THE PHOTOMETRIC AND GEOMETRIC PARAMETERS OF GALAXIES IN CLUSTERS A 1983, 2065

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1. Introduction

In the last decade quite a large number of clusters of galaxies have been studied photometrically. Extensive investigations have been carried out by Oemler (1974), MacGillivray et al. (1976), Dressler (1978), Godwin & Peach (1977), Hoffman & Crane (1977), Couch & Newell (1984), Butcher & Oemler (1985), Butcher, Oemler & Wells (1983) and others in order to reveal global photometric properties of clusters.

In the middle of the 1970s a photometrical study of selected clusters of galaxies was undertaken at Abastumani. It includes the study of the overall properties of clusters of galaxies and determination of the photometric, geometric and dynamic parameters of brighter galaxies.

The objects to be studied were selected from Abell's catalog (Abell 1958). The objects were taken with various richness classes, not located at low galactic latitudes. Except for its richness class, the characteristics of the cluster itself were not considered in making the choice. The final list of clusters, for which photometrical measurements have been done, is presented, along with the richness class, redshifts, BM&RS type and population of each object, in the first six columns of Table 1.

2. The Observations and Measurements

Measurements of galaxies were made on plates taken at the prime focus of the 2.6 m telescope of the Byurakan Observatory and 0.7 m meniscus telescope of the Abastumani Observatory with plate scales of 21.4 and 98 arcsec/min respectively. The photometrical material for A 1983 and 2065 were obtained on Kodak IIa-O unfiltered plates baked in air.

Photometric calibration of the plates have been performed by means of a 12-tube spot sensitometer of known relative intensities. The photoelectrically calibrated galaxies located in the clusters and sky background surface brightnesses measured photoelectrically were used for the zero point determination. Measurements of the plates obtained have been carried out using the automatic microphotometer of the Babelsberg Observatory (Fritze 1977).

In a region of 0.25 sq.deg., 204 and 147 galaxies were identified up to the limiting magnitude 21.5 in the photographic band. The magnitudes were integrated up to the isophote corresponding

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to 25 mags per sq. arcsec. The completeness limit is 19.5 and the number of galaxies up to this limit are 132 and 108 respectively.

Table 1. Basic cluster data

Cluster	R	z	B-M	R-S	N	Band		
A 119	1	.0437	II-III	C	295		V	
168	2	.0452	II-III	I	120		V	
400	1	.0232	II-III	I	200	B	V	
779	1	.0226	I-II	cD	170	B	V	R
1228	1	.0344	II-III	F	210	B	V	
1314	0	.0341	III	C	180	B	V	
1367	2	.0213	II-III	F	460	B	V	R
1831	1	.0749	III	F	230		V	
1983	1	.0430	III	F	150		Pg	
2065	2	.0721	III	C	200		Pg	
2147	1	.0356	III	F	240		V	
2151	2	.0371	III	F	360		V	
2152	1	.0383	III	F	190		V	
2197	1	.0303	III	L	350	B	V	R
2199	2	.0305	I	cD	495	B	V	R

3. The Results

For the parameters of the Abell luminosity function the values of a(1) = 0.80, a(2) = 0.27 and m(pg) = -20.0 are derived for A 1983 (Kurtanidze & Richter 1987a).

For the parameters of the Schechter luminosity function of A 2065 the values of α = -1.25, m* = -20.45 were derived and for those of Abell a(1) = 1.1, a(2) = 0.36, m(pg) = -20.65 (Kurtanidze & Richter 1987b).

To investigate the luminosity segregation effect in the cluster A 2065, the measured region has been divided into several concentric rings and limiting magnitudes 17.5, 18.0 and 18.5 have been taken subsequently. The results are shown in Table 2, a so-called contingency table. The luminosity segregation of the galaxies is observed only within a magnitude from the brightest galaxy. The expected number of galaxies for a uniform distribution are given in brackets.

Table 2. Luminosity segregation in A 2065

Region	< 17.5	> 17.5	< 18.0	> 18.0	< 18.5	>18.5
0.0-3.0	8 (4)	35 (39)	10 (10)	33 (33)	19 (18)	24 (24)
3.0-6.3	4 (4)	40 (40)	10 (10)	34 (34)	21 (18)	22 (24)
6.3-10	1 (4)	42 (38)	9 (9)	33 (33)	15 (18)	26 (23)
		7.0		0.0		1.2

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The position angle and elipticity of galaxies were calculated for each of the two cluster samples. Several statistical tests were applied to check for nonrandomness. It was shown that the galaxies in the cluster A 2065 appear to be preferentially aligned at a confidence level 0.05. The alignment of the galaxy major axes is perpendicular to the direction of the central double galaxy orientation and that of the cluster elongation.

On the basis of the contingency tables it is shown that the observed ellipticity does not depend on the luminosity, diameter and the position of galaxies in the cluster.

The radial density profiles were studied for sixty clusters. They were approximated by the sum of exponents, parameters of which were determined by Proni's method.

The photometrical properties of the intermediate distance ($0.05 < z < 0.15$) clusters of different morphological types will be determined using a CCD mounted on 125 cm and 70 cm meniscus type telescopes.

On the basis of J and F surveys of the southern sky the detailed structure of a few hundred clusters will be studied.

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