DIAMETERS OF HI DISKS IN VIRGO CLUSTER - AND FIELD GALAXIES

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Environmental effects may be of great importance to the structure and evolution of galaxies. Sullivan and collaborators (1981, AJ 86, 919) find that the ratio between HI content and luminosity of galaxies tends to be smaller in regions of high galaxy density than elsewhere. It is not quite clear what processes reduce the gas content (or enhance the luminosity!): collisions, mergers or tidal interactions of galaxies, encounters with gas clouds, stripping by ram pressure? Detailed comparison of gas distributions and motions in cluster and field galaxies may help answer this question.

With the Westerbork Synthesis Radio Telescope we have measured the HI distributions in about 35 galaxies in the Virgo Cluster. Our observing time was limited to 2 × 2 hours, rather than 12 hours, per galaxy. Each 2-hour observation provides high (~30") angular resolution in one dimension only. Thus we obtain for each galaxy the projections of its HI distribution on two different axes. From these we can derive angular diameters at a specific (face-on) surface density, σ_{HI}.

For 12 Virgo Cluster galaxies we have determined D_{HI}, the diameter at $\sigma_{HI} = 2 \times 10^{20}$ atoms/cm^2, and referred this to the face-on diameter D(0) from the Second Reference Catalogue. For the ratio $D_{HI}/D(0)$ we find an average of 1.33, with a 1σ scatter of 0.58. Taking for comparison 12 field objects with similar ranges of type and luminosity for which Bosma (1981, AJ 86, 1825, Table VI) lists diameters at $\sigma_{HI} = 1.8 \times 10^{20}$ atoms/cm^2, we find for $D_{HI}/D(0)$ an average of 2.07, with scatter 0.60.

Thus, in our 12 Virgo Cluster galaxies the HI diameters, if scaled to optical diameters, are on average ~35% smaller than in the field. We consider this result tentative, because a) the calibration of our HI surface densities is preliminary; b) the present set of 12 is only part of our final Virgo Cluster sample of ~35 galaxies, well spread in both radial velocity and distance from Cluster centre; c) our final comparison sample will be more accurately matched to the Cluster sample.

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