ASTRONOMY & ASTROPHYSICS
SUPPLEMENT SERIES

Astron. Astrophys. Suppl. Ser. **116**, 193-202 (1996)



# A $^{12}$CO(1−0) survey of spiral galaxies in the region of the Coma supercluster*

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Received July 4; accepted September 19, 1995

**Abstract.** — We present observations of the $^{12}$CO($J$=1−0) line at 2.6 mm of 65 galaxies located in the Coma supercluster region: 33 actually belong to the Coma supercluster while 32 are either foreground or background objects. These data have been obtained using the NRAO 12 m telescope at Kitt Peak (United States), and for four galaxies, using the IRAM 30 m telescope at Pico Veleta (Spain). Out of these 65 galaxies, 54 had never been observed in the CO(1−0) line; 49 have been detected by us, of which 37 are new detections. We give molecular gas masses deduced from the CO line integrated intensities, and upper limits for the 16 undetected objects, computed with a Galactic conversion factor $N(H_2) = 2.3\ 10^{20}\ I(CO)$ and $H_0 = 75$ km/s/Mpc.**

**Key words:** galaxies: clusters: Coma cluster — galaxies: interstellar medium — radio lines: galaxies

## 1. The CO(1−0) emission of galaxies in the Coma supercluster region

The CO(1−0) line at 2.6 mm is the most widely used, athough indirect, tracer of molecular hydrogen (see e.g. Young & Scoville 1991). With present-day millimeter-wave receivers, this line is now detectable in relatively distant galaxies such as the Coma cluster ones (Casoli et al. 1991, hereafter CBCD, Dickey & Kazès 1992, hereafter DK; Boselli et al. 1995). Here we present new observations of this line in 65 galaxies in the region of the Coma supercluster, that is, the Coma cluster itself (A1656), the A1367 cluster, their periphery, and some foreground objects. A complete analysis of the available CO(1−0) data for one hundred galaxies in the region of Coma, including these ones, can be found in a companion paper (Casoli et al. 1995).

Sixty-one galaxies have been observed with the NRAO 12 m telescope at Kitt Peak (herafter KP), of which the beamsize is 55″, corresponding to 10.7 to 36 kpc depending on the galaxy distance. This is large enough that with a single pointing on each galaxy we observe its whole molecular emission. Four additional galaxies have been observed with the IRAM 30 m telescope (beamsize 22″); all of them belong to the Coma cluster itself, at an adopted distance of 92 Mpc, so that the beam encloses a 9.8 kpc radius on the galaxy. The study of DK has shown that this beamsize likely encloses most of the emission; in any case only one of these four galaxies has been detected.

This sample is not complete in any sense and it is mainly far-infrared selected. In order to construct the sample observed at KP, we have indeed searched in the NASA Extragalactic Data base (NED) for all IRAS-detected galaxies in the region of the Coma supercluster as defined in Gavazzi (1987): the clusters Abell 1367 and Abell 1656 (the Coma cluster) and the "bridge" between the two. Out of this sample, 61 objects have been observed. The four additional objects observed with the IRAM 30 m telescope have been chosen because they were not detected by IRAS in spite of their large size and blue luminosity (blue diameter between 23 and 40 kpc, blue luminosity larger than $10^{10}\ L_{\odot}$).

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*Tables 1 and 2 are also available at the CDS via anonymous ftp 130.79.128.5

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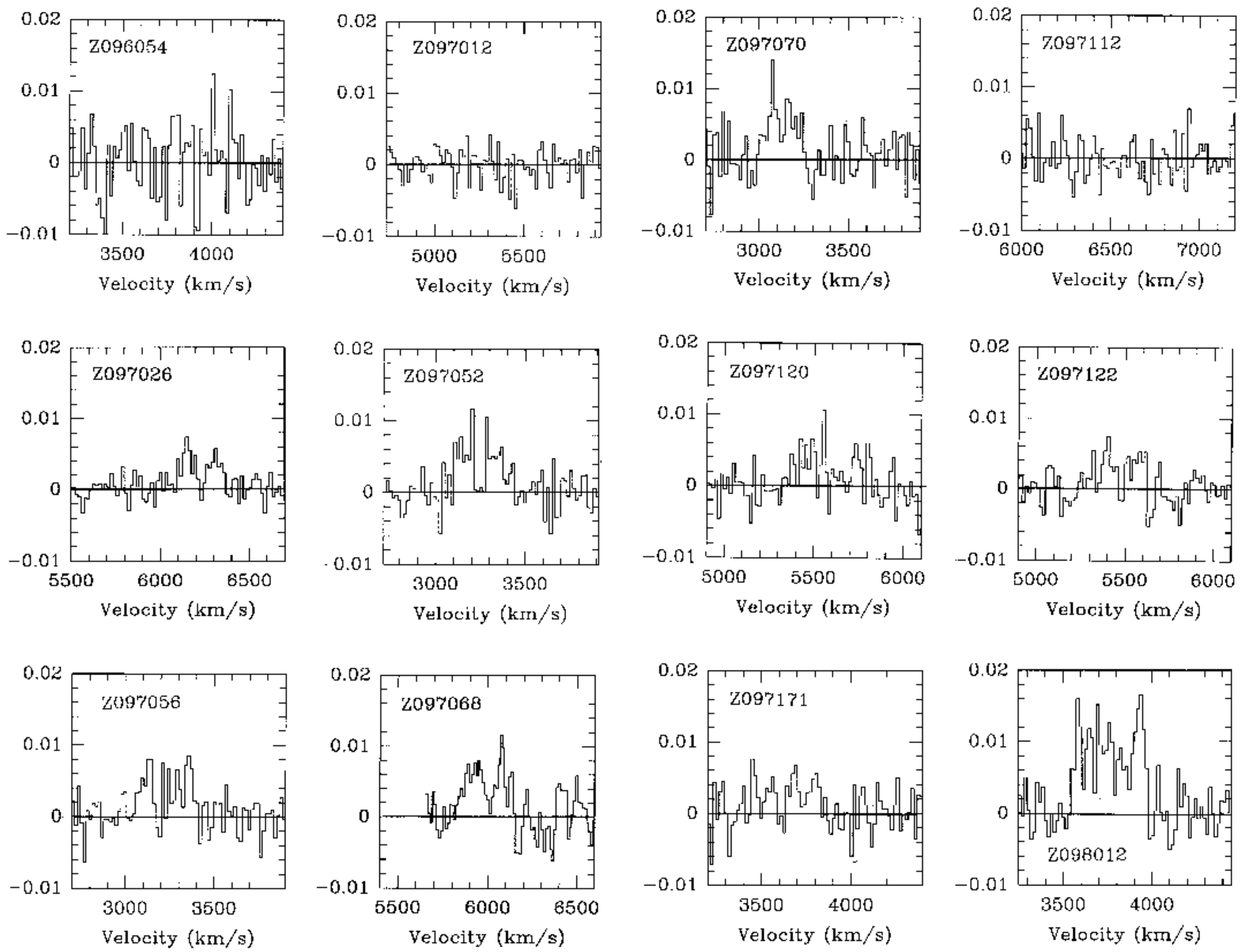


**Fig. 1.** $^{12}$CO(1−0) spectra of the galaxies observed at the 12 m telescope at Kitt Peak. The ordinate is the main-beam brightness temperature. All velocities are heliocentric (optical definition, $v = cz$), and the spectra have been smoothed to a resolution of 16.25 km/s. The galaxies are in alphabetical order for the CGCG names (Zwicky et al. 1961-1968)

Table 1 lists some characteristics of the sample galaxies:

*Column 1*: the name of the galaxy from the General Catalogue of Galaxies and Clusters of Galaxies (Zwicky 1961-1968).

*Column 2*: the name of the galaxy in the Principal Catalog of Galaxies (PGC, see Paturel et al. 1989).

*Column 3*: other names.

*Columns 4 and 5*: the adopted celestial coordinates (1950), from the NASA extragalactic database (NED). The position of some galaxies is given in this database with a poor accuracy (5″); this may be a problem for the IRAM observations (22″ beam) but not for the 12 m ones (55″ beam).

*Column 6*: the velocity centering of the filterbank. All velocities quoted here are heliocentric, optical definition ($v = cz = \Delta\lambda/\lambda_0$).

*Column 7*: the aggregation parameter, which indicates the galaxy environment as in Gavazzi (1987).

1, 2 are Coma cluster members, 3, and 3.1 are A1367 members, 4 are dubious members of the two clusters, while 5.1 to 5.9 belong to groups of galaxies inside the supercluster, 6 are pairs of galaxies and 7 are relatively isolated objects in the supercluster. Agg = 8 to 17 belong to various structures in the foreground of the supercluster, 19 and 19.2 are foreground objects.

*Column 8*: the distance computed according to this aggregation parameter, in the following way (we use $H_0 =$ 75 km/s/Mpc):

1, 2: 92 Mpc = (average velocity of the Coma cluster members)/75

3,3.1: 86.7 Mpc = same for A1367

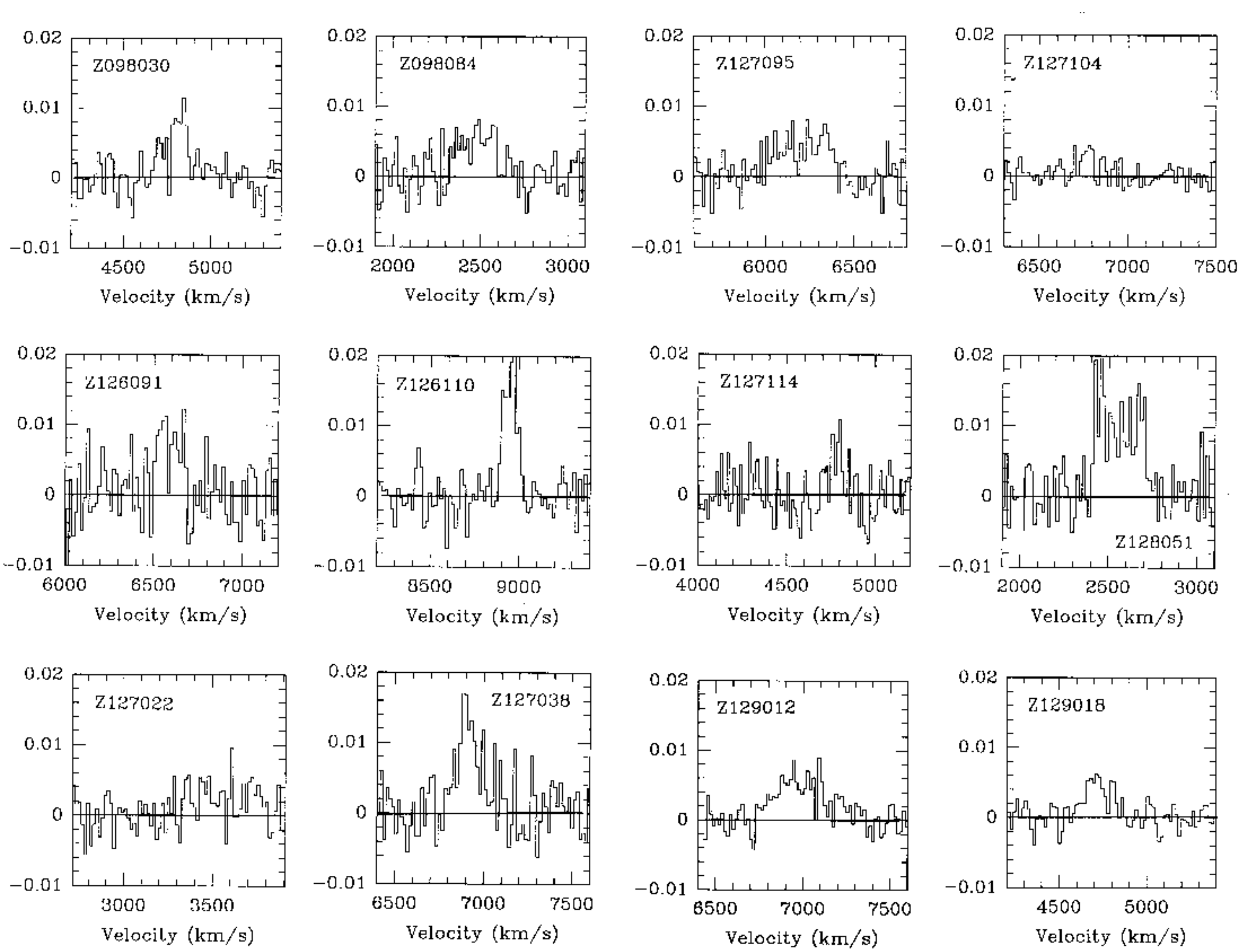


**Fig. 1.** continued

4, 6, 7, 16, 19, 19.2: background and foreground objects (D=galaxy velocity given in Col. 4)/75
5.1 to 5.9, 8 to 15, 17: (average group velocity)/75, that is:

- 5.1: 95.1 Mpc
- 5.2: 90.2 Mpc
- 5.3: 92.1 Mpc
- 5.4: 90.9 Mpc
- 5.5: 89.9 Mpc
- 5.6: 104.4 Mpc
- 5.7: 93.2 Mpc
- 5.8: 100 Mpc
- 5.9: 95.9 Mpc
- 8: 45.7 Mpc,
- 9: 43.9 Mpc
- 10: 45.3 Mpc,
- 11: 62 Mpc
- 12: 59.5 Mpc
- 13: 52 Mpc
- 14: 61.1 Mpc
- 15: 51.2 Mpc
- 17: 33.7 Mpc.

The agregation parameter has not been determined for 10 objects, for which we have computed the distance using the relation $D$ (Mpc) = $v$(km/s)/75.

*Column 8*: morphological type, extracted from the Lyon-Meudon Extragalactic Database (LEDA), coded as in the RC3 (de Vaucouleurs et al. 1992). They are coded as follows: E = −5, SO = −2, Sa = 1, Sb = 3, Sc = 6, Sm = 9, Irr = 10.

*Column 9*: the telescope where the CO observations were made. KP is for the NRAO 12 m telescope, I is for the IRAM 30 m.

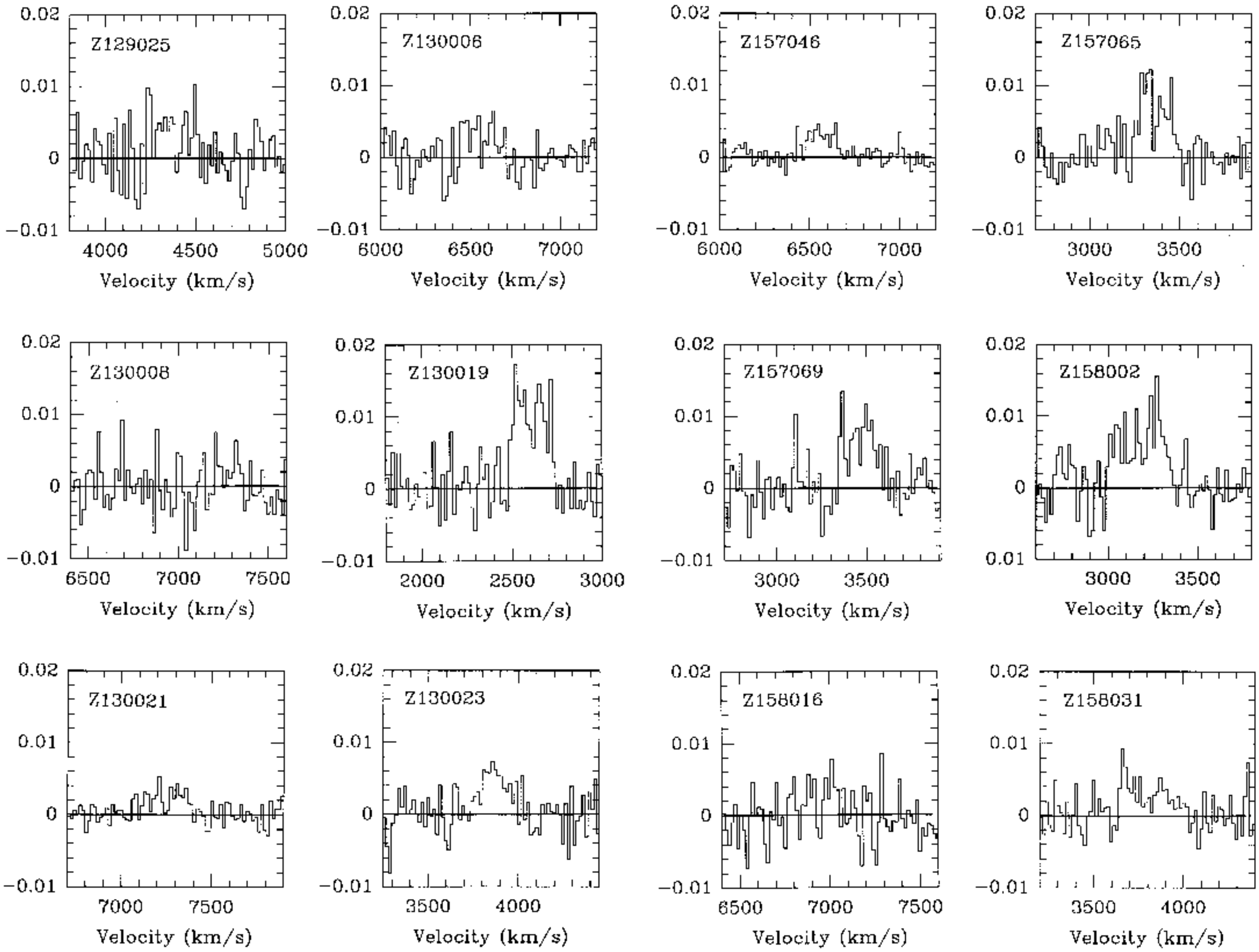


**Fig. 1.** continued

## 2. Observations

These observations have been obtained during three observing runs in May 1992, March and May 1993 using the 12 m radiotelescope of NRAO at Kitt Peak (Arizona). Four galaxies have been observed in november 1992 with the 30 m radiotelescope of IRAM at Pico Veleta (Spain).

For the 12 m observations, we used a dual polarization SIS mixer, with a receiver temperature of about 30 K; the system temperatures in the $T_{\rm R}^*$ scale were typically 250−500 K. As a backend we used a filter bank of 256 2 MHz wide channels (5.2 km/s). To improve the signal-to-noise ratio, the spectra were boxcar smoothed to a final resolution of 16.25 km/s. The rms noise at this resolution is generally a few mK (see Col. 6 of Table 2). The observing procedure was beam switching with a nutating secondary and a throw of 2 arcmin on each side of the source, and the pointing was checked every two hours by observations of a nearby continuum source.

At the IRAM 30 m, we used an SIS receiver. Typical receiver and system temperatures were 180 and 350 K in the $T_{\rm A}^*$ scale. As a backend we used a filterbank of 512 contiguous 1 MHz channels (2.6 kms resolution). The spectra were boxcar smoothed to a resolution of 16.25 km/s. The observing procedure was wobbler switching with a throw of 4′. Pointing was checked every two hours or less by broadband continuum observations of the radiosource 3C273.

The final spectra, reduced using the CLASS software (Forveille et al. 1990), are shown in Fig. 1 (KP data) and 2 (IRAM data) ordered by CGCG number (Zwicky 1961-1968). We have used the main beam brightness temperature scale. At the 12 m telescope, the raw spectra which are in the $T_{\rm r}^*$ scale, were converted using $T_{\rm mb}= T_{\rm r}^*/0.82$. At the 30m telescope, the raw spectra are in the $T_{\rm A}^*$ scale

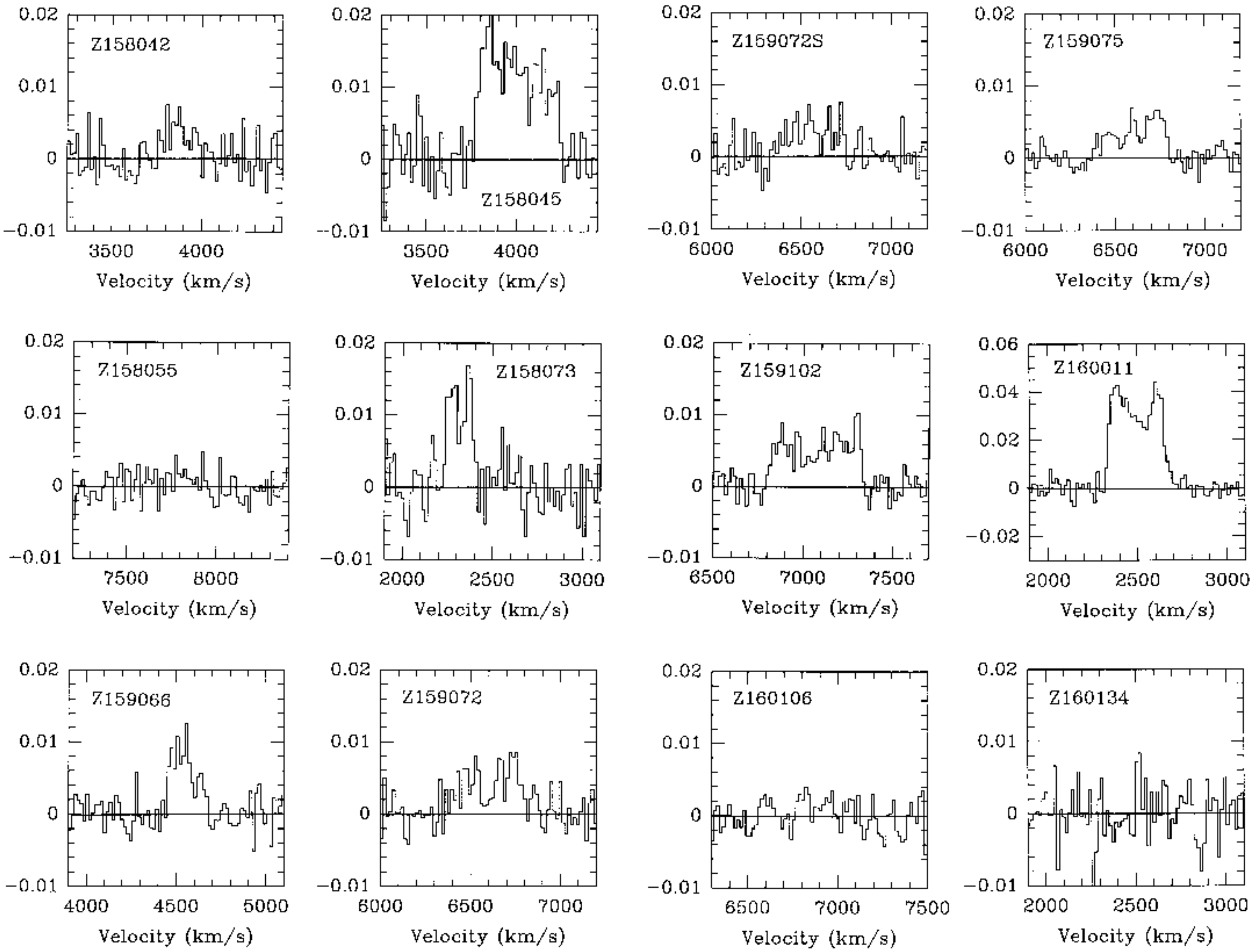


**Fig. 1.** continued

and were converted using $T_{\rm mb} = T_{\rm A}^{*}\ (\eta_{\rm fss}/\eta_{\rm m})$ where $\eta_{\rm fss}$ and $\eta_{\rm mb}$ are the forward and main-beam efficiencies (0.92 and 0.56 respectively). These main-beam brightness temperatures can be converted to Janskys using the conversion factor of 4.6 Jy/K for the 30 m telescope (this is appropriate for a source which fills the main beam, Guélin et al. 1995) and 29 Jy/K for the 12 m.

Masses of molecular hydrogen in the beam have been computed assuming the empirical conversion factor given by Strong et al. (1988):

$$N(\mathrm{H_2})\ (\mathrm{mol\ cm^{-2}}) = 2.310^{20}\ I(\mathrm{CO})\ (\mathrm{Kkm/s})$$

where $I$(CO) is the line area in main-beam units. This gives:

(1) $M(\mathrm{H_2}) = 2.05\ 10^5\ I(\mathrm{CO})\ (D/1\ \mathrm{Mpc})^2$ for KP, and
(2) $M(\mathrm{H_2}) = 3.28\ 10^4\ I(\mathrm{CO})\ (D/1\ \mathrm{Mpc})^2$ for IRAM,

where $D$ is the galaxy distance given in Col. 6 of Table 1. It is not known to what extent this Galactic disk value is valid for extragalactic objects. One can view these masses as a way of measuring the CO luminosities in units more convenient than the usual Kkm/s/kpc$^2$. Anyway, the $H_2$ masses can easily be converted back to CO luminosities by:

- $L_{\rm CO}$ (Kkm/s/kpc$^2$) $= 0.27\ M(\mathrm{H_2})\ (M_\odot)$, and
- $L_{\rm CO}$ $(L_\odot) = 1.3\ 10^{-5}\ M(\mathrm{H_2})\ (M_\odot)$.

Table 2 contains an overview of the CO data and the value of the H2 masses. It is arranged as follows:

*Column 1*: galaxy name.

*Column 2*: total integration time (ON + OFF), in minutes.

*Column 3*: line area (Kkm/s, main beam units), estimated either from a gaussian fit or the line moments, depending on the lineshape. rms noise in mK.

*Column 4*: CO(1−0) central velocity, and its error.

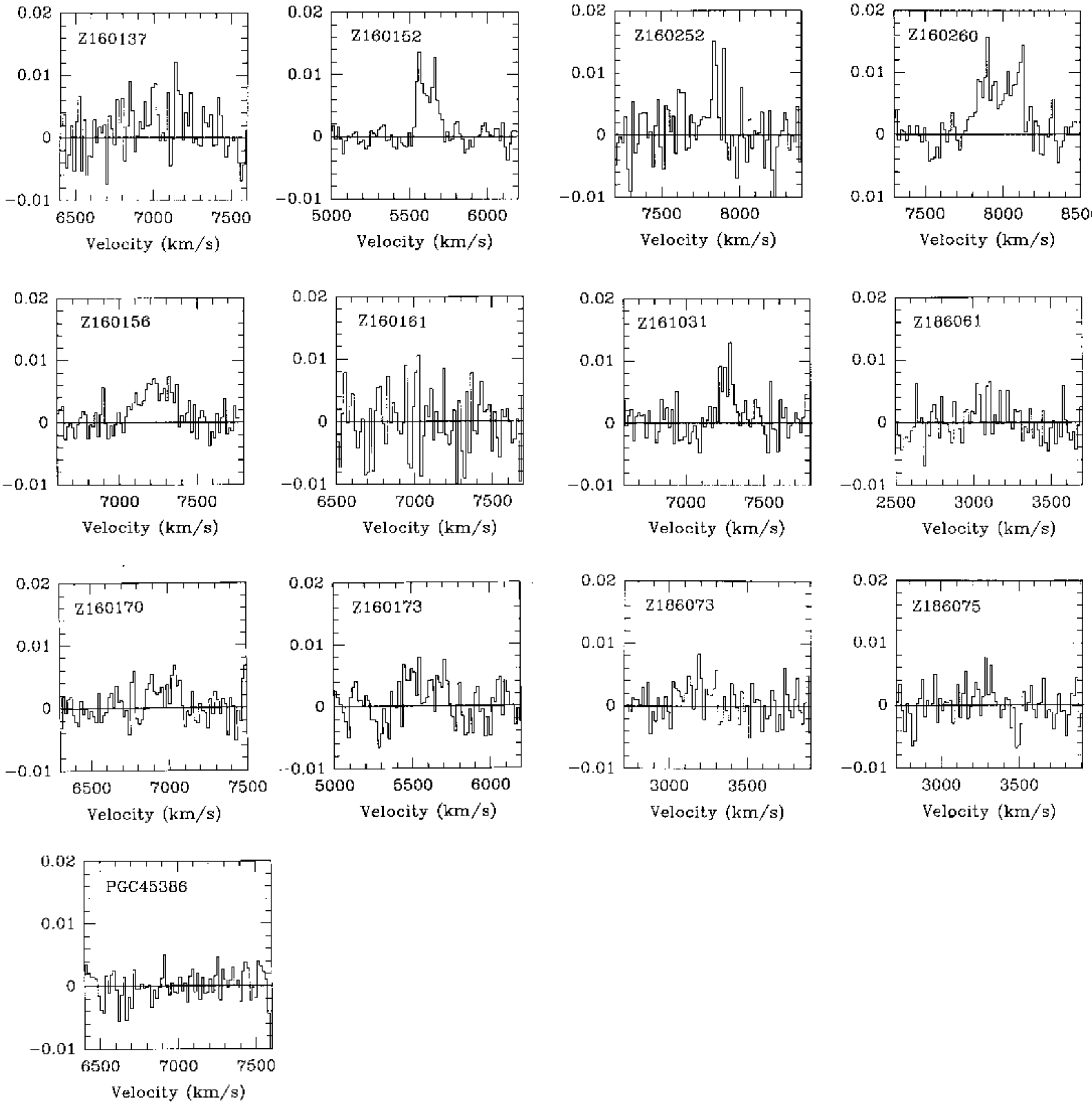


**Fig. 1.** continued

*Column 5*: CO(1−0) linewidth at half-maximum, and its error, determined either from a gaussian fit or from the line moments depending on the line shape.

*Column 6*: $H_2$ mass derived using Eqs. (1) or (2) and the distance given in Col. (6) of Table 1. If the target was not detected the upper limit given is equal to 3 $\sigma' W_{20}$, where $W_{20}$ is the HI linewidth at 20% of the maximum, from the Lyon-Meudon extragalactic database LEDA, and $\sigma'$ the rms noise reached if the spectrum was smoothed in such a way that only 3 channels are left inside the HI linewidth. Thus $\sigma' = \sigma(16.25/(W_{20}/3)^{0.5}$, and $\sigma$ is the rms noise in the spectrum smoothed to 16.25 km/s (Col. 6).

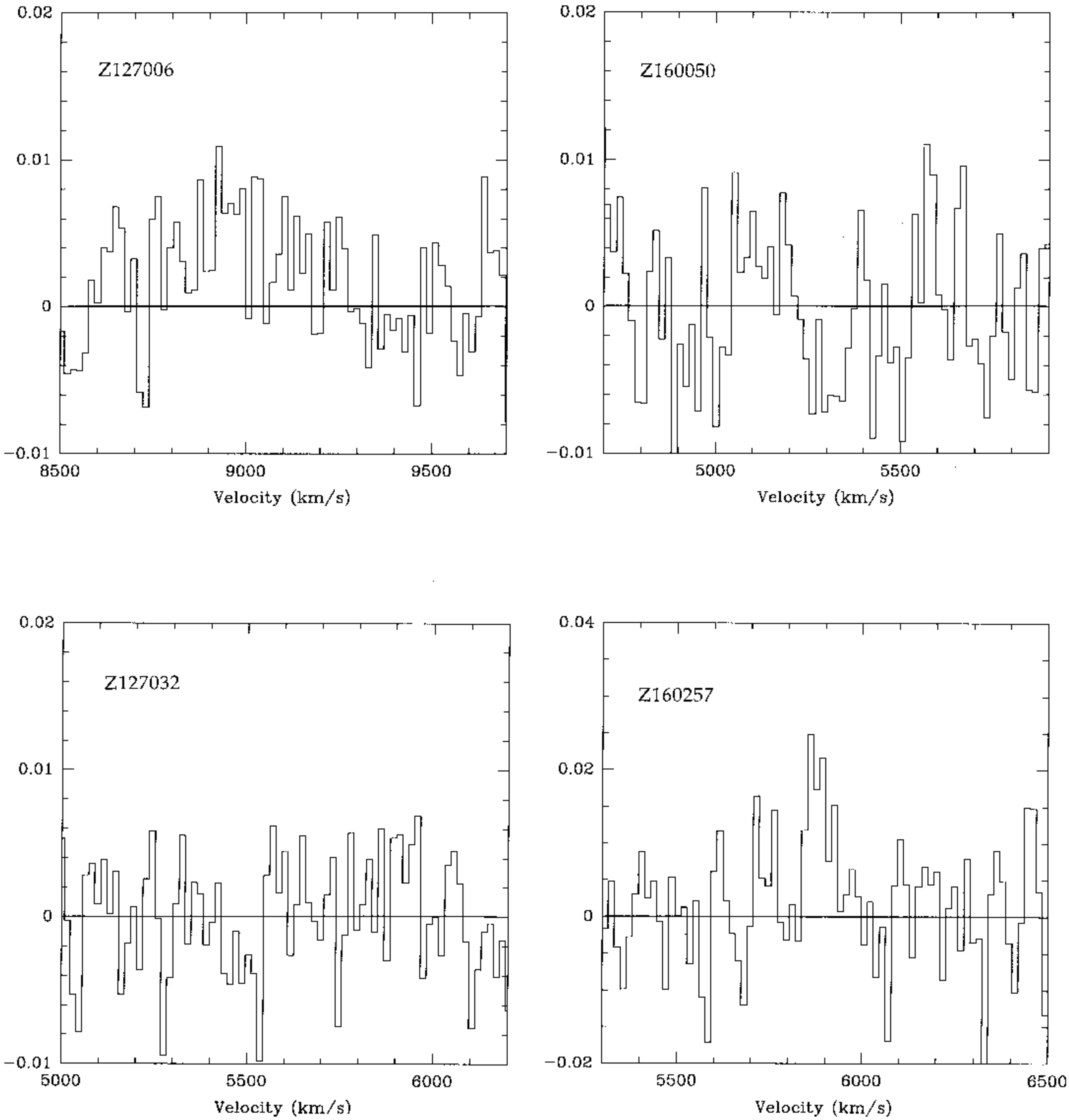


**Fig. 2.** $^{12}CO(1{-}0)$ spectra of the galaxies observed at the IRAM 30 m telescope at Pico Veleta (Spain). The ordinate is the main-beam brightness temperature. The velocities are heliocentric (optical definition, $v = cz$), and the spectra have been smoothed to a resolution of 16.25 km/s

## 2.1. *Comparison between IRAM and Kitt Peak observations*

Eleven galaxies have been observed both at Kitt Peak and other telescopes. The results are generally in fairly good agreement given the errors and the uncertainties associated in the millimeter range with the comparison of observations made with different telescopes. A detailed comparison is given below; for each galaxy we give inside parenthesis the source of the value which has been eventually adopted in the analysis of Paper II.

**CGCG 097-068** has been observed by DK and in Kitt Peak. The $H_2$ masses are respectively 4.1 $10^9$ $M_\odot$ and 2.3 $10^9$ $M_\odot$, but the Kitt Peak spectrum has a low signal-to-noise ratio. (DK value)

**CGCG 097-122** has been observed Boselli et al. (1995) with the Onsala 20 m radiotelescope. The $H_2$ mass scaled to our adopted distance is 4.1 $10^9$ $M_\odot$ to be compared to 1 $10^9$ $M_\odot$ in this work. Both spectra have low signal to noise ratios, but the KP one has a linewidth in better agreement with the HI one. (KP)

**CGCG 159-072** has been observed by CBCD. They find 3.1 $10^9$ $M_\odot$, while the KP observations give 3.9 $10^9$ $M_\odot$. (CBCD)

**CGCG 159-072S** has been observed by CBCD. They find 2.0 $10^9$ $M_\odot$, while the KP observations give 2.8 $10^9$ $M_\odot$. (CBCD)

**CGCG 159-072 and 159-072S** are the two galaxies which constitute the interacting pair sometimes called "the Mice" (Arp 242; CGCG 159-072 is Arp 242B and CGCG 159-072S is Arp 242A). Smith & Higdon (1994) have recently published NRAO CO(1−0) observations of the two galaxies. Although the central positions are the same to a few arcsec, the line areas are not in good agreement: for the first galaxy they find $I$(CO) = 2.2 Kkm/s (we find 1.45), for the second one they find 1.0 Kkm/s while we detected 2.0 Kkm/s. The central velocities are however in good agreement. Given the overall agreement of our KP data with the IRAM data, we believe that these discrepancies are likely due to a higher noise in the Smith & Higdon data: their noise level is 2.7 and 3.4 mK in 36 km/s channels, while ours is 2.2 mK in 16 km/s channels.

**CGCG 160-252**: 2.4 $10^9$ $M_\odot$ from CBCD, 1.6 $10^9$ from KP, with a high noise. (CBCD)

**CGCG 160-260**: CBCD give 3.0 $10^9$ $M_\odot$, while DK give 6.2 $10^9$ and KP 5.9 $10^9$ $M_\odot$. It is likely that CBCD have missed some CO emission: their central position differs by 7″ from the one used by DK, and the spectrum is highly asymetric. (KP)

**CGCG 160-106**: 1.9 $10^9$ from CBCD, marginally compatible with a 3 $\sigma$ limit of 1.7 $10^9$ $M_\odot$ at Kitt Peak. (CBCD)

**CGCG 130-006**: 1.2 $10^9$ from CBCD, $10^9$ at KP, but the detection is marginal. (CBCD)

**CGCG 130-023 = IC860**, a peculiar object where HI and OH absorptions have been detected, has been previously observed in the CO(1−0) line by Kazès et al. (1988) using the Nobeyama 45 m telescope (NRO). Their derived $H_2$ mass is 5 $10^8$ $M_\odot$ if we scale to our conversion factor. We find 7 $10^8$ $M_\odot$, a narrower line (174 km/s versus 270 km/s), and we do not see the blue CO wing present in the NRO spectrum, which is clearly more noisy than the KP one. Our linewidth is in better agreement with the width of the HI absorption.

**CGCG 160-156**: DK give 3.3 $10^9$ $M_\odot$, KP 3.4 $10^9$. (KP)

**CGCG 160-173**: DK give 1.1 $10^9$ $M_\odot$, KP 0.9 $10^9$ $M_\odot$. (KP)

The KP values are generally slightly larger than the IRAM values, which could indicate that a small fraction of the emission was missed in the 22″ beam of IRAM. But this may not be significant given the uncertainties in the relative and absolute calibrations of the temperature scales.

*Acknowledgements.* We thank the operators of the NRAO 12 m telescope for their efficient help. This resarch has made great use of the Lyon-Meudon Extragalactic Data Base (LEDA) and of the NASA Extragalactic Database (NED).

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**Table 1.**

| CGCG | PGC | Other names | RA 1950 | DEC 1950 | vhel km/s | Agg | distance Mpc | type | Obs |
|---|---|---|---|---|---|---|---|---|---|
| Z096054 | 35362 | U6483 | 11 26 25.9 | 17 30 16 | 3800 | | 50.7 | 5.2 | KP |
| Z126091 | 35708 | IC707,U6543 | 11 31 07.7 | 21 39 24 | 6575 | | 87.7 | 5.0 | KP |
| Z097012 | 35745 | | 11 31 45.0 | 15 56 17 | 5330 | | 71.1 | 5.5 | KP |
| Z126110 | 35905 | N3578,MK739 | 11 32 52.5 | 21 52 24 | 8912 | | 118.8 | 5.0 | KP |
| Z097026 | 35942 | U6583,MK181 | 11 34 17.8 | 20 14 53.3 | 6200 | 5.1 | 95.1 | 10.0 | KP |
| Z127006 | 35997 | U6597 | 11 35 07.1 | 22 17 10.3 | 9161 | 19.2 | 122.1 | 3.0 | I |
| Z127022 | 36199 | N3798,U6632 | 11 37 37.3 | 24 58 29 | 3310 | 8 | 45.7 | -2.0 | KP |
| Z097052 | 36203 | N3802,U6636 | 11 37 43.1 | 18 02 28.8 | 3310 | 9 | 43.9 | 5.0 | KP |
| Z097056 | 36294 | U6653 | 11 39 04.6 | 16 14 34.1 | 3300 | | 44.0 | 0.7 | KP |
| Z127032 | 36314 | N3821,U6663 | 11 39 33.1 | 20 35 38.0 | 5560 | 3.1 | 74.1 | 0.3 | I |
| Z097068 | 36349 | MCG3-30-51 | 11 39 48.7 | 20 23 45.3 | 6193 | 3.1 | 79.7 | | KP |
| Z097070 | 36361 | N3827,U6673 | 11 40 00.7 | 19 07 22.5 | 3310 | 9 | 43.9 | 9.0 | KP |
| Z127038 | 36446 | N3832,U6693 | 11 40 55.4 | 23 00 10 | 7036 | 7 | 93.8 | 4.3 | KP |
| Z097112 | 36544 | MCG3-30-83 | 11 41 53.5 | 20 23 19.2 | 6575 | 3 | 87.7 | 5.0 | KP |
| Z097120 | 36577 | NGC3860,U6718 | 11 42 13.6 | 20 04 27 | 5595 | 3 | 74.6 | 2.0 | KP |
| Z097122 | 36582 | N3859,U6721 | 11 42 16.8 | 19 43 56.6 | 5439 | 3 | 72.5 | 7.5 | KP |
| Z157046 | 37158 | | 11 49 27.0 | 30 35 54 | 6600 | 7 | 88.0 | 4.5 | KP |
| Z097171 | 37170 | N3934,U6841 | 11 49 37.3 | 17 07 49.7 | 3800 | | 50.7 | 2.0 | KP |
| Z186061 | 37183 | N3935,U6843 | 11 49 48.6 | 32 40 57.0 | 3050 | | 40.7 | 5.3 | KP |
| Z127095 | 37264 | N3947,U6863 | 11 50 45.4 | 21 01 53.0 | 6197 | 5.2 | 90.9 | 2.7 | KP |
| Z127104 | 37406 | U6887 | 11 52 38.1 | 22 58 18.7 | 6900 | 7 | 92.0 | 7.0 | KP |
| Z186073 | 37613 | N3991,U6933 | 11 54 56.3 | 32 36 54 | 3310 | | 44.1 | 8.8 | KP |
| Z186075 | 37624 | N3995,U6944 | 11 55 06.6 | 32 33 52.3 | 3310 | | 44.1 | 7.6 | KP |
| Z127114 | 37629 | N3997,U6942 | 11 55 14.0 | 25 32 57 | 4600 | 11 | 62.0 | 3.2 | KP |
| Z157065 | 37654 | N4004,U6950 | 11 55 30.8 | 28 09 23 | 3300 | 10 | 45.3 | 10.0 | KP |
| Z098012 | 37695 | N4014,U6961 | 11 56 01.5 | 16 27 22 | 3850 | 10 | 45.3 | 0.0 | KP |
| Z157069 | 37705 | N4017,U6967 | 11 56 11.5 | 27 43 53 | 3310 | 10 | 45.3 | 4.8 | KP |
| Z158002 | 38009 | U7017 | 11 59 48.9 | 30 08 24 | 3113 | 10 | 45.3 | 3.6 | KP |
| Z098030 | 38040 | N4048,U7023,VV384 | 12 00 16.4 | 18 17 40 | 4800 | 12 | 59.5 | 6.0 | KP |
| Z158016 | 38325 | A1203+314,B | 12 03 12.4 | 31 20 17 | 7036 | 6 | 93.8 | -2.5 | KP |
| Z158031 | 38605 | N4134,U7130 | 12 06 37.6 | 29 27 17 | 3800 | 13 | 52.0 | 4.2 | KP |
| Z098084 | 38802 | N4158,U7182 | 12 08 37.2 | 20 27 18 | 2465 | 17 | 33.7 | 3.0 | KP |
| Z128051 | 38851 | N4162,U7193 | 12 09 20.1 | 24 24 05 | 2465 | 17 | 33.7 | 4.8 | KP |
| Z158042 | 38903 | A1209+29 | 12 09 52.4 | 29 05 45 | 3850 | 13 | 52.0 | 4.2 | KP |
| Z158045 | 38912 | N1475,U7211 | 12 09 59.0 | 29 26 47.6 | 3850 | 13 | 52.0 | 3.7 | KP |
| Z158055 | 39261 | U7286 | 12 13 27.4 | 27 43 17 | 7800 | 7 | 104.0 | 2.2 | KP |
| Z158073 | 39728 | N4275,U7382 | 12 17 21.8 | 27 53 56 | 2465 | 17 | 33.7 | 4.0 | KP |
| Z129012 | 42076 | IC3581,ARAK381 | 12 34 08.9 | 24 42 12 | 7100 | 7 | 94.7 | 4.0 | KP |
| Z129018 | 42584 | N4615,U7852 | 12 39 09.5 | 26 20 55 | 4800 | 14 | 61.1 | 5.6 | KP |
| Z159066 | 42937 | MCG5-30-69 | 12 42 13.5 | 26 41 35.3 | 4500 | 14 | 61.1 | 5.5 | KP |
| Z159072 | 43062 | N4676A,B,U7938,7939 | 12 43 44.2 | 31 00 17.8 | 6600 | 6 | 88.0 | 0.2 | KP |
| Z159072S | 43065 | N4676A,B,U7938,7939 | 12 43 45.4 | 30 59 48 | 6600 | 6 | 88.0 | -0.8 | KP |
| Z159075 | 43164 | MCG5-30-82 | 12 45 01.4 | 27 43 50.7 | 6600 | 7 | 88.0 | 1.0 | KP |
| Z129025 | 43368 | N4712,U7977 | 12 47 06.8 | 25 44 34 | 4600 | 14 | 61.1 | 1.0 | KP |
| Z159102 | 43726 | U8017 | 12 50 27.9 | 28 38 33 | 7100 | 2 | 92.0 | 1.7 | KP |
| Z160011 | 43939 | N4793,U8033 | 12 52 15.4 | 29 12 33 | 2465 | 17 | 33.7 | 4.9 | KP |
| Z160050 | 44370 | U8076 | 12 55 26.0 | 29 55 28 | 5319 | 4 | 70.9 | 5.2 | I |
| Z160252 | 44789 | I4040,MCG5-31-85 | 12 58 13.6 | 28 19 34 | 7597 | 1 | 92.0 | 5.0 | KP |
| Z160257 | 44819 | N4907 | 12 58 24.2 | 28 25 31 | 5868 | 1 | 92.0 | 3.2 | I |
| Z160260 | 44840 | N4911,U8128 | 12 58 31.5 | 28 03 34 | 7795 | 1 | 92.0 | 3.8 | KP |
| Z160106 | 44968 | N4926A | 12 59 43.0 | 27 55 06 | 6600 | 2 | 92.0 | 0.7 | KP |
| Z130006 | 45260 | MCG4-31-5,8ZW232 | 13 02 50.0 | 26 13 40 | 6600 | 7 | 88.0 | 4.0 | KP |
| Z160134 | 45311 | N4961,U8185 | 13 03 23.4 | 28 00 04 | 2465 | 17 | 33.7 | 5.7 | KP |
| Z130008 | 45356 | ARAK4041 | 13 03 50.2 | 25 43 41 | 7036 | 7 | 93.8 | 2.7 | KP |
| Z160137 | 45358 | N4966,U8194,C55 | 13 03 54.0 | 29 19 48 | 7036 | 2 | 92.0 | 3.2 | KP |
| PGC45386 | 45386 | A1304+28 | 13 04 12.5 | 28 08 25 | 6200 | | 82.7 | 3.3 | KP |
| Z160152 | 45658 | N5000,U8241 | 13 07 24.7 | 29 10 28 | 5439 | 16 | 72.5 | 3.4 | KP |
| Z160156 | 45757 | N5004A,U8259 | 13 08 39.3 | 29 50 37.3 | 7100 | 6 | 94.7 | 2.0 | KP |
| Z130019 | 45836 | N5016,U8279 | 13 09 42.1 | 24 21 36 | 2465 | 17 | 33.7 | 5.0 | KP |
| Z160161 | 45863 | | 13 10 05.2 | 28 47 55.1 | 7036 | 7 | 93.8 | -3.0 | KP |
| Z130021 | 45975 | | 13 11 21.2 | 25 14 49 | 7200 | 7 | 96.0 | 6.0 | KP |
| Z130023 | 46086 | I860 | 13 12 38.2 | 24 53 05.7 | 3850 | 15 | 51.2 | 4.0 | KP |
| Z160170 | 46095 | | 13 12 48.0 | 30 39 59.3 | 6900 | 7 | 92.0 | -2.0 | KP |
| Z160173 | 46180 | N5056,U8337 | 13 13 51.5 | 31 12 48.5 | 5439 | 16 | 72.5 | 6.3 | KP |
| Z161031 | 46657 | U8399 | 13 19 25.6 | 31 29 52.9 | 6947 | 5.9 | 95.9 | 2.8 | KP |

**Table 2.**

| CGCG | Tint min | I(CO) Kkm/s | v(CO) km/s | W(CO) km/s | σ mK | M(H2) 109 Mo |
|---|---|---|---|---|---|---|
| Z096054 | 106.5 | <2.12 | | | 5.6 | <1.11 |
| Z126091 | 118.2 | 1.49±0.3 | 6578±15 | 144±30 | 5.0 | 2.34 |
| Z097012 | 122.4 | <0.98 | | | 2.7 | <1.01 |
| Z126110 | 94.9 | 2.27±0.2 | 8950±5 | 89±10 | 3.3 | 6.56 |
| Z097026 | 379 | 1.21±0.18 | 6206±20 | 279±45 | 2.0 | 2.24 |
| Z127006 | 78 | <2.82 | | | 5.7 | <1.02 |
| Z127022 | 219.1 | 1.54±0.3 | 3545±42 | 404±70 | 2.8 | 0.66 |
| Z097052 | 112.7 | 1.71±0.25 | 3244±20 | 282±35 | 2.6 | 0.67 |
| Z097056 | 130.1 | 1.59±0.3 | 3229±30 | 342±55 | 2.4 | 0.63 |
| Z127032 | 97 | <2.33 | | | 6.0 | <0.31 |
| Z097068 | 240 | 1.76±0.26 | 5976±20 | 240±30 | 3.4 | 2.28 |
| Z097070 | 83 | 1.63±0.27 | 3121±15 | 168±25 | 3.8 | 0.64 |
| Z127038 | 130.1 | 2.95±0.39 | 6909±10 | 147±30 | 4.1 | 5.32 |
| Z097112 | 118.6 | <1.24 | | | 3.4 | <1.96 |
| Z097120 | 160.1 | 1.87±0.32 | 5565±40 | 410±70 | 2.6 | 2.13 |
| Z097122 | 402 | 0.96±0.21 | 5442±30 | 257±40 | 2.3 | 1.04 |
| Z157046 | 276.2 | 0.89±0.12 | 6559±15 | 190±30 | 1.5 | 1.41 |
| Z097171 | 231.1 | <0.72 | | | 3.7 | <0.38 |
| Z186061 | 180.3 | <1.24 | | | 3.4 | <0.42 |
| Z127095 | 118.6 | 2.06±0.3 | 6205±25 | 332±40 | 2.8 | 3.49 |
| Z127104 | 181.7 | 0.63±0.13 | 6763±12 | 97±45 | 1.5 | 1.10 |
| Z186073 | 118.4 | 0.82±0.25 | 3169±30 | 196±60 | 2.9 | 0.33 |
| Z186075 | 219.4 | <1.04 | | | 3.4 | <0.42 |
| Z127114 | 199.8 | 0.46±0.2 | 4776±10 | 92±25 | 3.7 | 0.36 |
| Z157065 | 134.3 | 2.15±0.23 | 3351±10 | 189±25 | 2.7 | 0.90 |
| Z098012 | 102.2 | 4.8±0.37 | 3761±15 | 373±30 | 3.2 | 2.02 |
| Z157069 | 201.6 | 2.06±0.29 | 3474±15 | 185±25 | 3.8 | 0.87 |
| Z158002 | 204 | 2.83±0.7 | 3202±20 | 282±35 | 3.9 | 1.19 |
| Z098030 | 150.3 | 1.60±0.23 | 4814±10 | 167±35 | 2.6 | 1.16 |
| Z158016 | 106.5 | <1.01 | | | 4.1 | <1.82 |
| Z158031 | 118.4 | 1.35±0.29 | 3769±31 | 294±60 | 3.0 | 0.75 |
| Z098084 | 284.3 | 1.95±0.31 | 2479±20 | 250±40 | 3.4 | 0.45 |
| Z128051 | 118.6 | 4.24±0.45 | 2552±15 | 292±30 | 4.5 | 0.99 |
| Z158042 | 205.4 | 1.09±0.23 | 3866±20 | 167±45 | 3.2 | 0.60 |
| Z158045 | 71.19 | 7.02±0.51 | 3973±15 | 376±30 | 4.3 | 3.89 |
| Z158055 | 205.2 | <1.21 | | | 2.4 | <2.69 |
| Z158073 | 106.8 | 2.44±0.31 | 2312±10 | 154±20 | 4.1 | 0.57 |
| Z129012 | 492.4 | 2.35±0.22 | 6983±15 | 328±35 | 2.1 | 4.32 |
| Z129018 | 304 | 1.10±0.19 | 4718±15 | 170±30 | 2.6 | 0.84 |
| Z159066 | 126.6 | 1.71±0.17 | 4536±10 | 142±15 | 2.6 | 1.31 |
| Z159072 | 118.6 | 2.44±0.30 | 6636±25 | 386±45 | 2.7 | 3.87 |
| Z159072S | 181.7 | 1.77±0.28 | 6566±25 | 311±55 | 2.7 | 2.81 |
| Z159075 | 213.2 | 1.87±0.15 | 6645±15 | 289±25 | 1.6 | 2.96 |
| Z129025 | 118.6 | 1.44±0.37 | 4366±35 | 241±60 | 4.3 | 1.10 |
| Z159102 | 370.4 | 3.45±0.24 | 7091±15 | 456±30 | 2.6 | 5.98 |
| Z160011 | 118.6 | 13.54±0.38 | 2492±5 | 236±10 | 3.9 | 3.15 |
| Z160050 | 78 | <5.41 | | | 7.3 | <0.66 |
| Z160252 | 156 | 0.94±0.22 | 7840±5 | 37±15 | 4.9 | 1.63 |
| Z160257 | 54 | 2.03±0.55 | 5879±10 | 70±20 | 14.9 | 2.60 |
| Z160260 | 240 | 2.80±0.29 | 7983±15 | 316±25 | 2.8 | 5.92 |
| Z160106 | 150.1 | <0.98 | | | 2.7 | <1.69 |
| Z130006 | 94.92 | 0.61±0.21 | 6552±25 | 180±35 | 2.7 | 0.97 |
| Z160134 | 118.6 | <1.04 | | | 3.3 | <0.24 |
| Z130008 | 106.8 | <1.31 | | | 4.1 | <2.36 |
| Z160137 | 118.6 | 2.00±0.46 | 7098 | 692 | 3.0 | 3.47 |
| PGC45386 | 132.5 | <1.2 | | | 3.3 | <1.68 |
| Z160152 | 562.6 | 1.52±0.12 | 5613±5 | 140±10 | 2.2 | 1.64 |
| Z160156 | 441.8 | 1.87±0.22 | 7239±15 | 251±30 | 2.3 | 3.43 |
| Z130019 | 118.6 | 3.17±0.30 | 2601±10 | 204±20 | 3.8 | 0.74 |
| Z160161 | 59.3 | <2.08 | | | 5.7 | <3.76 |
| Z130021 | 185.5 | 0.87±0.14 | 7246±20 | 251±40 | 1.6 | 1.63 |
| Z130023 | 162.1 | 1.32±0.27 | 3869±20 | 174±40 | 3.3 | 0.71 |
| Z160170 | 213.1 | 0.84±0.24 | 6973±30 | 193±50 | 2.9 | 1.46 |
| Z160173 | 324 | 0.85±0.30 | 5567±30 | 237±45 | 3.6 | 0.92 |
| Z161031 | 432 | 1.39±0.19 | 7264±10 | 102±20 | 3.2 | 2.62 |