HI DEFICIENT GALAXIES IN COMA ARE NOT CO DEFICIENT

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Spiral galaxies belonging to rich clusters are generally found to be deficient in atomic gas ; this has been interpreted as being due to the ram pressure from the intracluster X-ray emitting gas or to the tidal interaction between the galaxies. However, the molecular content of spirals does not share these characteristics, at least in the Virgo cluster (Stark et al., 1986; Kenney and Young, 1989).

We have investigated the molecular content of galaxies in the Coma supercluster (A1367 and A1656). Since it is denser than Virgo and contains galaxies with higher degrees of HI deficiency, one may expect in this case to observe significant CO depletions. We present here a preliminary analysis of recently obtained ^{12}CO data for 18 spiral galaxies. Only IRAS detected galaxies were considered (100μm flux larger than about 0.5 to 1Jy). The observed galaxies cover a large range in both HI deficiency (there is one subsample with HI def. < 0.1 -"normal" sample- and one with HI def. > 0.5 -"deficient" sample-), and in angular distance from the cluster core (from about 10').

The observations were performed at the IRAM 30m telescope during October 1989 and May 1990. The observing procedure was the following : first, we observed the nucleus, of which the coordinates were carefully selected by checking the consistency of various sources of data. Second, depending on the strength of the line, the optical extent and inclination, a few other positions were observed. The typical integration time was 60 minutes, yielding a typical noise level at 20.8 km/s resolution of 10 to 15 mK.

The detection rate is very high : 16 detections in CO(1-0) out of the 18 galaxies observed (the detection limit is about 2 Kkm/s, that is 6 10^8 $M_\odot$ at a distance of 87 Mpc and for a conversion factor from CO line area to H_2 column density of 2.6 10^{20}). All of the HI-deficient galaxies but one have been detected. Of the two undetected galaxies, one has a normal HI content.

There is a rough correlation between L_{IR} and the H_2 mass: the IR criterium is a good one to detect such distant galaxies. This criterium does not prevent us to detect CO-deficient galaxies if there were any since the detection limit is very low. The HI mass inversely correlates with HI deficiency: this indicates that all these galaxies have about the same total mass, which is the most important parameter to determine the HI mass of a galaxy (rather than its type). As in Virgo the deficient galaxies have more H_2 than HI, but there is no correlation of H2 mass with deficiency : HI has not been turned into H2.

HI-deficient galaxies are found mainly in the core but we find no relationship between the H_2 mass and the distance to the core. There is no obvious correlation between HI deficiency with L_{IR}/L_B, nor with $L_{IR}/M(H_2)$, so that deficient galaxies seem normal not only in their CO content but also in their star formation activity (but the sample is still small). These results are consistent with the idea that the intracluster medium acts on galaxies by removing the gas in their outer parts only ; in these regions, the gas is mainly atomic and does not participate to the star formation activity of the galaxy.

References :

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