Dwarf Galaxies: From the Deep Universe to the Present
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Dwarf Galaxies in the Local Volume

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Abstract. The Updated Nearby Galaxy Catalog (=UNGC) of 1047 Local Volume (=LV) galaxies, situated within a distance of 11 Mpc, contains 870 dwarfs, i.e. 5/6 of the sample. Almost 40% of them have accurate distances measured with Hubble Space Telescope. Most of the LV dwarfs have been observed in HI and Hα emission lines, as well in far-ultraviolet with GALEX. We present basic properties of the LV dwarfs, their HI-mass content and star-formation rate in different local environments. We discuss a baryonic Tully-Fisher relation for the LV dwarfs, and apply it to determine TF -distances for several hundreds local galaxies. The accurate distances and radial velocities of the LV dwarfs are used by us to trace dark matter distribution within 11 Mpc. We discuss also does the Local Group may be treated as a typical or uncommon representative of the LV population.

Keywords. Galaxies: dwarf galaxies

1. Introduction

To test numerical cosmological models, one needs a sample of galaxies limited by their distance but not an apparent magnitude. The difference between these two kinds of galaxy selection is enormous, e.g., the famous Shapley-Ames Catalog of 1246 brightest galaxies overlaps with the UNGC catalog of 1047 nearest galaxies by 8% in number only. The global properties of galaxies, such as atomic hydrogen abundance or star- formation rate, have been considered by many authors, using samples of different composition and depth. However, a representative sample of the nearest galaxies has an undeniable advantage over the others in this respect, since various effects of observational selection in it are easier to analyse and account for. Here, we briefly discuss some basic observational properties of the LV dwarfs.

2. Overview

Some basic observational data on the LV dwarf galaxies are presented in Table 1 and Figures.

Figure 1 shows the behavior of the M_{HI}/M^* ratio for late-type dwarfs and spiral galaxies depending on their tidal index i.e. the local density contrast. The small drift of M_{HI}/M^* on tidal index indicates that the hydrogen-to-stellar mass ratio in late-type galaxies is primarily caused by their internal processes and only secondly to ambient density.

It follows from Fig. 1 that about 40% of late-type dwarf galaxies in the LV have hydrogen masses greater than their stellar masses. Given the presence of He and H_2, gas-rich dwarfs are the dominating population of the LV.

Figure 2 presents the distribution of late-type LV galaxies by sSFR and tidal index. It is seen that the scatter of sSFR values increases from isolated dwarfs to group members.

Table 1. Numbers of the LV galaxies observed and detected in *HI*, *FUV*, and Hα:

Sample numbers	All types	dIr	Im, BCD	dSph, dE
All UNGC	1047	402	147	318
Observed/detected in *HI*	795/584	329/293	127/119	166/7
Observed/detected in *FUV*	890/646	346/302	119/118	267/71
Observed/detected in Hα	692/532	263/222	117/111	110/41
Obs/det in *HI*, *FUV* or Hα	758/568	314/280	123/116	148/7

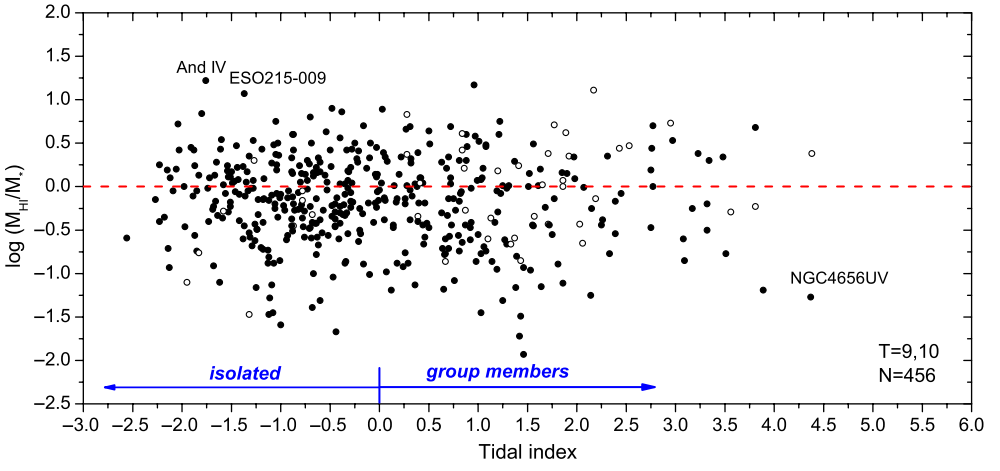

Figure 1. Hydrogen mass-to-stellar mass ratio for the LV dwarf galaxies. Open circles mark cases with an upper limit of *HI*-flux.

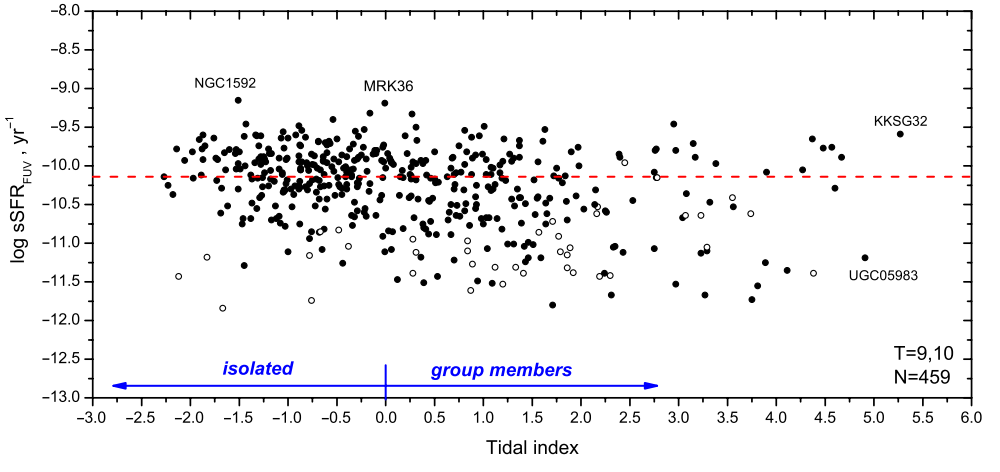

Figure 2. Specific star formation rate, SFR/M*, for the LV dwarfs. Open circles indicate cases with an upper limit of the FUV-flux. The dashed line corresponds to sSFR = H_0= (1/13.7 Gyr).

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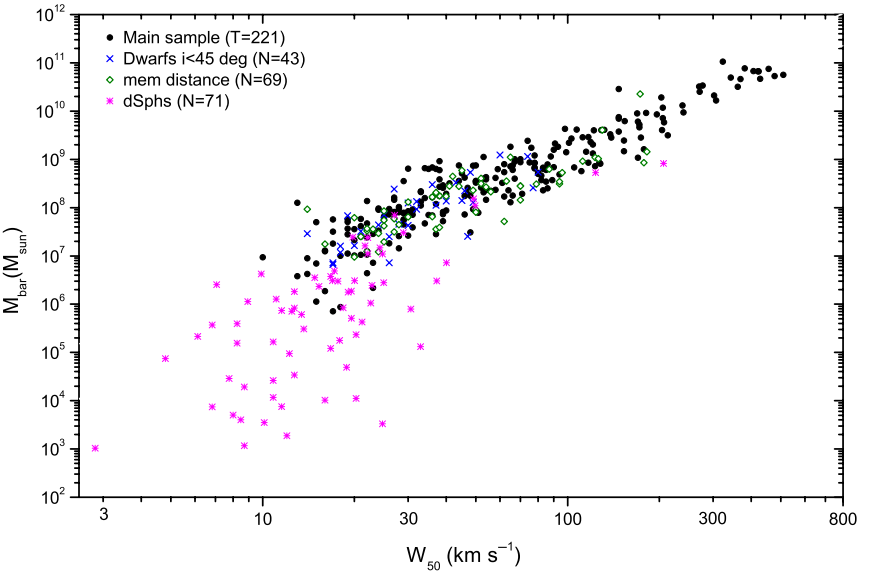

Figure 3. Baryonic mass vs. *HI*-line width for the LV galaxies. Face-on dwarfs ($i < 45^\circ$) and satellites with distance estimates via their membership, as well as dSph/dE galaxies are shown by different symbols.

Unlike the blurry lower boundary of the distribution of galaxies by sSFR, the upper boundary appears rather sharp with the limit $sSFR_{max} \simeq -9.4\ dex$.

According to (Karachentsev *et al.* 2017) , the baryonic Tully-Fisher relation for 404 galaxies in the LV has the form shown in Fig. 3. The standard deviation on the diagram makes it possible to estimate distances to other gas-rich dwarf galaxies with a typical error of 0.20 dex.

Acknowledgements

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