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H I observations of nearby galaxies*,**

III. More dwarf galaxies in the northern sky

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Abstract. We carried out a systematic search for nearby dwarf galaxies in the northern sky based on POSS-II film copies. As a result we present a list of 101 nearby dwarf galaxy candidates mainly of low surface brightness which have angular diameters $a \gtrsim 0\farcm5$. About two thirds of the objects are new discoveries. This sample is considered as a supplement to the 163 northern dwarf galaxy candidates (A&AS, 1998, 127, 409) which have been detected in the same declination range around the known Local Volume galaxies and to the 78 dwarf galaxy candidates (A&AS, 1999, 135, 221) in the Local Void region. All the galaxies were observed in H I with the 100-m Effelsberg radio telescope with a detection rate of 46%. The sample of detected galaxies has the following median parameters: radial velocity $V_{\rm LG} = +770$ km s^{-1}, H I line width $W_{50} = 46$ km s^{-1}, absolute blue magnitude $M_{\rm B} = -13.8$ mag, linear diameter $A_0 = 2.7$ kpc, hydrogen mass-to-luminosity ratio $M_{\rm HI}/L_{\rm B} = 1.2\ M_\odot/L_\odot$, and the HI mass-to-total mass ratio $M_{\rm H\,I}/M_{\rm t} = 0.28$.

Key words. galaxies: distances and redshifts – galaxies: dwarf – galaxies: fundamental parameters – galaxies: general – galaxies: irregular – infrared: galaxies

1. Introduction

The creation of a complete sample of galaxies limited by distance, not by flux, is a rather difficult task due to the great width of the galaxy luminosity function. A nearby volume-limited sample is needed for comparison in the analysis of properties of galaxies in deep sky areas like the Deep Hubble Field (Williams et al. 1996) directed to investigate evolutionary effects. The first step toward a reference sample of nearby galaxies was undertaken by Kraan-Korteweg & Tammann (1979) who published a list of 179 galaxies with corrected radial velocities $V_{\rm LG} < 500$ km s^{-1} with respect to the Local Group centroid. Later this sample was updated by Huchtmeier & Richter (1988, 1989) and Karachentsev (1994) to 215 galaxies. Over the last years the nearby galaxy census was increased as a by-product of H I line surveys of the Milky Way (Henning et al. 1998), as well as by a "blind" H I-survey of the southern sky with the Parkes radio telescope (Kilborn et al. 1999; Banks et al. 1999).

The publication of the Second Palomar Observatory Sky Survey (=POSS-II) made on modern photographic emulsions Kodak IIIaJ and IIIaF stimulated searches for "new" nearby galaxies. The high resolution and the sensitivity to low contrast details allow a secure detection and classification of objects of small angular dimensions, especially low surface brightness (=LSB) galaxies. Binggeli et al. (1990), Schombert et al. (1992), and Impey et al. (1996) found a great number of LSB galaxies on POSS-II plates. Disney & Phillips (1983) and McGaugh (1996) assumed that about 90% of all galaxies may have a very low surface brightness (SB > 28 mag/□″) being undetectable with present sky surveys.

As a first step of our search for new nearby dwarf galaxies we inspected the vicinities of 215 known galaxies of the Local Volume (=LV) with radial velocities $V_{\rm LG} <$ 500 km s^{-1}. As a result 260 LV galaxy candidates with angular diameters $a \gtrsim 0\farcm5$ were found (Karachentseva & Karachentsev 1998). Observations of these objects in the 21 cm line (Huchtmeier et al. 1997, 2000a Paper I hereafter) confirmed a great number of these LV galaxies among them. The next stages of the project were searches for nearby galaxies: in a wide vicinity of the Local Void (Karachentseva et al. 1999; for the H I data see Huchtmeier et al. 2000b hereafter Paper II), in the southern

* Tables 1 and 2 are also available in electronic form at the CDS via anonymous ftp to `cdsarc.u-strasbg.fr` (`130.79.128.5`) or via
`http://cdsweb.u-strasbg.fr/cgi-bin/qcat?J/A+A/366/428`
** Figure 1 is only available at `http://www.edpsciences.org`

equatorial SERC EJ belt (Karachentsev et al. 2000), and in the southern (Dec $< -18°$) sky covered by the ESO/SERC films (Karachentseva & Karachentsev 2000).

In this paper we present results of our search for nearby galaxies in those parts of the northern sky which could not be inspected earlier because their POSS-II copies were not available so far.

We inspected about 97% of the entire sky. A total of 570 nearby galaxy candidates was found. Almost all of them have been observed in the H I line with the 100-m Effelsberg radio telescope or other telescopes. More than 50 galaxies were found to have radial velocities smaller than 500 km s^{-1}, increasing the LV sample.

2. List of dwarf galaxy candidates from the POSS-II survey

The search for nearby dwarf galaxy candidates was carried out on blue (IIIaJ) and red (IIIaF) POSS-II film copies using the same morphological criterion as in previous studies. We selected galaxies of low surface brightness and low brightness gradient with angular diameters $a \gtrsim 0.'5$. In some cases we included in our list objects of high surface brightness when their structure showed signs of resolution into stars. In their majority the objects look like the dwarf galaxies from the DDO catalog (van den Bergh 1966). The result of our search is presented in Table 1. Its columns contain: (1) the running number; (2) equatorial coordinates (epoch 1950.0); (3) major and minor angular diameters measured on blue plates (upper line) and red plates (lower line) to the limiting isophote $\sim$(26.5–27.0) mag/□″ with an accuracy of $\sim$15%; (4) morphological type in the usual designations: Sph – spheroidal, Ir – irregular, Sm – irregular with signs of spiral structure; (5) mean surface brightness in a scale: H – high (22–23 mag/□″), L – low ($\sim$24 mag/□″), VL – very low ($\sim$25 mag/□″), EL – extremely low ($\sim$26 mag/□″); (6) galaxy name in other catalogues/lists as given in the NASA Extragalactic Database (=NED); (7) apparent blue magnitude of the galaxy (upper line) estimated visually with an accuracy of 0.5 mag based on comparison with other LSB galaxies having photometrically measured total magnitudes; the lower line gives galactic extinction $A_{\rm b}$ from Schlegel et al. (1998); (8) comments concerning structure, color, and heliocentric radial velocity.

As can be seen from Col. (6), only one third of the galaxies were catalogued earlier. About 88% of the objects are classified as irregular (Ir or Ir?), a number of them (35%) have very low and extremely low surface brightness.

3. The H I line observations

Observations of all 101 objects were performed using the Effelsberg 100-m radio telescope in the total power mode (ON–OFF) combining a reference field 5 min earlier in RA with the on-source position. The telescope half power beam width at 21 cm wavelength is $9.'3$. The dual channel HEMT receiver had a system noise of 30 K. The 1024 channel autocorrelator was split into 4 bands of 256 channels each, shifted in frequency by 5 MHz with respect to its neighbor in order to cover a total velocity range from -470 to 3970 km s^{-1}. The resulting channel separation was 5.1 km s^{-1} yielding a resolution of 6.2 km s^{-1} or 10.2 km s^{-1} after Hanning smoothing (if applied). In a few cases we were able to observe H I profiles with higher velocity resolution (3.0 km s^{-1}): kkh 11, 43, 84, 86. Applying Hanning smoothing the resolution is then 5.1 km s^{-1}: kkh 12, 34, 77. The observed H I profiles are presented in Fig. 1 in order of increasing RA starting at the bottom left corner. Measured and derived parameters of H I observations are given in Table 2. Its columns contain: (1) the running number; (2) the H I flux in Jy km s^{-1}; (3) the maximum emission and/or the rms noise in mJy; (4) the mean heliocentric radial velocity and its error; (5) the line widths at the 50%, the 25%, and the 20% level of the peak emission; (6) the radial velocity with respect to the Local Group centroid with the solar apex parameters: $V_{\rm A} = 316$ km s^{-1}, $l_{\rm A} = 93°$, $b_{\rm A} = -4°$ (Karachentsev & Makarov 1996); (7) the integral absolute magnitude corrected for galactic extinction $A_{\rm b}$ (Schlegel et al. 1998) assuming a kinematic distance $D = V_{\rm LG}/H$ with a Hubble constant of 75 km s^{-1} Mpc^{-1}; (8) the integrated H I mass-to-luminosity ratio in solar units, where

$$(M_{\rm H\,I}/M_\odot) = 2.35\ 10^5 \times D^2 \times S_{\rm H\,I};$$

(9) the galaxy "total" mass-to-luminosity ratio in solar units, where the indicative total mass

$$M = 0.83\ 10^4 \times a \times W_{50}^2 \times D$$

is expressed via the measured angular diameter in arcmin and the H I line width W_{50} at 50% of the peak intensity, in km s^{-1}; here we did not introduce a correction for the galaxy inclination because of its uncertainty for irregular galaxies, and the calculated value is a minimum for the total galaxy mass inside the isophote of $\sim$27 mag/□″; (10) comments concerning galaxy membership in groups or cases of confusion with galactic hydrogen emission.

4. Discussion

The morphology of the galaxies from Paper I and from this Paper III is similar, the great majority is of irregular type, 73% and 89%, respectively. A small part is of spheroidal type, 15% and 9%, respectively. A significant difference is in the subclasses of irregular galaxies in our different samples. In Paper I we have 10% of type Im, in Paper III we find none, as in Paper II. Galaxies in sample I were found in the neighborhood of known galaxies/groups of the Local Volume, sample III is a field sample, i.e. in regions of lower galaxy density. Hence external triggers for starbursts are missing. This might be the reason why we do not find galaxies of type Im in sample III.

The detection rate in H I for our sample is 46% (see Table 2). The limited amount of observing time yielded a higher rms noise as compared with profiles in Paper I.

Table 1. List of new northern dwarf galaxy candidates

kkh	RA (1950) DEC		$(a \times b)_{\rm b}$ $(a \times b)_{\rm r}$		Type	S.B.	Identification	$B_{\rm T}$ $A_{\rm B}$	Notes
1	2		3		4	5	6	7	8
1	00 11 54.0	+31 02 22	0.70	0.45	Ir	L		18.4	blue, distant?
			0.50	0.35				0.32	
2	00 16 11.6	+36 56 48	0.50	0.35	Ir	L			knots
			0.45	0.35				0.28	
3	00 43 00.3	−01 22 38	1.00	0.75	Ir?	L	MCG 0-3-4	15.5	
			0.90	0.75				0.09	
4	01 02 56.8	+45 14 35	0.50	0.30	Ir	VL			
			0.40	0.30				0.49	
5	01 04 35.0	+51 10 25	0.65	0.40	Ir?	VL		17.1	
			0.70	0.50				1.22	
6	01 31 44.0	+51 50 10	0.85	0.60	Ir	L		17.0	blue
			0.70	0.45				1.52	
7	01 34 12.0	+03 28 03	0.60	0.35	Ir	VL			blue,comp.of
			0.50	0.25				0.16	UGC 1133?
8	02 09 47.1	+10 05 56	1.30	0.75	Ir	L		16.7	bluish
			1.10	0.60				0.54	
9	02 09 58.8	+32 34 49	0.80	0.55	Sph?	VL	UGC 1703=		
			0.80	0.60			F415-01	0.42	
10	02 15 13.1	+06 04 37	1.60	0.80	Ir	VL		16.5	knots, blue
			1.50	0.70				0.28	
11	02 21 03.6	+55 47 09	1.40	0.75	Ir	VL	ZOAG	16.2	resolved
			1.70	0.85			135.7-4.5	2.13	w. 6-m tel.
12	02 23 51.2	+57 15 50	1.7:	0.5:	Ir	EL		17.8	resolved
			1.5:	0.5:				3.44	w. 6-m tel.
13	02 35 18.6	+29 41 25	1.20	0.75	Sph?	L	K21	16.5	
			1.20	0.80				0.64	
14	02 42 01.8	+31 57 04	1.35	0.75	Ir	L		17.0	
			1.35	0.80				0.80	
15	02 53 06.7	+36 56 02	0.75	0.45	Ir	L	UGC 2397	16.9	
			0.70	0.40				0.50	
16	02 56 11.2	+43 40 47	1.30	0.40	Ir	L	STM(92)	17.0	(1992, ApJS,
			1.45	0.45				0.77	81, 5)
17	02 58 42.1	+37 04 31	0.55	0.50	Ir	L			blue knots
			0.50	0.50				0.58	
18	03 00 00.5	+33 29 56	0.70	0.35	Ir	L		16.7	bluish, resolv.
			0.70	0.35				0.86	w. 6-m tel.
19	03 04 10.2	+74 00 56	1.10	0.75	Ir	VL		18.1	
			0.95	0.70				2.62	
20	03 19 54.1	+76 05 59	0.90	0.70	Ir	L	ZOAG	16.8	
			0.90	0.70			131.8+16.1	1.36	
21	03 22 25.0	+81 23 22	1.10	1.00	Ir?	EL			isol. cirrus?
			1.10	1.00				1.00	
22	03 39 33.5	+71 54 25	1.05	0.55	Ir	EL			star projected
			1.0:	0.6:				1.66	
23	03 39 36.0	+38 27 30	1.10	0.85	Ir	L			blue knots
			0.95	0.75				1.17	
24	04 06 19.0	+85 42 57	0.80	0.40	Ir	L	Mai 6	17.5	proj. on RN
			0.85	0.45				1.22	
25	04 19 06.7	+30 19 20	0.75	0.50	Ir?	VL		18.3	
			0.70	0.50				2.33	

This fact is at least partially responsible for the lower detection rate in this sample. There are three basic reasons for non-detections: a) a low H I-content, e.g. of some spheroidal type dwarfs like Cassiopeia dwSph and Pegasus dwSph, b) confusion of the galaxy H I line with local galactic emission typically in the heliocentric velocity range of $[-200, +100]$ km s^{-1}, and c) a high radial velocity exceeding $+3970$ km s^{-1}.

Table 1. continued

kkh	RA (1950)	DEC	$(a\times b)_{\rm b}$		Type	S.B.	Identification	$B_{\rm T}$	Notes
			$(a\times b)_{\rm r}$					$A_{\rm B}$	
1	2		3		4	5	6	7	8
25	04 19 06.7	+30 19 20	0.75	0.50	Ir?	VL		18.3	
			0.70	0.50				2.33	
26	04 35 41.4	+06 59 39	2.40	0.65	Ir?	L		16.5	filament
			2.70	0.60				0.65	like UGCA20
27	04 36 56.2	+11 05 07	0.80	0.30	Ir	VL			bluish
			0.70	0.35				1.77	
28	04 41 07.0	+02 54 21	1.15	0.90	Ir	L		16.8	blue, patchy
			1.00	0.80				0.98	
29	04 53 27.3	+37 52 20	1.20	0.70	Ir	L	ZOAG		
			1.25	0.60			166.81-3.2	7.73	
30	05 07 47.1	+81 33 56	0.70	0.40	Ir	L	Mai 7		
			0.70	0.40				0.38	
31	05 10 25.5	+62 38 07	1.30	0.80	Ir	EL			9'NNE away
			1.00	0.70				1.41	UA105
32	05 39 37.0	+58 43 28	0.95	0.55	Ir?	L			distant?
			0.85	0.40				1.22	
33	05 49 39.1	+28 05 18	1.10	0.80	PN?	L			
			1.20	0.95				3.18	
34	05 53 23.0	+73 25 24	0.90	0.50	Ir	L	Mai 13	17.1	knots?
			0.80	0.50				1.08	
35	05 54 15.6	+15 25 09	1.30	1.10	Ir	EL			structureless
			1.30	1.10				1.71	
36	05 59 33.9	+14 51 01	0.70	0.45	Sm	L	ZOAG	18.6	$Vh = 710$, NED
			1.50	0.90			194.1-3.8	3.97	
37	06 38 57.3	+80 10 35	1.20	0.80	Ir	L	Mai 16	16.4	knots
			0.90	0.60				0.31	
38	06 44 09.6	+47 34 10	1.20	0.65	Ir	VL		17.4	
			1.00	0.50				0.40	
39	07 35 30.0	−01 23 24	0.55	0.50	Ir	VL		17.4	
			0.50	0.45				0.49	
40	07 43 08.3	+51 25 11	0.80	0.45	Ir	L	MCG 9-13-52	16.6	
			0.80	0.55				0.27	
41	07 44 11.6	+64 05 11	1.30	0.60	Ir	VL			
			-	-				0.17	
42	07 57 37.3	+86 16 49	0.85	0.55	Ir	L	UGC 4129	16.1	knots, $Vh = 1850$
			0.65	0.45				0.37	NED
43	08 03 23.1	+15 38 55	0.60	0.50	Ir	EL		17.8	bluish
			0.50	0.40				0.12	
44	08 11 36.4	+69 30 03	0.60	0.50	Ir	VL		18.2	
			-	-				0.15	
45	08 21 09.8	+22 58 06	0.65	0.40	Ir?	L			distant?
			0.60	0.35				0.15	
46	09 05 58.5	+05 29 43	0.65	0.55	Ir	L		17.0	knots
			0.60	0.50				0.20	
47	09 06 06.5	+62 24 40	0.50	0.50	Sph?	EL			U4803 3'NW
			0.55	0.50				0.20	
48	09 13 30.0	+51 15 56	0.90	0.80	Ir	L			near NGC 2841
			0.70	0.70				0.07	
49	09 18 32.0	+50 28 55	1.30	1.10	Ir	L			near NGC 2841
			1.20	1.00				0.07	
50	09 19 18.4	+48 47 23	1.30	0.80	Ir	L	K 55	16.7	
			1.20	1.10				0.08	

Table 1. continued

kkh	RA (1950)	DEC	$(a \times b)_{\rm b}$		Type	S.B.	Identification	$B_{\rm T}$	Notes
			$(a \times b)_{\rm r}$					$A_{\rm B}$	
1	2		3		4	5	6	7	8
51	09 27 24.2	+20 12 42	0.70	0.70	Ir	L	K 56=	17.0	$Vh = 561$, NED
			0.65	0.60			D 565-10	0.19	comp.N2903?
52	09 34 52.9	+27 47 35	0.65	0.30	Ir	L	P27427	16.6	$Vh = 1597$, NED
			0.60	0.25				0.08	
53	09 37 53.2	+00 16 15	0.80	0.70	Ir	L	K 58		
			0.70	0.50				0.25	
54	09 42 06.4	+32 28 07	0.90	0.90	Ir	L	UGC 5209	16.5	$Vh = 546$, NED
			0.85	0.65				0.08	
55	09 45 14.1	+13 30 51	1.00	0.90	Sph?	EL			
			–	–				0.19	
56	09 53 53.6	+66 34 48	2.3:	2.0:	Ir	EL			cirrus?
			2.5:	2.0:				0.48	
57	09 56 35.0	+63 25 30	0.60	0.50	Sph	VL	HS108	18.5	resolved
			0.70	0.70				0.10	with 6-m tel.
58	10 04 23.3	+39 12 50	1.60	0.60	Ir	H	P29431	15.5	patchy, envel.
			1.05	0.45				0.06	$Vh = 580$, NED
59	10 06 40.0	+63 09 36	1.20	0.80	Ir	H	kig402	15.2	br.star proj.,
			1.20	0.70				0.06	Vstar = +33
60	10 13 22.0	+07 03 15	0.85	0.45	Ir	L			blue
			0.55	0.30				0.09	
61	10 23 07.0	+63 04 30	0.50	0.50	Ir	L			knots, dist.?
			0.45	0.40				0.03	
62	10 41 51.2	+54 28 09	0.65	0.45	Ir	L		17.1	granulated
			0.65	0.45				0.05	
63	10 43 22.8	+82 41 30	1.20	0.70	Ir	VL			
			1.10	0.70				0.12	
64	10 48 57.0	+03 43 10	1.20	0.95	Sm	L		16.5	
			0.95	0.75				0.19	
65	10 49 14.6	+28 37 42	0.70	0.70	Sph?	VL	BTS023	17.0	distant?
			0.60	0.50				0.08	
66	10 59 00.4	+70 32 01	0.80	0.60	Ir	L	K 74	17.9	
			0.80	0.60				0.10	
67	11 20 25.4	+21 36 05	1.20	0.90	Ir?	EL			
			–	–				0.10	
68	11 28 17.0	+14 25 18	0.80	0.65	Ir	L		16.7	blue, patchy
			0.65	0.45				0.16	
69	11 32 17.7	+11 17 42	0.80	0.40	Ir	L		17.0	blue knots
			0.85	0.35				0.10	
70	11 36 42.0	+60 26 55	0.90	0.45	Ir	H		16.7	blue knots
			0.75	0.40				0.06	
71	11 40 35.3	+14 30 08	1.10	0.70	Ir	L	K 79	16.6	
			0.90	0.65				0.10	
72	11 42 20.1	+02 26 31	0.95	0.60	Ir	L		17.6	blue
			0.85	0.50				0.11	
73	11 47 27.6	+56 03 15	0.85	0.70	Ir?	VL	BTS045	16.5	
			0.70	0.55				0.03	
74	11 52 38.6	+44 25 43	1.05	0.80	Ir	L	K 81	16.7	
			0.95	0.65				0.06	
75	11 59 22.0	+62 55 13	0.75	0.40	Ir	L		18.0	
			0.55	0.35				0.08	

For the detected galaxies we searched a circle with 15′ radius around the optical position in the NED for nearby objects. Possible cases of confusion are noted in Col. 10 of Table 2.

The measured and derived parameters of the detected galaxies indicate clearly that these objects are dwarf galaxies. Their absolute magnitudes cover a range from −10.5 to −17.5 with a median of −13.8 mag.

Table 1. continued

kkh	RA (1950) DEC		$(a \times b)_{\rm b}$ $(a \times b)_{\rm r}$		Type	S.B.	Identification	$B_{\rm T}$ $A_{\rm B}$	Notes
1	2		3		4	5	6	7	8
76	12 08 50.6	+38 49 06	0.70	0.35	Ir	H		17.1	blue knots
			0.55	0.30				0.08	
77	12 11 42.1	+66 22 12	1.50	0.60	Ir	H	UGC 7242	14.6	blue, near a
			1.40	0.60				0.08	bright star
78	12 15 14.9	+33 37 16	0.80	0.50	Ir	VL	BTS113	17.5	
			0.60	0.45				0.06	
79	12 17 28.0	+61 47 45	0.55	0.30	Ir	L		17.7	blue
			0.50	0.25				0.08	
80	12 25 34.8	+22 34 02	0.90	0.60	Ir	L	F573-01	17.0	
			0.80	0.55				0.09	
81	13 08 52.5	+36 56 44	0.65	0.50	Ir	VL		18.5	two LSB
			–	–				0.04	objects 8'N
82	13 10 43.1	+42 03 03	1.30	1.00	Ir	L	UGC A337	16.3	knots, gradient
			1.20	1.00				0.06	of brightness
83	13 22 38.0	+42 45 09	0.95	0.50	Ir?	L	UGC A354	17.0	central knots
			0.85	0.45				0.06	
84	13 32 08.2	+09 02 56	1.15	0.75	Ir	H		15.8	knots+blue
			0.90	0.60				0.11	envelope
85	13 37 34.1	+39 23 20	0.55	0.30	Ir	EL		17.2	patchy
			0.55	0.30				0.04	
86	13 52 02.2	+04 29 17	0.70	0.50	Ir	L		16.8	
			0.65	0.45				0.12	
87	14 13 32.9	+57 19 10	0.80	0.30	Ir	H	KUG	16.1	two knots, res.
			0.75	0.25				0.05	w. 6-m tel.
88	15 50 51.0	+64 16 30	0.70	0.50	Ir	H	P56228	15.4	distant?
			0.70	0.45				0.07	
89	18 30 54.0	+33 20 58	1.50	1.00	Ir?	EL		18.0	cirrus?
			1.30	0.80				0.28	
90	19 41 50.0	+68 27 03	1.30	0.75	Ir?	VL		18.0	refl. neb.?
			1.10	0.75				0.67	
91	19 55 30.6	+04 39 17	0.95	0.55	Ir	L		17.4	
			0.90	0.60				0.46	
92	20 09 34.0	+65 56 03	0.55	0.20	Ir	L			wedge-like
			0.45	0.20				0.41	
93	20 56 56.5	+62 09 15	0.50	0.35	Ir	L		18.3	distant?
			0.50	0.35				2.89	
94	23 06 12.0	+56 14 08	2.5	1.6	Ir?	VL			isol.cirrus?
			1.5	1.0				3.32	
95	23 19 32.3	+85 05 57	1.00	0.70	Sph?	VL		18.0	refl. neb.?
			0.70	0.50				1.36	
96	23 24 10.2	+50 24 02	2.5	2.0	Sph	VL		13.6	Cassiop.dSph
			2.2	1.9				0.84	
97	23 35 50.7	+39 55 08	0.50	0.30	Ir	L			
			0.45	0.25				0.51	
98	23 43 03.9	+38 26 24	1.10	0.65	Ir	L		16.7	blue,granul.
			0.85	0.50				0.54	res. w. 6-m tel
99	23 49 13.9	+24 18 29	4.0	2.0	Sph	VL		14.1	Pegasus dSph
			2.8	1.8				0.28	
100	23 49 51.4	+08 33 45	0.60	0.45	Ir	L			blue, distant?
			0.55	0.40				0.42	
101	23 53 42.8	+05 49 57	0.75	0.50	Ir	L			knots, distant?
			0.75	0.45				0.22	

Table 2. The HI line data for nearby dwarf galaxies

kkh No.	HI-flux Jy km s^{-1}	$S_{\rm max}$ mJy	$V_{\rm h}$ km s^{-1}	line width km s^{-1}	$V_{\rm LG}$ km s^{-1}	$M_{\rm B}$	$M_{\rm HI}/L_{\rm B}$ $M_\odot/L_\odot$	$M/L_{\rm B}$ $M_\odot/L_\odot$	Comments
1	2	3	4	5	6	7	8	9	10
1	2.2	98 ± 7	-104 ± 2	25 28 29					local HI
2		± 9							
3		± 10							
4		± 8							
5	1.74	120 ± 9	61 ± 2		326	−12.3	0.6		in Maffei gr.?
6	≥1.3	80 ± 7	70 ± 3		323	−12.7	0.3:		in Maffei gr.?
7		± 12							
8	1.3	34 ± 6	1740 ± 4	55 70 72	1861	−15.8	0.6	2.7	
9		± 6							
10	7.7	147 ± 10	1558 ± 3	55 71 78	1569	−15.5	3.8	3.9	
11	22.8	260 ± 7	75 ± 1	92 98 103	308	−14.0	1.6	7.1	in Maffei gr.?
12	8.5	220 ± 8	71 ± 1	41 57 63	304	−13.7	0.8	2.2	in Maffei gr.?
13	5.9	96 ± 10	693 ± 2	76 89 91	860	−14.4	2.1	7.6	
14	9.7	97 ± 7	1580 ± 2	108 120 122	1748	−15.6	4.7	11.8	
15	2.5	81 ± 6	-142 ± 2	28 29 44					local HI
16	2.4	40 ± 6	2148±2	99 131 133	2338	−16.2	1.2	7.2	
17		± 18							
18	2.6	94 ± 6	216 ± 3	37 52 57	375	−12.6	0.9	2.4	
19	3.0	61 ± 6	2037 ± 2	50 56 63	2269	−16.9	0.8	0.8	
20	10.4	169 ± 9	2131 ± 1	65 78 82	2361	−17.0	2.5	1.1	
21		± 9							
22		± 8							
23		± 5							
24	0.5	20 ± 3	1706 ± 3	32 39 59	1936	−15.8	0.3	0.6	
25	2.20	101 ± 10	-135 ± 2	14 30 35					local HI
26	6.5	135 ± 6	-138 ± 3	46 59 65					local HI
27		± 7							
28	3.6	50 ± 7	3508±2	87 95 99	3463	−17.5	1.2	2.3	
29		± 5							
30		± 5							
31		± 6							
32		± 7							
33		± 6							
34	1.1	60 ± 6	110 ± 2	21 30 32	299	−12.0	0.5	1.5	in Maffei gr.?
35		± 6							
36	102.6	554 ± 7	767 ± 1	232 244 248	708	−15.8	6.8	9.3	
37	1.8	70 ± 9	-146 ± 2	25 34 36	57	−8.3	0.8	15.3	local HI?
38	6.5	130 ± 10	451 ± 2	58 67 70	518	−13.1	2.9	9.1	
39	3.1	71 ± 7	1348 ± 2	45 54 57	1159	−14.0	2.9	2.4	
40	2.6	98 ± 12	445 ± 2	27 40 42	510	−12.8	1.4	1.7	

The median radial velocity of the detected galaxies is 770 km s^{-1}, and the median HI line width is W_{50} = 46 km s^{-1}. Median values of the hydrogen mass and hydrogen mass-to-luminosity ratio are 7 10^7 $M_\odot$ and 1.2 $M_\odot/L_\odot$, respectively. In Fig. 2 we show the distribution of absolute magnitudes for the detected galaxies in Paper I, Paper II, and Paper III (present sample). The median value and its error are given for each sample. The distribution of $M_{\rm B}$ in Papers I and III are similar in extent and shape except for a few bright objects in Paper I. This contrasts to the distribution of $M_{\rm B}$ in Paper II where we find a lack of faint (nearby) dwarfs due to the Local

Table 2. continued

kkh	HI-flux	$S_{\max}$	$V_{\rm h}$	line width	$V_{\rm LG}$	$M_{\rm B}$	$M_{\rm HI}/L_{\rm B}$	$M/L_{\rm B}$	Comments
No.	Jy km s^{-1}	mJy	km s^{-1}	km s^{-1}	km s^{-1}		$M_{\odot}/L_{\odot}$	$M_{\odot}/L_{\odot}$	
1	2	3	4	5	6	7	8	9	10
41		±5							
42	2.4	41 ± 7	1841 ± 2	63 70 72	2060	−16.5	0.8	1.4	
43	0.9	21 ± 5	1981 ± 4	47 62 63	1855	−14.3	1.7	3.6	
44	1.2	54 ± 6	1054 ± 2	20 28 29	1202	−13.0	3.2	1.4	
45		±9							
46	2.6	100±9	598 ± 2	28 35 39	409	−11.9	2.2	2.8	
47		±12							
48		±5							
49		±9							
50	1.7	34 ± 4	736 ± 3	60 66 69	770	−13.4	1.2	11.5	
51	1.3	40 ± 8	559 ± 2	31 36 37	438	−12.0	1.1	3.6	
52	2.8	80 ± 6	1594 ± 2	32 47 50	1533	−15.0	1.9	0.8	
53		±10							
54	1.2	43 ± 5	535 ± 3	23 34 46	479	−12.6	0.7	1.6	
55		±14							
56		±6							
57		±5							new dSph in M 81 group
58	2.8	52 ± 9	587 ± 3	83 100 103	569	−14.0	0.7	12.5	
59	1.9	40 ±6	−160 ± 5	46 56 61					local HI?
60		±10							
61		±5							
62	1.3	36 ± 4	999 ± 2	31 51 56	1068	−13.7	1.4	1.7	
63		±4							
64	11.6	200 ± 9	1070 ± 1	64 73 76	881	−14.0	0.6	7.9	
65		±7							
66		±4							
67		±14							
68	1.3	62 ± 6	878 ± 1	18 23 24	751	−13.5	0.9	0.6	
69	0.9	46 ± 6	882 ± 3	19 26 33	742	−13.1	0.8	1.0	
70	1.4	45 ± 5	−154 ± 2	24 37 39					local HI
71	2.4	45 ± 7	1015 ± 2	77 91 93	894	−13.9	1.5	12.3	
72	4.4	153 ± 8	1013 ± 2	24 39 42	839	−13.4	4.1	1.6	
73		±5							
74	0.8	25 ± 3.6	727 ± 3	37 45 46	762	−13.4	0.6	3.7	
75	9.4	430 ± 7	−153 ± 2	20 28 31					local HI
76	1.8	17 ± 6	1081 ± 2	54 60 61	1094	−13.8	0.5	5.1	
77	7.1	126 ± 12	68 ± 2	63 73 79	213	−12.7	0.7	7.8	comp. of NGC 4236
78		±6							
79	1.3	44 ± 10	320±	30 45 47	446	−11.2	2.3	5.4	
80	0.9	48 ± 5	603 ± 2	16 29 33	544	−12.4	0.8	1.1	

Void (see Paper II). Recently Eder & Schombert (2001) presented HI data for gas-rich dwarfs selected from the POSS-II survey and observed with the 305-m Arecibo radio telescope. Their sample (crosses a nearby void at RA 0h45m [1950] Dec = 20^0, $v = 3500$ km s^{-1}) has almost the same median $M_{\rm HI}/L_{\rm B}$ ratio but their mean HI mass ($8\ 10^8\ M_{\odot}$) exceeds the median of our sample by one order of magnitude. It is a more distant sample.

The "total" (dynamical) mass-to-luminosity ratio for our dwarf galaxies ranges from 0.6 to 17.3 in solar units with the median value of 3.0 $M_{\odot}/L_{\odot}$. Using the apparent axial ratios to correct W_{50} for inclination, the median

Table 2. continued

kkh	HI-flux	$S_{\rm max}$	$V_{\rm h}$	line width	$V_{\rm LG}$	$M_{\rm B}$	$M_{\rm HI}/L_{\rm B}$	$M/L_{\rm B}$	Comments
No.	Jy km s^{-1}	mJy	km s^{-1}	km s^{-1}	km s^{-1}		$M_\odot/L_\odot$	$M_\odot/L_\odot$	
1	2	3	4	5	6	7	8	9	10
81	4.5	35 ± 4	1032 ± 4	143 176 178					conf.w. NGC 5002 4' W
82		± 6							
83	3.5	48 ± 8	1105 ± 2	92 103 104	1174	-14.1	3.3	17.3	
84	5.1	78 ± 4	1233 ± 3	61 98 104	1158	-15.2	1.6	3.0	
85	0.9	33 ± 7	678 ± 2	38 39 52	741	-12.8	1.0	3.4	
86	0.5	27 ± 3	283 ± 3	18 26 29	205	-10.5	0.4	2.2	
87	3.9	86 ± 7	324 ± 2	39 56 67	477	-13.0	1.7	2.9	in M 101 group
88	8.7	107 ± 11	933 ± 2	83 97 110	1147	-15.6	1.9	2.5	
89	4.5	160 ± 11	-99 ± 2	36 42 ..					local HI
90	3.2	127 ± 10	-140 ± 2	38 46 47					local HI
91	0.4	34 ± 6	-107 ± 2	15 17 18:					local HI
92		± 8							
93	15.8	1060 ± 7	-112 ± 2	45 62 69					local HI
94		± 5							
95	2	11 ± 3	3570 ± 7	106 154 ..	3818	-16.9	1.4	5.8	
96		± 9							
97		± 7							
98	2	89 ± 7	-136 ± 3	26 36 40	152	-10.4	1.0	6.0	
99		± 9							
100		± 6							
101		± 11							

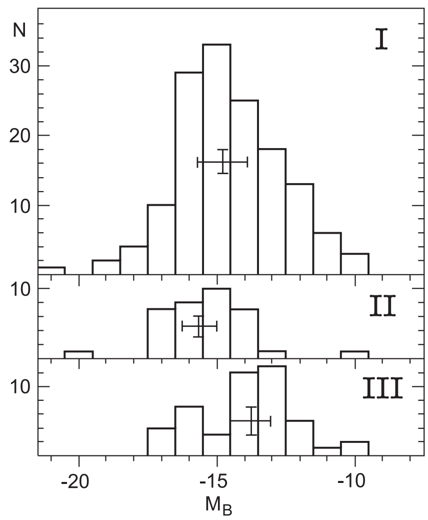

Fig. 2. The distribution of the absolute magnitude $M_{\rm B}$ of the detected galaxies in Paper I, Paper II, and the present sample (Paper III) is shown; the average absolute values and their errors are indicated, too

increases to 4.7 $M_\odot/L_\odot$. The mean M/L, as well as $M_{\rm HI}/L$ shows no correlation with the galaxy luminosity.

In spite of the uncertainty of this estimate of the "total" mass of dwarf galaxies due to a problematic inclination correction and turbulent motion correction, the hydrogen mass-to-total mass ratio shows that most of the considered galaxies contain a significant reservoir of gas for further star formation. The median value of $M_{\rm HI}/M_{\rm t}$ for them is 0.47 (or 0.28 after a formal correction for galaxy inclination). Taking into account a (primordial) helium abundance as well as the probable presence of molecular hydrogen, the gaseous mass in dwarf LSB galaxies may be larger than their stellar mass. In some dwarf galaxies (kkh 14, 36, 72) of our sample the $M_{\rm HI}/L$ ratio exceeds 4 $M_\odot/L_\odot$, i.e. these galaxies are more gas-rich than the well known gas-rich irregular galaxy UGC 8024 = DDO154 (Carignan & Beaulieu 1989). A number of the dwarf galaxies are probable members of known nearby groups around Maffei/IC 342 (kkh 5, 6, 11, 12, 34), M 81 (kkh 57, 77), and M 101 (kkh 87). As an example we present in Fig. 3 large-scale images of four Ir galaxies (kkh 11, 12, 87, 98) which have been observed with the 6-m telescope. Each of them is well resolved into stars, confirming their proximity.

5. Conclusion

In this paper we presented the results of a search for new nearby dwarf galaxies on POSS-II films covering the northern sky. On a total sky area of $\sim 10\,000$ □° we

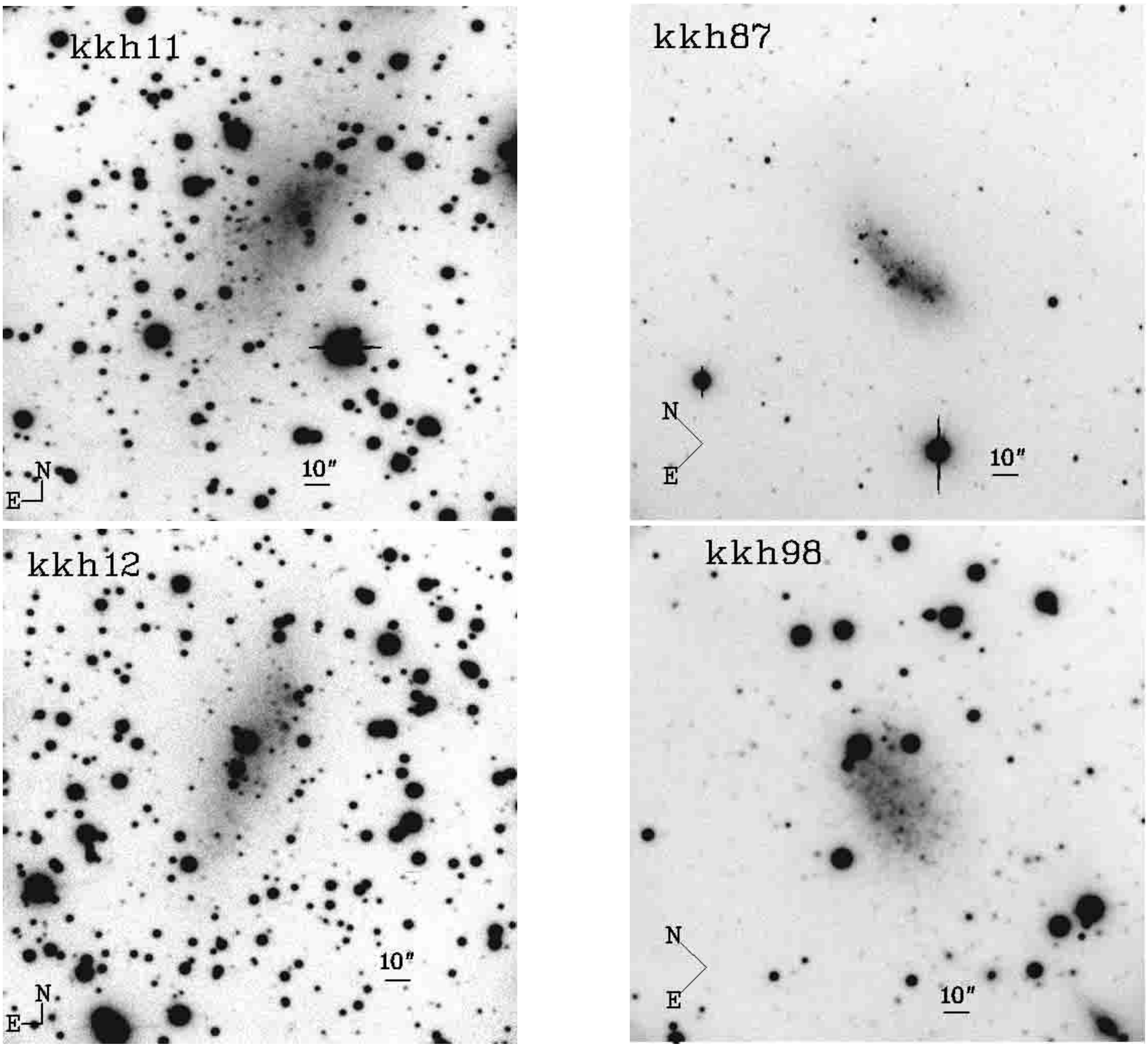

Fig. 3. R images of kkh 11, kkh 12, kkh 87, and kkh 98 obtained with the 6-m telescope. North and East are indicated by arrows

found 101 nearby galaxy candidates, two thirds of them previously uncatalogued. Together with the two previous lists (Karachentseva & Karachentsev 1998; Karachentseva et al. 1999) the present list covers $\sim 94\%$ of the northern (Dec > 0) sky giving a total number of 163 + 78 + 101 = 342 objects mainly of low surface brightness. About 1200 $\Box^\circ$ remain to be inspected due to the fact that the POSS-II is still uncomplete.

HI line observations with the 100-m Effelsberg radio telescope yielded a detection rate of 46%. Most of them are actually nearby dwarf galaxies with a median corrected radial velocity of +770 km s^{-1}, a median absolute magnitude of -13.8 mag, and a median linear optical diameter $A_0 = 2.7$ kpc. More than half of the detected galaxies have a high hydrogen mass-to-luminosity ratio $M_{\rm HI}/L > 1\ M_\odot/L_\odot$. Typically their gaseous mass is comparable to their stellar mass ($M_{\rm HI}/M_{\rm t} \sim 0.3$).

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References

Banks, G. D., Disney, M. J., Knezek, P. M., et al. 1999, ApJ, 524, 612

Binggeli, B., Tarenghi, M., & Sandage, A. 1990, A&A, 228, 42

Carignan, C., & Beaulieu, S. 1989, ApJ, 347, 760

Disney, M., & Phillips, S. 1983, MNRAS, 205, 563

Eder, J. A., & Schombert, J. 2001, ApJS, submitted [astro-ph/0006290]

Henning, P. A., Kraan-Korteweg, R. C., Rivers, A. J., et al. 1998, AJ, 115, 584

Huchtmeier, W. K., & Richter, O. G. 1988, A&A, 203, 237
Huchtmeier, W. K., & Richter, O. G. 1989, A&A, 210, 1
Huchtmeier, W. K., Karachentsev, I. D., & Karachentseva, V. E. 1997, A&A, 322, 375
Huchtmeier, W. K., Karachentsev, I. D., Karachentseva, V. E., & Ehle, M. H. 2000a, A&AS, 141, 469, Paper I
Huchtmeier, W. K., Karachentsev, I. D., & Karachentseva, V. E. 2000b, A&AS, 147, 187, Paper II
Impey, C. D., Sprayberry, D., Irwin, M. J., & Bothun, G. D. 1996, ApJS, 105 209
Karachentsev, I. D. 1994, A&Ap Trans., 6, 1
Karachentseva, V. E., & Karachentsev, I. D. 1998, A&AS, 127, 409
Karachentseva, V. E., Karachentsev, I. D., & Richter, G. M. 1999, A&AS, 135, 221
Karachentsev, I. D., Karachentseva, V. E., Suchkov, A. A., & Grebel, E. K. 1998, A&AS, 145, 415
Karachentseva, V. E., & Karachentsev, I. D. 2000, A&AS, 146, 35
Karachentsev, I. D., & Makarov, D. I. 1996, AJ, 111, 535
Kilborn, V., Webster, R., & Staveley-Smith, L. 1999, PASA 16, 8 (HIPASS)
Kraan-Korteweg, R. C., & Tammann, G. A. 1979, Astron. Nachr., 300, 181
McGaugh, S. S. 1996, MNRAS, 280, 337
Schlegel, D. J., Finkbeiner, D. P., & Davis, M. 1998, ApJ 500, 525
Schombert, J. M., Bothun, G. D., Schneider, S. E., & McGaugh, S. S. 1992, AJ, 103, 1107
van den Bergh, S. 1966, AJ, 71, 33
Williams, R. E., Blacker, B., Dickinson, M., et al. 1996, AJ, 112, 1335