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ENVIRONMENTAL EFFECTS ON GALAXIES IN CLUSTERS.

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Several observational facts show the importance of the interactions between galaxies in clusters and the intracluster medium. One of the main effects are caused by the strong pressure shocks over the interstellar medium produced by the displacement of the galaxies trough the hot intracluster medium (Gunn and Gott 1972).

These processes strip the reserves of HI in galaxies in clusters (Solanes et al. 2001) and affect the subsequent stellar formation, and could be responsible of the important morphological evolution observed in clusters of galaxies (Dressler et al. 1997).

Several theoretical works computed the amount of these interactions on galaxies (Abadi et al. 1999; Quilis 2000) and showed the strong influence that they have over the galaxies. Since adequate modelling requires the computation of the hydrodynamical forces, these analysis were made for oversimplified situations, but they provide important insights about the characteristics and efficiencies of the RAM pressure process. However little effort was focused in studying the cumulative effects along all the history of interactions betwen the galaxies and the group-cluster environments. The computation of realistic environmental interaction requires knowledge of the paths of the galaxies and the intergalactic medium conditions in a cosmological volume that contains several clusters of galaxies.

The simulations of the Virgo consortium (Pearce et al. 2000) provide a complete and realistic picture of the process of structure formation in τ CDM and ΛCDM cosmologies, and they give the complete physical situation of the intergalactic medium, and the orbital information of the galaxies, that allow us to study the history of interactions in order to compare with the observed properties of galaxies in clusters.

Since the process to be studied occurs in scales belowr the level of resolution in our simulations, and the results of numerical detailed studies confirm the simple analytic estimates made by Gunn & Gott, we applied their criterion to compute the radius of stripping for standard galactic disks under the influence of the hot intracluster plasma in groups, filaments and clusters, whose physical conditions are given by the results of the simulation.

No previous work has considered a full treatment of the history of interactions within a hierachical scenario, in order to reproduce the long scale distributions of galaxy gas deficiencies. We compute the density of the hot ICM at the position of the galaxies and their velocity, we determine the remaining gas mass (using a semi-analytical model) in order to compare with the observed HI deficiencies in galaxies in clusters.

This type of study also allows us to predict the distribution of metals recently observed in clusters (Sanders 2001), since the stripping of intergalactic gas (i.e. contaminated) is an efficient way of transferring heavy elements to the intracluster medium. Since the position where the galaxies lose interstellar gas (by RAM pressure striping) is known, we could follow the evolution of the contaminated gas fractions inside the clusters and then present a natural explanation about the origin of the gradients in the metal abundances in clusters.

REFERENCES

Abadi, M. et al. 1999, MNRAS, 308, 947
Dressler, A. et al. 1997, ApJ, 490, 577
Gunn, J. & Gott, J.R. 1972, ApJ, 176, 1
Pearce, F. et al. 2001, MNRAS, 326, 649
Sanders, D.B. 2001, astro-ph 0109336
Solanes, M. et al. 2001, ApJ, 548, 97
Quilis, V. et al. 2000, Sci, 288, 1617

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