# ON THE GOODNESS OF DIFFERENT MASS ESTIMATORS FROM N-BODY SIMULATIONS.

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N-body models were run in order to test the mass estimators considered by Heisler, Tremaine and Bahcall (1985, HTB), when systems with a large number of mass-points with a non-flat mass-spectrum are considered. The initial conditions of the models were a analytic King profile for the number density, a Gaussian velocity distribution function and a Schechter-type mass spectrum. The models were left to evolve from a far from virial initial configuration, so a violent collapse occurs before the system reachs equilibrium. The code we use was NBODY2 code kindly provided to us by Dr. S. Aarseth.

The main result is that all of the mass estimators clearly overestimate the real mass, at least by a factor of 2 at large radii. This result is very general and has been found for all the runs. We think the main reason for that difference with the results of HTB is on the mass spectrum used. The Virial and the Median Methods are the best suited to estimate the mass of a cluster for two reasons. First they are those which give the smaller discrepancy and secondly they seem to tend to a well defined asymptotic value. On their side the Average and Projected Mass Methods do not have such a behaviour and do not seem to be well suited for mass estimations. That difference can be easily understood since the Harmonic mean and Median used in the first two methods are not affected by large separations and consequently are more robust estimators.

We have considered the bright sample of Coma ($m \leq 15.7$) analyzed by Kent and Gunn (1982) and we calculated the total mass given by the different mass estimators. A similar trend for Coma and simulations is found and therefore one can in principle apply the conclusions from the models to the real case. In particular it seems that both the Projected an the Average Mass methods are far from being good mass estimators except for the innermost parts of the cluster. The values from the Virial and Median methods are consistent with total mass for Coma around $2 \times 10^{15} M_\odot$ or of $1.5 \times 10^{15} M_\odot$ for the inner $3^0$. This value could overestimate the mass by a factor of 2. If this is the case and if we use the value of the total luminosity obtained by Kent and Gunn (1982) the corresponding $M/L_B$ would be $\approx 190$ in solar units ($H_0 = 100$ km s$^{-1}$ Mpc$^{-1}$).

## REFERENCES

- Heisler, J., Tremaine, S. and Bahcall, J.: 1985, Ap. J. 298, p. 8.
- Kent, S.M., Gunn, J.E.: 1982, Astron. J., 87, p. 945.



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