The AMIGA project:
Analyzing the properties of the most ioslated galaxies

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The project

Motivation and Goals: A definition of "isolated galaxy" is needed before one can properly assess the properties of peculiar and interacting ones. We have constructed and analyzed the first complete unbiased control sample of the most isolated galaxies in the northern sky to serve as a template in the study of star formation and galaxy evolution in denser environments. The AMIGA sample is particulary important for the study of high-z galaxies where interactions played a more fundamental role than today.

Sample: The source list based on the Catalogue of Isolated Galaxies (CIG, 1050 galaxies, Karatchenseva 1973) assembled with a strict isolation criterion: no similarly sized companions (within a factor 4 in size) within 40*R(companion).

Strength of the sample: 1) Large size, 2) based on a strict isolation criterion, 3) all morphological types 4) 80-90% complete down to mzw(corr) = 15.0 mag.

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Summary of Results

Refinements of the Sample:

➢ Revision of positions and redshifts (Leon & Verdes-Montenegro 2003, Verdes-Montenegro et al. 2005).

➢ Revision of morphologies necessary because of considerable differences between the classification in NED and LEDA (Sulentic et al. 2006)

➢ Computational revision of isolation and cuantification of isolation degree (Verley 2007ab,)

Multiwavelength database:

➢ FIR data from reprosseing of IRAS data (Lisenfeld et al 2007)

➢ optical data (Verdes-Montenegro et al. 2005)

➢ Hα emission for about 200 galaxies(Verley et al. 2007)

➢ radio continuum emission from the NVSS (Leon et al. 2008)

➢ HI spectra for about 900 galaxies (Espada 2006, PhD),

➢ CO for about 200 galaxies from the IRAM 30m and FCRAO telescope (Lisenfeld et al. In preparation)

➢ AGN frequncy based on FIR and radio data (Sabater et al. 2008)

Our Webpage: www.iaa.es/AMIGA.html iprovides interactive access to the database. Up to date it contains: revised positions, redshifts, revised Hubble types, isolation degree, blue magnitudes, MIR/FIR data

An example :
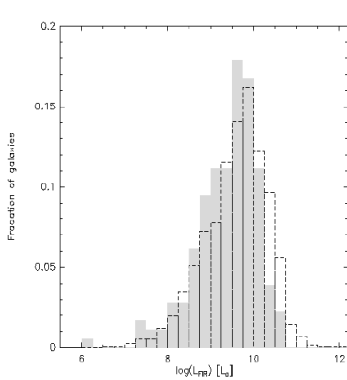## The FIR properties of the AMIGA sample

Fig. 1: The percentage distribution of the FIR luminosity for the AMIGA sample (shaded area), restricted to the same magnitude limit as the CfA sample, and the corresponding distribution for the CfA sample (dashed line).
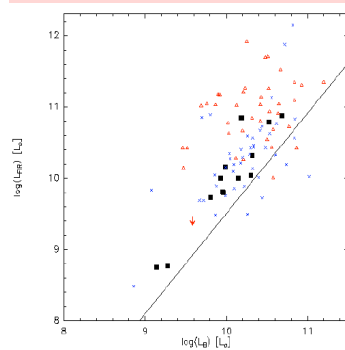
Fig. 2: L_{FIR} vs. L_B for interacting subsamp. The line represents the regression fit for the AMIGA sample. Filled squares and arrows: galaxies from the CIG excluded in Sulentic et al. (1996) because they show signs of interacton. Blue crosses: Weakly interacting galaxies from Perea et al. (1987). Red triangles: Strongly interacting galaxies from Perea et al. (1987)

Future studies

We will use and amplify the AMIGA database in order to study nature driven effects in galaxies and evaluate the role of environment in galaxy evolution. Projects include:

- Improve the evaluation of the isolation using SDSS data

- Study of the cold ISM in isolated ellipticals

- Study the condtions for star formation in the inner and outer parts of isolated galaxy disks.

- Study galaxies with asymetries of the HI spectrum in more detail, including Hα Fabry-Perot observations

- Comparision of the properties of the AMIGA sample to those of pairs and groups.

We have reprocessed IRAS MIR/FIR survey data using ADDSCAN/SCANPI for all CIG galaxies covered by IRAS. We focus on the FIR diagnostics (L_{FIR}, $R=L_{FIR}/L_B$ and IRAS colours) believed to be sensitive to environment.

Our main results are:

− The galaxies in our sample show only modest values for L_{FIR} (see Fig. 1) and R. A comparison to the magnitude limited CfA sample, that was selected without environmental discrimination, shows that both mean L_{FIR} (Fig. 1) and R of the AMIGA galaxies are significantly lower, whereas the mean L_B is the same.

− Our sample shows a strong L_{FIR} vs. L_B correlation. Interacting galaxies are found above this correlation (i.e. towards higher L_{FIR}) (Fig. 2).

It is well known that FIR emission can be enhanced by interaction, Since our sample probably shows the lowest possible mean FIR value, this attests to the utility of our sample for defining a nurture-free zero point.

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