TIDAL RADII AND MASSES OF THE CLUSTERS IN THE LMC

M. Kontizas*, M. Chrysovergis*, E. Kontizas**   and
D. Hadjidimitriou**.
* University of Athens, ** Observatory of Athens.

ABSTRACT

Masses and tidal radii of star clusters in the LMC have
been derived by means of star counts from U.K. Schmidt pla-
tes. Two groups of clusters according to their distance
from the rotation centre of the LMC were measured. The ti-
dal radii of the central clusters vary from 58 to 85 pc and
those of the most distant clusters from 33 to 86 pc whereas
masses were found to vary from 10^5 to $4 \times 10^5 M_\odot$ and from 10^4
to $2 \times 10^5 M_\odot$ respectively.

OBSERVED DYNAMICAL PARAMETERS

Star clusters are an important key of understanding the
stellar evolution and the dynamical properties of the stars
in a galaxy. LMC is our nearest galaxy and gives the oppor-
tunity to study many clusters in detail. Plates (covering
all the LMC area) taken with the 1.2m U.K. Schmidt Telesco-
pe were measured on IIIaJ, IV-N and IIaD emulsion. Star
counts were carried out on the screen of a magnifying system.
The homogeneous observational material allowed star counting
far beyond the tidal radii of the clusters so that the back-
ground is reached safely in all cases. Two groups of clus-
ter were selected according to their distance from the rota-
tion centre of this galaxy. One group of 26 clusters is lo-
cated in a ring within the radii of 0.5 and 3 degrees and a
second group of 41 clusters (occupying the outer part of
the LMC) at distances from 5° to 7°. Therefore this se-
cond group represents the most remote LMC clusters in all
directions.

The tidal radii were found by the method described by
King (1962) and the various sources of errors give an uncer-
tainty of 15% in the derived values. The tidal radii of

the central group of clusters were found to be from 58 to 85 pc whereas for the outermost clusters the derived values are 33 to 86 pc. From these values it can seen that the tidal radii of the studied clusters are in the same range of the galactic globulars (Peterson and King, 1975) and the SMC clusters (Kontizas, 1984). The central clusters classified by Freeman et al (1983) as Kinematically disk clusters are all found to have tidal radii systematically larger that the SMC disk clusters whereas the remote clusters show a range of radii similar to those of the halo SMC clusters (Kontizas 1984).

The masses of the central clusters were found by the method described by Chun (1978) and the derived values are from 10^5 to $4\times10^5 M_\odot$ whereas the masses of the outermost clusters calculated using the King formula (1962), were found to be from 10^4 to $2\times10^5 M_\odot$. These values show that the LMC clusters are about 10 times less massive that the galactic globulars and 10 times more massive that the SMC halo clusters.

ACKNOWLEDGEMENTS

REFERENCES

King, I. R. : 1962, Astron. J. 67, 471.
Chun, M. S. : 1978, Astron. J. 83, 1062.
Peterson, C. J., King, I.R. : 1975, Astron. J., 80, 427.
Kontizas, M. : 1984, Astr. and Astrophys. 131, 58.
Freeman, C.K., Illingworth G. and Oemler A Jr. 1983. Ap. J. 272, 488.