MERGER RATES IN SIMULATED AND OBSERVED GROUPS OF GALAXIES

Gary A. Mamon
Department of Physics
New York University
New York, NY 10003, USA

The occurrence of mergers in simulated loose groups of galaxies (Barnes 1985; Mamon 1987) has generated the concern that mergers may be significantly more frequent in simulated groups than in observed groups (Ostriker 1987). I compare here quantitatively the rates of merging between a subset of 102 groups (Mamon 1986) of the CfA group catalog (Geller and Huchra 1983) and samples of 50 dynamically simulated groups of given initial density. The simulated groups start out *virialized* with galaxy luminosities pseudo-randomly generated from a Schechter function of index -1 and cutoff $0.5\,L*$ (giving an average luminosity $\sim L*$, close to the average in the CfA group catalog). The groups are evolved with the N-body code described in Mamon (1987). The merging time of the sample of 50 simulated groups is defined as the time at which the Tremaine-Richstone (1977) statistic $T_1 = \sigma(M_1)/\langle \Delta M_{12} \rangle$ becomes smaller than 0.8. This value of T_1 is significantly smaller than expected from a random realization of groups with the luminosity function given above (Mamon 1987).

The densities of the CfA groups are estimated in 8 different ways using 4 different mass estimators and 2 different size estimators. In all 8 cases, the 50 densest CfA groups produce $T_1 > 1$ (T_1 is biased for $N < 50$). With 7 of the 8 density estimators, the simulated groups with the densities of the 50 densest CfA groups do not have time to merge (where the time for the group to virialize in included, and assuming that no mergers occur before virialization). With one estimator, the corresponding simulated groups do have enough time to merge if $\Omega \ll 1$ or if the galaxies have massive halos.

The absence of significant merging in the densest CfA groups ($T_1 > 1$) is thus probably consistent with theory, regardless of the value of Ω or of the (early) existence of massive halos around galaxies. A larger database of observed groups will provide stricter constraints on this problem.

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