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Properties of nearby clusters of galaxies

IV. A147, A260, A272, A278, A1661, A2056, A2073, A2093, A2096, A2124⋆,⋆⋆

P. Flin[1], **J. Krywult**[1], **D. Trèvese**[2], **G. Cirimele**[2], **and P. Hickson**[3]

[1] Institute of Physics, Pedagogical University, ul. Konopnickiej 15, 25-405 Kielce, Poland
[2] Istituto Astronomico, Universita di Roma "La Sapienza", via G. M. Lancisi 29, I-00161 Roma, Italy
[3] Department of Physics and Astronomy, University of British Columbia, 2219 Main Mall, BC, V6T 1Z4, Canada

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Abstract. We present F band photometry from digitized plates obtained with 48-inch Palomar Schmidt for 1074 galaxies brighter than $m_3 + 3$ in 10 clusters. For each galaxy equatorial coordinates, magnitude, size, ellipticity and orientation are given. We provide the galaxy surface density maps for each cluster.

Key words: galaxies — clusters of galaxies — general

1. Introduction

For performing uniform statistical analysis of properties of galaxy clusters a large sample of these objects was needed (Flin et al. 1988). This is the fourth, and the last one, of a series of papers (Trèvese et al. 1992; Flin et al. 1995; Trèvese et al. 1997) giving the positions, magnitudes ellipticities and orientations of cluster galaxies with magnitudes between m_3 and m_3+3, where m_3 is the magnitude of the third brightest galaxy within one Abell radius from the cluster centre. Because the details of the observations and data reduction were given in the previous papers, here in Sect. 2 we present their brief summary. The description of the catalogues is given in Sect. 3. We present also the surface density maps for each cluster with individual objects superimposed on the map. For identification some galaxies are labelled with corresponding numbers from the catalogue.

Send offprint requests to: P. Flin

⋆ Tables 2 to 11 are only available in electronic form at the CDS via anonymous
ftp to cdsarc.u-strasbg.fr (130.79.128.5) or via
http://cdsweb.u-strasbg.fr/Abstract.html

⋆⋆ Figures 2 to 10 are only available in electronic form at http://www.edpsciences.org

2. Observational data and reduction procedures

Our data are derived from 10-inch photographic plates taken with the 48-inch Palomar Schmidt Telescope (Hickson 1977). The emulsions employed were Kodak 127-02 or Kodak 098-04, both used with 2 mm Schott RG-1 glass filter, which corresponds to the red photographic F-band of Oemler (1974). Plates were calibrated using the Palomar spot sensitometer.

Fields containing the clusters originally selected by Hickson (1977), as well as some additional Abell clusters well visible on plates, were scanned in transparency mode using a PDS 1010G micro-densitometer in Rome, producing a digital image for each cluster field having pixel size from 15 to 20 μm, according to the noise level of the plate and cluster distance. Objects are automatically detected and magnitude values are computed in many circular apertures, producing a magnitude profile from which objects are automatically classified as point-like or diffuse.

Total magnitudes $m_{\rm T}$ are computed from flux integrated in an aperture whose radius is $R_1 = 1.5r_1$, where r_1 is the first momentum of the intensity distribution (see Trèvese et al. 1992).

With the above definition, total magnitudes correspond on average to the magnitude $m_{\rm iso}$ computed in a circular aperture determined by the isophote $\mu = 24$ mag arcsec^{-2}, with the advantage that r_1 is less noisy than the corresponding isophotal radius (see Flin et al. 1995).

Magnitude zero points are taken from the literature, as indicated in Sect. 3. For comparison we give also the magnitude computed in a fixed aperture of 5 pixel radius. The corresponding value of the radius in arcsec is given in Table 1 for each cluster.

The ellipticity and the orientation of each object are computed from the second-order momenta of the intensity distribution.

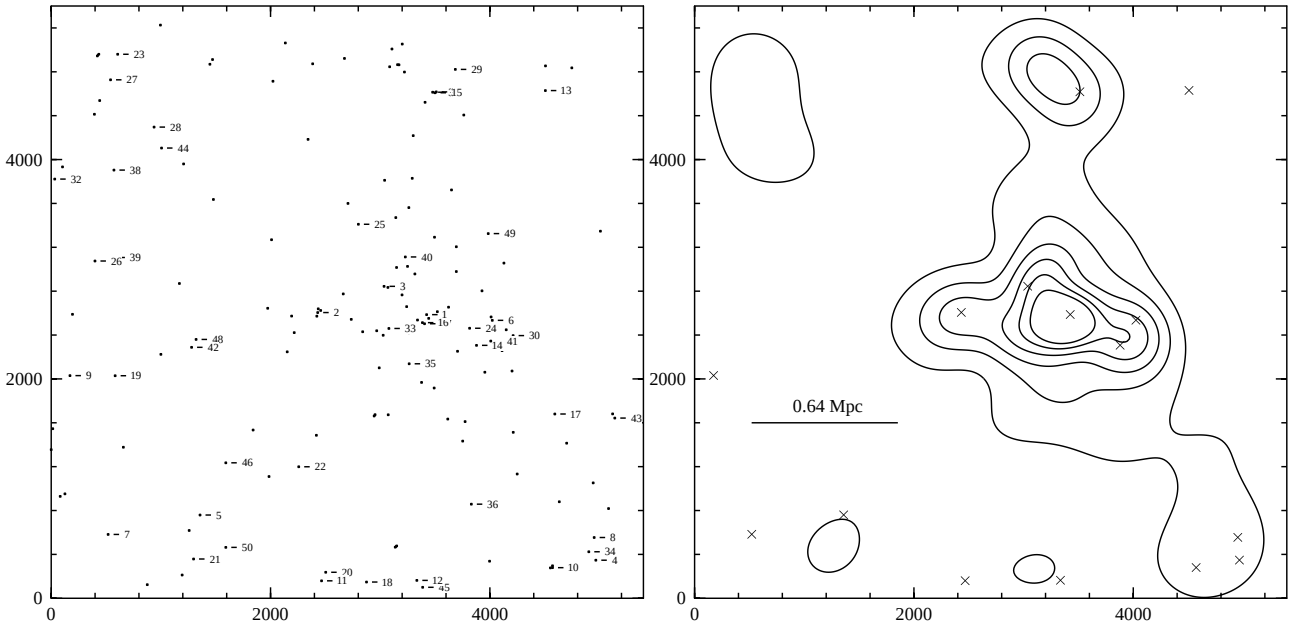

Fig. 1. Abell 147

Table 1. Cluster data

Abell	N	z	$\alpha(2000)$	$\delta(2000)$	$\phi_a('')$	n
A147	67	0.0438	01 08.2	+02 09	6.7	155
A260	1	0.0348	01 51.9	+33 09	6.7	85
A272 [a]		0.0877	01 55.3	+33 56	6.7	58
A278 [a]		0.0891	01 57.3	+32 13	6.7	176
A1661 [b]		0.1671	13 01.8	+29 04	5.0	197
A2056 [c]		0.0804	15 19.2	+28 16	6.7	98
A2073 [c]		0.124†	15 25.7	+28 24	6.7	58
A2093 [d]		0.139†	15 34.3	+37 02	5.0	48
A2096 [d]		0.116†	15 35.4	+37 20	5.0	100
A2124	1	0.0654	15 45.0	+36 03	5.0	99

[a] Same calibration as A260.
[b] Same calibration as A1700 (Trèvese et al. 1997).
[c] Same calibration as A2065 (Trèvese et al. 1997).
[d] Same calibration as A2124.
† The redshift has been estimated from the $z - m_{10}$ relation.

In each cluster the equatorial coordinates of galaxies for the epoch 2000 have been computed from the rectangular coordinates of scans, using right ascension α and declination δ of at least 20 galaxies taken from Digitized Sky Survey.

Density maps were constructed using algorithm applying an adaptive filter as described by Pisani (1993) and already involved in plots of maps in the paper Trèvese et al. (1997). Density images were computed using all galaxies brighter than $m_3 + 3$. Isodensity maps of each cluster field are shown in Figs. 1 to 10. The accuracy of determined parameters, this is for both photometries and ellipticity of galaxy images, has been discussed in the previous papers as listed in the references.

3. Description of the catalogue

The clusters studied in this paper are listed in Table 1. The column headings are:

Column 1: Abell catalog number.
Column 2: Number of galaxy in our catalogue used for the determination of the magnitude zero point.
Column 3: Redshift (from Struble & Rood 1991).
Columns 4 and 5: Right ascension and declination of the cluster centre (Abell et al. 1989).
Column 6: Radius adopted for fixed aperture photometry, in arcsec.
Column 7: The number of galaxies in the magnitude range $m_3, m_3 + 3$ within catalogued galaxy cluster.

The zero point of the magnitude was estimated using published photometric data.

For A147 we have used g magnitude of bright galaxy given by Hoessel et al. (1980) after the transformation $F = g - 1.76$. The clusters A260, A272 and A278 lie in the same plate. In this case we have used the V magnitudes taken from Sandage & Perelmuter (1991) after the transformation $F = V - 1.71$. For A2093, A2096, and A2124, lying in the same plate, we have used the g magnitudes given by Hoessel et al. (1980) after the transformation $F = g - 1.78$.

Details of the photometry of A1661, which lies in the same plate of A1700, are presented in our previous paper

(Trèvese et al. 1997). Photometry of A2056 and A2073, which are in the same plate of A2065, are presented in our previous paper (Trèvese et al. 1997).

Each catalogue contains all galaxies in the area shown in the identification maps, brighter than $m_3 + 3$.

Data for the individual galaxies in each cluster are given in Tables 2 to 11. The column headings for these tables are as follows:

Column 1: Identification number.
Column 2: X coordinate in arcseconds.
Column 3: Y coordinate in arcseconds.
Column 4: Right ascension 2000.
Column 5: Declination 2000.
Column 6: Size in arcsec, defined in Eq. (1) of Paper I.
Column 7: Ellipticity $(1 - b/a)$, where b/a is the ratio of minor/major axis lengths.
Column 8: Angle between the major axis and the positive y direction, in degrees, increasing counterclockwise.
Column 9: Total F magnitude integrated in a circular area of radius R_1.
Column 10: F magnitude in a fixed circular aperture, whose radius in arcsec is indicated in Table 1.

Galaxies are sorted according to their total magnitude.

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