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9. Authorship

*D. Proust*[1]
*A. Mazure*[1]
*L. Sodré*[3]
*H. Capelato*
*G. Lund*[2]

Responsible author

13. Authorized by

*Marco Antônio Raupp*
*General Director*

14. Abstract/Notes

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[1] *Observatoire de Paris. Section de Meudon et Université Paris VII Département d'Astrophysique Extragalactique et Cosmologie F-92195 Meudon Principal Cedex, France.*

[2] *Université de Nice. Département d'Astrophysique 06000 Nice, France.*

[3] *Departamento de Astronomia - IAG/USP Caixa Postal 30627, 01051 São Paulo, Brazil*

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# NEW MEASUREMENTS OF RADIAL VELOCITIES IN CLUSTERS OF GALAXIES - II*

D. Proust[1], A. Mazure[1], L. Sodre[2], H. Capelato[3+], G. Lund[4]

(1) Observatoire de Paris, Section de Meudon et Université Paris VII
Département d'Astrophysique Extragalactique et Cosmologie
F-92195 Meudon Principal Cedex, France

(2) Departamento de Astronomia - IAG/USP
Caixa Postal 30627, 01051 Sao Paulo, Brazil

(3) Departamento de Astrofisica - INPE/MCT
CP 515
12201 - Sao José dos Campos, Brazil

(4) Université de Nice, Département d'Astrophysique
06000 Nice, France

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(+) On leave of absence from IAG - USP

Summary : We have obtained 100 new redshifts in five galaxy clusters. Data from individual galaxies is presented, and the accuracy of the determined velocities as well as some properties of the clusters are discussed.

Keywords : Redshifts of galaxies - Clusters of galaxies

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INTRODUCTION

From recent developments of observational astronomy, the overall view of the structure of the universe appears to be very different from the homogeneous and isotropic one claimed by traditional cosmology. The hypothesis of long, interconnected linear filaments or even large "bubbles" characterizing the concentration of galaxies now seems to be well established, these regions being separated by large voids empty of bright galaxies.

One of the fundamental factors in the understanding of such formations is the determination of their structure in the third dimension as opposed to their flat "projected" appearance.

While redshift determinations represent virtually the only tool giving access to the third dimension, they are also essential to the understanding of structural dynamics because they provide us with a wealth of information concerning the velocity dispersion in particle systems. Radial velocity measurements are essential to the understanding of structures such as galaxy clusters, since dynamic analysis of their velocity distribution can lead to mass determinations and to an estimation of the missing mass in the universe.

Analyses of some Abell clusters have been recently published ; as an example it has been shown that the A 496 cluster has a complex structure formed essentially by a main cluster (or main sub-cluster), and another small sub-cluster, with the cD in its center, at the same distance (Mazure et al., 1986).

The well-known Coma cluster has also been reinvestigated by Mellier et al. (1987). The isopleth map of "sequence" galaxies determined from a colour-magnitude strip (Visvanathan and Sandage, 1977) to magnitude 20 shows the presence of several secondary density peaks in the vicinity of bright galaxies and a double structure in the core of the cluster. The distribution of velocities relative to the brightest galaxies also indicates a composite population, with a velocity dispersion as small as $\sigma$ = 350 km/s.

Using the ESO multi-object facility, OPTOPUS, we have observed several galaxy clusters in order to collect a large set of individual radial velocities, in pursuit of similar analyses. An initial set of data relating to ten clusters, made with different telescopes, has been published (Proust et al., 1987).

## INSTRUMENTATION

The observations were carried out during two nights at the end of July 1986 at the Cassegrain focus of the 3.60m telescope at La Silla, using the multi-object spectrograph OPTOPUS. A full description of the instrument is given by Lund (1986), and here we describe the main characteristics of the instrument, as it was used for our observations. 32 separate optical fibers were available for collecting the light from galaxies spread over a field of 33 arcminutes diameter in the telescope focal plane. The fibres are aligned in a common slit at the entrance to a modified Boller & Chivens spectrograph which is attached underneath the mirroir cell, about 1.5m from the optical axis of the telescope.

The fiber input ends are located in the focal plane by means of specially drilled aluminum plates. These were prepared at ESO - Garching using X-Y Schmidt plate coordinates (measured with an Optronic-3000 facility) which were reconverted into X-Y observing plate coordinates at the appropriate focal plane scale. The overall r.m.s. error with which our target centers could be measured and reproduced on a starplate was typically 0.25 arcsec. Three holes were reserved for guide stars in the same region in order to achieve accurate alignment and guiding of the plate with respect to the observed field.

A fibre is projected onto a 2.6 arsec spot on the sky, and the minimum object-object separation which can be achieved is 26.4 arcsec (due to the physical size of the fibre connectors). With the use of an F/1.9 dioptric spectrograph camera, each fibre output was projected onto an RCA CCD (512x320 pixel) detector with a monochromatic image size of 85μm (2.8 pixels).

A dispersion of 114 Å/mm was used, providing spectral coverage from 3800 to 5180 Å. Table 1 summarizes the journal of observations. The exposure times ranged between 90 and 150 min according to the average blue magnitude of each cluster. In all cases, observations were made in the vicinity of the meridian plane in order to minimize refraction effects which can lead to small fibre/image offsets during the course of observations. The second half of the last night was almost completely lost through cloudy conditions.

## DATA REDUCTION

Data reduction was carried out using the IHAP image-processing software at ESO-Garching. The program automatically identifies the positions of the spectra on the CCD frame and extracts them by adding the contribution of the three brightest columns. Wavelength calibration was performed using the He-Ar lamp reference exposures obtained immediately after each cluster exposure through the same OPTOPUS configuration and at the same sky position. The lines are fitted with a third order polynomial ; the average r.m.s. of the calibration is 0.25, and the resolution as measured from the FWHM of a gaussian fit to the He-Ar lines is 5 Å.

The redshifts were determined by measuring the most prominent absorption lines and systematically cross correlating them with a template spectrum of known radial velocity (Sadler, 1982). In the case where the spectra were particularly noisy, the redshift was obtained from the Hη line, the MgI band and the H and K lines, and an iterative procedure, proposed by Cristiani et al. (1987) was then applied to identify other lines in the spectrum and to derive a new average redshift.

Table 2 lists the redshifts (z) for the individual galaxies in the 5 observed clusters. We also include data from literature (quoted with an asterix) in order to give a complete list of velocities for each cluster. The galaxy numbers of A 151, and DC 1842-630 are from Dressler (1980). Fig. 1 shows the spectrum of an elliptical mb = 17.26 galaxy in the SC0004.8-345 cluster and Fig. 2 is the same as Fig. 1 for an mb = 18.79 galaxy in the same cluster.

ERROR ESTIMATION

In order to test the accuracy of our velocities, we compared our redshift determinations with data available in the literature for the same set of galaxies. The results of the comparison are summarized in Table 3, where we list the velocity differences between our measurements and other determinations. In the statistics we have excluded eight galaxies (indicated with an asterix) for which the discrepancy between redshift determinations was too large.

Note that in DC 1842-630, three redshift determinations (galaxies 15, 36 and 46) of Fairall (1979) (quoted with a "?" and pointed out as having an "incertainty on the identification of the H and K lines" by the author) have been rejected from the calculations. In the same way, only the measurement of galaxy 19 by Quintana and Melnick (1979) is confirmed with our own determination. The two redshift measurements of galaxy 35 give the same result and the large discrepancy found for galaxy 10 is related to the presence of a surimposed star on our spectrum : the z-measurement was thus very inaccurate.

We have no direct explanation for the discrepancy found in galaxy 21 of the same cluster and galaxies 67 and 274 in SC 2008-565, both of which have been measured by Melnick and Quintana with a good accuracy.

Our velocities are on average shifted by $-43$ km $s^{-1}$ with respect to the published data. The standard deviation in the difference is 139 km $s^{-1}$, which is consistent with the r.m.s. redshift error mentioned in Table 3 : most of the existing measurements are given with a large error bar of $z = 0.0007 \simeq 210$ km $s^{-1}$ (Fairall, 1979). A valuable comparison can be made for the 16 galaxies of DC 1842-630.

From the comparison of our redshifts with those of Fairall, we find that our velocities are on average shifted by $-73$km $s^{-1}$. The standard deviation in the differences is 137 km $s^{-1}$. From the same comparison with the data of Quintana and Melnick (1975) and Melnick and Quintana (1981), derived from only five galaxies, we find that our velocities are shifted by $+40$ km $s^{-1}$ on average, with a standard deviation in the differences of 95 km $s^{-1}$ : in both cases, with the exception of the 8 galaxies excluded from the error calculations, all velocities in the present study agree with those quoted by the above authors to within a $2\sigma$ level.

## DISCUSSION AND CONCLUSIONS

In this paper, we have reported new redshift measurements for 100 galaxies in 5 clusters. For a cluster like SC0004.8-345 (Carter, 1980), we derived 28 reliable redshifts from 32 raw galaxy spectra ranging in blue magnitude between 17.8 and 18.8, obtained with an exposure time of 150 minutes. The signal-to-noise ratio of the spectrum shown in Fig. 2 is around five, representative of the extreme case of a noisy spectrum for which the redshift was determined using the cross-correlation procedure. The same number of redshifts was achieved for the galaxy cluster DC1842. In this cluster, the apparent members nos 15, 20, 26, 28, 30 and 33 must all be background galaxies, and are probably members of a more distant open cluster as pointed out by Fairall (1979). In the case of SC2008-565, the poorly known photometry of this cluster led to an underestimation of the required exposure time, and thus to a considerable degradation in the proportion of accurately determined redshifts. A more complete analysis of these clusters will be published later. However, some comments can be made for the clusters using both our velocities and those already published.

The cluster of galaxies DC1842-633

This cluster has been studied using population and morphology analysis by Quintana and Melnick (1975) and spectroscopically by Fairall (1979). Both concluded the presence of a system of two clusters based on an elliptical component (around galaxy 19) and a spiral one (around galaxy 39), each being a centre of concentration. Using the list of morphological types published by Dressler (1980), we proceeded to a new analysis in order to determine the population contents around galaxies 19 and 39. We rejected seven background galaxies (Fig. 3) having an average velocity of 11240 ± 190 km/s and a velocity dispersion of 510 km/s (members of a more distant cluster ?).

We confirm the existence of two apparent groups with an elliptical component Southward and a spiral one northward. However, the isopleths of

Fig.4 reveal no evident substructure, although a ridge is present towards the north.

The compilation of the velocities of Table 2 gives no significant systematic difference in redshift between elliptical and spiral components to change the conclusions of Fairall (1979).

## The cluster of galaxies SC0004.8-345.

This cluster stands as the proeminent member of a larger superstructure at z = 0.114 0H – 35° (Carter, 1980 ; Parker et al., 1984 ; Capelato et al., 1984).

A previous analysis based solely on the photometric properties of its galaxies has shown that this cluster is luminosity anti-segregated, in the sense that one finds only faint galaxies around the central cD, the brightest ones being distributed more homogeneously (Capelato et al., 1985).

We measured redshifts for 28 galaxies among the 50 brightest ones. Their positions are shown in the isopleth map of figure 5. Note the complex structure displayed in this map contrasting with the apparent uniformity of the bright galaxies distribution. The mean redshift derived for this sample is z = 0.114 (galaxies 27 and 42 excluded), and the velocity dispersion is 727 km/s. Note that the velocity of the cD galaxy is exactly the average value for the 26 confirmed members of the cluster ($\bar{v}$ = 34183 ± 140km/s). However more data are needed in order to confirm the reality of the observed substructures.

## The cluster of galaxies SC2008-565

The isopleths of Fig.6 show that the cluster as a whole appears to be centered around the $m_B$ = 14.85 brightest component, (n°141) although there is a concentration around the $m_B$ = 15.17 (n°134) galaxy. The velocities of these two galaxies are respectively 16490±80 and 16890±70 km/s (Melnick and Quintana, 1981), indicating the probable presence of subclustering. Using the results of Melnick and Quintana combined with our own, we obtain a global large velocity dispersion (Fig. 7) of about 2500 km/s, although with the exception of galaxies 267 and 341 of Table 2, no membership uncertainties are apparent. Note however that the 11 galaxies gathered around n°141 (n°145 has been excluded as a foreground galaxy with Vr = 7010 km/s (Melnick and Quintana, 1981)) have an average velocity of 16492 ± 418 km/s with a velocity dispersion of 1388 km/s, while the 5 galaxies close to n°134 have redshift corresponding respectively to 16706 ± 444 and 992 km/s (n°267 has been excluded as a background galaxy). A complete analysis will be improved by the completion of b and r Band photometry, which is now in progress (Sodré et al., 1987).

The cluster of galaxies A 151

Because of the prevailing atmospheric conditions we were able to add only four radial velocities to the others known measurements (Proust et al., 1987) leading to a total of 19. However, Fig. 8 shows a very large scatter of velocities, ranging from ≃ 10000 to 17000 km/s - it appears that six galaxies are foreground ones, the cluster itself having an average value of <Vr> = 15969 ± 211 km/s and a velocity dispersion of 761 km/s. Fig. 9 shows the position of the 19 measured galaxies : note the concentration of elliptical ones around the center of the cluster at $V_r \simeq 16000$ km/s and a probable small background group of spirals westwards at $V_r \simeq 16500$ km/s, corresponding to one of the condensation in the isopleths map of Geller and Beers (1982). The southward concentration of ≃ 12 galaxies (with seven measured redshifts) shows a large scatter of velocities due to a probable superposition of galaxies on the line of sight.

With a total of 100 well determined redshifts from 1.5 nights of observation, the OPTOPUS multiobject spectrographic facility appears to be a particularly well adapted instrument for the rapid and simultaneous determination of redshifts in catalogued galaxy clusters.

Detailed analysis of the clusters (in particular for SC0004.8−345 and SC2008−565) is in progress and will be published later.

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# TABLE CAPTIONS

Table 1 : Journal of observations.

Table 2 : Heliocentric redshifts for galaxies.

Table 3 : Comparison with published redshifts.

FIGURE CAPTIONS

Fig. 1 : Spectrum of an elliptical mb 17.26 galaxy in the SC0004.8–345 cluster.

Fig. 2 : Spectrum of an mb 18.79 galaxy in the SC0004.8–345 cluster.

Fig. 3 : Wedge diagram of the cluster DC1842–633 obtained by projecting the galaxies with their measured redshift.

Fig. 4 : The DC1842–633 cluster computed with a 35x35 filtered isopleth map (mesh 109") of galaxies. Backgound density is null, the density step is 20 gal per Sq. Deg. The seven galaxies with Vr > 10000 km/s are excluded. The numbers are from Dressler (1980).

Fig. 5 : 50x50 (mesh 32") filtered isopleth map of the SC0004.8–345 cluster. Background density is null, the density step is 175 gal per Sq.deg. The 28 galaxies having a measured redshift are plotted. The numbers are from Carter (1980).

Fig. 6 : 50x50 (mesh 100") filtered isopleth map of the SC2008–565 cluster – Background density bis null, the density step is 58 gal per Sq. deg. The 47 galaxies having a measured redshift (Melnick and Quintana, 1981 and this paper) are plotted. The numbers are from the present work. The zoom of the center of the cluster is represented on the lower right of the figure.

Fig. 7 : Distribution of the measured velocities from this work and Melnick and Quintana (1981) in the cluster of galaxies SC2008–567. Note the large velocity dispersion ranging from 12000 to 19000 km/s. The solid line is a gaussian curve centered at $\bar{V}$= 16200 km/s with $\sigma$ = 1600 km/s.

Fig. 8 : Wedge diagram of the cluster A 151 obtained by projecting the galaxies with their measured redshift.

Fig. 9 : Map of the 19 measured redshift of galaxies in the A151 cluster with their morphological type. The "zoom" corresponds to the center of the cluster.

| CLUSTER | EXPOSURE TIME (min) | RANGE OF MAGNITUDE | NUMBER OF SPECTRA | NUMBER OF REDSHIFTS |
|---|---|---|---|---|
| DC1842-630 | 90 | 14 - 16 | 30 | 27 |
| SC2008-565 (south-1) | 90 | 16.19-18.66 | 31 | 17 |
| SC2008-565 (south-2) | 90 | 16.19-18.66 | 31 | |
| SC0004.8-345 | 150 | 16.43-18.82 | 32 | 28 |
| SC2008-565 (north) | 120 | 15.81-17.64 | 31 | 14 |
| DC2103-390 | 120 (cloudy) | 15 - 17 | 31 | 10 |
| A151 | 60 (clouds) | 16 - 17 | 31 | 4 |

TABLE 1

| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|
| | | **A 151** | | | | |
| 5 | 01 06 28.7 | -16 19 04 | S0 | 15 | 11909 100* | (1) |
| 10 | 01 06 37.7 | -16 16 00 | S | 14 | 16111 75* | (1) |
| 11 | 01 06 34.5 | -16 16 29 | S | 16 | 16730 100 | |
| 16 | 01 06 21.5 | -16 12 52 | E | 14 | 12567 * | (4) |
| 41 | 01 09 16.3 | -15 48 47 | S+S | 15 | 11865 100* | (1) |
| | | | | | 16371 100* | (1) |
| 42 | 01 08 13.1 | -15 47 09 | SB0 | 15 | 9947 60* | (1) |
| 43 | 01 07 37.8 | -15 46 11 | S | 15 | 16425 100* | (1) |
| 44 | 01 07 36.7 | -15 47 07 | S | 15 | 16530 55* | (1) |
| 46 | 01 06 42.8 | -15 45 44 | S | 15 | 15554 100* | (1) |
| 51 | 01 04 30.6 | -15 45 51 | S0 | 15 | 11740 75* | (1) |
| 52 | 01 07 39.4 | -15 45 16 | S0/S | 15 | 16609 120* | (1) |
| 61 | 01 06 22.8 | -15 40 20 | D | 14 | 15445 60* | (1) |
| 62 | 01 06 22.2 | -15 40 29 | E | 15 | 15980 60* | (1) |
| 63 | 01 06 21.3 | -15 40 09 | E | 15 | 16166 100* | (1) |
| 69 | 01 06 03.1 | -15 39 48 | E | 15 | 16535 75* | (1) |
| 106 | 01 06 13.3 | -16 13 32 | | -- | 14050 120? | |
| 107 | 01 06 16.1 | -16 12 12 | | -- | 15095 100 | |
| 108 | 01 06 41.5 | -16 10 55 | | -- | 11980 100 | |
| | | **SC0004.8-345** | | | | |
| 1 | 00 03 26.9 | -34 59 59 | cD | 16.43 | 34180 60 | |
| 3 | 00 04 09.1 | -35 01 03 | E/D | 17.26 | 32980 60 | |
| 4 | 00 03 53.6 | -34 51 12 | E | 17.49 | 33880 65 | |
| 5 | 00 03 55.9 | -34 58 35 | E | 17.53 | 33880 65 | |
| 7 | 00 04 24.1 | -35 06 31 | Ring | 17.80 | 34770 65 | |
| 8 | 00 04 06.2 | -34 57 23 | ? | 17.81 | 33730 65 | |
| 11 | 00 03 42.9 | -34 57 51 | | 18.02 | 35530 65 | |
| 13 | 00 04 03.7 | -35 02 22 | | 18.04 | 34630 65 | |
| 15 | 00 03 17.8 | -35 05 01 | | 18.14 | 35380 75 | |
| 16 | 00 03 58.5 | -34 52 47 | | 18.15 | 34730 75 | |
| 20 | 00 02 39.0 | -34 59 16 | | 18.27 | 34480 75 | |
| 21 | 00 03 53.3 | -35 01 17 | | 18.28 | 33730 75 | |
| 22 | 00 03 08.4 | -35 04 08 | | 18.30 | 32980 100 | |
| 26 | 00 03 27.1 | -35 08 05 | | 18.35 | 33890 120 | |
| 27 | 00 03 07.7 | -35 03.21 | | 18.37 | 37480 200 | |
| 29 | 00 02 57.8 | -35 02 22 | | 18.42 | 33790 75 | |
| 31 | 00 03 23.2 | -34 48 40 | | 18.42 | 33570 100 | |
| 32 | 00 03 33.7 | -34 57 25 | | 18.45 | 35500 75 | |
| 34 | 00 02 54.7 | -35 12 28 | | 18.46 | 33730 75 | |
| 35 | 00 03 15.0 | -34 48 08 | | 18.47 | 34420 75 | |
| 36 | 00 03 21.5 | -34 55 18 | | 18.55 | 34270 75 | |
| 38 | 00 03 51.6 | -35 00 17 | | 18.56 | 34090 75 | |
| 40 | 00 03 42.7 | -35 03 46 | | 18.57 | 34660 100 | |
| 41 | 00 03 07.5 | -35 00 18 | | 18.59 | 33190 100 | |
| 42 | 00 03 46.4 | -35 01 23 | | 18.60 | 39270 200 | |
| 43 | 00 04 13.9 | -35 06 14 | | 18.60 | 33730 120 | |
| 47 | 00 04 00.4 | -35 02 16 | | 18.79 | 35320 75 | |
| 49 | 00 03 42.4 | -35 02 15 | | 18.82 | 337307 | |
| | | **SC2008-565** | | | | |
| 7 | 20 08 29.8 | -56 56 54 | | 16.61 | 14670 180* | (2) |
| 14 | 20 08 07.1 | -56 40 35 | | 15.81 | 15030 100 | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 20 | 08 | 18.0 | -56 | 50 | 44 | | 16.92 | 12820 | 100 | |
| 16 | 20 | 07 | 59.4 | -56 | 54 | 33 | | 16.29 | 18965 | 70* | (2) |
| 18 | 20 | 08 | 25.8 | -56 | 56 | 46 | | 17.66 | 17365 | 180* | (2) |
| 19 | 20 | 08 | 21.8 | -56 | 56 | 50 | | 16.31 | 15790 | 210* | (2) |
| 20 | 20 | 08 | 22.4 | -56 | 57 | 07 | | 17.00 | 18040 | 90 | |
| 24 | 20 | 07 | 07.3 | -56 | 32 | 15 | | 16.99 | 17650? | | |
| 25 | 20 | 06 | 53.5 | -56 | 34 | 51 | | 16.38 | 15540 | 85 | |
| 28 | 20 | 06 | 46.5 | -56 | 40 | 52 | | 16.19 | 14030 | 240* | (2) |
| 37 | 20 | 07 | 27.6 | -56 | 53 | 01 | | 16.57 | 15760 | 100* | (2) |
| 63 | 20 | 10 | 24.0 | -57 | 01 | 56 | | 17.50 | 13370 | 90 | |
| 67 | 20 | 08 | 46.9 | -57 | 00 | 27 | | 17.18 | 16050 | 85 | |
| 75 | 20 | 09 | 17.1 | -57 | 02 | 12 | | 17.02 | 16025 | 50* | (2) |
| 78 | 20 | 09 | 02.0 | -57 | 05 | 50 | | 16.19 | 16130 | 75 | |
| 89 | 20 | 09 | 59.6 | -57 | 06 | 35 | | 16.84 | 13260 | 210* | (2) |
| 94 | 20 | 09 | 58.5 | -57 | 11 | 26 | | 16.00 | 16330 | 100 | |
| 95 | 20 | 10 | 02.1 | -57 | 10 | 32 | | 16.46 | 17245 | 50* | (2) |
| 97 | 20 | 08 | 00.4 | -57 | 10 | 15 | | 16.99 | 18050 | 75 | |
| 98 | 20 | 07 | 37.5 | -57 | 11 | 51 | | 17.25 | 15130 | 75 | |
| 99 | 20 | 07 | 57.8 | -57 | 14 | 06 | | 16.48 | 16640 | 75 | |
| 117 | 20 | 08 | 44.9 | -57 | 27 | 10 | | 17.22 | 15860 | 100 | |
| 134 | 20 | 06 | 50.8 | -56 | 49 | 20 | | 15.17 | 16890 | 70* | (2) |
| 136 | 20 | 08 | 31.2 | -56 | 56 | 48 | | 16.34 | 14530 | 80* | (2) |
| 141 | 20 | 08 | 27.2 | -56 | 58 | 27 | | 14.85 | 16490 | 80* | (2) |
| 142 | 20 | 08 | 31.0 | -56 | 58 | 30 | | 17.91 | 16395 | 200* | (2) |
| 144 | 20 | 08 | 23.9 | -56 | 59 | 09 | | 17.64 | 16620 | 120* | (2) |
| 145 | 20 | 08 | 23.2 | -56 | 59 | 19 | | 16.71 | 7010 | 50* | (2) |
| 165 | 20 | 06 | 32.9 | -56 | 30 | 38 | | 17.16 | 15330? | | |
| 166 | 20 | 06 | 43.3 | -56 | 30 | 44 | | 17.07 | 17415? | | |
| 167 | 20 | 06 | 55.0 | -56 | 32 | 18 | | 16.57 | 15060 | 120 | |
| 187 | 20 | 08 | 33.5 | -56 | 39 | 48 | | 17.26 | 17410 | 100 | |
| 191 | 20 | 07 | 59.0 | -56 | 39 | 43 | | 16.86 | 15210 | 100 | |
| 236 | 20 | 06 | 58.8 | -56 | 48 | 49 | | 17.16 | 18320 | 50* | (2) |
| 267 | 20 | 07 | 34.2 | -56 | 53 | 31 | | 17.64 | 20840 | 120 | |
| 270 | 20 | 08 | 12.4 | -56 | 57 | 38 | | 17.60 | 15100 | 75 | |
| 272 | 20 | 07 | 08.3 | -56 | 50 | 49 | | 16.20 | 16130 | 100 | |
| 274 | 20 | 07 | 20.5 | -56 | 30 | 55 | | 16.54 | 16430 | 100 | |
| 302 | 20 | 09 | 32.0 | -57 | 02 | 32 | | 17.27 | 13550 | 130* | (2) |
| 305 | 20 | 09 | 58.5 | -57 | 03 | 54 | | 17.62 | 16670 | 100 | |
| 320 | 20 | 07 | 13.8 | -57 | 06 | 15 | | 17.84 | 18940 | 75 | |
| 336 | 20 | 10 | 05.8 | -57 | 16 | 32 | | 17.49 | 15510 | 80 | |
| 338 | 20 | 10 | 16.9 | -57 | 17 | 30 | | 18.66 | 16390 | 80 | |
| 341 | 20 | 09 | 04.9 | -57 | 09 | 27 | | 17.59 | 32250 | 80 | |
| 343 | 20 | 08 | 16.4 | -57 | 06 | 59 | | 17.28 | 17350 | 60 | |
| 346 | 20 | 08 | 15.8 | -57 | 13 | 55 | | 17.05 | 14180 | 120 | |
| 365 | 20 | 08 | 37.7 | -57 | 21 | 02 | | 17.16 | 16620 | 80 | |
| 383 | 20 | 07 | 49.4 | -57 | 23 | 44 | | 17.61 | 16300 | 200 | |

DC1842-630

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 18 | 42 | 22.6 | -63 | 32 | 40 | Sa | 13 | 3900 | 60 | |
| 10 | 18 | 43 | 26.4 | -63 | 26 | 18 | Sc | 14 | 4560? | | |
| 11 | 18 | 43 | 27.8 | -63 | 24 | 48 | E | 16 | 4110 | 120 | |
| 12 | 18 | 42 | 57.2 | -63 | 27 | 36 | S0p | 12 | 3600 | 65 | |
| 13 | 18 | 42 | 34.4 | -63 | 24 | 49 | E | 11 | 4020 | 60 | |
| 14 | 18 | 42 | 09.9 | -63 | 24 | 51 | S0 | 14 | 4110 | 60 | |
| 15 | 18 | 41 | 24.6 | -63 | 25 | 56 | S/I | 16 | 12290 | 120 | |
| 17 | 18 | 42 | 39.2 | -63 | 21 | 52 | S0 | 14 | 4020 | 65 | |
| 18 | 18 | 42 | 38.8 | -63 | 23 | 11 | E | 14 | 4800 | 210* | (3) |
| 19 | 18 | 42 | 34.6 | -63 | 23 | 04 | D | 11 | 4440 | 65 | |
| 20 | 18 | 42 | 07.7 | -63 | 22 | 05 | E/S0 | 14 | 10850 | 65 | |
| 21 | 18 | 41 | 40.9 | -63 | 22 | 42 | SB0 | 14 | 3930 | 65 | |
| 24 | 18 | 43 | 40.6 | -63 | 18 | 14 | Sc | 14 | 4590 | 120 | |
| 25 | 18 | 42 | 52.5 | -63 | 20 | 49 | Sa | 14 | 4860 | 65 | |
| 26 | 18 | 42 | 53.6 | -63 | 19 | 28 | Sa | 16 | 11240? | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 27 | 18 42 37.9 | -63 18 59 | S0 | 16 | 4470 | 210* | (3) |
| 28 | 18 42 31.7 | -63 20 20 | S0 | 16 | 11270 | 65 | |
| 29 | 18 41 07.1 | -63 17 15 | E | 15 | 4710 | 75 | |
| 30 | 18 40 57.6 | -63 19 40 | S0 | 16 | 11270 | 120 | |
| 33 | 18 43 39.3 | -63 16 23 | S | 15 | 10730 | 120 | |
| 34 | 18 43 25.0 | -63 15 53 | S0 | 16 | 4680 | 75 | |
| 35 | 18 43 18.3 | -63 14 39 | Sp | 14 | 4350 | 75 | |
| 36 | 18 43 13.4 | -63 14 19 | S0 | 15 | 4110 | 65 | |
| 37 | 18 42 54.2 | -63 16 33 | E | 16 | 3120 | 90 | |
| 38 | 18 42 05.1 | -63 15 23 | Sb | 15 | 3240 | 120 | |
| 39 | 18 43 01.0 | -63 12 39 | SBc | 12 | 4380 | 90 | |
| 40 | 18 42 36.4 | -63 12 25 | I | 16 | 5010 | 75** | |
| 44 | 18 43 24.7 | -63 09 35 | S0 | 16 | 3870 | 100 | |
| 45 | 18 43 15.8 | -63 08 17 | SB0/a | 15 | 11030 | 210* | (3) |
| 46 | 18 43 13.0 | -63 08 39 | Sb | 15 | 3720 | 100 | |

DC2103-390

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | 21 04 41.9 | -39 46 41 | -- | 19560 | 120 |
| 10 | 21 04 42.3 | -39 47 26 | -- | 15020 | 120 |
| 11 | 21 05 26.3 | -39 47 07 | -- | 13565? | |
| 13 | 21 05 36.4 | -39 44 06 | -- | 14580 | 100 |
| 16 | 21 04 56.9 | -39 32 58 | -- | 13940? | |
| 20 | 21 05 57.0 | -39 32 55 | -- | 9375? | |
| 32 | 21 06 17.7 | -39 53 55 | -- | 32530 | 100 |
| 36 | 21 06 31.1 | -39 42 03 | -- | 16340 | 80 |
| 37 | 21 06 39.3 | -39 39 06 | -- | 15320 | 100 |
| 38 | 21 04 48.6 | -39 47 18 | -- | 16610 | 150 |

TABLE 2

HELIOCENTRIC REDSHIFTS FOR GALAXIES.

COLUMN 1: GALAXY NUMBER IN THE CLUSTER (Dressler,1980).
The numbers of SC0004.8-345 are from Carter (1980) and the numbers of SC2008-565 and DC2103-390 are from the present work.
COLUMN 2 AND 3: RIGHT ASCENSION AND DECLINATION (1950)
COLUMN 4: MORPHOLOGICAL TYPE
COLUMN 5: APPARENT MAGNITUDES TAKEN FROM DRESSLER (1980): A151 AND DC1842-63 (estimated total visual magnitudes); FROM CARTER (1980) FOR SC0004.8-345 (b27.5), AND FROM SODRE et al.(1987) FOR SC2008-565 (b25).
COLUMN 6: GALAXY HELIOCENTRIC VELOCITY AND ESTIMATED ERROR. DATA QUOTED WITH AN ASTERIX ARE FROM THE LITERATURE.
COLUMN 7: NOTES
(1): Proust et al. (1987)
(2): Melnick and Quintana (1981)
(3): Fairall (1979)
(4): Humason et al. (1956)

** : emission lines

| GALAXY | | V±ΔV(ref) | | reference | V-V(ref) |
|---|---|---|---|---|---|
| DC1842-630- | 10 | 5040 | 210 | Fairall (1979) | -480* |
| | 12 | 3600 | 210 | " | 0 |
| | 13 | 4230 | 210 | " | -210 |
| | 14 | 4050 | 210 | " | +60 |
| | 15 | 41107 | | " | +8180* |
| | 17 | 4080 | 210 | " | -60 |
| | 19 | 4800 | 210 | " | -360* |
| | | 4400 | 300 | Quintana & Melnick (1975) | +40 |
| | 20 | 10795 | 210 | Fairall (1979) | +55 |
| | 21 | 4800 | 210 | " | -870* |
| | 24 | 4860 | 210 | " | -270 |
| | 25 | 5010 | 210 | " | -150 |
| | 29 | 4500 | 210 | " | +210 |
| | 33 | 10730 | 210 | " | 0 |
| | 34 | 4000 | 210 | " | -120 |
| | 35 | 43207 | | " | +30 |
| | 36 | 31507 | | " | +960* |
| | 37 | 3420 | 210 | " | -300 |
| | 38 | 3510 | 210 | " | -270 |
| | 39 | 4500 | 210 | " | -120 |
| | | 4500 | 210 | Quintana & Melnick (1975) | -120 |
| | 40 | 5010 | 210 | Fairall (1979) | 0 |
| | 44 | 3900 | 210 | " | -30 |
| | 46 | 109157 | | " | -7195* |
| SC2008-565- | 67 | 17475 | 50 | Melnick & Quintana (1981) | -625* |
| | 78 | 16110 | 50 | " | +20 |
| | 94 | 16240 | 40 | " | +90 |
| | 272 | 15960 | 50 | " | +170 |
| | 274 | 13245 | 00 | " | +3185* |
| | | | | <V-V(ref)> | -43 |
| | | | | $\sigma$ | 139 |

* not included in the calculations

TABLE 3

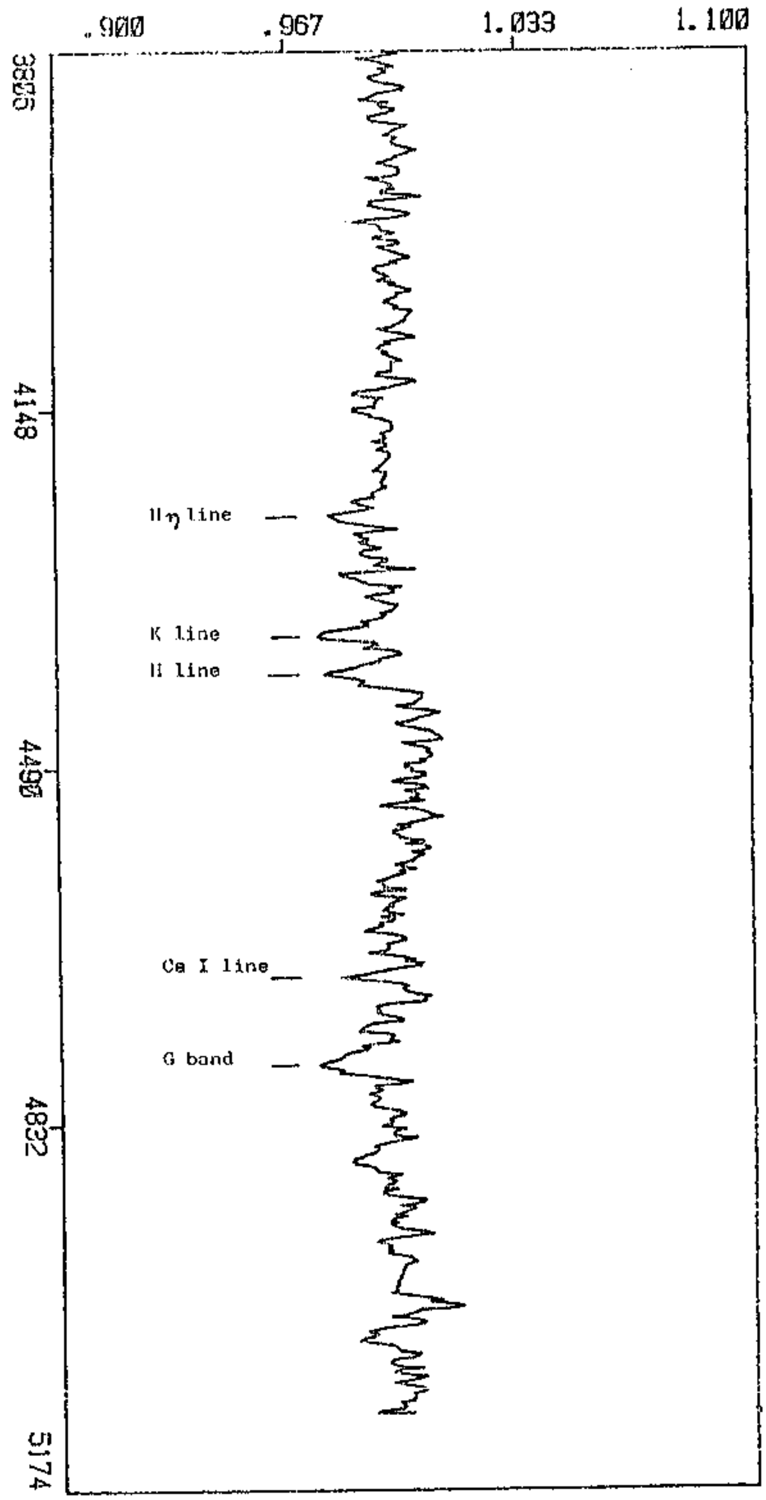
.900
.967
1.033
1.100
3805
4148
4490
4832
5174
Hη line
K line
H line
Ca I line
G band

Figure 1

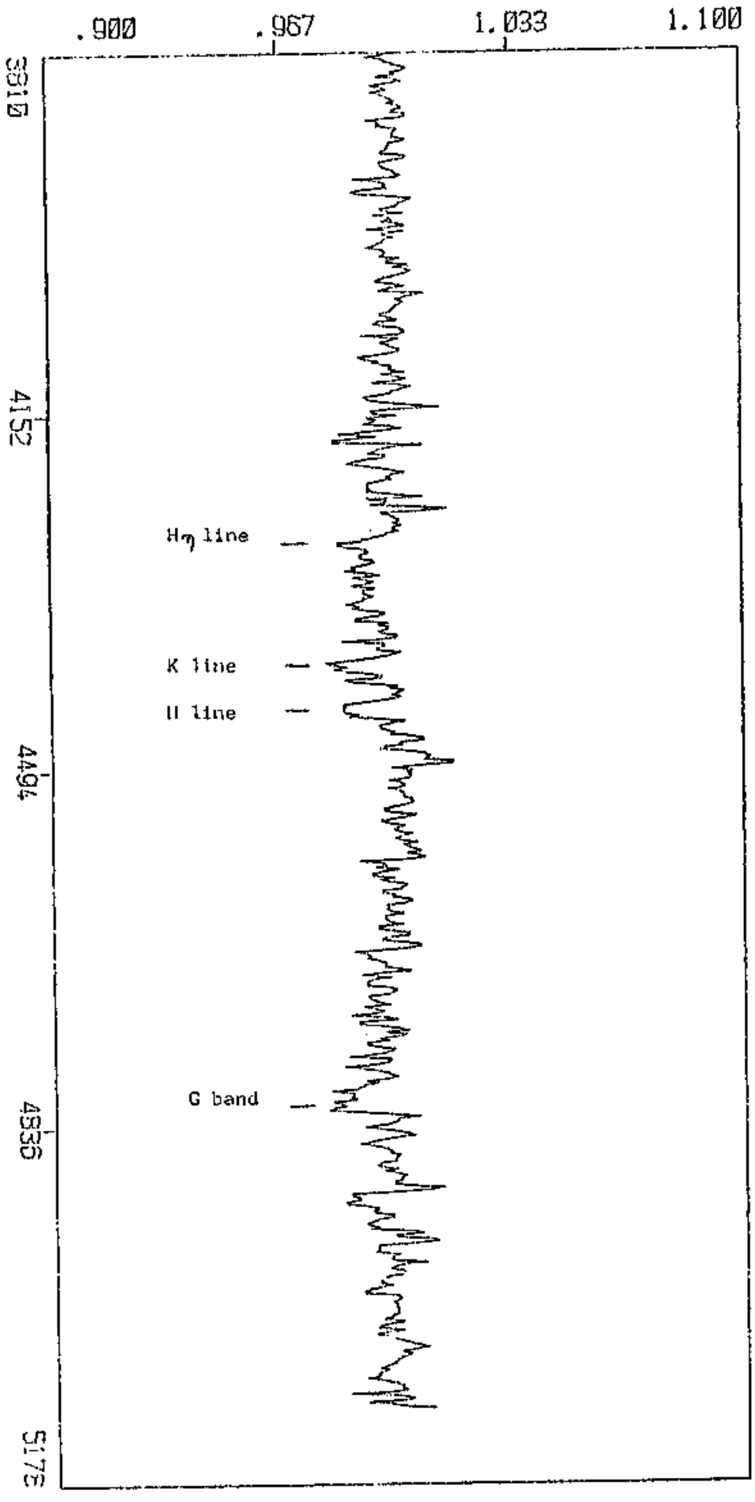
.900
.967
1.033
1.100
3810
4152
4494
4836
5178
Hη line
K line
H line
G band

Figure 2

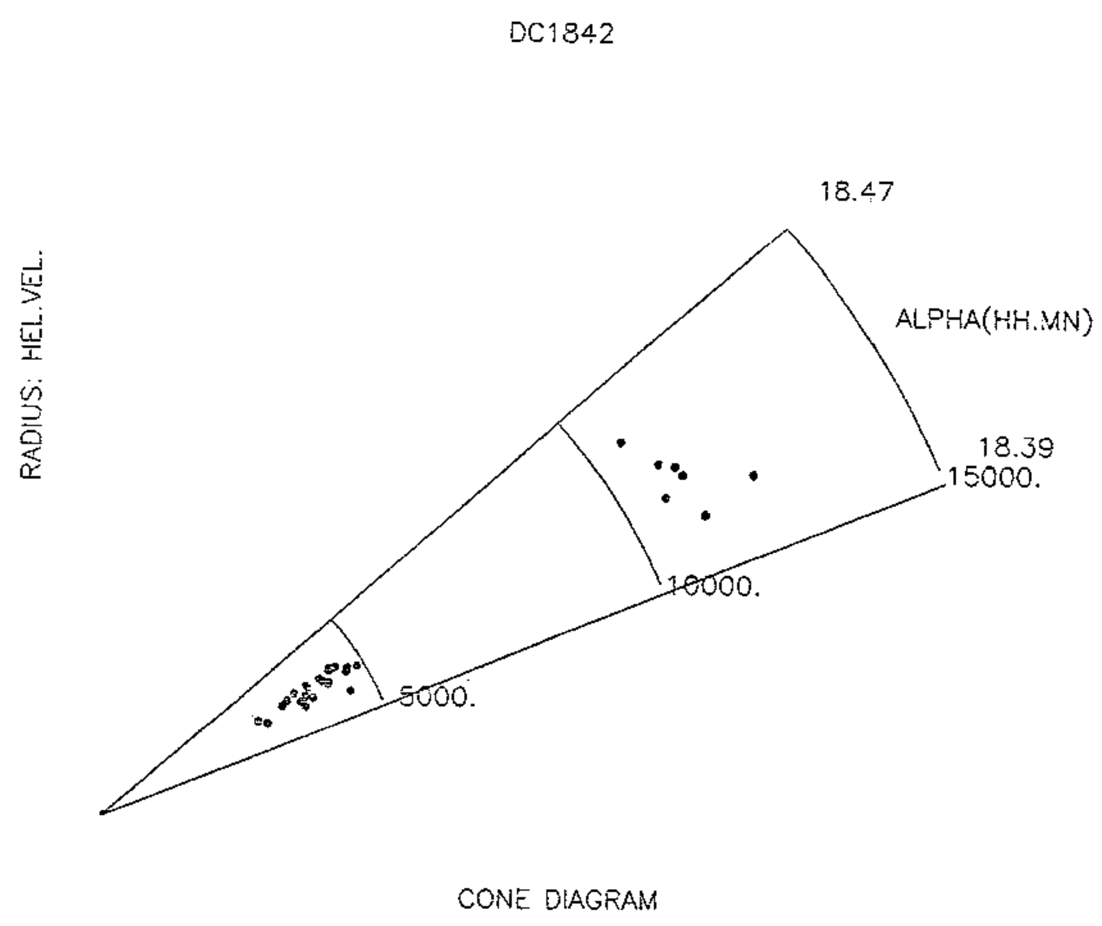
DC1842
18.47
ALPHA(HH.MN)
18.39
15000.
10000.
5000.
RADIUS: HEL.VEL.
CONE DIAGRAM

**Figure 3**

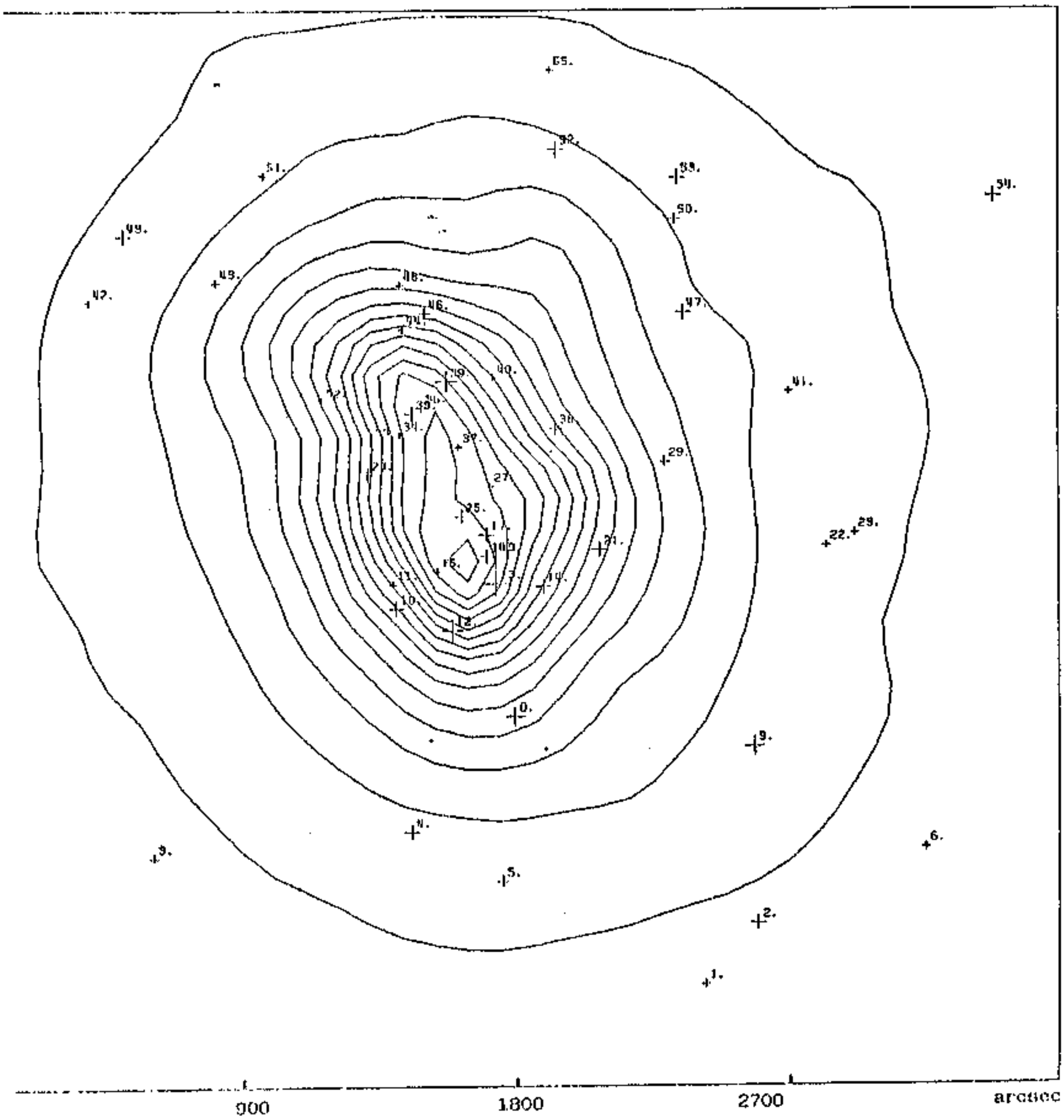


Figure 4

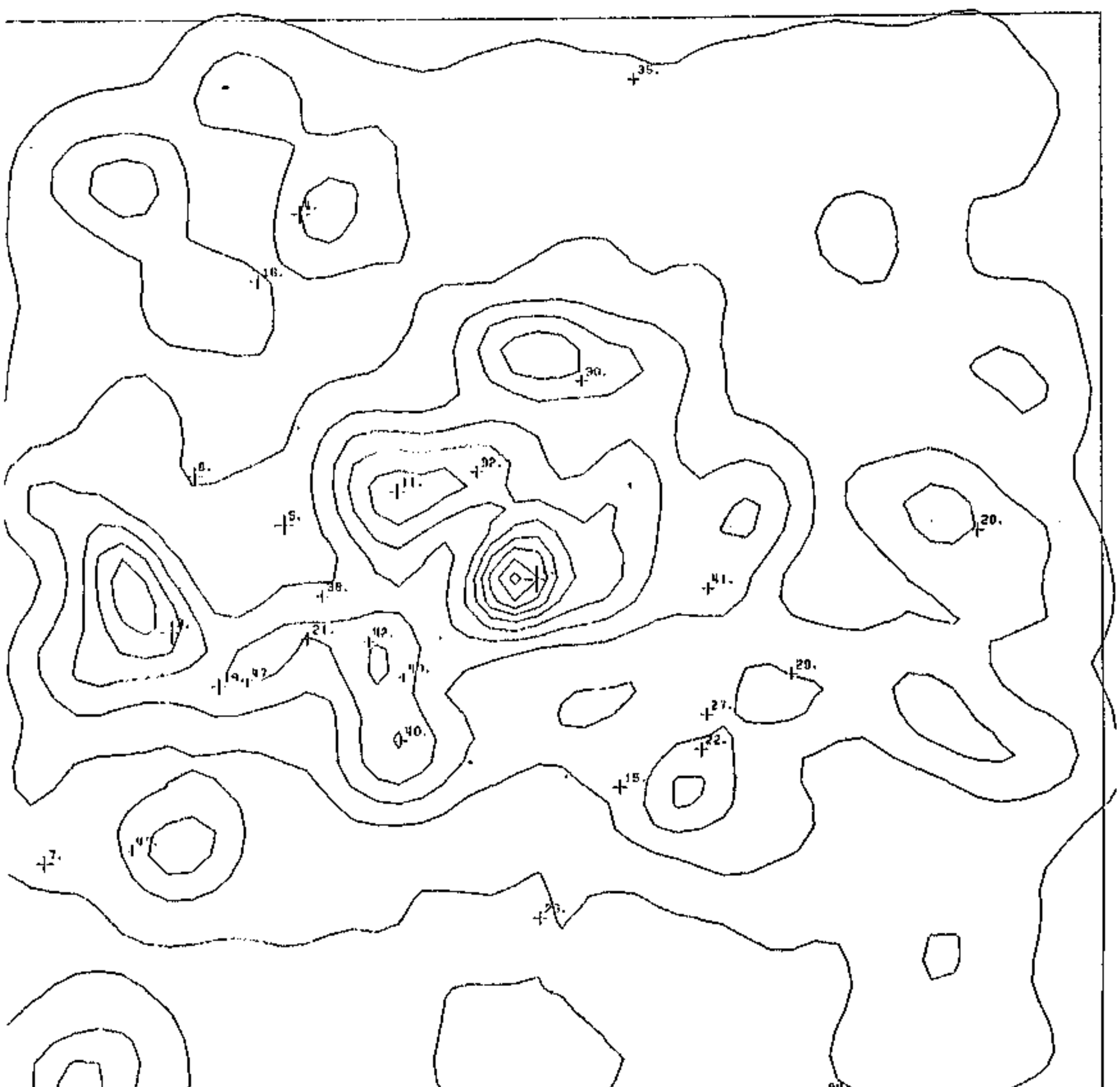


Figure 5

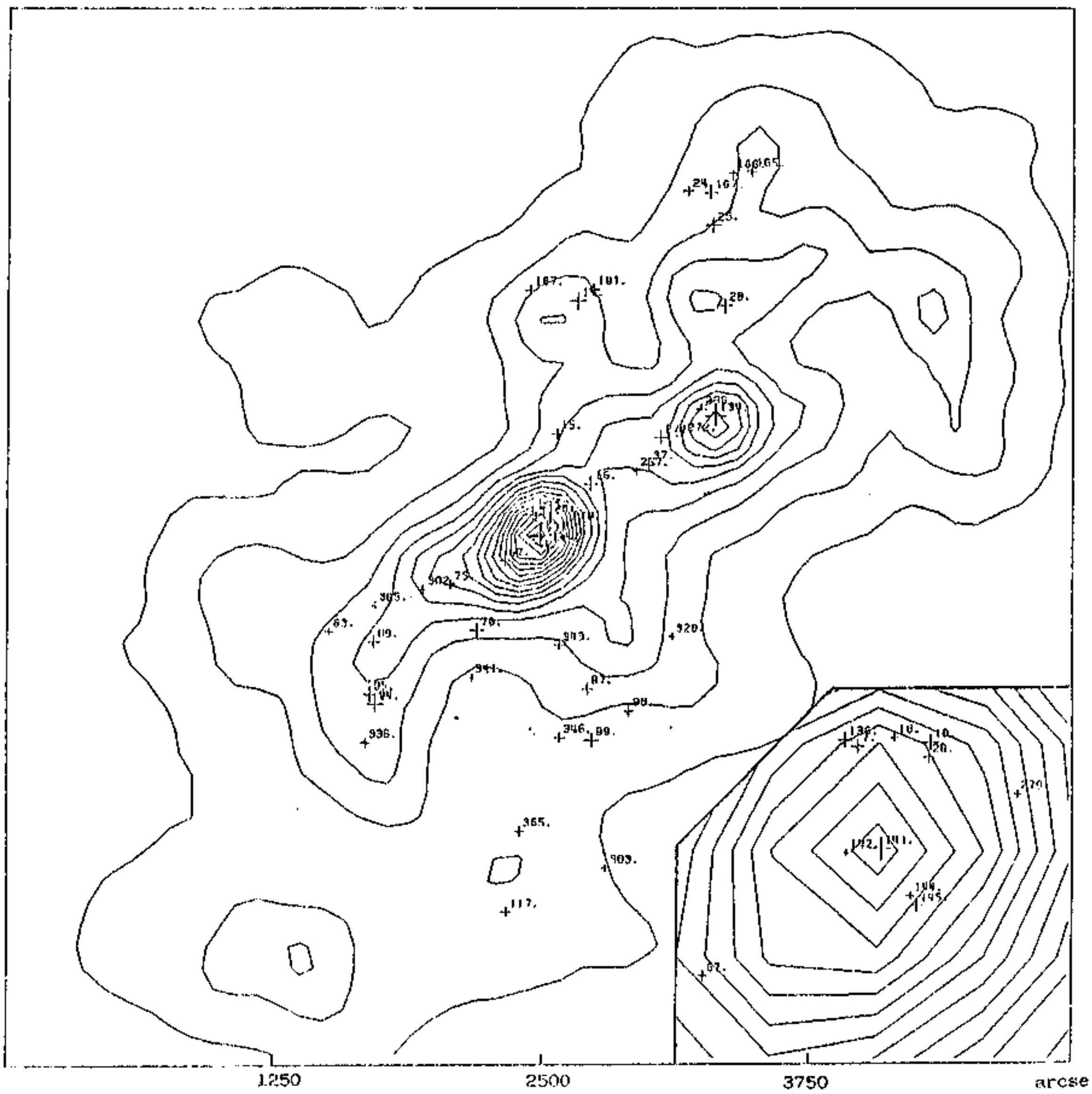


Figure 6

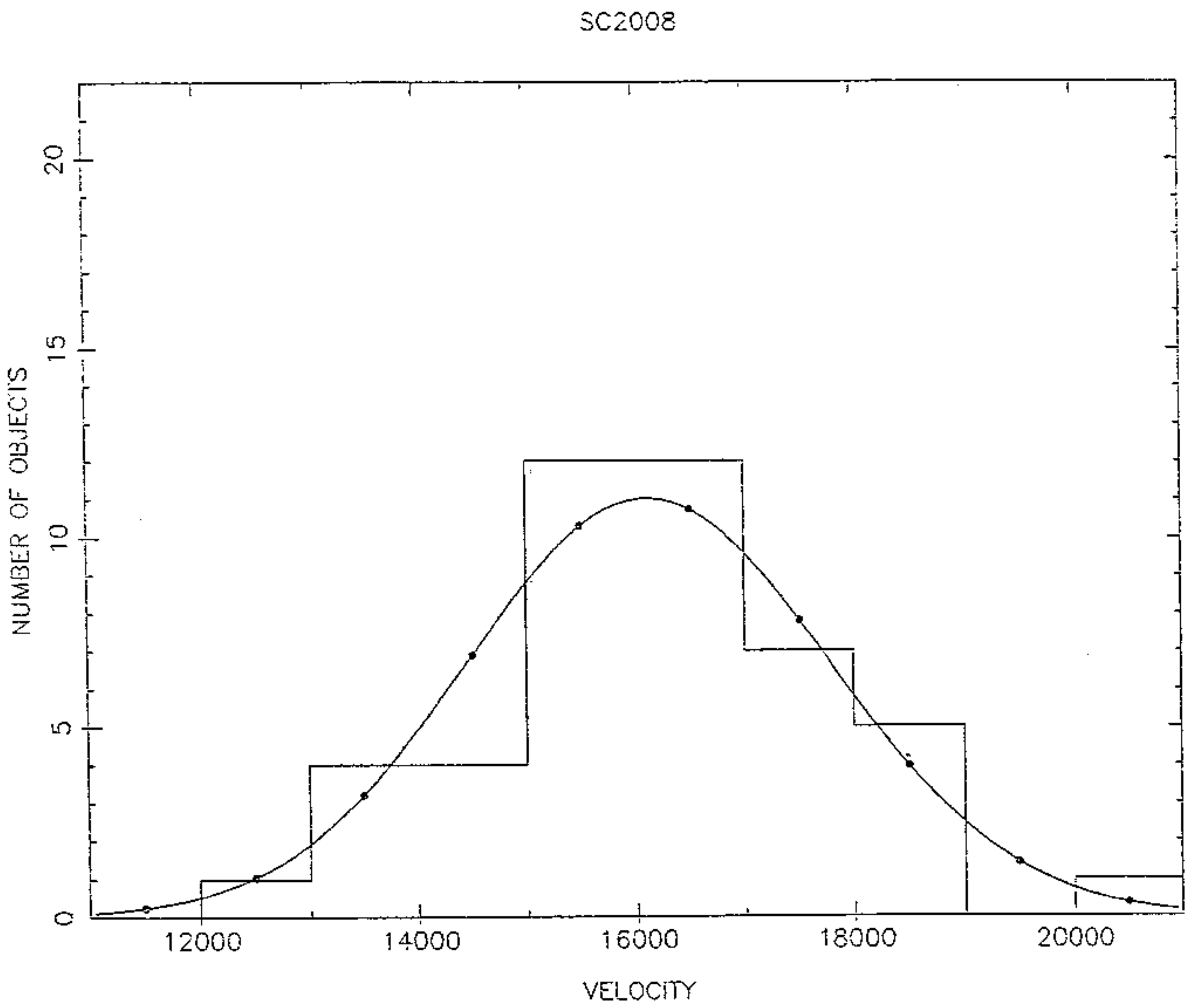
SC2008
NUMBER OF OBJECTS
0
5
10
15
20
12000
14000
16000
18000
20000
VELOCITY

**Figure 7**

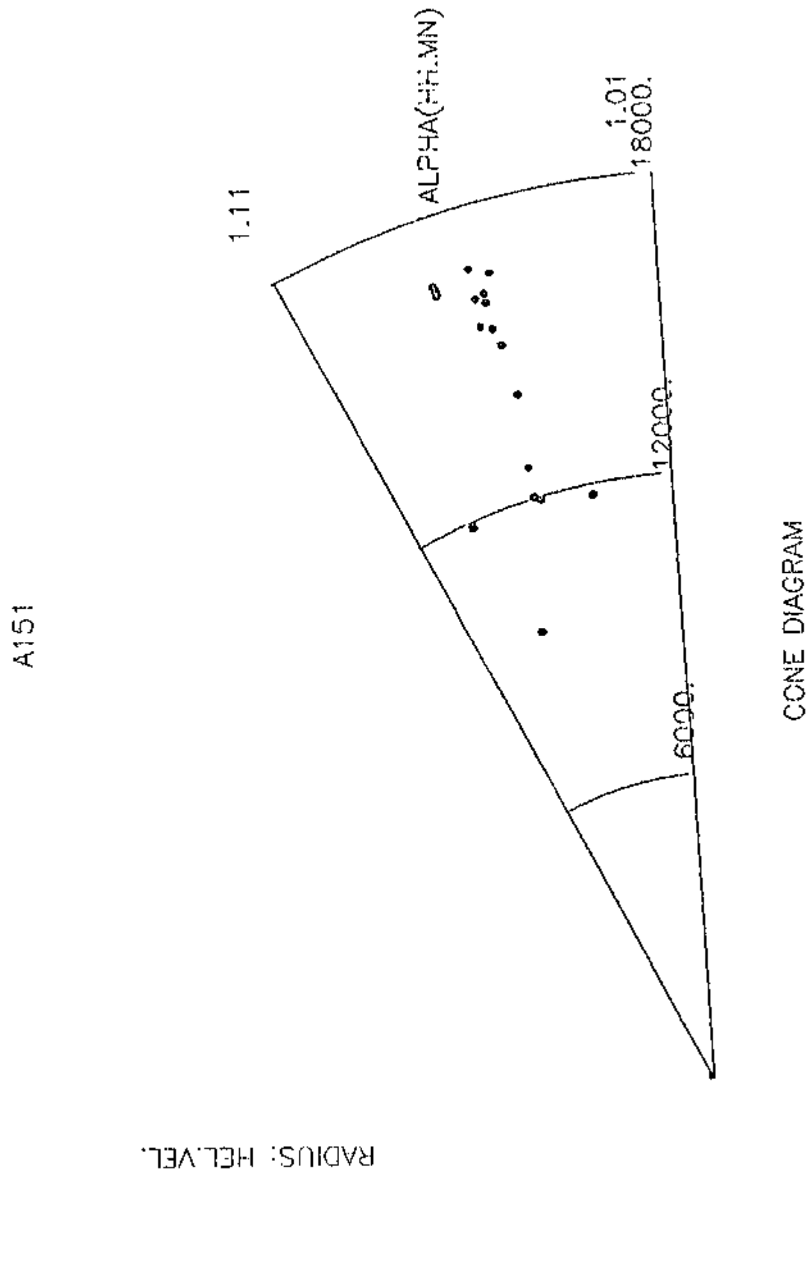
A151
ALPHA(HR.MN)
1.11
1.01
18000.
12000.
6000.
CONE DIAGRAM
RADIUS: HEL.VEL.

**Figure 8**

A151

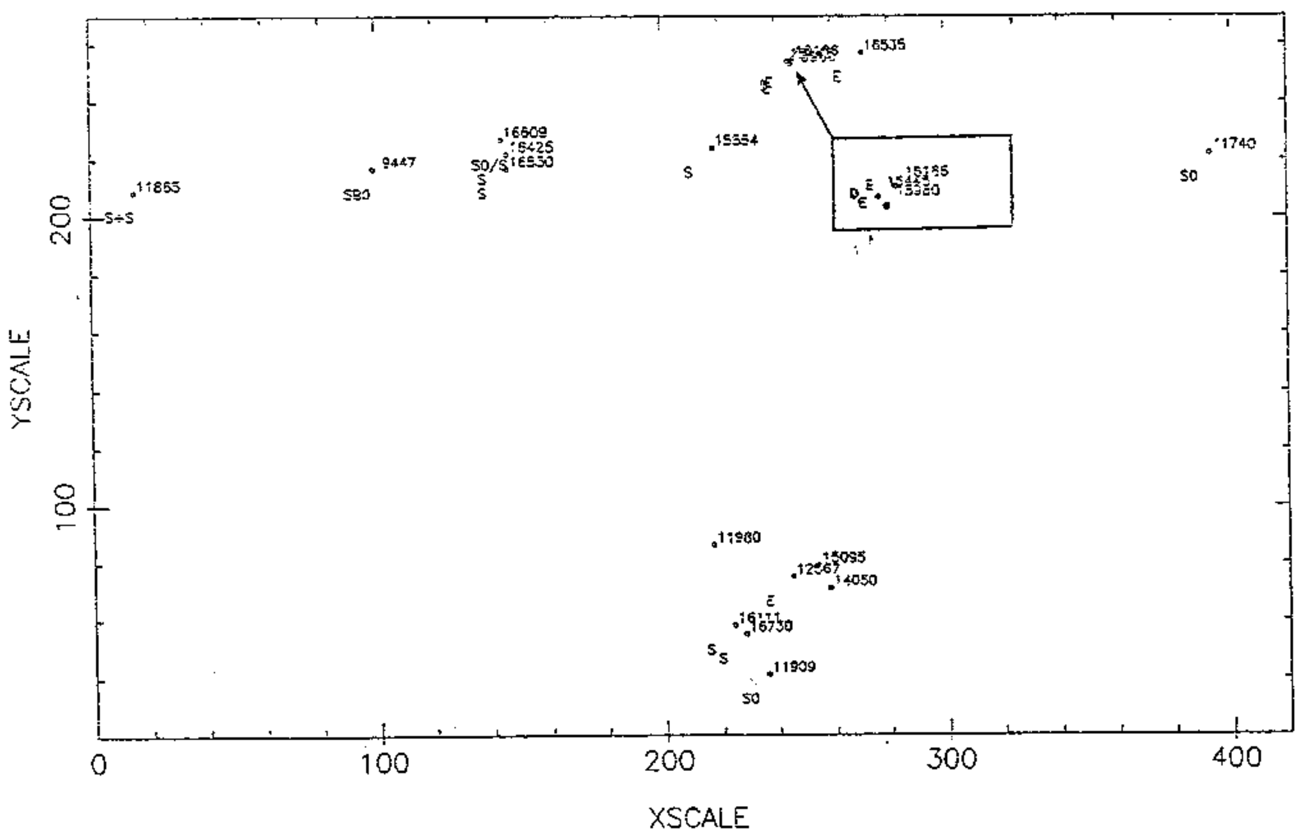


**Figure 9**

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"NEW MEASUREMENTS OF RADIAL VELOCITIES IN CLUSTERS OF GALAXIES - II"

**IDENTIFICAÇÃO**

**AUTOR(ES)**

D. Proust
A. Mazure
L. Sodré
H. Capelato
G. Lund

**ORIENTADOR**

**CO-ORIENTADOR**

**DIVULGAÇÃO**

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- [ ] INTERNA
- [ ] RESTRITA

**EVENTO/MEIO**

- [ ] CONGRESSO
- [x] REVISTA
- [ ] OUTROS

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| __/__/__ | __/__/__ | | DAS |

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| RECEBIDO | DEVOLVIDO | NOME DA DATILÓGRAFA |
|---|---|---|
| | __/__/__ | Neide Gêa |

Nº DA PUBLICAÇÃO: PÁG.:
CÓPIAS: Nº DISCO: LOCAL:

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