Dwarf Galaxies: From the Deep Universe to the Present
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Catalog & atlas of the LV galaxies

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Abstract. We present a database of galaxies in the Local Volume (LV) (https://www.sao.ru/lv/lvgdb/) Kaisina *et al.* (2012) having individual distance estimates within 11Mpc or corrected radial velocities $V_{LG} < 600$ km s^{-1}. It collects data on the following galaxy observables: angular diameters, apparent magnitudes in far-UV, B, and Ks bands, $H\alpha$ and HI fluxes, morphological types, HI-line widths, radial velocities, and distance estimates. It also contains a consolidated set of optical images of all the galaxies from the SDSS and DSS surveys and $H\alpha$ images of galaxies that were derived with the 6-m BTA telescope. The latest version of the Updated Nearby Galaxy Catalog (UNGC) Karachentsev *et al.* (2013) contains 869 objects, now the database consist of 1175 objects. We present basic relations, describing the updated LV sample: Hubble flow, distribution galaxies according to their distance estimates and on the sky, et al.

Keywords. Astronomical data bases: catalogs, surveys, galaxies: dwarf, fundamental parameters

1. Introduction

Almost all existing galaxy catalogs limit their samples by galaxy flux but not distance. Because galaxies differ by a large range of luminosities and surface brightnesses, the creation of a sample limited by a fixed volume extremely difficult. Given these circumstances, we have included in the Local Volume (LV) sample the galaxies having radial velocities with respect to centroid of the Local Group

$$V_{LG} < 600\,\mathrm{km\ s^{-1}}, \tag{1}$$

or the galaxies with individual distance estimates

$$D < 11.0\,\mathrm{Mpc}. \tag{2}$$

A simultaneous fulfillment of both conditions (1) and (2) is not required. Here, we took into account the fact that some galaxies at distances $\sim(7-10)$ Mpc may have orbital/virial velocities that place them in the region of $V_{LG} > 600$ kms^{-1} on the Hubble diagram, while other galaxies, projected onto the Virgo cluster, are expected to have an additional positive velocity component due to their infall toward the cluster.

2. Overview

The velocity–distance diagram for 673 LV galaxies is presented in Figure 1. Beyond the upper edge of the figure, there are 16 galaxies with $D = (7-11)$ Mpc and $V_{LG} > 1100$ km s^{-1}, almost all of them are located near the line of sight, directed to the Virgo cluster center. Beyond the right edge of the figure, there are 72 galaxies with $V_{LG} < 600$ km s^{-1},

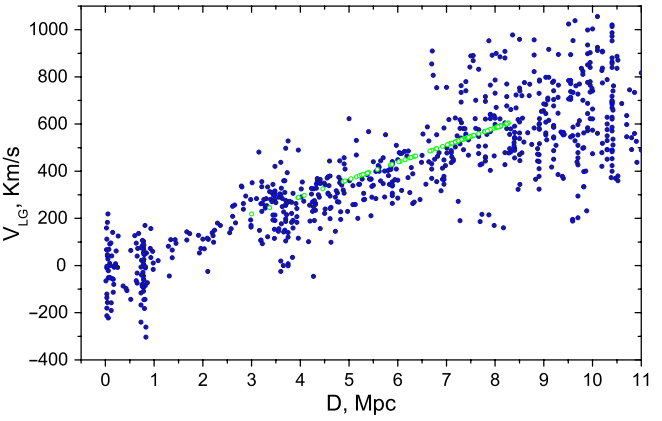

Figure 1. The velocity–distance relation for LV galaxies.

but with the photometric distance estimates over 11 Mpc. In addition, the list of LV objects contains 108 galaxies with individual distance estimates of $D < 10$ Mpc, but without their radial velocity measurements.

Figure 2. presents the distribution of 1077 LV galaxies according to their distance estimates, derived by various methods. As seen, the distance medians of these panels substantially vary for different methods. The smallest median of $D \sim 4$ Mpc falls within the subsample {TRGB + Cep + SN}, where the accuracy of distance measurements is the highest, amounting to (5-10)%.

Figure 3 presents 3-D scaling relation between absolute magnitude, Holmberg diameter and rotation velocity for the LV galaxies. Late-type ($T > 3$) galaxies are shown by filled circles and early-type by open ones. The disk dominated galaxies ($T > 3$), and bulge dominated galaxies ($T < 4$) tend to be located along some fundamental plane in the parameter space luminosity-dimension–internal motion amplitude. Three projections of this distribution in the coordinates M_B, A_{26}, V_m are shown in the panels.

It should be noted that in the Hubble morphological classification scheme, the type of dwarf irregular galaxy was a sort of "trash bin" where the "ugly" objects were dropped. However, 3/4 of the sample of the LV consists of dwarf galaxies. So we propose more refined classification of dwarf systems. Figure 4 shows the distribution of a number of dwarf objects in our classification scheme by type. The cells of the scheme vary considerably in the degree of filling, which is obviously caused by conditions of dwarf system formation and subsequent evolution in different environments. However, the two-dimensional shape of this diagram may be subject to a significant selection effect: the galaxies poor in gas and of extremely low surface brightness, such as Apples I, can easily stay undetected both in the optical and HI surveys. Observed differences in the mean surface brightness of dwarf galaxies reach more than 10 mag, and these differences are obviously caused by features of star formation history in them

The study of galaxies in the LV, has an obvious advantage, since most of dwarf systems become inaccessible for observations at large distances. These"test particles" with measured radial velocities and distances trace the Hubble flow with unprecedentedly high detail.

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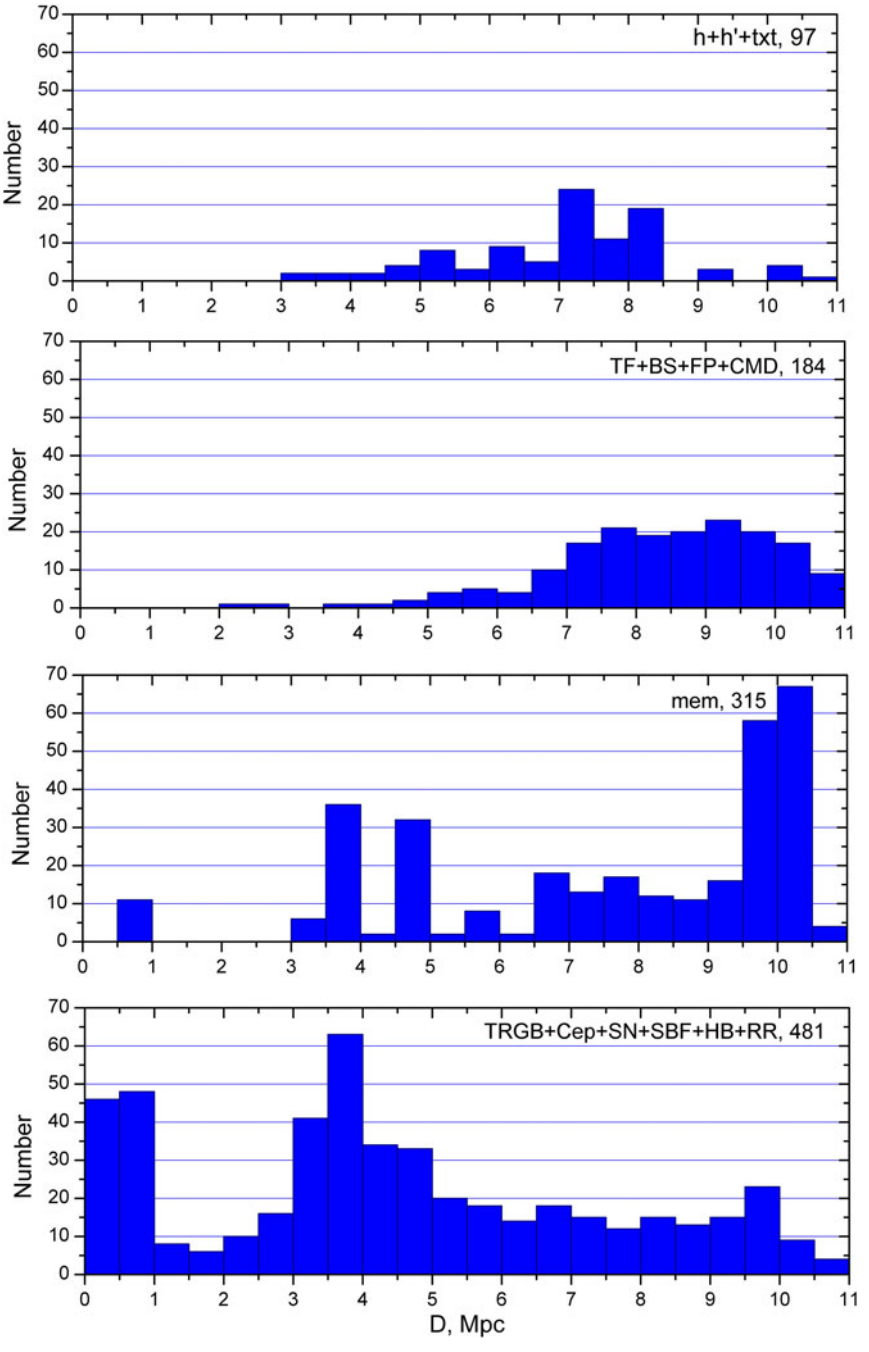

Figure 2. Distribution of LV galaxies according to their distance estimates, derived by various methods.

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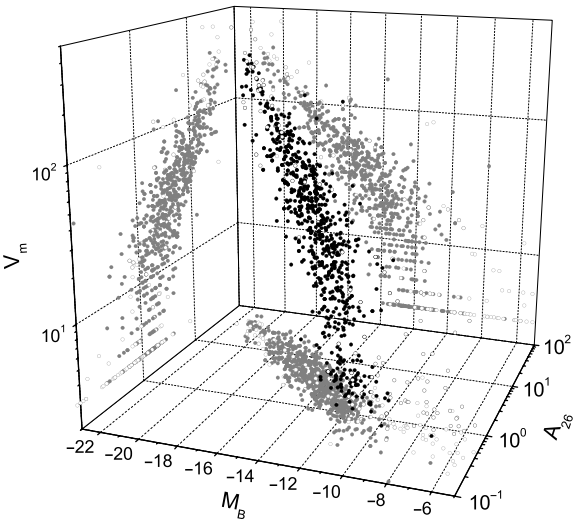

Figure 3. 3-D scaling relation between absolute magnitude, Holmberg diameter and rotation velocity for the LV galaxies.

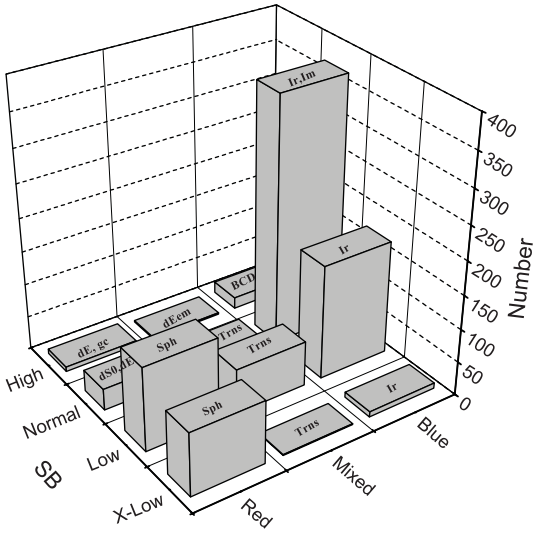

Figure 4. Distribution of a number dwarf galaxies by type.

Acknowledgements

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