Chapter 6

Summary

The work presented in this thesis can be broadly classified as a study of the relation of cold gas (H I) and hot gas (X-ray emitting) in galaxies. While Chapters 2,3 and 4 discuss the evolution of the H I contents of galaxies in the presence of the hot X-ray emitting intra-group medium (IGM), Chapter 5 deals with the relation of the H I contents of galaxies and the hot X-ray emitting inter-stellar medium (ISM). Here we present a brief summary of the basic conclusions drawn from the entire work presented in this thesis.

From the statistical comparative study of the H I contents of the galaxies in X-ray bright and X-ray non-bright groups, presented in Chapter 2, we find,

- The galaxies in X-ray groups are deficient in H I and have lost more gas (H I) compared to those in non X-ray groups.
- No systematic dependence of the H I deficiency with X-ray luminosity (L_x) of the group is found.
- IGM assisted stripping processes can be responsible for the excess gas loss found in galaxies in X-ray bright groups.

Having found the galaxies in X-ray bright groups to be more H I deficient compared to the ones in non X-ray bright groups, we imaged some galaxies from X-ray bright groups in the H I 21cm line, to see if IGM assisted stripping has left its signature on the galaxies. Conclusions from this work, presented in Chapter 3 are,

- The H I distributions of the galaxies look disturbed and the H I extents truncated.
- The average value of the ratio $D_{H\,i}/D_{25}$ for the sample is 1.1 ± 0.12, compared to 1.7 ± 0.05 as seen in field spirals.
- Estimates for the sample show, ram pressure can strip off as much as 50% of the H I in some cases.

In Chapter 4, we present the H I observations of 2 intermediate redshift (~0.06) groups. This work is part of an on-going project: a multiwavelength study of an unbiased sample of 25 groups, to study the cold gas and hot gas evolution of galaxies in groups at an intermediate redshift. Though small sample size prevent us from drawing any strong conclusions about the gas loss from these galaxies, we do find the results of this study to agree with the results of the studies carried out with nearby groups, presented in the previous chapters.

- One galaxy in MZ5383, a group at z~0.06 and with an X-ray poor IGM, has been detected in H I .
- The galaxy is found to be H I deficient, and H I image of this galaxy suggests an interaction with a neighboring large elliptical galaxy to be the likely cause of the gas loss.
- On an average the galaxies tend to be H I deficient. No galaxy was detected in the group which was brighter in X-rays. More data is required to statistically check if the H I deficiency is related to the presence of the hot IGM.

Having studied the relation of the H I and hot gas of the IGM, the next step was to understand the relation of the H I and the X-ray emitting ISM of spiral galaxies. In our quantitative, comparative study using a sample of 34 spiral galaxies (mostly in groups), addressing the origin of hot gas in spirals and its relation with the cold gas content, presented in Chapter 5, we find,

- In galaxies, with SFR $\geq 1\ M_{\odot}\ yr^{-1}$, the X-ray emission is tightly correlated with the FIR emission, suggesting the star formation in the galaxy to be the main contributor to the X-ray emission.

- In galaxies, with SFR $< 1\ M_{\odot}\ yr^{-1}$, the X-ray emission is better correlated with the mass of the galaxy than its SFR, suggesting the mass to be the deciding factor for the hot gas content of the galaxy.

- On an average, galaxies with higher H I deficiency show lower hot gas content– an indirect confirmation of the Schmidt law.

- However, the subsample of AGN host galaxies, show marginal increase in H I deficiency with increasing X-ray luminosity–higher probability of interacting /merger galaxies to be AGN hosts can be a possible explanation.

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