ELLIPTICITIES OF GLOBULAR CLUSTERS IN THE ANDROMEDA GALAXY

Nedka M. Spassova

Bulgarian Academy of Sciences

Anelia V. Staneva and Valery K. Golev

Sofia University

A program of investigation of globular clusters' structural parameters in nearby galaxies has been initiated at the Rozhen National Observatory, Bulgaria (Spassova and Staneva 1984). Here we report on the projected ellipticities of 88 bright globular clusters in M 31, obtained on plates taken with the 2 m Ritchey-Chretien telescope at Rozhen (16 m focal length, 12"89/mm plate scale over a 1^{o} x 1^{o} field).

The cluster density distributions were obtained and digitized using the MDM-6 Joyce-Loebl microdensitometer. For each object four 32 x 32 raster data arrays (40 mcm pixel spot size and 50 mcm increment) were formed. For the ellipse parameter determination we applied the momentum analysis method (Stobie 1980) and the cluster's isodensity contour analysis (Geyer et al. 1953, Kadla et al. 1977). For each object we processed 30 - 50 different contours using the last method. Most of the clusters were measured on two or more plates. Table I lists the basic results of the investigation. The cluster number (Sargent et al 1977) is listed in column 1, the mean ellipticity e over all isodensities is listed in column 2. The analysis of the data in Table I yield the following conclusions:

1. The projected ellipticities of the Andromeda clusters range over 0.02 - 0.27 with a mean value of 0.097 ±0.04.

a. The globular clusters in M 31 and in the Galaxy (e - 0.09 according to Frenk and Fall (1982); e = 0.07 according to Geyer et al. (1983) actually have identical mean ellipticities.

b. The mean ellipticity obtained for M 31 clusters is similar to the one for LMC clusters in Frenk and Fall (1982) (e = 0.11) and in Geyer and Richtler (1981) (e = 0.13), but differs significantly from the value of 0.22 of Geisler and Hodge (1980).

c. Another phenomenon needing explanation from a physical point of view is the obvious difference in the flatness of M 31 and SMC clusters (Kontizas et al. 1985).

J. E. Grindlay and A. G. Davis Philip (eds.),
The Harlow-Shapley Symposium on Globular Cluster Systems in Galaxies, 569–570.

TABLE I

The Ellipticities of the Globular Clusters in M 31

No.	e	No.	e	No.	e	No.	e	No.	e	No.	e
35	0.08	102	0.10	147	0.07	213	0.06	239	0.10	280	0.03
40	0.10	104	0.07	148	0.07	215	0.08	241	0.16	281	0.07
52	0.06	107	0.05	150	0.18	216	0.18	243	0.08	282	0.12
53	0.13	110	0.11	155	0.12	217	0.05	244	0.06	286	0.11
62	0.06	113	0.14	156	0.08	218	0.08	250	0.06	287	0.10
64	0.11	114	0.15	157	0.08	222	0.11	252	0.10	299	0.10
70	0.04	119	0.05	165	0.07	223	0.13	256	0.06	300	0.04
72	0.06	121	0.09	169	0.05	224	0.15	257	0.10	301	0.14
76	0.06	122	0.09	172	0.09	226	0.02	258	0.04	305	0.10
78	0.09	124	0.11	173	0.07	227	0.09	263	0.12	315	0.21
87	0.02	125	0.07	176	0.06	229	0.08	267	0.22	D83	0.14
90	0.08	127	0.08	183	0.07	230	0.12	272	0.08	D87	0.12
96	0.04	130	0.14	199	0.27	233	0.14	275	0.16	98	0.09
98	0.07	134	0.07	205	0.05	234	0.16	277	0.13		
101	0.12	144	0.05	212	0.17	235	0.11	279	0.12		

2. No explicit correlation between the visible ellipticities and stellar magnitudes, on the one hand, and the color indices on the other, could be established during the investigation. Although only preliminary, this conclusion seems interesting in view of the results of van den Bergh (1983) and Hesser et al. (1984), namely that the ellipticities of clusters in the Magellanic Clouds and in NGC 5128 correlate with their luminosities.

REFERENCES

Frenk, C. S and Fall, S. M. 1982 Monthly Notices Roy. Astron. Soc. **199**, 565.
Geisler, D. and Hodge, P. 1980 Astrophys. J. **242**, 66.
Geyer, E. and Richtler, T. 1981 in IAU Colloquium No. 68, Astrophysical Parameters for Globular Clusters, A. G. D. Philip and D. S. Hayes, eds., L. Davis Press, Schenectady, p. 239
Geyer, E., Hopp, U. and Nelles, B. 1983 Astron. Astrophys. **125**, 359.
Hesser, J. E., Harris, H., van den Berg, S. and Harris, G. 1984 Astrophys. J. **276**, 491.
Kadla, Z., Richter, N., Strugatzkaja, A. and Hagner, V. 1977 Pulkova Contr. **195**, 74.
Kontizas, E., Dialetis, D. Prokakis, T. and Kontizas, M. 1985 Astron. Astrophys. **146**, 293.
Sargent, W., Kowal, C., Hartwick, F. D. A. and van den Bergh, S. 1977 Astron. J. **82**, 947.
Spassova, N. and Staneva, A. 1984 Sov. Astron. Lett. **10**, 114.
Stobie, R. 1980 Journ. Brit. Interplanetary Soc. **33**, 323.
van den Berg, S. 1983 Publ. Astron. Soc. Pacific **95**, 839.