

## **Star Cluster Encounters in the Magellanic Clouds**

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### **1. Cluster Pairs: Sample and Numerical Simulation**

The study of star cluster pairs in the Magellanic Clouds (MCs) has been explored extensively in the past years (Bhatia & Hatzidimitriou 1988; Rodrigues et al. 1994; de Oliveira et al. 1998). The evolution of these pairs can provide fundamental insight into the past history of cluster formation in the MCs.

We have selected MC clusters (Bica & Schmitt 1995; Bica et al. 1998) with morphologies resembling those of the present models. The images in this selection of pairs were obtained from the Digital Sky Survey (DSS). We have also performed N-body simulations of star cluster encounters under different initial conditions, with the total number of particles per simulation ranging from 1024 to 20480.

We analyze the morphology of these selected cluster pairs in the MCs and compare them to the results of our numerical simulations of star cluster encounters. Evidence is found that during the interactions, transient morphological effects such as expanded halo, isophotal deformation and isophotal twisting can occur due to tidal effects and dynamical friction. These simulations, when compared to isodensity maps of cluster pairs in the MCs, can reproduce a wide range of morphological structures.

### **2. Examples**

From the analysis of the time evolution of each model, it is possible to observe in the beginning of the encounter the trend to form bridges. As time goes by the smaller cluster is disrupted by the massive one, partly merging into a single cluster at the end of the simulation, partly being ejected to the field.

In Fig. 1 we compare the isodensity map of the pair HS319/BRHT52b with a suitable model. This suggests that the small cluster is enduring a disruption by dynamical friction.

In Fig. 2 we show the isolated LMC cluster NGC1783 isophotes and ellipticity compared with a final merger cluster model. The similarities between the model and the observation suggests that NGC1783 could be the result of a cluster pair encounter.

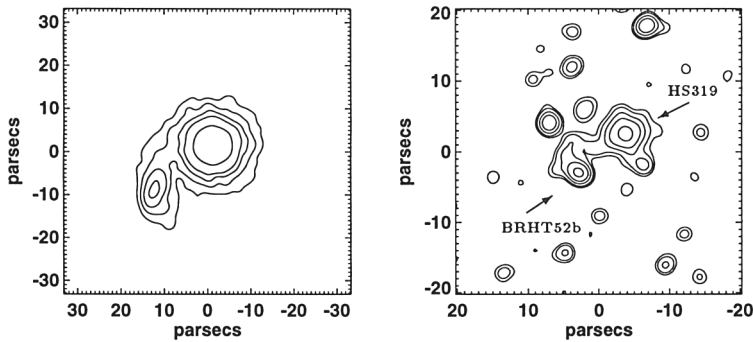


Figure 1. Comparison of a suitable model (left panel) with the LMC pair HS319/BRHT52b (right panel). In this model the projected plane is XY and the time of simulation is  $t = 19.5$  Myr.

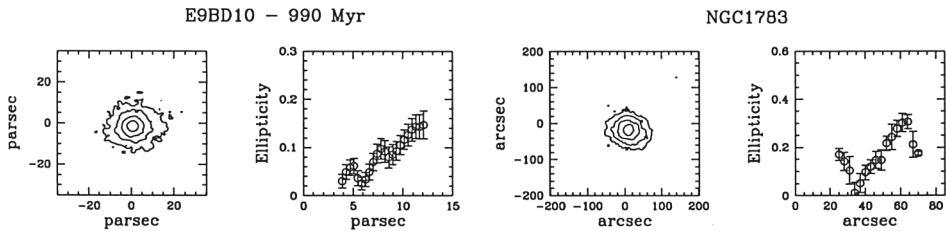


Figure 2. Comparison of a final stage model (left two panels), in a XZ projection with the LMC cluster NGC1783 (right two panels).

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