

Recommendation of the PhD thesis of
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by the co-supervisor

Gas Stripping in Galaxy Clusters a New SPH Simulation Approach

1 Subject of the thesis

The stripping of the ISM by the ram pressure due to the motion of galaxies through the hot and tenuous medium (Intracluster medium - ICM) in galaxy clusters is explored. The aim is to explain the differences in morphology, star formation rates and ISM content between galaxies inside and outside of clusters. The ISM stripping addresses the question of ICM enrichment with metals, and the problem of the deficit of the ISM in galaxies in clusters.

2 The Method of the Approach

The interaction of ISM with the ICM is simulated using the SPH approach. Pavel Jáchym uses the code GADGET originally designed for cosmological simulations, which he has adopted for the situation, when the two gaseous media of different densities interact as the galaxy moves in a cluster. An improvement is achieved with a special routine accounting for the differing sizes of particles representing the two media.

This leads to a more realistic hydrodynamical description of the galaxy interaction with the ICM medium, where the orbital parameters and galaxy orientation in the orbit are taken into account. For the first time, the gravitational effects (tides) and hydrodynamical effects are included into a model of the galaxy in a cluster.

3 The results

There are several interesting results in the PhD thesis:

- The Gunn & Gott (1972, GG72) estimate of the gas stripping should be modified, particularly for cluster with low ICM surface densities. The GG72 overestimates the gas stripping in clusters.
- The PhD thesis provides an alternative formula to estimate the amount of stripping showing the dependence on the ICM surface density.
- The dependence on galaxy orbit and orientation is described.

4 Suggestions

The results of the PhD thesis should be published. A first paper has been submitted to A&A, but all other results on different orbits and galaxy orientations should follow. A natural continuation using the same N-body/SPH approach can include the perturbation of the orbits due to galaxy x galaxy encounters. The cluster formation scenario including galaxies and ICM based on the current simulations could be discussed.

The thesis shows the potential of Pavel Jáchym to perform a scientifically important project using new methods of approach. I do recommend to award the PhD degree to the candidate.



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