | 19.83 | ea   |
| 2.19       | 0   | 0.52009   | 0.00035| 535786.9  | 171167.8 | 20.87 | 19.06 | 19.84 |
| 1.42       | 0   | 0.52024   | 0.00027| 535860.4  | 171494.6 | 21.25 | 20.43 | 20.09 | ea   |
| 1.31       | 0   | 0.52198   | 0.00033| 535690.8  | 171276.8 | 21.52 | 19.77 | 20.45 |
| 1.19       | 0   | 0.53193   | 0.00017| 535479.1  | 171225.4 | 20.90 | 18.80 | 19.44 | ea   |
| 2.45       | 0   | 0.54180   | 0.00039| 536148.7  | 171183.2 | 20.94 | 19.99 | 99.99 |
| 2.37       | 0   | 0.54719   | 0.00036| 535971.6  | 171078.5 | 99.99 | 99.99 | 99.99 |
| 1.5        | 0   | 0.62983   | 0.00037| 535242.1  | 171362.5 | 21.05 | 20.29 | 20.38 |
Table 11. Data for the line of sight PDCS38.

| Num. group | z      | err-z    | Alpha    | Delta   | V      | I      | R      | type |
|------------|--------|----------|----------|---------|--------|--------|--------|------|
| 1.29       | 0      | 0.0043   | 531785.0 | 171838.4| 21.00  | 19.54  | 20.02  | ea   |
| 3.20       | 0      | 0.0027   | 532379.0 | 171580.7| 22.06  | 21.39  | 21.35  |
| 3.25       | 0      | 0.0032   | 532459.4 | 171679.7| 22.62  | 19.91  | 21.05  |
| 1.47       | 0      | 0.0029   | 531975.6 | 171708.8| 99.99  | 99.99  | 99.99  |
| 3.30       | 0      | 0.0026   | 532529.1 | 171411.8| 21.87  | 20.08  | 20.58  |
| 2.15       | 0      | 0.0021   | 532124.6 | 172156.7| 17.63  | 16.77  | 16.88  |
| 1.6        | 0      | 0.00020  | 531400.5 | 171988.2| 22.51  | 22.09  | 21.71  |
| 1.27       | 0      | 0.0019   | 531756.4 | 172048.3| 21.21  | 19.92  | 20.23  |
| 2.46       | 0      | 0.0025   | 532607.4 | 171800.6| 22.33  | 21.54  | 21.58  |
| 1.21       | 0      | 0.0036   | 531625.1 | 172069.6| 20.57  | 20.55  | 20.23  |
| 3.47       | 0      | 0.0049   | 532777.0 | 171653.4| 22.69  | 21.96  | 21.68  |
| 1.25       | 0      | 0.0054   | 531698.6 | 171806.4| 20.19  | 18.95  | 19.42  |
| 2.1        | 0      | 0.0027   | 531883.3 | 172144.4| 20.72  | 20.34  | 20.25  | em   |
| 2.26       | 0      | 0.0043   | 532287.7 | 171839.2| 20.69  | 19.58  | 19.84  |
| 2.41       | 0      | 0.0107   | 532523.7 | 171950.8| 20.81  | 20.36  | 20.39  |
| 2.20       | 0      | 0.0018   | 532218.6 | 171915.5| 22.76  | 21.57  | 21.55  |
| 2.18       | 0      | 0.0020   | 532172.2 | 171837.0| 22.62  | 21.61  | 21.42  |
| 2.48       | 0      | 0.0027   | 532648.4 | 172112.0| 22.26  | 21.18  | 21.52  |
| 2.44       | 0      | 0.0027   | 532570.7 | 171888.1| 20.89  | 20.38  | 20.53  | em   |
| 1.9        | 0      | 0.0033   | 531434.0 | 171754.2| 20.92  | 19.54  | 19.95  |
| 2.42       | 0      | 0.0027   | 532543.1 | 172124.6| 22.41  | 21.10  | 21.42  |
| 1.19       | 0      | 0.0041   | 531610.0 | 172021.3| 20.05  | 19.31  | 19.49  |
| 1.20       | 0      | 0.0032   | 531618.1 | 171813.6| 22.90  | 20.96  | 20.39  |
| 2.10       | 0      | 0.0020   | 532037.2 | 172176.1| 19.78  | 18.43  | 18.93  |
| 3.32       | 0      | 0.0092   | 532565.3 | 171552.2| 19.95  | 19.62  | 19.55  | em   |
| 1.40       | 0      | 0.0014   | 531976.1 | 171837.7| 22.36  | 21.60  | 21.54  | em   |
| 1.26       | 0      | 0.0060   | 531715.3 | 171794.2| 20.07  | 18.59  | 19.14  |
| 2.16       | 0      | 0.0042   | 532141.9 | 171974.5| 20.78  | 20.10  | 20.08  |
| 3.11       | 0      | 0.0065   | 532270.8 | 171430.9| 99.99  | 99.99  | 99.99  |
| 2.34       | 0      | 0.0043   | 532406.5 | 172183.3| 22.50  | 21.64  | 21.78  |
| 3.21       | 1      | 0.0020   | 532411.9 | 171626.8| 21.06  | 20.22  | 20.49  | em   |
| 1.17       | 1      | 0.0030   | 531554.4 | 171641.5| 22.39  | 20.74  | 21.34  |
| 1.46       | 1      | 0.0030   | 532064.7 | 171976.3| 20.53  | 19.36  | 19.81  |
| 2.17       | 1      | 0.0060   | 532156.5 | 172170.7| 20.19  | 18.67  | 18.94  |
| 2.21       | 1      | 0.0021   | 532228.3 | 172202.0| 20.61  | 19.12  | 19.63  |
| 1.41       | 1      | 0.0033   | 531988.0 | 172070.3| 20.84  | 20.04  | 20.19  | ea   |
| 2.7        | 1      | 0.0015   | 532005.3 | 171846.7| 20.09  | 18.55  | 19.15  |
| 2.4        | 1      | 0.0017   | 531973.4 | 172157.0| 19.88  | 18.48  | 18.89  |
| 2.19       | 1      | 0.0033   | 532179.2 | 172153.1| 20.85  | 19.37  | 19.91  |
| 1.38       | 1      | 0.0023   | 531926.5 | 171784.4| 22.15  | 20.73  | 21.24  |
| 2.11       | 1      | 0.0032   | 532048.0 | 171841.3| 19.91  | 18.72  | 19.02  | ea   |
| 2.18       | 1      | 0.0032   | 532449.0 | 172170.7| 19.91  | 18.72  | 19.02  | em   |
Table 11—Continued

| Num. | group | z     | err-z  | Alpha     | Delta     | V     | I     | R     | type |
|------|-------|-------|--------|-----------|-----------|-------|-------|-------|------|
| 1.10 | 1     | 0.33850 | 0.00096 | 531448.6  | 171668.5  | 22.26 | 19.74 | 21.72 |      |
| 2.8  | 0     | 0.35203 | 0.00048 | 532021.0  | 172114.2  | 20.92 | 20.47 | 20.46 | ea   |
| 2.6  | 0     | 0.35250 | 0.00040 | 531990.2  | 172070.3  | 20.84 | 20.04 | 20.19 | ea   |
| 1.11 | 0     | 0.37434 | 0.00038 | 531450.2  | 171938.5  | 21.27 | 20.24 | 20.58 |      |
| 2.43 | 0     | 0.38238 | 0.00026 | 532545.3  | 171860.0  | 22.71 | 21.30 | 21.82 |      |
| 1.30 | 0     | 0.38304 | 0.00022 | 531808.2  | 172051.9  | 20.81 | 19.63 | 19.95 |      |
| 1.52 | 0     | 0.39252 | 0.00018 | 532139.8  | 171974.5  | 20.78 | 20.10 | 20.08 | ea   |
| 1.48 | 0     | 0.43030 | 0.00028 | 532078.7  | 171918.7  | 22.22 | 20.61 | 20.98 |      |
| 2.3  | 0     | 0.43451 | 0.00029 | 531917.8  | 172054.1  | 21.13 | 19.86 | 20.26 | ea   |
| 2.39 | 2     | 0.45792 | 0.00032 | 532469.2  | 172165.3  | 21.22 | 19.27 | 19.85 |      |
| 2.47 | 2     | 0.46250 | 0.00034 | 532629.0  | 171964.1  | 20.12 | 18.83 | 19.07 |      |
| 2.30 | 2     | 0.46544 | 0.00027 | 532333.6  | 171842.4  | 20.99 | 19.29 | 19.90 |      |
| 2.23 | 2     | 0.46562 | 0.00043 | 532258.6  | 172179.7  | 22.16 | 20.25 | 20.54 | ea   |
| 2.45 | 2     | 0.46573 | 0.00021 | 532602.0  | 172149.8  | 21.31 | 19.45 | 19.57 |      |
| 1.42 | 2     | 0.46752 | 0.00044 | 531989.1  | 171806.8  | 21.62 | 20.72 | 20.87 | ea   |
| 2.28 | 2     | 0.46781 | 0.00025 | 532309.9  | 172157.4  | 21.41 | 19.45 | 20.22 |      |
| 3.37 | 2     | 0.47112 | 0.00052 | 532630.1  | 171454.0  | 21.22 | 20.38 | 20.55 |      |
| 2.25 | 2     | 0.47183 | 0.00039 | 532278.0  | 172185.8  | 21.56 | 19.75 | 20.36 |      |
| 3.46 | 2     | 0.47346 | 0.00042 | 532760.2  | 171654.5  | 21.01 | 19.66 | 20.12 |      |
| 2.22 | 2     | 0.47468 | 0.00043 | 532243.4  | 171950.8  | 21.03 | 19.96 | 20.11 | ea   |
| 2.29 | 2     | 0.47477 | 0.00046 | 532336.9  | 172075.7  | 22.71 | 22.53 | 22.16 | ea   |
| 3.48 | 2     | 0.47973 | 0.00065 | 532795.3  | 171672.8  | 22.62 | 21.46 | 21.53 |      |
| 3.43 | 0     | 0.49224 | 0.00044 | 532726.2  | 171366.8  | 21.05 | 19.76 | 20.16 |      |
| 2.49 | 0     | 0.53619 | 0.00043 | 532659.8  | 171870.8  | 22.47 | 22.12 | 21.66 |      |
| 1.13 | 0     | 0.53965 | 0.00030 | 531481.0  | 171659.5  | 21.17 | 19.30 | 19.70 |      |
| 3.49 | 0     | 0.55338 | 0.00033 | 532807.2  | 171443.9  | 21.65 | 20.40 | 20.61 | ea   |
| 3.41 | 0     | 0.55607 | 0.00030 | 532704.6  | 171375.1  | 22.07 | 21.09 | 21.16 | ea   |
| 2.13 | 0     | 0.56575 | 0.00049 | 532903.3  | 172141.6  | 22.67 | 20.39 | 21.29 | ea   |
| 3.16 | 0     | 0.56647 | 0.00045 | 532300.7  | 171489.6  | 22.39 | 19.56 | 21.29 |      |
| 2.24 | 0     | 0.58212 | 0.00055 | 532263.4  | 171926.3  | 22.97 | 21.54 | 22.06 |      |
| 3.36 | 0     | 0.61749 | 0.00019 | 532609.0  | 171800.6  | 22.33 | 21.54 | 21.58 |      |
| 3.44 | 0     | 0.62185 | 0.00028 | 532740.2  | 171415.1  | 20.78 | 19.68 | 20.09 |      |
| 2.31 | 0     | 0.64559 | 0.00037 | 532352.5  | 172084.0  | 22.88 | 20.71 | 21.59 |      |
Table 12.  Data for the line of sight PDCS57.

| Num. group | z     | err-z | Alpha   | Delta   | V      | I      | R      | type |
|------------|-------|-------|---------|---------|--------|--------|--------|------|
| 1.17       | 0     | 0.01421 | 723173.4 | 108354.6 | 99.99  | 99.99  | 18.93  |      |
| 2.30       | 0     | 0.01751 | 723594.6 | 107896.7 | 19.71  | 18.88  | 99.99  |      |
| 1.64       | 0     | 0.12047 | 723799.8 | 107872.9 | 22.31  | 21.73  | 99.99  |      |
| 2.42       | 0     | 0.12386 | 723546.0 | 108133.6 | 21.77  | 21.57  | 21.58  |      |
| 2.51       | 0     | 0.13010 | 723627.0 | 108188.3 | 21.85  | 21.11  | 21.06  |      |
| 2.24       | 0     | 0.14819 | 723724.2 | 107934.1 | 19.98  | 19.22  | 18.92  |      |
| 2.35       | 1     | 0.15820 | 723697.2 | 107898.5 | 21.39  | 20.30  | 99.99  |      |
| 1.61       | 1     | 0.15915 | 723578.4 | 108123.1 | 21.59  | 21.50  | 21.29  |      |
| 1.65       | 1     | 0.15963 | 723546.0 | 108241.2 | 19.23  | 18.35  | 18.68  |      |
| 2.45       | 1     | 0.16119 | 723346.2 | 108164.2 | 21.48  | 20.08  | 20.55  |      |
| 1.22       | 1     | 0.16196 | 723546.0 | 108133.6 | 21.10  | 21.06  | 20.80  |      |
| 2.33       | 1     | 0.16254 | 723627.0 | 108097.2 | 20.94  | 20.31  | 20.49  |      |
| 1.37       | 0     | 0.17680 | 723367.8 | 108419.4 | 19.64  | 18.51  | 18.92  |      |
| 2.62       | 0     | 0.22114 | 723897.0 | 108146.2 | 21.94  | 20.89  | 99.99  |      |
| 2.2        | 0     | 0.22464 | 723324.6 | 107918.3 | 21.67  | 20.79  | 99.99  |      |
| 2.49       | 0     | 0.23377 | 723767.4 | 108254.5 | 18.77  | 17.92  | 99.99  |      |
| 1.68       | 0     | 0.24918 | 723627.0 | 108188.3 | 21.85  | 21.11  | 21.06  |      |
| 1.59       | 0     | 0.24922 | 723519.0 | 108022.0 | 19.28  | 17.91  | 18.43  |      |
| 1.23       | 0     | 0.24966 | 723627.0 | 108133.6 | 22.02  | 21.08  | 21.47  |      |
| 1.34       | 0     | 0.25576 | 723335.4 | 108287.3 | 20.44  | 19.09  | 19.59  |      |
| 2.23       | 0     | 0.25828 | 723535.2 | 107933.0 | 20.54  | 20.02  | 99.99  |      |
| 2.52       | 0     | 0.26635 | 723799.8 | 107872.9 | 22.31  | 21.73  | 99.99  |      |
| 1.8        | 0     | 0.27941 | 723092.4 | 108121.0 | 99.99  | 99.99  | 19.45  |      |
| 1.70       | 0     | 0.28701 | 723643.2 | 108355.5 | 22.66  | 21.87  | 21.90  |      |
| 1.25       | 0     | 0.28759 | 723546.0 | 108461.9 | 21.04  | 20.07  | 20.21  |      |
| 2.60       | 2     | 0.30108 | 723875.4 | 108184.0 | 19.65  | 18.33  | 99.99  |      |
| 1.45       | 2     | 0.30234 | 723412.8 | 108209.5 | 19.55  | 18.01  | 18.47  |      |
| 1.29       | 2     | 0.30306 | 723281.4 | 108117.7 | 19.06  | 18.11  | 18.45  |      |
| 2.64       | 2     | 0.30369 | 723292.4 | 108070.9 | 99.99  | 99.99  | 99.99  |      |
| 1.60       | 2     | 0.30444 | 723535.2 | 108233.6 | 20.52  | 19.61  | 19.96  |      |
| 1.31       | 2     | 0.30509 | 723297.6 | 108168.5 | 21.27  | 20.23  | 20.56  |      |
| 1.53       | 0     | 0.31104 | 723481.2 | 108125.3 | 22.78  | 21.81  | 21.79  |      |
| 1.24       | 0     | 0.31268 | 723249.0 | 108075.2 | 21.59  | 20.76  | 20.84  |      |
| 1.62       | 0     | 0.31969 | 723562.2 | 108351.7 | 22.00  | 21.48  | 21.60  |      |
| 2.61       | 0     | 0.32149 | 723897.0 | 107903.2 | 22.33  | 20.63  | 99.99  |      |
| 2.58       | 0     | 0.33336 | 723859.2 | 107941.3 | 22.04  | 21.69  | 99.99  |      |
| 1.58       | 0     | 0.33976 | 723513.6 | 108301.0 | 21.11  | 19.68  | 20.14  |      |
| 1.30       | 0     | 0.34005 | 723297.6 | 108362.5 | 20.69  | 19.30  | 19.75  |      |
| 1.14       | 0     | 0.34384 | 723151.8 | 108129.6 | 99.99  | 99.99  | 20.78  |      |
| 2.8        | 0     | 0.36319 | 723389.4 | 108020.2 | 22.34  | 21.70  | 21.69  |      |
Table 12—Continued

| Num. | group | z     | err-z  | Alpha   | Delta  | V     | I     | R     | type |
|------|-------|-------|--------|---------|--------|-------|-------|-------|------|
| 2.1  | 0     | 0.36542| 0.00046| 723319.2| 108149.0| 21.53 | 20.83 | 20.94 |      |
| 2.55 | 0     | 0.38580| 0.00023| 723816.0| 107965.8| 21.52 | 21.62 | 99.99 |      |
| 1.27 | 0     | 0.39174| 0.00027| 723265.2| 108060.5| 22.45 | 21.05 | 21.79 |      |
| 1.20 | 0     | 0.40224| 0.00021| 723216.6| 108379.1| 22.09 | 21.37 | 21.46 |      |
| 1.55 | 0     | 0.41289| 0.00046| 723486.6| 108147.2| 20.35 | 19.60 | 19.76 |      |
| 1.42 | 0     | 0.41498| 0.00043| 723405.6| 108400.7| 18.20 | 17.03 | 17.36 |      |
| 1.21 | 0     | 0.41900| 0.00025| 723222.0| 108200.9| 20.44 | 18.74 | 19.30 |      |
| 1.36 | 0     | 0.41903| 0.00032| 723362.4| 108256.3| 22.17 | 20.69 | 20.97 |      |
| 1.32 | 3     | 0.45309| 0.00030| 723308.4| 108406.8| 99.99 | 99.99 | 20.64 |      |
| 1.26 | 3     | 0.45455| 0.00027| 723249.0| 108270.7| 21.45 | 19.85 | 19.86 |      |
| 1.15 | 3     | 0.45558| 0.00031| 723151.8| 108386.3| 99.99 | 99.99 | 20.14 | ea   |
| 1.46 | 3     | 0.45990| 0.00018| 723427.2| 108443.5| 22.11 | 20.47 | 21.26 |      |
| 1.7  | 3     | 0.46069| 0.00041| 723070.8| 108388.1| 99.99 | 99.99 | 20.42 |      |
| 1.28 | 3     | 0.46184| 0.00031| 723276.0| 108307.4| 21.87 | 19.78 | 20.39 |      |
| 1.9  | 3     | 0.46414| 0.00029| 723097.8| 108411.8| 99.99 | 99.99 | 22.05 |      |
| 2.56 | 0     | 0.47001| 0.00036| 723837.6| 108218.5| 21.78 | 21.61 | 99.99 |      |
| 2.37 | 0     | 0.47573| 0.00030| 723664.8| 108139.7| 22.19 | 20.98 | 21.25 |      |
| 2.19 | 0     | 0.47724| 0.00063| 723486.6| 107936.3| 21.16 | 20.49 | 99.99 | ea   |
| 1.3  | 0     | 0.47893| 0.00043| 723027.6| 108141.1| 99.99 | 99.99 | 20.17 |      |
| 1.12 | 0     | 0.48044| 0.00028| 723119.4| 108161.6| 99.99 | 99.99 | 21.05 |      |
| 1.67 | 0     | 0.48806| 0.00026| 723610.8| 108105.5| 21.59 | 20.41 | 20.76 | ea   |
| 2.31 | 0     | 0.48966| 0.00025| 723616.2| 108105.5| 21.59 | 20.41 | 20.76 | ea   |
| 2.9  | 0     | 0.50116| 0.00036| 723405.6| 108101.2| 21.86 | 21.09 | 21.03 | em   |
| 2.54 | 0     | 0.50246| 0.00034| 723805.2| 108204.8| 21.55 | 19.39 | 99.99 |      |
| 1.38 | 0     | 0.50448| 0.00031| 723373.2| 108098.6| 21.22 | 19.84 | 20.32 |      |
| 1.63 | 0     | 0.50765| 0.00023| 723578.4| 108405.7| 22.09 | 20.43 | 21.00 |      |
| 2.12 | 0     | 0.51687| 0.00031| 723427.2| 107973.7| 22.53 | 20.96 | 21.62 | ea   |
| 1.66 | 0     | 0.53380| 0.00041| 723610.8| 108343.8| 22.56 | 20.86 | 21.60 |      |
| 2.67 | 0     | 0.54054| 0.00016| 723951.0| 107934.1| 99.99 | 99.99 | 99.99 |      |
| 1.35 | 0     | 0.54464| 0.00048| 723340.8| 108478.8| 18.84 | 18.13 | 18.34 |      |
| 1.41 | 0     | 0.56426| 0.00026| 723384.0| 108042.1| 21.05 | 20.20 | 20.40 |      |
| 1.69 | 0     | 0.58086| 0.00042| 723627.0| 108388.1| 22.78 | 21.10 | 21.28 |      |
| 2.28 | 0     | 0.60384| 0.00019| 723583.8| 107946.7| 21.72 | 20.40 | 99.99 | ea   |
| 2.47 | 0     | 0.62882| 0.00039| 723756.6| 108042.1| 21.48 | 20.38 | 99.99 | ea   |
| 2.66 | 0     | 0.65797| 0.00021| 723940.2| 108228.2| 21.77 | 20.21 | 99.99 |      |
Table 13. Data for the line of sight PDCS61.

| Num. | group | z    | err-z | Alpha     | Delta     | V    | I    | R    | type |
|------|------|------|-------|-----------|-----------|------|------|------|------|
| 1.40 | 0    | 0.02084 | 0.00053 | 726519.6 | 109353.6 | 99.99 | 99.99 | 22.49 |      |
| 1.6  | 0    | 0.09630 | 0.00021 | 726040.8 | 109359.7 | 22.35 | 22.02 | 22.52 |      |
| 1.49 | 0    | 0.12389 | 0.00029 | 726559.2 | 109033.2 | 19.14 | 18.09 | 20.38 |      |
| 1.29 | 0    | 0.12404 | 0.00045 | 726300.0 | 108997.9 | 19.54 | 19.34 | 19.58 | em   |
| 1.37 | 0    | 0.15591 | 0.00057 | 726424.2 | 108931.3 | 20.85 | 19.22 | 21.47 |      |
| 1.34 | 0    | 0.17021 | 0.00015 | 726386.4 | 109074.2 | 19.42 | 17.90 | 19.06 |      |
| 1.51 | 0    | 0.17026 | 0.00037 | 726575.4 | 109107.7 | 20.14 | 19.46 | 20.06 | em   |
| 1.50 | 0    | 0.19231 | 0.00025 | 726564.6 | 109290.2 | 22.20 | 22.04 | 21.72 | em   |
| 1.31 | 0    | 0.19270 | 0.00028 | 726343.2 | 109076.8 | 22.56 | 20.07 | 22.34 |      |
| 1.46 | 0    | 0.23467 | 0.00039 | 726526.8 | 109114.6 | 18.64 | 17.65 | 22.73 |      |
| 1.35 | 0    | 0.26855 | 0.00026 | 726408.0 | 109053.7 | 19.04 | 17.47 | 21.92 |      |
| 1.41 | 0    | 0.32502 | 0.00051 | 726456.6 | 109103.0 | 21.70 | 20.39 | 22.05 |      |
| 1.25 | 0    | 0.33901 | 0.00053 | 726256.8 | 109223.3 | 19.96 | 18.16 | 19.00 |      |
| 1.16 | 0    | 0.34410 | 0.00024 | 726159.6 | 109260.4 | 20.40 | 18.60 | 20.03 |      |
| 1.30 | 0    | 0.35066 | 0.00040 | 726327.0 | 109206.0 | 21.58 | 20.06 | 21.52 |      |
| 1.33 | 0    | 0.37550 | 0.00036 | 726381.0 | 109083.2 | 19.78 | 18.63 | 19.06 |      |
| 1.21 | 0    | 0.38577 | 0.00033 | 726197.4 | 109308.6 | 21.66 | 20.18 | 21.46 |      |
| 1.18 | 0    | 0.42178 | 0.00075 | 726159.6 | 109166.8 | 20.88 | 20.33 | 20.78 | em   |
| 1.39 | 0    | 0.55517 | 0.00050 | 726440.4 | 108983.2 | 21.98 | 20.60 | 21.81 |      |
| 1.3  | 0    | 0.56395 | 0.00033 | 726008.4 | 109189.1 | 20.45 | 19.09 | 21.78 |      |
| 1.13 | 0    | 0.56815 | 0.00042 | 726089.4 | 109188.0 | 22.51 | 22.13 | 22.87 |      |
| 1.42 | 0    | ?      | ?      | 726534.0 | 109132.6 | 99.99 | 99.99 | 21.13 | quasar? |

\(^a\)The last galaxy of this table (1.42) exhibits a single broad band emission line, probably from a quasar. The cross-correlation technique provides, however, with the absorption line features a redshift equal to 0.57801±0.00049.
Table 14. Data for the line of sight PDCS62.

| Num. group | z   | err-z  | Alpha  | Delta | V   | I   | R   | type |
|------------|-----|--------|--------|-------|-----|-----|-----|------|
| 63.2       | 0   | 0.00952| 0.00091| 723176.0 | 109521.6 | 17.24 | 99.99 | 16.72 |
| 37.2       | 0   | 0.01632| 0.00028| 723513.6 | 109489.3 | 22.93 | 21.46 | 22.20 |
| 63.1       | 0   | 0.01806| 0.00019| 723254.4 | 109116.4 | 22.16 | 21.44 | 21.49 |
| 12.2       | 0   | 0.02595| 0.00033| 723034.0 | 109173.9 | 22.45 | 99.99 | 21.60 |
| 14.1       | 0   | 0.04053| 0.00020| 723427.2 | 109154.5 | 22.20 | 21.35 | 21.57 |
| 68.1       | 0   | 0.04566| 0.00017| 723627.0 | 109503.4 | 19.13 | 18.37 | 18.54 |
| 60.1       | 0   | 0.04727| 0.00023| 723104.7 | 109479.7 | 18.61 | 99.99 | 17.98 |
| 70.1       | 0   | 0.04875| 0.00025| 723134.1 | 109512.4 | 21.46 | 99.99 | 19.90 |
| 40.2       | 0   | 0.06115| 0.00008| 723010.0 | 109395.3 | 20.91 | 99.99 | 99.99 |
| 30.2       | 0   | 0.06202| 0.00032| 723330.0 | 109312.9 | 19.01 | 19.23 | 18.87 |
| 19.2       | 0   | 0.06701| 0.00026| 723046.0 | 109242.4 | 20.24 | 99.99 | 19.44 |
| 54.2       | 0   | 0.07348| 0.00039| 723120.8 | 109448.4 | 22.17 | 99.99 | 21.66 |
| 28.1       | 0   | 0.09205| 0.00057| 723351.6 | 109552.9 | 21.03 | 20.84 | 20.71 |
| 45.1       | 0   | 0.11294| 0.00015| 723454.2 | 109346.0 | 21.41 | 20.07 | 20.44 |
| 33.2       | 0   | 0.11688| 0.00025| 723026.7 | 109357.5 | 22.29 | 99.99 | 20.93 |
| 17.2       | 0   | 0.13460| 0.00016| 723101.2 | 109235.2 | 18.92 | 99.99 | 18.19 |
| 8.1        | 0   | 0.15983| 0.00017| 723502.8 | 109118.9 | 21.46 | 21.13 | 18.85 |
| 75.1       | 0   | 0.16226| 0.00004| 723409.2 | 109552.9 | 21.53 | 99.99 | 21.20 |
| 1.1        | 0   | 0.16302| 0.00003| 723543.9 | 109068.8 | 20.81 | 20.76 | 20.57 |
| 45.2       | 0   | 0.16686| 0.00024| 72839.4  | 109429.6 | 20.31 | 99.99 | 99.99 |
| 9.1        | 0   | 0.17444| 0.00019| 723470.4 | 109123.6 | 22.18 | 22.37 | 21.81 |
| 36.1       | 0   | 0.23341| 0.00016| 723519.0 | 109319.0 | 20.77 | 19.49 | 19.89 |
| 30.1       | 0   | 0.23499| 0.00012| 723139.6 | 109286.4 | 20.56 | 99.99 | 20.13 |
| 47.1       | 0   | 0.23566| 0.00024| 723382.8 | 109357.9 | 21.35 | 20.64 | 20.61 |
| 59.1       | 0   | 0.24587| 0.00021| 723120.7 | 109448.9 | 22.06 | 99.99 | 21.66 |
| 27.2       | 0   | 0.25647| 0.00030| 722758.1 | 109285.9 | 20.36 | 99.99 | 99.99 |
| 35.2       | 0   | 0.28417| 0.00086| 722699.2 | 109344.0 | 21.39 | 99.99 | 99.99 |
| 50.1       | 0   | 0.28857| 0.00002| 723492.0 | 109374.8 | 19.70 | 18.88 | 19.13 |
| 42.1       | 0   | 0.28921| 0.00023| 723416.4 | 109332.7 | 21.26 | 20.13 | 20.52 |
| 26.2       | 1   | 0.29428| 0.00018| 723211.2 | 109276.2 | 19.74 | 18.62 | 19.14 |
| 37.1       | 1   | 0.29456| 0.00024| 723610.8 | 109323.4 | 19.45 | 18.12 | 18.67 |
| 26.1       | 1   | 0.29477| 0.00020| 723054.9 | 109241.8 | 19.83 | 99.99 | 19.06 |
| 40.1       | 1   | 0.29517| 0.00028| 723627.0 | 109328.8 | 21.16 | 19.97 | 20.32 |
| 34.1       | 1   | 0.29548| 0.00019| 723378.6 | 109314.7 | 21.51 | 20.21 | 20.70 |
| 20.1       | 0   | 0.30138| 0.00023| 723002.0 | 109193.8 | 19.67 | 18.57 | 18.94 |
| 31.1       | 0   | 0.30274| 0.00013| 723308.4 | 109286.6 | 21.56 | 21.63 | 21.14 |
| 4.1        | 0   | 0.31834| 0.00060| 72359.9  | 109012.3 | 21.91 | 21.15 | 21.32 |
| 53.1       | 0   | 0.32475| 0.00016| 723077.4 | 109405.2 | 20.13 | 99.99 | 19.07 |
| 54.1       | 0   | 0.32836| 0.00022| 723227.4 | 109404.0 | 21.21 | 20.42 | 19.84 |
| 10.2       | 0   | 0.33071| 0.00046| 722991.3 | 109168.3 | 20.53 | 99.99 | 99.99 |
Table 14—Continued

| Num. | group | z     | err-z  | Alpha   | Delta   | V     | I     | R     | type |
|------|-------|-------|--------|---------|---------|-------|-------|-------|------|
| 39.1 | 0     | 0.37053 | 0.00019 | 723546.0 | 109325.2 | 21.53 | 20.99 | 21.22 |
| 15.2 | 0     | 0.37661 | 0.00054 | 723298.1 | 109211.7 | 21.54 | 99.99 | 20.72 |
| 3.1  | 0     | 0.40976 | 0.00025 | 723664.8 | 109132.9 | 22.14 | 21.61 | 21.80 |
| 10.1 | 0     | 0.41147 | 0.00035 | 723627.0 | 109108.8 | 20.47 | 19.31 | 19.68 |
| 5.1  | 0     | 0.41225 | 0.00055 | 723573.0 | 109493.6 | 21.88 | 20.63 | 21.01 |
| 66.1 | 0     | 0.42056 | 0.00033 | 722775.7 | 109106.3 | 21.44 | 99.99 | 99.99 |
| 2.2  | 0     | 0.42762 | 0.00015 | 723562.2 | 109519.6 | 20.69 | 19.12 | 19.56 |
| 71.1 | 0     | 0.42828 | 0.00024 | 723286.8 | 109258.6 | 21.88 | 20.35 | 20.90 |
| 11.1 | 0     | 0.43427 | 0.00017 | 723529.8 | 109137.2 | 22.05 | 20.72 | 21.08 |
| 17.1 | 0     | 0.43496 | 0.00029 | 723367.8 | 109166.8 | 22.15 | 20.58 | 21.24 |
| 33.1 | 0     | 0.44427 | 0.00023 | 723234.6 | 109312.9 | 19.26 | 19.23 | 18.87 |
| 1.2  | 2     | 0.45112 | 0.00019 | 722967.2 | 109087.7 | 20.84 | 99.99 | 99.99 |
| 56.1 | 2     | 0.45240 | 0.00015 | 723157.8 | 109426.9 | 21.85 | 99.99 | 20.32 |
| 52.1 | 2     | 0.45495 | 0.00024 | 723097.7 | 109395.1 | 21.88 | 99.99 | 20.41 |
| 55.1 | 2     | 0.45819 | 0.00019 | 723170.7 | 109414.9 | 20.72 | 99.99 | 19.19 |
| 41.1 | 2     | 0.45874 | 0.00035 | 723529.8 | 109332.7 | 21.43 | 20.35 | 20.56 |
| 69.1 | 2     | 0.45922 | 0.00015 | 723134.1 | 109512.4 | 21.46 | 99.99 | 19.90 |
| 67.1 | 2     | 0.46060 | 0.00020 | 723448.8 | 109496.9 | 21.22 | 19.43 | 20.02 |
| 47.2 | 2     | 0.46102 | 0.00032 | 723292.2 | 109429.6 | 20.98 | 19.82 | 20.19 |
| 24.1 | 2     | 0.46127 | 0.00021 | 723072.2 | 109234.1 | 21.86 | 99.99 | 20.91 |
| 32.1 | 2     | 0.46136 | 0.00015 | 723562.2 | 109303.9 | 21.66 | 19.57 | 20.35 |
| 48.1 | 2     | 0.46212 | 0.00015 | 723211.2 | 109366.2 | 19.97 | 18.47 | 20.35 |
| 56.2 | 2     | 0.46283 | 0.00018 | 722848.1 | 109460.3 | 21.95 | 99.99 | 99.99 |
| 60.2 | 2     | 0.46345 | 0.00020 | 722936.2 | 109480.3 | 20.40 | 99.99 | 99.99 |
| 43.1 | 2     | 0.46443 | 0.00015 | 723276.0 | 109342.4 | 22.72 | 21.15 | 21.28 |
| 44.1 | 2     | 0.46525 | 0.00014 | 723286.8 | 109343.9 | 21.02 | 19.31 | 19.59 |
| 49.2 | 2     | 0.46775 | 0.00015 | 723243.6 | 109431.0 | 20.66 | 18.76 | 19.56 |
| 65.1 | 2     | 0.46803 | 0.00024 | 723276.0 | 109494.7 | 21.87 | 20.45 | 20.80 |
| 38.1 | 2     | 0.47118 | 0.00013 | 723249.0 | 109325.5 | 21.00 | 19.51 | 19.98 |
| 20.2 | 2     | 0.47260 | 0.00013 | 723243.6 | 109253.9 | 20.28 | 18.92 | 19.41 |
| 21.1 | 0     | 0.47787 | 0.00031 | 723643.2 | 109198.4 | 22.63 | 22.22 | 22.11 |
| 14.2 | 0     | 0.47973 | 0.00020 | 723013.8 | 109202.1 | 21.18 | 99.99 | 99.99 |
| 16.1 | 0     | 0.49868 | 0.00042 | 723443.4 | 109165.0 | 22.17 | 20.92 | 21.23 |
| 23.1 | 0     | 0.51100 | 0.00014 | 723583.8 | 109228.0 | 21.52 | 19.40 | 20.02 |
| 8.2  | 0     | 0.52277 | 0.00039 | 723133.9 | 109158.8 | 20.79 | 99.99 | 20.14 |
| 34.2 | 0     | 0.63039 | 0.00039 | 722815.0 | 109342.4 | 20.16 | 99.99 | 99.99 |
| 43.2 | 0     | 0.65472 | 0.00038 | 723265.2 | 109407.6 | 21.79 | 20.71 | 21.04 |
| 64.2 | 0     | 0.65762 | 0.00019 | 722905.0 | 109531.9 | 21.97 | 99.99 | 99.99 |
| 64.1 | 0     | 0.69326 | 0.00053 | 723610.8 | 109491.1 | 22.77 | 21.10 | 21.74 |
| 28.2 | 0     | 0.69433 | 0.00027 | 722967.9 | 109288.4 | 99.99 | 99.99 | 99.99 |
Table 15. Data for the line of sight PDCS67.

| Num. | group | z    | err-z | Alpha  | Delta  | V    | I    | R    | type |
|------|-------|------|-------|--------|--------|------|------|------|------|
| 56.1 | 0     | 0.02427 | 0.00012 | 867650.4 | 148451.0 | 18.17 | 18.08 | 17.32 | em   |
| 59.1 | 0     | 0.03314 | 0.00027 | 867420.7 | 148496.2 | 19.67 | 19.33 | 19.35 | em   |
| 21.1 | 0     | 0.06550 | 0.00036 | 867704.4 | 148123.4 | 21.98 | 20.99 | 21.26 |      |
| 57.1 | 0     | 0.10789 | 0.00062 | 867347.5 | 148468.8 | 99.99 | 99.99 | 20.81 |      |
| 22.1 | 1     | 0.16664 | 0.00017 | 867132.0 | 148233.6 | 21.56 | 20.56 | 20.98 |      |
| 25.1 | 1     | 0.16773 | 0.00049 | 867353.4 | 148248.4 | 20.08 | 19.61 | 19.66 |      |
| 46.1 | 1     | 0.16852 | 0.00032 | 867537.0 | 148399.2 | 18.64 | 17.62 | 18.07 |      |
| 42.1 | 1     | 0.16879 | 0.00020 | 867574.8 | 148365.4 | 21.02 | 20.20 | 22.86 |      |
| 36.1 | 1     | 0.16899 | 0.00008 | 867693.6 | 148282.6 | 18.55 | 17.39 | 17.92 |      |
| 35.1 | 1     | 0.16911 | 0.00031 | 867434.4 | 148281.8 | 21.67 | 20.62 | 20.88 |      |
| 53.1 | 0     | 0.18652 | 0.00022 | 867385.8 | 148437.0 | 21.74 | 21.43 | 21.24 |      |
| 47.1 | 0     | 0.18764 | 0.00024 | 867499.2 | 148411.1 | 22.20 | 21.49 | 21.69 |      |
| 24.1 | 0     | 0.20706 | 0.00005 | 867645.0 | 148236.1 | 21.72 | 21.52 | 21.48 | em   |
| 48.1 | 0     | 0.22680 | 0.00022 | 867413.5 | 148153.5 | 99.99 | 99.99 | 21.81 | em   |
| 38.1 | 0     | 0.22799 | 0.00018 | 867414.0 | 148303.5 | 99.99 | 99.99 | 22.00 |      |
| 45.1 | 0     | 0.23349 | 0.00020 | 867164.4 | 148399.9 | 18.40 | 17.45 | 17.84 |      |
| 52.1 | 0     | 0.23438 | 0.00028 | 867186.1 | 148442.7 | 99.99 | 99.99 | 18.40 |      |
| 8.1  | 0      | 0.26523 | 0.00024 | 867269.2 | 148117.2 | 99.99 | 99.99 | 16.21 |      |
| 54.1 | 0     | 0.26962 | 0.00024 | 867693.6 | 148433.4 | 21.72 | 20.65 | 20.94 |      |
| 7.1  | 0     | 0.28121 | 0.00015 | 867323.2 | 148111.0 | 99.99 | 99.99 | 19.49 |      |
| 4.1  | 0     | 0.28816 | 0.00019 | 867726.0 | 148080.2 | 20.10 | 19.41 | 19.56 | em   |
| 55.1 | 0     | 0.32847 | 0.00020 | 867261.6 | 148441.0 | 22.84 | 22.41 | 21.84 |      |
| 23.1 | 0     | 0.32892 | 0.00026 | 867613.7 | 148242.2 | 99.99 | 99.99 | 20.22 |      |
| 16.1 | 0     | 0.32983 | 0.00042 | 867105.0 | 148156.2 | 20.17 | 19.05 | 19.48 | ea   |
| 13.1 | 0     | 0.33096 | 0.00056 | 867310.2 | 148134.6 | 23.00 | 22.22 | 22.00 |      |
| 30.1 | 0     | 0.36660 | 0.00047 | 867331.8 | 148255.2 | 21.63 | 20.66 | 21.04 |      |
| 19.1 | 0     | 0.36709 | 0.00020 | 867218.4 | 148192.9 | 21.20 | 19.57 | 19.96 |      |
| 39.1 | 0     | 0.36804 | 0.00039 | 867510.0 | 148309.9 | 20.83 | 19.82 | 20.30 |      |
| 17.1 | 0     | 0.42277 | 0.00014 | 867753.0 | 148165.2 | 22.12 | 19.70 | 20.17 |      |
| 31.1 | 2     | 0.46640 | 0.00038 | 867477.6 | 148263.8 | 21.85 | 20.53 | 20.98 | ea   |
| 41.1 | 2     | 0.46558 | 0.00032 | 867709.8 | 148329.4 | 21.81 | 20.64 | 20.87 | ea   |
| 18.1 | 2     | 0.46755 | 0.00040 | 867526.2 | 148176.4 | 20.87 | 19.73 | 20.16 | ea   |
| 33.1 | 2     | 0.46759 | 0.00023 | 867393.2 | 148279.7 | 99.99 | 99.99 | 23.25 |      |
| 28.1 | 2     | 0.46821 | 0.00015 | 867456.0 | 148255.6 | 21.41 | 19.70 | 20.16 |      |
| 32.1 | 2     | 0.46859 | 0.00026 | 867466.8 | 148271.8 | 21.76 | 19.97 | 20.81 | ea   |
| 29.1 | 0     | 0.52568 | 0.00027 | 867550.2 | 148267.5 | 99.99 | 99.99 | 22.85 | ea   |
| 34.1 | 0     | 0.59038 | 0.00023 | 867434.4 | 148281.8 | 21.67 | 20.62 | 20.88 | ea   |
| 43.1 | 0     | 0.59220 | 0.00016 | 867369.6 | 148382.3 | 21.58 | 19.69 | 21.63 |      |
| 2.1  | 0     | 0.67098 | 0.00018 | 867493.8 | 148045.0 | 22.41 | 20.07 | 21.14 | ea   |
