

ARE ALL HIGH LUMINOSITY IRAS GALAXIES INTERACTING?

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1 Summary

We have surveyed a sample of 40 ultraluminous ($L_{60\mu m} > 10^{12}L_{\odot}$ using $H_0 = 50 \text{ km s}^{-1} \text{ Mpc}^{-1}$ and $\Omega_0 = 1$) and 7 high-luminosity ($11.7 < \log(L_{60\mu m}) < 12.0$) IRAS galaxies with the aim of obtaining a better estimate of the fraction of ultraluminous IRAS galaxies in interacting systems. This is the largest imaging survey of such high-luminosity galaxies. The galaxies were selected from the North Galactic Wedge (Lawrence *et al.* 1986) and QDOT (Rowan-Robinson *et al.* 1990 MN in press) area and flux limited IRAS galaxy samples with complete z information. Imaging observations were carried out at the Observatorio del Roque de los Muchachos (La Palma) using the CCD imaging system at the $f/3$ focus of the 2.5m Isaac Newton Telescope. The average total exposure time per galaxy was 2000s, reaching a limiting isophote of $R=26$.

Four ultraluminous galaxies and one high luminosity galaxy cannot be classified due to their small image size. Of the 36 remaining ultraluminous IRAS galaxies we can classify, six (17%) show no evidence for interactions and another four (11%) are in close pairs showing no signs of interactions. Of the 7 high luminosity galaxies, one is in a close pair showing no signs of an interaction and another remains unclassified. It is possible that the classification of some of the high redshift objects would change if very high resolution images were obtained of them, but 5 of the ultraluminous non-interacting galaxies have redshifts below 0.15. We are confident we would be able to recognise morphological irregularities in these galaxies if they were interacting.

Ten galaxies are classified as only possibly interacting or being in a close pair but showing no signs of interacting. They can only be undergoing weak interactions at most. Given the work of Bushouse *et al.* (1988) and Telesco *et al.* (1988) we question whether such weak interactions actually enhance the IR luminosities of the galaxies.

Our conclusions are that about 72% of ultraluminous IRAS galaxies are interacting, 11% are in close pairs showing no signs of an interaction and 17% show no sign of an interaction. Another trigger is required for the non-interacting galaxies to cause them to produce stars at such a rate their luminosities are similar to those of quasars.

2 References.

- Bushouse, H.A., Lamb, S.A. & Werner, M.W., 1988. *Astrophys. J.*, **335**, 74.
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Telesco, C.M., Wolstencroft, R.D. & Done, C., 1988. *Astrophys. J.*, **329**, 174.