

THE BLUE STAR CLUSTERS OF M 31

Paul Hodge

University of Washington

ABSTRACT. CCD images in UBVR of 33 star clusters in the disk of M31 show them to be mainly bright and very young. Few cataloged clusters in the disk are likely to be as old as 10^9 years.

1. INTRODUCTION

Although the globular clusters of M31 have now been studied in considerable detail (Fusi Pecci 1986) and the young stellar associations in the disk (van den Bergh 1964; Efremov 1982) have been explored, little has been published about its disk clusters. A catalog of 404 clusters in the disk has been published (Hodge 1979), but no measurements of their properties have heretofore been given.

2. OBSERVATIONS AND RESULTS

Integrated UBVR photometry has been made for a selection of 33 disk star clusters in six regions of M31, using a CCD detector on the KPNO 4-m telescope. The brightest have absolute magnitudes of $M_v = -8.0$ and colors as blue as $B-V = -0.3$. Clusters in this sample also include objects as faint as $M_v = -3.7$.

The color distribution is similar to a composite of those of the LMC and M33: our sample includes a large fraction of luminous blue clusters, as in the LMC, as well as some intermediate color clusters like those in M33, but which are absent in the LMC.

The oldest disk clusters in the sample have ages, estimated from their BVR colors, of approximately 4×10^8 years, and the youngest are only a few million years old. Comparison of the cluster luminosity function with those of the LMC (van den Bergh 1981) and M33 (Christian and Schommer 1982) suggests that present sampling of M31 disk clusters is very incomplete. There are probably tens of thousands of such clusters still undetected.

Figure 1 shows a comparison of the color-magnitude diagrams of M 31's disk clusters and its globular clusters. Even in this plane there is a fairly clear separation of cluster types. The figure also compares these data with that for clusters in the local group dwarf irregular galaxies NGC 6822 and IC 1613 (Hodge 1986), which have cluster populations like that of M 31's disk, but with fewer high-luminosity clusters, probably largely a population effect.

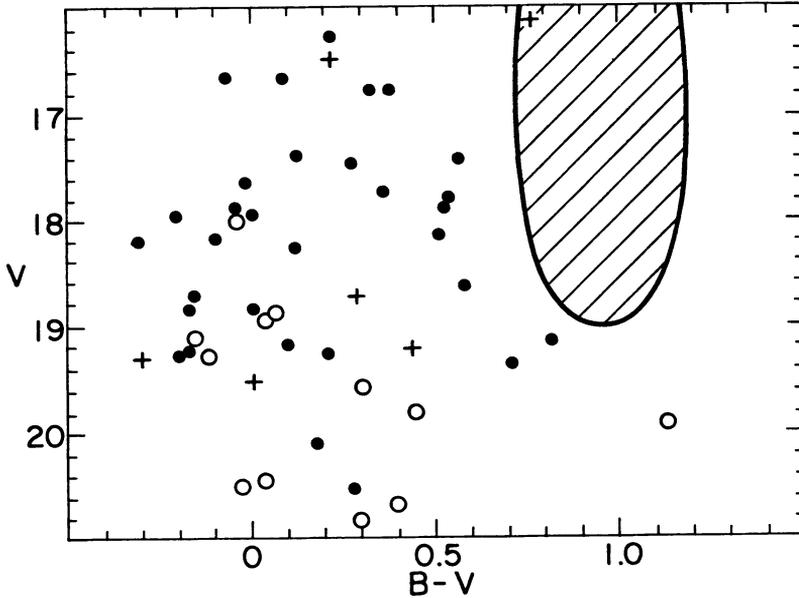


Fig. 1. Color-magnitude diagram for M 31 disk clusters (dots), compared with the area occupied by that galaxy's globulars (shaded) and with the clusters of NGC 6822 (crosses) and IC 1613 (open circles), both from Hodge (1986).

REFERENCES

- Christian, C. and Schommer, R. 1982 *Astrophys. J. Suppl.* 49, 405.
 Efremov, Yu. N. 1982 *Astron. Zhur.* 8, 585.
 Fusi Pecci, F. 1987 in *IAU Symposium No. 126, Globular Cluster Systems in Galaxies*, J. E. Grindlay and A. G. D. Philip, eds., Reidel, Dordrecht, p. 173.
 Hodge, P. 1979 *Astron. J.* 78, 959.
 Hodge, P. 1986 *Mem. Soc. Astron. Italiana* in press.
 van den Bergh, S. 1964 *Astrophys. J. Suppl.* 9, 65.
 van den Bergh, S. 1981 *Astron. Astrophys. Suppl.* 46, 79.