HYPERLEDA - I. Identification and designation of galaxies

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HYPERLEDA

I. Identification and designation of galaxies⋆,⋆⋆

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Abstract. We present the new catalog of principal galaxies (PGC2003). It constitutes the framework of the HYPERLEDA database that supersedes the LEDA one, with more data and more capabilities. The catalog is still restricted to confirmed galaxies, i.e. about one million galaxies, brighter than ≈18 B-mag.
In order to provide the best possible identification for each galaxy we give: accurate coordinates (typical accuracy better than 2 arcsec), diameter, axis ratio and position angle. Diameters and axis ratios have been homogenized to the RC2 system at the limiting surface brightness of $25B-$ mag arcsec^{-2}, using a new method, the EPIDEMIC method.
In order to provide the best designation for each galaxy, we collected the names from 50 catalogues. The compatibility of the spelling is tested against NED and SIMBAD, and, as far as possible we used a spelling compatible with both. For some cases, where no consensus exists between NED, SIMBAD and LEDA, we propose some changes that could make the spelling of names fully compatible.
The full catalog is distributed through the CDS and can be extracted from HYPERLEDA.

Key words. galaxies: general – catalogs

1. Introduction

In 1978 we started a compilation of 21-cm line widths (Bottinelli et al. 1982) in order to apply the relation between the 21-cm line width and the absolute magnitude, the so-called Tully-Fisher relation (Tully & Fisher 1977). The optical measurements (morphological types, diameters and magnitudes), properly homogenized to standard systems, were provided to us by G. de Vaucouleurs and coworkers. Then, we maintained this catalog, but several difficulties appeared. For instance, a same galaxy could be designated differently in both sources of data (radio and optical). Further, any change in raw data obliged us to rebuild the final catalog in a tedious way. It became clear that we needed a more rational management of data. Thus, the database (LEDA)[1] was created in Lyon observatory by one of us (GP).

The spirit of this database was inspired by de Vaucouleurs' method. The scheme has been the following. Galaxies are identified with the best available coordinates and designated with the most common names (at the beginning NGC, IC, MCG, UGC and ESO names). Only raw data are stored in such a way that it is easy to add new ones. When a new homogenized catalog is needed, a computer program quickly extracts relevant raw data, applies on them the treatment for homogenization and finally, produces the final catalog of mean homogenized astrophysical parameters. This last step constitutes the original contribution of LEDA used as a tool for specific applications but not created as a general service, like NED or SIMBAD. Today the same method is used and only the homogenization procedures need to be revised periodically. This is the main objective of this series of papers.

A profund transformation is beginning. At the origin, within our small group of French and Texan members, it was possible to collect the different astrophysical parameters required for the study of the extragalactic distance scale.

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⋆ Full Tables 1 and 2 are available in electronic form at `http://www.edpsciences.org`

⋆⋆ Full Table 5 is available in electronic form at CDS via anonymous ftp to `cdsarc.u-strasbg.fr (130.79.128.5)` or via `http://cdsweb.u-strasbg.fr/cgi-bin/qcat?/A+A/412/45`

[1] Originally the database was called Lyon-Meudon Extragalactic Database. After its incorporation into the DENIS project that already was managing the SODA and LODA databases, it was decided to rename it LEDA.

Today, this process is more efficient within a larger consortium. One of us (PhP) set up such an organization for his hypercat system, based on a collection of catalogs. Because the internal names of galaxies (PGC) in LEDA were used in hypercat, it was quite natural to merge LEDA and hypercat in a new system, HYPERLEDA. The objectives are similar, i.e. the creation of an efficient tool for extragalactic research, but with many new capabilities, like the ability of datamining in different web sites and the possibility of performing on-line customized calculations. These future developments will be conducted by the HYPERLEDA consortium.

In this first paper, we present the framework of the latest version of the Principal Galaxy Catalogue (PGC2003) built for the 20th anniversary of the opening of LEDA. We first discuss the important question of identification and designation of galaxies in order to point out the difficulties (Sect. 2). Then, we explain what we have done to facilitate both identification and designation of galaxies (Sects. 3 and 4 respectively). The final catalog of about one million galaxies is presented (Sect. 5). It is available at CDS and through the HYPERLEDA database. In subsequent papers we will present homogenization of other astrophysical parameters. A CD-ROM containing all parameters will be distributed.

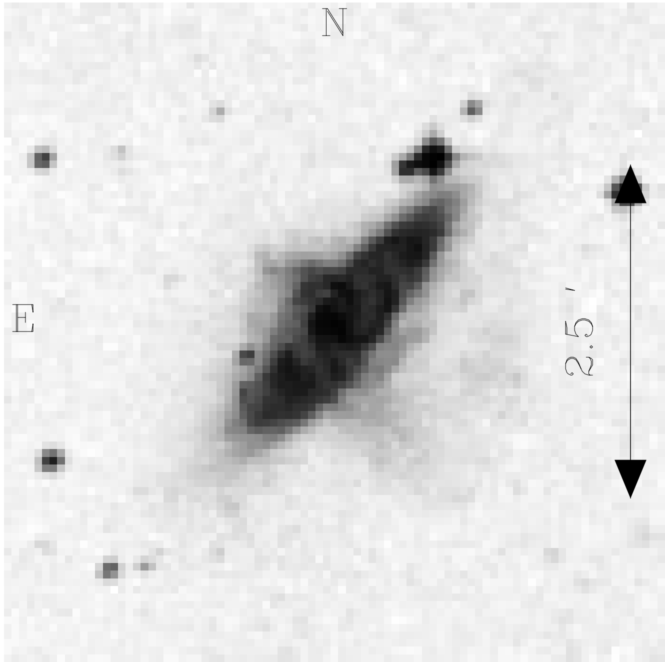

Fig. 1. In some cases the coordinates are not sufficient to identify a galaxy. This shows that often additional information is required. For instance for the pair of galaxies NGC 3314A and NGC 3314B.

2. General comments about identification and designation of galaxies

In a previous paper (Paturel et al. 1991b) we discussed the problems of identification (for the retrieval of an object) and designation (for naming an object in a concise way). We now emphasize that a proper identification of a galaxy has two steps:

- recognition of the nature of the considered object,
- definition of parameters allowing users to retrieve the galaxy on the sky.

We also emphasize that designations are based on conventions, and require cooperation between catalog builders to assure that names are consistent between catalogs. The IAU naming conventions can be found for instance at the CDS (`http://cdsweb.u-strasbg.fr/iau-spec.html`).

2.1. Recognition and identification

The confirmation of the nature of a galaxy from an old catalog must still be done from a visual inspection. The compilation of redshift progressively validates definitively some extragalactic objects.

Automatic extraction of galaxies from either digitized sky surveys or direct CCD images (see for instance, McGillivray et al. 1988; Loveday et al. 1996; Paturel et al. 2000a) does not exempt us from a tedious visual inspection. This can be understood as follows: in a very large catalog of sources, one can find all intermediate cases between a dominant galaxy associated with a tiny star and a dominant star associated with a tiny galaxy. There is no clear frontier between a pure galaxy and a pure star. A computer program can hardly make a reliable confirmation. The most common difficulty comes from multiple faint stars measured with poor seeing. They can reproduce elongated low surface brightness galaxies. A combination of several colors (e.g. DENIS or 2MASS) may help to reject some galactic objects (like planetary nebulae or HII regions), but only a spectrum associated with the photometry (e.g. SDSS) can validate the extragalactic nature of an object with a high confidence level. Further, it is not so trivial to define what is a galaxy. For instance the complex object shown in Fig. 2 is considered as two galaxies in the ESO-LV catalog (Lauberts & Valentijn 1982) while it is considered as three galaxies in the Morphological Catalogue of Galaxies (see Vorontsov-Velyaminov et al. 1974, and references therein).

If coordinates are obviously the most natural way to identify an object they are not sufficient, because several objects can exist within the ellipse of positional uncertainty (e.g., Fig. 1).

Superimposing the contour of each galaxy onto an image of the field is probably the most efficient way to perform an identification (see, Paturel et al. 2000a and Fig. 6) because it visualizes instantaneously six parameters: two coordinates relative to surrounding objects, the size, the axis ratio, the position angle, and the morphology of the object. This exhibits the importance of these parameters for a clear identification. Database centers have to play an important role in providing users with such visualization through the web.

This discussion leads us to inspect visually thousands of galaxy candidates and then to produce accurate coordinates and homogeneous diameters, axis ratios, and position angles. This is explained in Sects. 3 and 4.

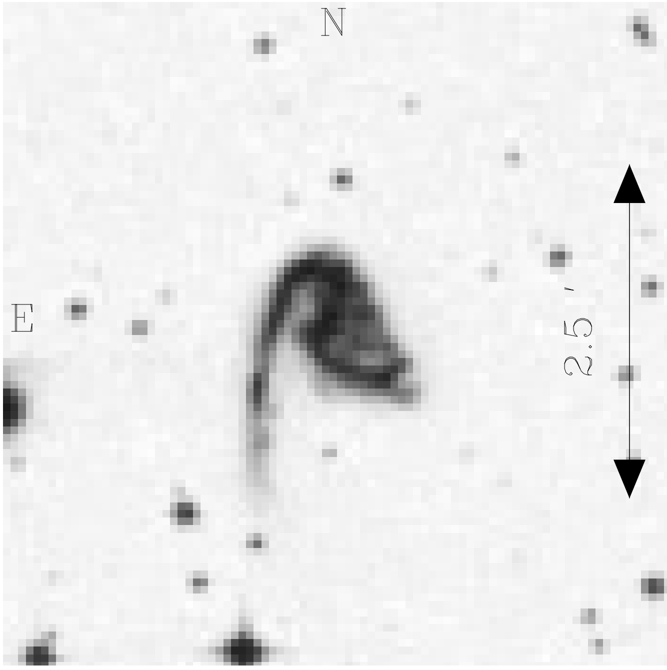

Fig. 2. In some cases the definition of what is a galaxy is difficult. The object ESO 267-41 = PGC 40012 is considered as three galaxies in the MCG catalog (MCG-7-26-1 MCG-7-26-2 and MCG-7-26-3).

2.2. Designation

Designation is a short cut to speak about an object clearly identified somewhere else. This shows that a designation must necessarily go with a reference explaining where to find the accurate identification. Generally, the acronym (a group of characters, like NGC, IC, UGC, ESO) is used in place of the reference. It is clear that a designation is simply a convention defined by astronomers (often those who made the catalog). But, sometimes, it is difficult to understand which object is designated by a given acronym when the identification is poor. For instance some NGC galaxies with poor original coordinates and poor description are almost impossible to recover. If there are no valuable parameters (except the identification itself) attached to this object, and if all astronomers adopt the same convention validated by many compatible publications, there is no drawback in adopting the corresponding name. If it is not the case, the name should be abandoned. Today, with the centralization of data in a few places, a solution appears for the first time, provided that the different centers adopt the same conventions (e.g., the same NGC number must designate the same object, properly identified as seen above, in all databases). This implies regular exchanges between these centers.

Another difficult problem is caused by the so-called multiple objects. This refers to a single entry in a given catalog, divided afterwards in several objects. A bad way of solving this case consists of adding an extension letter (A, B) to the original name. We already discussed this point (Paturel et al. 1991b) to show that there is no way of doing that properly except if the extension is identified (e.g., UGC1 NED1, UGC1 NED 2). In our previous catalogs (Paturel et al. 1989, 1992, 1996), when a same name appears on two or more objects (like UGC1), it is given between parenthesis.

We suggest cooperation with SIMBAD and NED in order to adopt, as far as possible, the same cross-identifications and the same spelling of galaxy names. This is explained in Sect. 3.

3. Improvement of identification

We have to control the nature of galaxy candidates, to improve coordinates and to produce catalogs with homogeneous parameters (diameter, axis ratio and position angle). Originally, we tried simply to improve the coordinates in an automatic way. We used our own digitalization of many galaxies (Garnier et al. 1996) to identify galaxies. Because of our poor equipment, the accuracy was not better than 8 arcsec. Nevertheless, it allowed us to improve many old coordinates, and to produce many new diameters and position angles, clarifying the identification. Later (Paturel et al. 2000a), we repeated the procedure using the digitized sky survey (DSS1) and detected three million galaxy candidates over the whole sky.

3.1. Proper nature of galaxy candidate

Among the three million galaxy candidates found in the DSS1, only one tenth of the sample were known galaxies, confirmed by identifications in the literature. Many objects (700 000) were inspected in order to confirm their extragalactic nature. This was done visually, as in old catalogs (MCG, UGC, ESO), using morphological criteria: shape, extension, central brightness, regularity, etc. This work leads to the present catalog of about 1 million confirmed galaxies[2] covering the whole sky, that is nearly complete to $B = 18$. Another list of two million galaxy candidates is under analysis and still demands a lot of work. In the Galactic plane, we collected detections made by Weinberger et al. (1999), Kraan-Korteweg et al. (see, Woudt et al. 2001), Rousseau et al. (see, Vauglin et al. 2002) and Saito and co-workers (see, Roman et al. 2000). We considered that it is not possible to detect new galaxies in an automatic way in the regions already inspected by these specialists. This allowed us to remove many false detections for galactic latitude $|b| < 10°$. For the provisional DENIS catalog of galaxies (Vauglin et al. 1999) we made a revision (Paturel et al. 2003) by checking visually all galaxies and by rejecting false detections and uncertain measurements.

For complex systems, like the object presented in Fig. 2, we generally keep the system as a single object. How it has to be disentangled is clearly the choice of users because it depends on their scientific objectives.

3.2. Coordinates

For more than twenty years we have tried to clarify the identification of principal galaxies by collecting accurate coordinates

[2] It is important to recall that no perfect catalog exists when the nature is estimated from morphology alone. Further, the present catalog cannot be strictly magnitude limited because one can miss very low surface brightness or very compact galaxies.

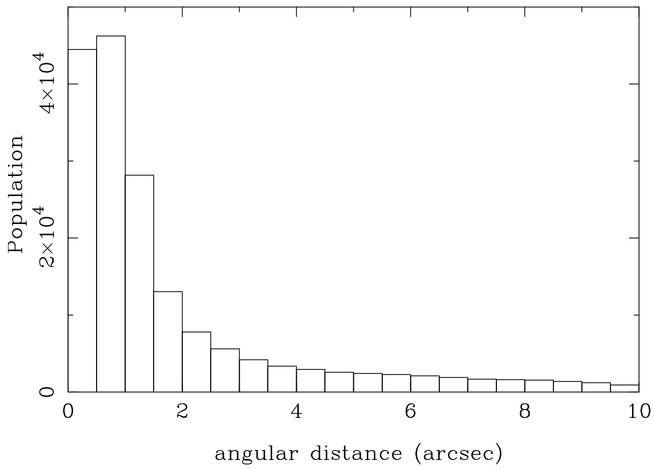

Fig. 3. Comparison of coordinates in LEDA with coordinates from SIMBAD (CDS).

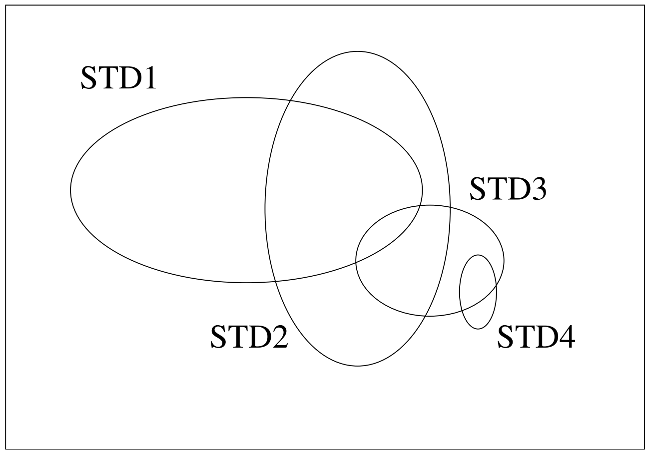

Fig. 4. Illustration of the EPIDEMIC method. The best and largest sample (here STD1) is used to convert the second best and largest sample STD2 to its scale. So, one obtains the new standard STD1+STD2. The process is applied to the next sample to get the next standard STD1+STD2+STD3, etc. In the present illustration, one can see that it would have been impossible to convert the sample STD4 to STD1 without the EPIDEMIC method.

and main characteristics (Paturel et al. 1989, 1992, 1996). We published a comparative study of coordinate accuracies (Paturel & Petit 1999) and measured many of them (Paturel et al. 1999).

For some large catalogs we collected new coordinates published in revised versions: the Updated Zwicky Catalogue (Falco et al. 1999), the new measurements of UGC galaxies (Cotton et al. 1999). We added all galaxies identified in notes of the original UGC catalog (Paturel et al. 2000). For the Morphological Catalogue of Galaxies (MCG, Vorontsov-Velyaminov et al. 1974), we remeasured all poor coordinates[3]. The identification has been done in cooperation with H.G. Corwin working at NED and, as far as possible, we adopted the same identification. In practice all MCG galaxies have coordinates now better than a few arcseconds. For the ESO catalog (Lauberts 1982; Lauberts & Valentijn 1989) the coordinates were originally published with a good accuracy. The standard deviation is less than 7 arcsec (Paturel & Petit 1999). The Revised Flat Galaxy Catalogue (RFGC, Karachentsev et al. 1999) has been used and some coordinates were re-measured.

Finally, we compared our coordinates with those of the SIMBAD database at CDS. Both databases evolved independently and allow us to judge the quality of coordinates. With a sample of 175 916 galaxies we made a histogram of angular separations (Fig. 3). The mean is 1.8 arcsec with a standard deviation of 2.1 arcsec. Nevertheless, we found 13 488 galaxies with a discrepancy larger than 10 arcsec. They were checked systematically and were re-measured. The corresponding new coordinates are included in the catalog presented in Sect. 5.

3.3. Diameters, axis ratios and position angles

We have underlined the importance of diameter, axis ratio and position angle to provide astronomers with a clear identification. In our previous catalogs we homogenized about 15 sources of diameters (see, Paturel et al. 1991a). Here, we homogenize more than 80 sources of measurements using a new method, hereafter, the EPIDEMIC method.

This approach represents a further and natural extension of the de Vaucouleurs method of standardization of data sets. It allows us to produce large homogeneous samples well evaluated from objective estimates of the accuracy and cleaned of incorrect measurements.

We have already used this method (see Paturel et al. 1991a), but here, we use it in a more systematic and rational way. We start from a standard sample (a homogeneous set of measurements). All other measurements are grouped into homogeneous classes[4] (for instance, the measurements made with a given photometric band for a given reference). The "best class" (an exact definition of this term will be given below) is cross-identified with the standard sample in order to find the coefficients of conversion to the standard system. Then, this class is incorporated in the standard sample after application of the conversion relation. So, the standard sample is growing progressively. An illustration of the method is given in Fig. 4. The conversion to the standard propagates like an epidemic.

The question arises as to how to choose the order of inclusion of classes into the growing standard sample (definition of the "best class"). Actually, the order is dictated by the quantity $t = \sigma/\sqrt{n}$, where σ is the standard deviation (S.D.) of a preliminary comparison of each class with the standard sample and n the number of measurements in common. The classes are sorted according to t. This gives the best compromise between quality (σ) and quantity (n). References having no intersection with the standard sample during the preliminary comparison will be included after all others, the order of inclusion being simply given by their total number of measurements, the richest, the first included. For the inclusion of a class into the growing standard sample, each measurement is replaced by a weighted mean. The weight is $1/\sigma^2$. Note that it is necessary

[3] A flag for coordinates improved to better than about 10 arcsec was stored in LEDA.

[4] Also designated as "dataset" in HYPERLEDA.

Table 1. Coefficients for the homogenization of diameters and axis ratios.

Ref.	$b \pm m.e.$ any type	$b \pm m.e.$ Spiral	$b \pm m.e.$ Elliptical	S.D.	c	$a \pm m.e.$ any type	$a \pm m.e.$ Spiral	$a \pm m.e.$ Elliptical	S.D.	c
27078B	0.05 ± 0.00	0.05 ± 0.00	0.05 ± 0.00	0.05	ns	1.01 ± 0.00	1.00 ± 0.00	1.01 ± 0.01	0.04	ns
27081B	0.01 ± 0.00	0.01 ± 0.00	0.03 ± 0.00	0.06	s	1.00 ± 0.00	0.99 ± 0.00	1.01 ± 0.01	0.05	ns
29001B	0.02 ± 0.00	0.01 ± 0.00	0.05 ± 0.00	0.07	s	1.07 ± 0.00	1.04 ± 0.01	1.25 ± 0.01	0.10	s
2000B	0.05 ± 0.00	0.04 ± 0.00	0.18 ± 0.00	0.12	s	0.99 ± 0.00	0.96 ± 0.00	1.15 ± 0.01	0.08	s
1000R	−0.04 ± 0.00	−0.04 ± 0.00	–	0.09	s	0.98 ± 0.00	0.97 ± 0.00	1.12 ± 0.01	0.10	s
27026B	0.05 ± 0.00	0.04 ± 0.00	0.16 ± 0.01	0.11	s	0.85 ± 0.01	0.83 ± 0.01	1.00 ± 0.06	0.09	s
3000B	−0.06 ± 0.00	−0.07 ± 0.00	−0.02 ± 0.00	0.08	s	0.98 ± 0.00	0.97 ± 0.00	0.91 ± 0.01	0.10	s
33004I	0.01 ± 0.00	0.02 ± 0.00	0.01 ± 0.00	0.10	s	1.04 ± 0.01	1.05 ± 0.01	1.04 ± 0.01	0.09	ns
...	...	...	...	...	...	...	...	...		
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to assign a given σ to the initial standard sample. We adopt the smallest standard deviation divided by $\sqrt{2}$. This assumes that the standard sample has the same scatter as the best class.

Let us see now the application to diameters and axis ratios. We wish to convert all diameters in a unified system. In previous attempts, only blue diameters were considered, despite that many diameters collected in LEDA are in blue and red. In practice, diameters do not depend very much on the photometric band because the limiting surface brightness is chosen to reach the same outskirt regions of galaxies. For instance, I-band diameters measured by Mathewson et al. (1996) correspond to a limiting surface brightness of $23.5I$ − mag arcsec^{-2}. They are nearly equivalent to blue diameters measured at a limiting surface brightness of $25B$ − mag arcsec^{-2}. Only the differential galactic extinction may affect the conversion of diameters for a given galaxy. The differential effect of inclination between the B and I band would be, on average, $\delta \log D \approx 0.016$ if one had considered the strong RC2 correction. It is negligible (0.0032) when one adopts our preferred correction (Bottinelli et al. 1995). The morphological type dependence is considered by analyzing separately elliptical and spiral galaxies. Thus, each diameter will be first corrected for the differential galactic extinction, before it is used with the EPIDEMIC method.

We first extracted from LEDA all measurements of external diameters and axis ratios (the references are listed in the bibliography with a reference code number). In order to derive the best conversion relations, only non-interacting galaxies are considered. Most of the data were obtained in blue but some are measured in visible, red or infrared (I-band). The standard system is our isophotal diameters converted to the isophote $25B$ − mag arcsec^{-2} (Paturel et al. 2000a). A simple relation of conversion without scale factor is adopted, because it was demonstrated that the scale factor is simply due to different completeness limit in apparent diameter (Paturel et al. 1991a). Thus, the relation of conversion to the standard system is:

$$\log D_{25} = \log D + (A_\lambda - A_B).\partial \log D/\partial B + b. \qquad (1)$$

Where A_λ is the galactic extinction (Schlegel et al. 1998) for the photometric band of the considered diameter system $\log D$ (D in 0.1′). A_B is the galactic extinction of the standard system. The quantity $\partial \log D/\partial B$ is taken from Fouqué & Paturel (1985) as a function of the morphological type code[5].

The values of b are presented in Table 1 available in the electronic version of the journal. They are determined using the EPIDEMIC method. The classes are defined from reference codes and photometric bands (Col. 1). The results are given for spiral and elliptical galaxies (Cols. 3 and 4, respectively) and for mixed morphological types, (Col. 2). The adopted standard deviation $S.D.$ of Rel. 1 is also given for mixed morphological types (the change with type is negligible) (Col. 5). A comment (Col. 6) tells if the morphological type dependence is significant (s) or not (ns). When it is not significant, the correction is made using the coefficient for mixed types.

The same procedure is applied for axis ratio $\log R$, but there is no need for galactic extinction because of the differential nature of $\log R$. The conversion equation is simply (Paturel et al. 1991a):

$$\log R_{25} = a \log R. \qquad (3)$$

The values of a are presented in Table 1.

From the values of b and the limiting surface brightness B' of some diameter systems, the limiting surface brightness B of the present diameter system can be estimated:

$$B = B'_{\rm cat} + \frac{b_{\rm cat}}{\partial \log D/\partial B}, \qquad (4)$$

where $b_{\rm cat}$ and $B'_{\rm cat}$ refers to a catalogue of diameters with known limiting surface brightness.

The limiting surface brightness (in B mag arcsec^{-2}) of UGC, MCG and Holmberg diameter systems were estimated to be 25.4, 24.6 and 26.5, respectively (Fouqué & Paturel 1985). For SGC and ESO it was estimated to be 27.5 and 25.5, respectively (Paturel et al. 1987), with a strong type dependence on morphological type for ESO. Further, the ESO-LV catalogue (Lauberts & Valentijn 1989) gives diameters at 25. Using $\partial \log D/\partial B = 0.1$, we found that the present diameter system corresponds to $\langle B \rangle = 24.9 \pm 0.2$. Using UGC, MCG,

[5]
$$\partial \log D/\partial B = \begin{cases} 0.094 & \text{for late types } (T > 0), \\ 0.081{-}0.016\,T & \text{for early types } (T < 0). \end{cases} \qquad (2)$$

A rough value is $\partial \log D/\partial B \approx 0.1$ mag^{-1}.

ESO and ESO-LV that require smaller extrapolation, we found instead $\langle B \rangle = 25.1 \pm 0.1$. We conclude that the diameter system does not differ very much from the canonical one at 25 B mag arcsec^{-2}.

3.4. Mean position angle

Position angle β does not require homogenization[6]. Nevertheless some precautions must be taken to avoid errors. One cannot calculate a simple mean of several measurements because the position angle is defined over the range [0°–180°] (e.g., a mean of two measurements 0° and 180° would lead to a wrong result of 90°. Stricto sensu, the position angle, like coordinates, is defined for a given equinox. This will be neglected. It is actually defined for equinox 1950.

For galaxies that have more than three measurements we calculate the standard deviation of the position angle and plot it against $\log R_{25}$ (Fig. 5). It is fairly represented by the equation:

$$\sigma(\mathrm{PA}) = \frac{1.9}{\log R_{25}} + 2.0. \quad (5)$$

This equation will be used to estimate the actual error on position angle and to test if an individual value is significantly different from the mean. Indeed, it was noted (Karachentsev et al. 1993) that some measurements correspond, occasionally, to a wrong orientation ($\beta' = 180° - \beta$). These values may be detected when several measurements are available. The most reliable measurements come from FGC (Karachentsev et al. 1993), UGC (Nilson 1973, 1974). ESO (Lauberts 1982) and our catalog (Paturel et al. 2000a). In the case of conflict, we rejected the values that differ significantly (2σ-rejection) from the mean, according to a Student's t-test. To account for the fact that β is defined modulo 180°, we calculated the Student's t value as the minimum of $|\beta - \overline{\beta}|/\sigma$ and $(180 - |\beta - \overline{\beta}|)/\sigma$.

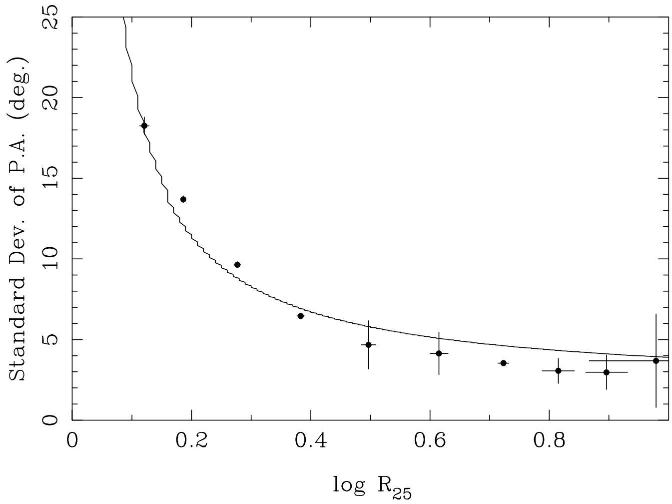

Fig. 5. Standard deviation of position angle as a function of $\log R_{25}$. The solid curve give the adopted representation (Eq. (5)).

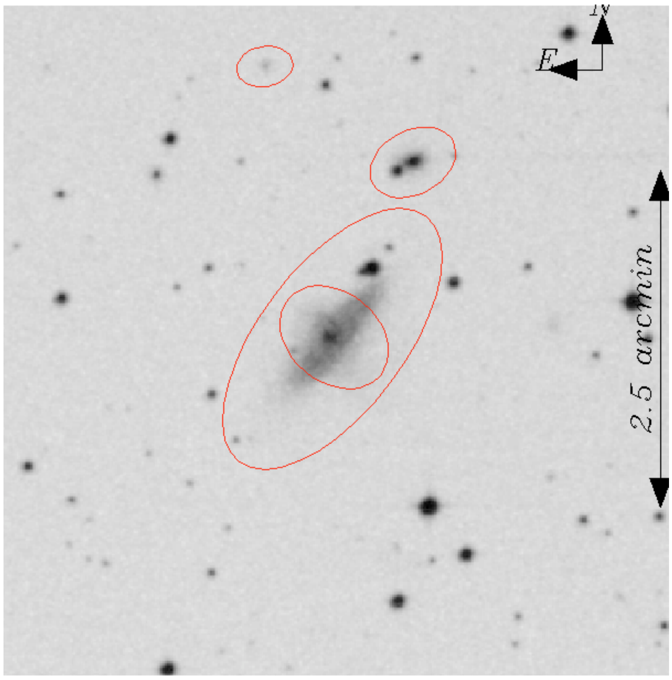

Fig. 6. The identification of NGC 3314A and NGC 3314B can be made unambiguously using coordinates, diameter, axis ratio and position angle. Such an identification works even in the most difficult cases.

3.5. Adopted identification criteria

The conclusion of this section is that galaxies in our catalog can be identified without ambiguity, using, coordinate, diameter, axis ratio and position angle. This is illustrated in Fig. 6. We have now to explain how these galaxies are designated to allow a wide compatibility.

4. Improvement of designations

4.1. Adopted acronyms

For historical catalogs (NGC, IC) we benefited from numerous corrections collected by G. de Vaucouleurs and H. G. Corwin. These catalogs give essentially an identification of objects, but no useful measurements. The identification is then just a matter of convention.

In Table 2 we give the list of acronyms used in our present catalog, with an example for each[7].

These names are written in a form accepted, as far as possible, by both NED and SIMBAD. For this purpose we changed the writing of some of our previous acronyms (Paturel et al. 1989, 1992, 1996). But NED and SIMBAD have their own inconsistencies that forbids us to use a common designation (e.g., the CGCG names). This is due to the fact that SIMBAD is managing all kinds of astronomical objects. For instance, the

[6] In fact, the position angle may vary with the limiting surface brightness of the diameter system, but one cannot predict in which sense it will change because it depends on the absolute orientation of the galaxy.

[7] In HYPERLEDA a principal name is chosen according to a short hierarchy: NGC, IC, UGC, ESO, PGC. Besides, some galactic objects are also available: stars, stellar clusters, nebulae etc.

Table 2. Table of adopted acronyms. For each adopted acronym we give an example of a name and the reference where the acronym was created. When an acronym comes from several references (e.g., KUG), we give the latest reference that lists the former ones. In the bibliography, the full reference is given with "Cat" followed by the acronym (e.g., Cat.: GIN).

Acronym (with example)	Reference
ABELL 0592:[*D*80] 012	Dressler A. (1980)
ARK 7	Arakelian M.A. (1975)
ARP 223	Arp, H. (1966)
CGMW 1-0056	Roman A.T. et al. (2000)
[*DCL*86] 571	Dickens R.J. et al. (1986)
DDO 207	van den Bergh S. (1960)
DUKST 474-11	Ratcliffe A. et al. (1998)
ESO 123-012	Lauberts A. (1982)
...	...
...	...
...	...

Table 3. Discrepant acronyms in NED/SIMBAD/LEDA. Comments: blank: the spelling is different but the name is accepted; n: Our spelling could be accepted after minor change (see text); N: Our spelling is not accepted.

LEDA	NED		SIMBAD	
ARK	ARK		Ark	
ARP	ARP		APG	
DRCG	ABELL :[*D*80]	N	[*D*80]ABELL	N
DUKST	DUKST		DUGRS	
ESO-LV	ESO-LV		ESO-LV	N
FAIRALL	FAIRALL		FRL	
FGCA	FGCA		FGCA	
ISZ	I SZ		SZ I	n
IZW	I ZW		ZW I	
KAZ	KAZ		Ka	
KDG	KDG		K68	
KIG	KIG		K73	n
LCRSB	LCRS B		LCRS B	N
PGC	PGC or LEDA		LEDA	
[*RB*67]	RB		[*RB*67]	
[*RC*2]A	[*RC*2]A		Anon	n
SBS	SBS		SBSG	N
TOLOLO	TOLOLO		TOL	
[*V*89]	[*V*89]		VDBG	n
WEIN	WEIN		Weinberger	
WKK	WKK		WKK98	N
Z	CGCG		Z	
ZOAGG	ZOAG G		ZOAG G	N

SBS acronym is used for stars and cannot be used for individual galaxies. It has been replaced by SBSG in SIMBAD.

In Table 3 we compare the spelling of acronyms that are not identical. Acronyms of the present catalog that are not recognized in NED or SIMBAD are noted "N".

Let us comment this table. Some names are not written in the same manner but can be retrieved anyway in SIMBAD (Z, FAIRALL, ARK, ARP, WEIN, TOLOLO, KAZ, DUKST, KDG) or NED (RB, LCRSB, ZOAGG). Originally, we adopted CGCG for the Catalogue of Galaxies and Cluster of Galaxies (Zwicky et al. 1968). We changed it for Z. So, it is recognized by both NED and SIMBAD (in SIMBAD, CGCG is reserved for galaxy clusters).

Table 4. Numbering for DRCG galaxies.

ID	Cluster	ID	Cluster
01	ABELL14	29	ABELL1913
02	ABELL76	30	ABELL1983
03	ABELL119	31	ABELL1991
04	ABELL151	32	ABELL2040
05	ABELL154	33	ABELL2063
06	ABELL168	34	ABELL2151 (2)
07	ABELL194	35	ABELL2256
08	ABELL376	36	ABELL2589
09	ABELL400	37	ABELL2634
10	ABELL496	38	ABELL2657
11	ABELL539	39	DC0003-50
12	ABELL548	40	DC0107-46
13	ABELL592	41	DC0103-47
14	ABELL754	42	DC0247-31
15	ABELL838	43	DC0317-54
16	ABELL957	44	DC0326-53
17	ABELL978	45	DC0329-52
18	ABELL979	46	DC0410-62
19	ABELL993	47	DC0428-53
20	ABELL1069	48	DC0559-40
21	ABELL1139	49	DC0608-33
22	ABELL1142	50	DC0622-64
23	ABELL1185	51	DC1842-63
24	ABELL1377	52	DC2048-52
25	ABELL1631	53	DC2103-39
26	ABELL1644	54	DC2345-28
27	ABELL1656 (1)	55	DC2349-28
28	ABELL1736		

Note 1: Coma.
Note 2: Herculis.

With a few changes, the compatibility of designation may be improved. It could be judicious that HYPERLEDA and NED write some names in agreement with SIMBAD (SBSG, VDBG) but maintain the recognition with the previous spelling (SBS, [*V*89]). Similarly, SIMBAD could adopt some NED/LEDA acronyms (ISZ, KIG, WKK, [*RC*2]A) and/or add brackets for acronym containing unprotected number that may confuse the recognition (e.g., K73 could be replaced by KIG or [*K*73]) Further, PGC should replace LEDA everywhere (both are actually equivalent in LEDA and SIMBAD).

Two difficult cases remain unsolved: DRCG (Dressler 1980) and ESO-LV (Lauberts & Valentijn 1989).

For DRCG, none of the acronyms is compatible with others but the corresponding names produced by NED and SIMBAD are recognized in HYPERLEDA. For simplicity, we kept our original designation made with the cluster number (Table 4) and a galaxy number (e.g., DRCG28-12). Otherwise, the designation is difficult because the galaxy clusters do not always have an ABELL number.

For ESO-LV, LEDA and NED adopted the same spelling with a single number (e.g. ESO-LV 1200120) while SIMBAD

Table 5. Sample of the catalog of galaxies. The full table contains about 1 million galaxies. It is available at CDS and can be extracted from the new HYPERLEDA database.

PGC0130936	J000000.8-405412	G	E	0.93+/-0.05	0.30+/-0.02	19.+/- 4.	0		
PGC0133590	J000002.7-232203	G	SO-a	0.69+/-0.10	0.09+/-0.08	26.+/- 15.	1	DUKST537-38	
PGC0000004	J000003.4+230516	G	Sc	0.93+/-0.04	0.68+/-0.11	63.+/- 1.	1	KUG2357+228817	
PGC0000008	J000005.1-772012	GM		0.50+/-0.07	0.25+/-0.05	85.+/- 10.	2	(ESO12-11)	ESO-LV120112
PGC0000009	J000008.3-772019	GM		0.62+/-0.16	0.24+/-0.02	121.+/- 29.	2	(ESO12-11)	ESO-LV120111
PGC0133624	J000013.8-251111	M		0.91+/-0.06	0.37+/-0.12	115.+/- 17.	0		
PGC0000834	J001208.9+221950	GM	SBc	0.71+/-0.07	0.16+/-0.06	134.+/- 14.	2	?MCG4-01-038	KUG0009+220A
PGC2019681	J000520.3+325912	G		0.75+/-0.05	0.25+/-0.05	171.+/- 2.	1	!KAZ14	
PGC2817385	J000009.4+300910	G		9.99+/-9.99	9.99+/-9.99	999.+/-999.	1	IRAS23575+2952	
...									
...									
...									

adopted a name with two fields (e.g., ESO-LV 120-0120). Further, NED imposes leading zeros (e.g., ESO-LV 0120040) while LEDA does not (e.g., ESO-LV120040).

The original Principal Galaxy Catalogue (PGC, Paturel et al. 1989) was sorted according to the right ascension (J2000) from PGC1 to PGC 73197. Each new galaxy added to LEDA received a new PGC number. It frequently happens that the same galaxy is measured several times by different authors without noting that it is actually the same object. When the fact is understood, both entries must be merged in a single one, and thus, the object has two (or more) PGC numbers. In this case, we adopted the convention that the smallest PGC number is the official one. In the HYPERLEDA system, the PGC name will be used as an internal pointer and also as a designation for galaxies[8].

4.2. Multiple designations

If a galaxy, previously known as a single object (typically a pair of galaxies), is separated in two or more components, the names previously attached to the pair are simply copied on each component, but they are written in parentheses. The old PGC name generally remains on the dominant component and new PGC name is given to each new component. A typical example is given by UGC 1. In the original UGC catalog it is a pair of galaxies. Each component has been identified in the MCG catalog (MCG3-1-15 and MCG 3-1-16). Then, MCG3-1-15 = (UGC1) = PGC177 and MCG3-1-16 = (UGC1) = PGC178. A query on UGC 1, gives two objects.

We rejected extension letters not present in the original catalog but we accepted the NGC/IC extensions because they are validated by many years of publications.

5. The galaxies of the principal galaxy catalogue PGC2003

Table 5 gives a sample of the catalog. The sample has been chosen to illustrated the different occurrences: three normal galaxies of different morphological types, two galaxies in a multiple system, an unresolved multiple system, two galaxies with flaged names ("?" or "!"; see explanation below), one galaxy with no diameter, no axis ratio, no position angle. The entire table is available in electronic form at the CDS (Vizier). The updated versions will be available directly through HYPERLEDA and the CDS. The arrangement of columns is as follows:

Column 1: PGC number.
Column 2: Right ascension and Declination for the equinox 2000 in hours, minutes, seconds and tenths, and in degrees, arcminutes and arcseconds respectively.
Column 3: Object type: "G", galaxies; "M", multiple system; GM, galaxy in multiple system.
Column 4: Provisional morphological type from LEDA according to the RC2 code.
Column 5: Apparent diameter (and its actual error) in log scale (D in 0.1 arcmin) converted to the RC3 system at the isophote 25 B – mag arcsec^{-2} (Sect. 3).
Column 5: Axis ratio (and its actual error) in log scale (log of major axis to minor axis).
Column 6: Adopted 1950-position angle in degrees (and its uncertainty), measured from the North to the East. Its value covers the range 0°–180°. A few values exactly equal to zero are taken as 180°.
Column 7: Number of alternate names.
Column 8: Alternate names following the hierarchy of Table 2. Names that correspond to a multiple system are written in parenthesis. 151 Names that do not agree with NED identification have been written with a question mark (?). 677 names that have been moved from one galaxy to another since the first PGC1989 catalog have been written with an exclamation point (!).

In Fig. 7 we present a color equal-area projection showing the distribution of integrated B-flux in supergalactic coordinates. In subsequent papers we will present the homogenization of additional astrophysical parameters needed for our research programs. In the future, all these data (and additional ones) will be managed within the HYPERLEDA consortium, still with scientific-oriented objectives but with more efficient means.

[8] Stars, star clusters and galactic nebulae managed also by HYPERLEDA, will not receive a PGC name, but the corresponding number will be used anyway as an internal pointer.

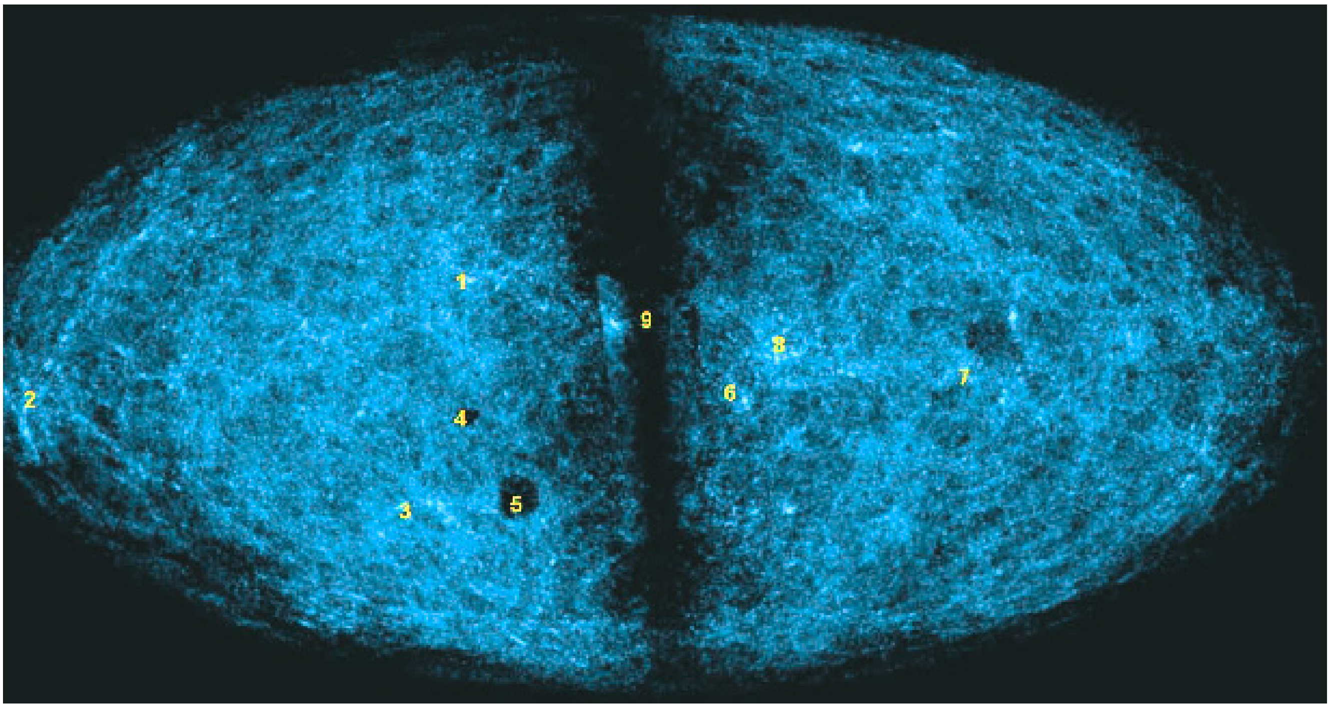

Fig. 7. The equal-area galaxy distribution of the present catalog in supergalactic coordinates. The longitude 0° is on the right, 360° is on the left. Different regions can be identified: **1** = Pavo-Indus, **2** = Perseus-Pisces, **3** = Fornax, **4** = SMC, **5** = LMC, **6** = Centaurus, **7** = Virgo, **8** = Shapley concentration, **9** = Position of the putative Great Attractor. A part of the galactic plane is visible as a vertical lane with a few galaxies. The limit of the surveys in this zone of avoidance are clearly delimited.

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Online Material

Table 1. Coefficients for the homogenization of diameters and axis ratios.

Ref.	$b \pm m.e.$ any type	$b \pm m.e.$ Spiral	$b \pm m.e.$ Elliptical	S.D.	c	$a \pm m.e.$ any type	$a \pm m.e.$ Spiral	$a \pm m.e.$ Elliptical	S.D.	c
27078B	0.05 ± 0.00	0.05 ± 0.00	0.05 ± 0.00	0.05	ns	1.01 ± 0.00	1.00 ± 0.00	1.01 ± 0.01	0.04	ns
27081B	0.01 ± 0.00	0.01 ± 0.00	0.03 ± 0.00	0.06	s	1.00 ± 0.00	0.99 ± 0.00	1.01 ± 0.01	0.05	ns
29001B	0.02 ± 0.00	0.01 ± 0.00	0.05 ± 0.00	0.07	s	1.07 ± 0.00	1.04 ± 0.01	1.25 ± 0.01	0.10	s
2000B	0.05 ± 0.00	0.04 ± 0.00	0.18 ± 0.00	0.12	s	0.99 ± 0.00	0.96 ± 0.00	1.15 ± 0.01	0.08	s
1000R	−0.04 ± 0.00	−0.04 ± 0.00	–	0.09	s	0.98 ± 0.00	0.97 ± 0.00	1.12 ± 0.01	0.10	s
27026B	0.05 ± 0.00	0.04 ± 0.00	0.16 ± 0.01	0.11	s	0.85 ± 0.01	0.83 ± 0.01	1.00 ± 0.06	0.09	s
3000B	−0.06 ± 0.00	−0.07 ± 0.00	−0.02 ± 0.00	0.08	s	0.98 ± 0.00	0.97 ± 0.00	0.91 ± 0.01	0.10	s
33004I	0.01 ± 0.00	0.02 ± 0.00	0.01 ± 0.00	0.10	s	1.04 ± 0.01	1.05 ± 0.01	1.04 ± 0.01	0.09	ns
1000B	−0.07 ± 0.00	−0.08 ± 0.00	−0.02 ± 0.00	0.08	s	0.98 ± 0.00	0.95 ± 0.00	1.10 ± 0.02	0.07	s
23286I	0.03 ± 0.00	0.03 ± 0.00	–	0.05		1.13 ± 0.01	1.12 ± 0.01	–	0.08	
27057B	−0.06 ± 0.00	−0.06 ± 0.00	–	0.08		0.82 ± 0.03	0.81 ± 0.03	–	0.12	
27057R	−0.02 ± 0.00	−0.02 ± 0.00	–	0.07		0.87 ± 0.02	0.86 ± 0.02	–	0.09	
24287B	0.01 ± 0.00	0.01 ± 0.00	0.02 ± 0.01	0.04	ns	1.00 ± 0.01	0.99 ± 0.01	1.13 ± 0.05	0.05	s
27098I	−0.02 ± 0.00	−0.01 ± 0.00	−0.09 ± 0.02	0.06	s	1.05 ± 0.01	1.02 ± 0.01	1.05 ± 0.12	0.08	ns
17000B	−0.32 ± 0.00	−0.32 ± 0.00	−0.31 ± 0.00	0.10	ns	1.43 ± 0.01	1.45 ± 0.01	1.36 ± 0.02	0.11	s
17001B	−0.20 ± 0.00	−0.22 ± 0.00	−0.16 ± 0.00	0.10	s	1.29 ± 0.01	1.29 ± 0.01	1.31 ± 0.03	0.09	ns
27043R	0.26 ± 0.00	0.24 ± 0.00	0.40 ± 0.01	0.17	s	1.16 ± 0.01	1.10 ± 0.01	3.22 ± 0.04	0.13	s
27010R	0.04 ± 0.00	0.03 ± 0.00	0.14 ± 0.01	0.11	s	0.81 ± 0.01	0.79 ± 0.01	0.95 ± 0.03	0.05	s
24372B	−0.11 ± 0.00	−0.11 ± 0.00	–	0.08		1.00 ± 0.01	0.98 ± 0.01	–	0.06	
27115B	−0.01 ± 0.00	−0.03 ± 0.00	0.08 ± 0.01	0.13	s	1.02 ± 0.02	1.00 ± 0.02	1.15 ± 0.06	0.12	s
23324I	–	0.01 ± 0.00	–	0.05		0.93 ± 0.03	0.92 ± 0.03	–	0.09	
27010B	0.01 ± 0.00	−0.01 ± 0.00	0.17 ± 0.01	0.11	s	0.82 ± 0.01	0.80 ± 0.01	0.95 ± 0.05	0.08	s
23323B	0.03 ± 0.00	0.02 ± 0.00	0.09 ± 0.01	0.11	s	1.01 ± 0.02	0.98 ± 0.02	1.39 ± 0.08	0.11	s
2000R	0.19 ± 0.00	0.16 ± 0.00	0.29 ± 0.01	0.14	s	1.10 ± 0.01	1.03 ± 0.01	1.33 ± 0.02	0.08	s
23284B	−0.05 ± 0.00	−0.05 ± 0.00	−0.03 ± 0.03	0.09	ns	0.93 ± 0.01	0.91 ± 0.01	0.88 ± 0.18	0.09	ns
27042R	0.15 ± 0.00	0.15 ± 0.01	0.19 ± 0.01	0.15	s	0.92 ± 0.02	0.91 ± 0.03	0.90 ± 0.04	0.14	ns
26000B	−0.13 ± 0.00	−0.15 ± 0.01	−0.08 ± 0.01	0.12	s	0.84 ± 0.02	0.90 ± 0.02	0.80 ± 0.03	0.09	s
23225B	−0.04 ± 0.00	−0.05 ± 0.00	0.01 ± 0.02	0.09	s	0.97 ± 0.02	0.95 ± 0.02	1.00 ± 0.06	0.08	ns
1001B	0.00 ± 0.01	−0.01 ± 0.01	0.10 ± 0.02	0.11	s	0.84 ± 0.02	0.82 ± 0.02	0.97 ± 0.08	0.09	ns
27066B	0.31 ± 0.01	0.26 ± 0.01	0.39 ± 0.01	0.15	s	0.95 ± 0.02	0.88 ± 0.03	1.03 ± 0.03	0.11	s
27101R	0.11 ± 0.01	0.07 ± 0.01	0.18 ± 0.03	0.15	s	0.98 ± 0.03	0.88 ± 0.06	1.21 ± 0.09	0.12	s
124290B	0.01 ± 0.00	0.01 ± 0.01	–	0.11		0.97 ± 0.03	0.96 ± 0.03	–	0.11	
27056B	−0.04 ± 0.00	−0.03 ± 0.01	−0.08 ± 0.01	0.12	s	1.07 ± 0.02	1.04 ± 0.02	1.24 ± 0.05	0.08	s
23212B	−0.05 ± 0.00	−0.05 ± 0.00	–	0.08		0.91 ± 0.01	0.89 ± 0.02	–	0.06	
24201B	0.34 ± 0.01	0.33 ± 0.01	0.38 ± 0.01	0.08	s	1.09 ± 0.03	1.07 ± 0.04	1.16 ± 0.07	0.08	ns
27003B	0.01 ± 0.00	0.01 ± 0.01	0.04 ± 0.01	0.05	s	0.86 ± 0.06	0.99 ± 0.06	0.63 ± 0.15	0.06	s
27092B	0.02 ± 0.01	−0.01 ± 0.01	0.07 ± 0.01	0.10	s	1.04 ± 0.04	1.02 ± 0.06	1.08 ± 0.06	0.06	ns
27004B	−0.04 ± 0.00	−0.04 ± 0.00	–	0.05		1.05 ± 0.03	1.02 ± 0.03	–	0.06	
27032B	−0.06 ± 0.00	−0.06 ± 0.00	–	0.07		0.93 ± 0.03	0.91 ± 0.03	–	0.08	
23297I	−0.01 ± 0.01	0.00 ± 0.01	–	0.06		0.82 ± 0.05	0.81 ± 0.05	–	0.09	
27062V	−0.08 ± 0.00	−0.07 ± 0.00	−0.10 ± 0.01	0.05	s	1.24 ± 0.06	1.25 ± 0.07	1.24 ± 0.11	0.10	ns
23295I	0.00 ± 0.01	0.01 ± 0.01	–	0.06		0.87 ± 0.05	0.86 ± 0.05	–	0.08	
23231B	−0.02 ± 0.01	−0.02 ± 0.01	–	0.07		1.02 ± 0.10	0.99 ± 0.11	–	0.09	
23224B	0.01 ± 0.01	−0.02 ± 0.01	0.08 ± 0.01	0.09	s	0.79 ± 0.04	0.78 ± 0.05	0.82 ± 0.05	0.08	ns
24273B	0.04 ± 0.01	0.04 ± 0.01	–	0.08		0.97 ± 0.04	0.99 ± 0.05	–	0.06	
27036B	–	–	–	0.04		1.05 ± 0.06	1.04 ± 0.05	–	0.07	
27083R	0.06 ± 0.01	0.06 ± 0.01	–	0.07		0.95 ± 0.06	0.94 ± 0.06	–	0.12	
13010b	−0.21 ± 0.01	−0.21 ± 0.01	−0.17 ± 0.02	0.08	ns	1.28 ± 0.03	1.24 ± 0.03	1.55 ± 0.18	0.09	ns
14000R	0.04 ± 0.01	0.03 ± 0.00	–	0.07		1.13 ± 0.03	1.15 ± 0.03	–	0.08	
14000B	–	−0.01 ± 0.00	–	0.06		1.09 ± 0.03	1.09 ± 0.03	–	0.09	
27113B	0.07 ± 0.01	0.03 ± 0.01	0.15 ± 0.04	0.11	s	0.80 ± 0.03	0.77 ± 0.04	0.87 ± 0.11	0.10	ns
27074B	0.04 ± 0.01	0.13 ± 0.02	0.02 ± 0.01	0.09	s	1.33 ± 0.05	1.13 ± 0.09	1.53 ± 0.08	0.08	s
27009B	0.14 ± 0.01	0.13 ± 0.01	–	0.13		0.86 ± 0.04	0.85 ± 0.04	–	0.11	
27037V	−0.10 ± 0.01	−0.10 ± 0.01	–	0.06		1.09 ± 0.05	1.07 ± 0.06	–	0.06	
27059B	0.11 ± 0.01	0.12 ± 0.02	0.14 ± 0.01	0.17	ns	0.97 ± 0.05	1.06 ± 0.10	0.96 ± 0.06	0.09	ns
27120B	0.10 ± 0.01	–	0.11 ± 0.01	0.09		1.41 ± 0.09	–	1.47 ± 0.09	0.07	
24315B	0.01 ± 0.01	−0.05 ± 0.02	0.08 ± 0.02	0.12	s	0.94 ± 0.06	0.94 ± 0.09	0.98 ± 0.15	0.08	ns
24338B	−0.02 ± 0.01	−0.05 ± 0.01	–	0.11		0.91 ± 0.04	0.90 ± 0.05	–	0.10	
27051B	−0.02 ± 0.01	−0.02 ± 0.01	–	0.06		1.06 ± 0.13	1.12 ± 0.14	–	0.08	
24337B	–	−0.01 ± 0.00	0.05 ± 0.01	0.05	s	1.02 ± 0.01	0.98 ± 0.02	1.29 ± 0.08	0.04	s
27013B	0.12 ± 0.01	–	0.15 ± 0.01	0.07		0.99 ± 0.05	–	1.02 ± 0.04	0.04	
27112B	0.44 ± 0.01	0.44 ± 0.01	0.45 ± 0.02	0.20	ns	1.10 ± 0.08	1.10 ± 0.09	1.11 ± 0.21	0.16	ns
27083B	0.10 ± 0.01	0.10 ± 0.01	–	0.11		0.94 ± 0.06	0.94 ± 0.06	–	0.13	
27047B	−0.09 ± 0.01	−0.11 ± 0.02	–	0.10		1.33 ± 0.09	1.46 ± 0.10	–	0.14	
24374R	0.17 ± 0.02	0.17 ± 0.02	–	0.16		1.13 ± 0.07	1.11 ± 0.07	–	0.12	
27102R	0.13 ± 0.01	0.09 ± 0.02	0.20 ± 0.03	0.16	s	1.07 ± 0.06	1.00 ± 0.12	1.26 ± 0.08	0.16	ns
27107B	−0.05 ± 0.01	−0.03 ± 0.01	–	0.07		1.12 ± 0.07	1.11 ± 0.07	–	0.08	
23319B	−0.13 ± 0.01	−0.12 ± 0.02	–	0.08		1.09 ± 0.08	1.07 ± 0.09	–	0.09	
23319B	0.07 ± 0.02	0.08 ± 0.02	–	0.09		1.04 ± 0.08	1.09 ± 0.06	–	0.09	
27002B	0.12 ± 0.02	0.11 ± 0.03	–	0.13		0.49 ± 0.14	0.55 ± 0.14	–	0.16	
23268B	−0.08 ± 0.01	−0.08 ± 0.01	–	0.11		0.92 ± 0.05	0.90 ± 0.05	–	0.10	
31003B	0.09 ± 0.01	0.08 ± 0.01	0.13 ± 0.01	0.12	s	1.14 ± 0.05	1.14 ± 0.06	1.22 ± 0.12	0.15	ns
27089R	0.05 ± 0.03	0.06 ± 0.03	–	0.14		0.98 ± 0.10	0.98 ± 0.10	–	0.10	
23342B	−0.05 ± 0.01	−0.06 ± 0.01	–	0.09		1.02 ± 0.02	0.99 ± 0.04	–	0.03	
27085B	−0.11 ± 0.01	−0.11 ± 0.01	–	0.14		0.97 ± 0.09	0.99 ± 0.10	–	0.12	
27017B	0.41 ± 0.03	0.44 ± 0.04	–	0.20		1.94 ± 0.14	1.86 ± 0.15	–	0.12	
24357B	0.37 ± 0.01	0.36 ± 0.01	–	0.09		1.26 ± 0.08	1.24 ± 0.09	–	0.11	
27067B	0.08 ± 0.02	0.07 ± 0.02	–	0.10		1.15 ± 0.16	1.16 ± 0.16	–	0.15	
27067R	0.11 ± 0.01	0.10 ± 0.01	–	0.11		1.12 ± 0.14	1.12 ± 0.14	–	0.12	
27073B	−0.02 ± 0.01	–	0.01 ± 0.01	0.09		1.16 ± 0.07	–	1.22 ± 0.09	0.06	
23344B	−0.18 ± 0.03	−0.18 ± 0.03	–	0.17		1.01 ± 0.17	1.15 ± 0.21	–	0.12	
19070B	−0.05 ± 0.01	−0.06 ± 0.01	–	0.06		0.99 ± 0.07	0.95 ± 0.07	–	0.06	
27049B	−0.06 ± 0.01	–	−0.03 ± 0.02	0.08		1.12 ± 0.11	–	1.18 ± 0.12	0.04	
27001B	−0.05 ± 0.01	–	−0.01 ± 0.01	0.04		1.07 ± 0.09	–	1.18 ± 0.09	0.06	
27006B	0.17 ± 0.04	0.16 ± 0.04	–	0.18		0.72 ± 0.07	0.68 ± 0.08	–	0.10	
27037B	−0.02 ± 0.01	−0.02 ± 0.01	–	0.04		1.12 ± 0.09	1.09 ± 0.11	–	0.07	
27089B	0.20 ± 0.03	–	–	0.16		1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	0.10	
27118B	−0.06 ± 0.03	–	–	0.15		0.85 ± 0.08	0.86 ± 0.10	–	0.08	
19045B	−0.03 ± 0.01	–	–	0.05		1.17 ± 0.10	–	–	0.08	
19045B	−0.21 ± 0.01	–	–	0.06		1.10 ± 0.12	–	–	0.10	
19054B	−0.07 ± 0.01	–	−0.02 ± 0.01	0.03		1.12 ± 0.08	–	1.26 ± 0.09	0.05	
24266B	0.03 ± 0.02	–	–	0.08		1.19 ± 0.09	–	–	0.06	

Table 2. Table of adopted acronyms. For each adopted acronym we give an example of a name and the reference where the acronym was created. When an acronym comes from several references (e.g., KUG), we give the latest reference that lists the former ones. In the bibliography, the full reference is given with "Cat" followed by the acronym (e.g., Cat.: GIN).

ABELL 0592:[*D*80] 012	Dressler A. (1980)
ARK 7	Arakelian M. A. (1975)
ARP 223	Arp, H. (1966)
CGMW 1-0056	Roman A. T. et al. (2000)
[*DCL*86] 571	Dickens R. J. et al. (1986)
DDO 207	Van den Bergh S. (1960)
DUKST 474-11	Ratcliffe A. et al. (1998)
ESO 123-012	Lauberts A. (1982)
ESO-LV 1200120	Lauberts A. & Valentijn E. A. (1989)
FAIRALL 1064	Fairall A. P. (1988)
FCC 307	Ferguson H. C. (1989)
FGC 288A	Karachentsev I. D. et al. (1993)
FGC 717	Karachentsev I. D. et al. (1993)
FGCE 217	Karachentsev I. D. et al. (1993)
GIN 727	Wegner G. et al. (1996)
HCG 098C	Hickson P. (1982)
IC 1575A	Dreyer J. L. E. (1895)
IRAS 00399-2354	Joint IRAS Science W. G. (1986)
I SZ 37	Rodgers A. W. et al. (1978)
I ZW 04	Zwicky F. (1971)
KAZ 344	Kazarian, M. A. (1983)
KDG 197	Karachentseva V. E. (1968)
KIG 1027	Karachentseva V. E. et al. (1973)
KPG 597A	Karachentsev I. D. (1972)
KUG 2358+128B	Takase B. & Miyauchi-Isobe N. (1993)
LCRS B005019.1-3901000	Shectman S. A. et al. (1996)
MCG +05-01-4	Vorontsov-Velyaminov B.A.et al. (1974)
MRC 1307+000	Large M. I. et al. (1981)
MRK 374	Bicay M. D. et al. (1995)
NGC 1427A	Dreyer J. L. E. (1889)
NPM1G -00.0643	Klemola A. R. et al. (1987)
POX 105	Kunth D. et al. (1981)
[*RB*67] 13	Rood H. J. & Baum W. A. (1967)
[*RC*2] A0025+30A	de Vaucouleurs G. et al. (1976)
RFGC 12	Karachentsev I. D. et al. (1999)
RKK 3237	Kraan-Korteweg R. (2000)
SBS 0745+601A	Bicay M. D. et al. (2000)
TOLOLO 115	Smith M. G. et al. (1976)
UGC 10691	Nilson P. (1973)
UGCA 109	Nilson P. (1974)
UM 456B	MacAlpine G. M. & Williams G. A. (1981)
[*V*89] 177	van den Bergh S. (1989)
VCC 2049	Binggeli, B. et al. (1985)
VV 791a	Vorontsov-Velyaminov, B. A. (1977)
WEIN 197	Weinberger, R. (1980)
WKK 4017	Woudt P. A. & Kraan-Korteweg R. C. (2001)
Z 478-037	Zwicky F. et al. (1968)
ZOAG G120.81-09.64A	Seeberger R. & Saurer W. (1998)
3C 027 3C175.1	Edge D. O. et al. (1959)
4C -00.01	Gower J. F. R. et al. (1967)