

Interstellar Hydrogen Observed in the Arms and Disks of the Nearest Southern Galaxies

J. Boulesteix and G. Courtès

French astronomers have been studying the kinematics of interstellar hydrogen for more than a decade, mainly by means of Fabry-Perot interferometers (cf. the article by M. Duval in Messenger No. 9). Recently, Drs. J. Boulesteix and G. Courtès from Laboratoire d'Astronomie Spatiale in Marseille travelled to La Silla and obtained new and spectacular results about the hydrogen in some nearby southern galaxies.

Our 3.6 m telescope observing programme on the kinematics of the nearest galaxies was continued during a recent run of 3 nights (April 3–5, 1978).

The main purpose of these observations is to obtain the highest possible space and spectral resolutions of the structure of the ionized hydrogen in the spiral arms as well as in the disk. During the reductions, particular attention is given to the velocity gradients of the gas at the edges of the morphologically well-determined spiral structures. Similar work has already been successfully done on M33 (the Triangulum nebula) in the northern hemisphere in an attempt to verify the density-wave theory (see bibliography given by Courtès, invited review paper, IAU Grenoble, Symp. 1975 in Topics in Interstellar Matter, 209–242, Reidel Publishing Company, Dordrecht, Holland, Ed. Hugo van Woerden).

Some of the best southern candidates for this kind of studies are two Sc spiral galaxies, NGC 2997 and NGC 5236, with large apparent diameters.

The instrumentation was the Marseille focal reducer at the Cassegrain focus of the 3.6 m telescope. This instrument gives a final focal ratio of 0.95 when used with a photographic emulsion as detector and focal ratio 2 with an RCA image tube. The RCA image tube, in spite of a good cooling, is definitely too noisy for long exposures (over 75 min). Therefore, the faintest objects were observed with the 0.95 focal ratio and the IIIa–J photographic emulsion.

We obtained Fabry-Perot interferograms and f/0.95 and f/3 direct photographs. In figure 1, we show a direct photograph of the spiral galaxy NGC 2997 in H α ; 3-minute exposure through the RCA tube on a IIIa–J plate. We notice the interesting morphology of the gas around the nucleus. This complex structure was also pointed out by Sersic, but we see here an almost complete, central ring of hydrogen which is well defined thanks to the resolving power of the 3.6 m telescope.

In another part of our programme, we obtained high-resolution interferograms of the strong southern radio source Cen A, also known as NGC 5128, thereby improving upon the results of Carranza with the 1.5 m telescope at the Cordoba Observatory. On the front page is shown the interferogram of the central part of this galaxy with very strong internal motions. Note, for example, the shift of the H α interference rings by comparison with the H α calibration. The free spectral range between two successive rings corresponds to approximately 300 km s⁻¹ in radial velocity.

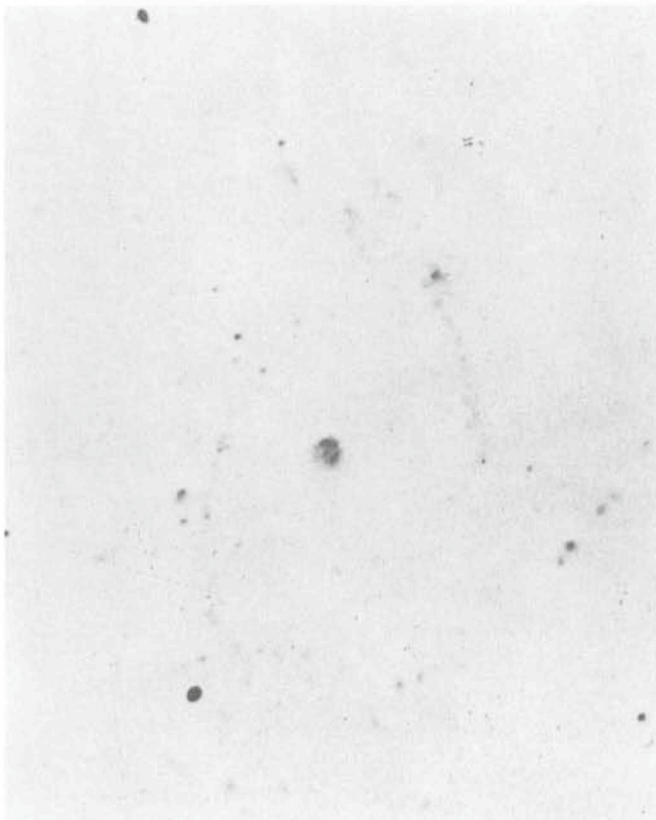


Figure 1: Three-minute exposure of NGC 2997 in the light of H α . Note in particular the central hydrogen ring.

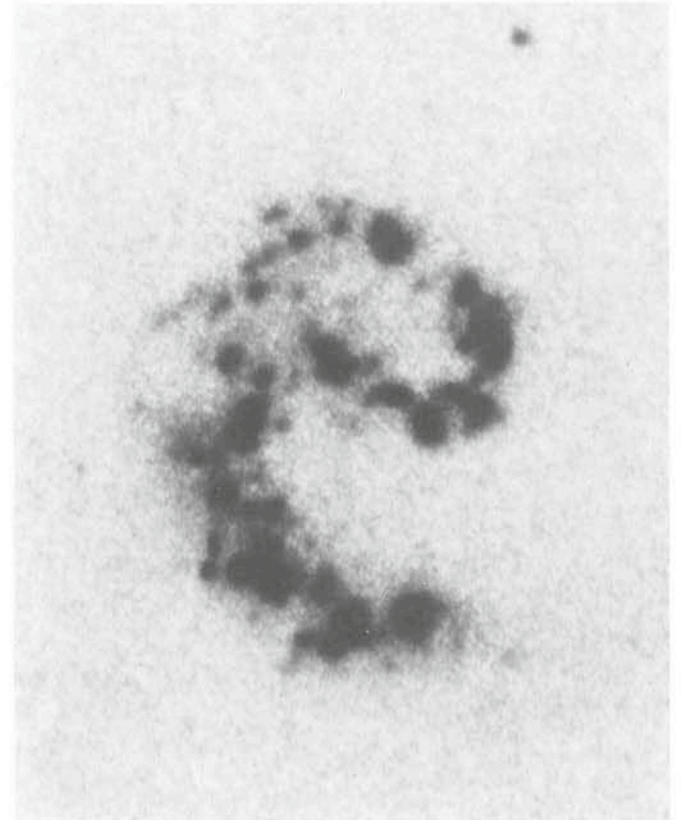


Figure 2: H II regions in the peculiar interacting galaxies Arp 244 (NGC 4038-39).

The broadening of the H α line is certainly less than 1 Å as a combined effect of the electron temperature and the internal motions. This means that the gas behaves relatively quietly in spite of the very strong large-scale motions that have been observed in the interstellar medium of NGC 5128.

The peculiar, interacting galaxies Arp 244 (NGC 4038–39) were also observed in order to detect H II regions. Figure 2 shows that one of the components has many bright, condensed H II regions.

The excellent quality of the 3.6 m telescope permitted a very efficient use of the observing time, and the seeing and weather were also very good.

Visiting Astronomers

(October 1, 1978—April 1, 1979)

Observing time has now been allocated for period 22 (October 1, 1978 to April 1, 1979). The demand for telescope time was again much greater than the time actually available.

This abbreviated list gives the names of the visiting astronomers, by telescope and in chronological order. The complete list, with dates, equipment and programme titles, is available at request from ESO/Munich.

3.6 m Telescope

- Oct. 1978: West/Smith/Cannon/Schuster, Laustsen/Tammann, Lequeux/West/Schuster/Laustsen, Feitzinger, Crane, van den Heuvel/Hammerschlag/Henrichs, Crane, Materne, Tarengi, Elvius.
- Nov. 1978: Elvius, Lindblad, van den Heuvel/Hammerschlag/Henrichs, Schoembs, Foy, Knoechel, Knoechel/Vogt, Borgman/Danks, Wamsteker, Schnur, Georgelin/Monnet.
- Dec. 1978: Georgelin/Monnet, Ardeberg/Lyngå, Hunger/Kudritzki, Weidemann, Lohmann/Weigelt, Alcaíno, Houziaux/Nandy, Surdej/Swings, Vogt.
- Jan. 1979: Vogt, Wlérick, Bouchet, Danks/Koornneef, Seitter/Duerbeck, Pakull, Lub, Melnick/Manfroid, Wlérick, Wamsteker.
- Feb. 1979: Wamsteker, Breysacher, Wlérick/Bouchet, Adam, Ritter/Schröder, Véron.
- March 1979: Véron, Danziger/Fosbury/Goss/Ekers/Wall, Courtin, Schultz/Kreysa, de Vries, Gyldenkerne, Schnur, Bergeron, Dennefeld, Kunth, Ulrich, Seggewiss.

1.52 m Spectrographic Telescope

- Oct. 1978: Breysacher/Azzopardi, Bouchet, Nordström/Andersen, Ahlin, van Dessel, Bareau, F. and M. Spite, Foy.
- Nov. 1978: Foy, Muratorio, Holweger, Bareau, Danks/Alcaíno, Feitzinger, Feitzinger/Kühn/Reinhardt/Schmidt-Kaler, Borgman/Danks, Bergvall/Ekman/Lauberts/Westerlund.
- Dec. 1978: Bergvall/Ekman/Lauberts/Westerlund, Monnet/Rosado, Wamsteker/Alcaíno, Lohmann/Weigelt, Breysacher, F. and M. Querci, Schnur.
- Jan. 1979: Schnur, Bastian/Mundt, Barbier/Swings, Bouchet, Renson, Baade, Swings, Hua/Doan, Gahm/Andrews.
- Feb. 1979: Gahm/Andrews, Danks, Bouchet, Dachs, Gerbaldi, Bastiaansen, Ritter/Schröder.

- March 1979: Ritter/Schröder, Mauder, Bouchet, Ahlin, Haug, de Vries, Haug, Mauder, Stenholm, Wramdemark, Schnur.

1 m Photometric Telescope

- Oct. 1978: Laustsen/Tammann, Danks/Alcaíno, Bouchet, Bensammar, Nguyen/Wamsteker/Bouchet, Olander, Westerlund/Lundgren, Schoembs.
- Nov. 1978: Schoembs, Vogt, Turon/Epchtein, Wamsteker, Knoechel, Bergvall/Ekman/Lauberts/Westerlund, Schnur/Mattila.
- Dec. 1978: Schnur/Mattila, Ardeberg/Lyngå, Shaver/Danks/Wamsteker, van Woerden/Danks, F. and M. Querci, Mianes/LMC Group.
- Jan. 1979: Mianes/LMC Group, Pakull, Wamsteker, Bouchet, Lodén, Wlérick/Bouchet, Melnick.
- Feb. 1979: Melnick, Salinari/Tanzi/Tarengi, Dachs, Moorwood, Thé, Adam.
- March 1979: Adam, Mauder, Schultz/Costa, Wamsteker, Haug, Wlérick/Bouchet.

50 cm ESO Photometric Telescope

- Oct. 1978: Bouchet, F. and M. Spite, Bouchet.
- Nov. 1978: Bouchet, Schöffel, Bouchet, Renson.
- Dec. 1978: Renson, Mianes/LMC Group.
- Jan. 1979: Bouchet, Wramdemark, Bastiaansen, Tinbergen, Lodén.
- Feb. 1979: Lodén, Bastiaansen, Tinbergen, Bouchet.
- March 1979: Bouchet, Haug, Lagerkvist.

40 cm GPO Astrograph

- Oct. 1978: Bensammar, Vogt.
- Nov. 1978: Vogt, Gieseking, Azzopardi.
- Dec. 1978: Azzopardi, Gieseking.
- Jan. 1979: Gieseking, Gahm/Andrews.
- Feb. 1979: Gahm/Andrews, Gieseking.
- March 1979: Vogt.

50 cm Danish Telescope

- Jan. 1979: Gahm.
- Feb. 1979: Gahm, Gerbaldi.

61 cm Bochum Telescope

- Oct. 1978: Danziger/Brunt/Whelan, Walter.
- Nov. 1978: Isserstedt.
- Dec. 1978: Isserstedt, Pakull.
- Jan. 1979: Pakull, Bastian/Mundt, Lodén, Elst.
- Feb. 1979: Elst.

Tentative Meeting Schedule

The following dates and locations have been reserved for meetings of the ESO Council and Committees:

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| November 14/15 | Finance Committee, Geneva |
| November 16 | Committee of Council, Geneva |
| November 22/23/24 | Observing Programmes Committee, Paris |
| December 7/8 | Council, Munich |