New Views of the Magellanic Clouds
IAU Symposium, Vol. 190, 1999
Y.-H. Chu, N.B. Suntzeff, J.E. Hesser, and D.A. Bohlender, eds.

Binary Clusters in the Magellanic Clouds

A. Dieball
Sternwarte der Universität, Auf dem Hügel 71, 53121 Bonn, Germany

E. K. Grebel
UCO/Lick Observatory, UCSC, Santa Cruz, CA 95064, USA

1. Introduction

Binary clusters account for more than 10% of the cluster population in the Magellanic Clouds. Statistically fewer than 50% of the found pairs are expected to be chance superpositions. We are studying binary cluster candidates in the Magellanic Clouds to investigate whether the cluster pairs are of common origin and if they show evidence for interaction. We determine ages for the cluster components through isochrone fitting (isochrone models based on Schaerer et al. 1993, and Bertelli et al. 1994) to the colour magnitude diagrams (CMDs). We investigate the stellar spatial density in the surroundings of the clusters to look for signs of possible interactions between the components.

2. The Large Magellanic Cloud

We present first results for three cluster pairs which are located in the bar of the LMC. The data were obtained with EFOSC 2 at the ESO/MPI 2.2-m telescope at La Silla using Washington and Hα filters.

SL 353 & SL 349 are located in the outer northwestern part of the LMC bar. Ages from isochrone fits to the core-He-burning giants of the two clusters are slightly higher than main-sequence-turnoff ages. We adopt a mean age of 520 ± 80 Myr for both clusters which is in agreement with Vallenari et al. (1998). Radial velocities are similar for both clusters and different from the surrounding field. This strongly supports that this cluster pair was formed at the same time from the same giant molecular cloud (GMC).

SL 385 & SL 387 are located in the eastern part of the LMC bar. The best fitting isochrones result in ages of 220 ± 40 Myr for SL 385 and 280 ± 60 Myr for SL 387. Our data, however, do not support an age difference as large as suggested by Vallenari et al. (1998) (150 and 500 Myr). The ages of both clusters are sufficiently similar to agree with near-simultaneous formation but are no evidence whether this cluster pair is a binary cluster or not.

NGC 1971 & NGC 1972 & NGC 1969 are located close to the geometrical LMC centre in the western part of the bar. A curved bridge of enhanced stellar density connects NGC 1971 and NGC 1972. We do not see such sign of possible interaction towards NGC 1969. Isochrone fits result in similar ages for all three clusters: 63 ± 8 Myr for both NGC 1971 and NGC 1969, and 56 ± 6

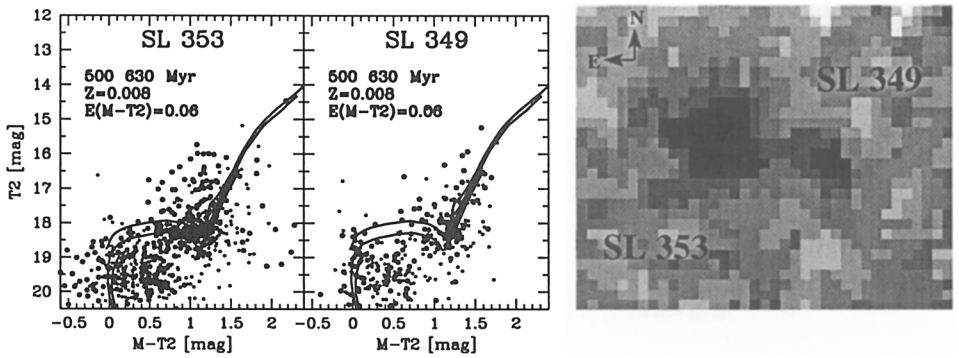

Figure 1. As an example we present the CMDs (left) and the stellar density plot (right) for SL 353 & SL 349.

Myr for NGC 1972. We suggest that NGC 1971 & NGC 1972 are a true binary cluster and all three clusters may have been formed in the same GMC.

3. The Small Magellanic Cloud

The data for six SMC cluster pairs were extracted from the SMC *BVI* database of the Optical Gravitational Lensing Experiment (OGLE; e.g., Udalski et al. 1998). Our results are presented in the following table:

Three of our SMC binary cluster candidates have sufficiently similar ages to indicate near-simultaneous formation. Chance superposition in the crowded SMC bar region (most likely) and gravitational capture (possible, but rare) may explain the age differences between the remaining three cluster pairs. We suggest that the last ones can be removed from the list of SMC binary cluster candidates. Kinematic studies are needed to validate this suggestion.

Table 1. Binary cluster data

cluster names	sizes [″]	ages [Myr]	separation [′]
H 99 & H 100	12 & 20	140 ± 20 & 140 ± 20	0.507
H 78 & H 76	18 & 7	72 ± 8 & 250 ± 40	0.812
H 179 & H 175	29 & 7	35 ± 5 & 400 ± 60	0.542
B 73 & H 143	11 & 18	72 ± 8 & 180 ± 20	1.301
IC 1612 & H 186	27 & 9	80 ± 8 & 90 ± 10	0.480
B 65 & H 134	29 & 9	72 ± 8 & 80 ± 8	0.617

https://doi.org/10.1017/S0074180900118492 Published online by Cambridge University Press

References

Bertelli, G., Bressan, A., Chiosi, C., Fagotto, F., & Nasi, E. 1994, A&AS 106, 275

Schaerer, D., Meynet, G., Maeder, A., & Schalle,r G. 1993, A&AS 98, 523

Udalski, A., Szymanski, M., Kubiak, M., Pietrzynski, G., Wozniak, P., & Zebrun, K. l998, Acta Astron. 48, 147

Vallenari, A., Bettoni, D., & Chiosi, C. 1998, A&A 331, 506