IRAM Newsletter

Number 26 April 30, 1996

Calendar

May 6-7th, 1996: IRAM User Meeting in Grenoble, France.

May 9-10th, 1996: IRAM S.A.C. Meeting.

June 26-27th, 1996: IRAM Council Meeting.

September 2nd, 1996: Deadline for the submission of observing proposals for the period Nov. 15, 1996 to May 15, 1997.

October 16-18th, 1996: Program Committee Meeting.

Contents

IRAM User Meeting at Grenoble on May 7th, 1996

In view of the limited number of responses we received to date it was decided to limit the User Meeting to one day and to offer in addition the possibility to visit the Plateau de Bure where Antenna 5 is currently in its final stages of preparation before a first astronomical test will take place in June. To allow both those who attend the User Meeting and those who attend the SAC Meeting on May 9th and 10th to participate in this visit, the visit will take place on May 8th which is a holiday in France.

Preliminary Agenda: see next page.

30m Telescope

Bolometer observations during winter 1995/96

The MPIfR 7-channel bolometer was available for observations in January 1996, and performed without major technical problems. The MPIfR 19-channel bolometer has been available since beginning of February and will be offered for astronomical observations until 9th of April. At this date, heterodyne observations will start again. This winter has seen a lot of rain and snow fall making observations impossible for prolonged periods of time. The loss of observing time because of bad weather so far has been significantly higher than in the winters before (see the statistics below).

Telescope time statistics for the last three winters

This winter more than one observer at the 30m telescope had the (unpleasant) experience of loosing almost all his oberving time because of bad weather. There has been an unusual amount of rain and snow in the last few months, partly compensating for the drought of the last years (some observers may remember the cut of water supply in the Granada residencia). What was appreciated by the organizers of the ski world championship and in general by people in Andalucía, didn't really make astronomers happy. The statistics in Fig. 1 compares the fractions of telescope time used for observations in the winters (December to March) 1993/94, 1994/95, and 1995/96. Fig. 2 shows the time distribution for each winter. Usually, almost 70% of the telescope time are used for observations, and about 20% lost due to bad weather and wind (this also corresponds roughly to the yearly averages of 1994 and 1995). This winter, however, *more than twice the time* (47%) was lost because of bad weather, and only 42% of the time was used for observations. Thus, more time was lost than used! Even in these 42% of used time, a large fraction was probably not good weather for bolometer observations, and some data may not be usable (the time is marked as "used for observations", when the observer records data, not taking into account the data quality).

User Meeting: Preliminary Agenda

May 7th (morning) CHAIRMAN : J.Martin Pintado

08:30-08:45	Opening of the meeting	M.Grewing
08:45-09:30	Status report on the 30m Telescope	W.Wild
09:30-09:45	Discussion	
09:45-10:05	Status report on the key project	E.Falgarone
10:05-10:15	Data reduction for the key project	J.-F.Panis
10:15-10:25	Correction for the 30m error beam pick-up	F.Bensch
10:25-10:45	Discussion	
10:45-11:00	Coffee Break	
11:00-11:20	Spectral-line on-the-fly-observations with the 30m Telescope: Test-Current Capabilities-Future plans	H.Ungerechts
11:20-11:30	OTF mapping of M31	N.Neininger
11:30-11:50	Discussion	
11:50-12:10	Status Report on VLBI Observations	A.Greve, T.P.Krichbaum
12:10-12:30	Discussion	
12:30-12:45	Short spacings using the IRAM 30m Telescope	F.Viallefond
12:45-14:00	Lunch Break	

May 7th (afternoon) CHAIRMAN : R.Wielebinski

14:00-14:30	Status report on the PdB Interferometer	S.Guilloteau
14:30-14:45	Discussion	
14:45-15:00	Mosaicing at the IRAM Plateau de Bure Interferometer	F.Gueth
15:00-15:30	Future heterodyne receivers for the 30m and the PdB Telescopes	J.Lamb
15:30-15:45	Discussion	
15:45-16:00	Status of the heterodyne multibeam project	K.Schuster
16:00-16:15	Future backends	M.Torres
16:15-16:30	Coffee break	
16:30-17:00	Ongoing/Future bolometer developments for the 30m Telescope	
	Development work at the MPIfR	N.N.
	DIABOLO - A dual-channel photometer	J.-L.Puget
	Future perspectives	B.Lazareff
17:00-17:15	Discussion	
17:15-17:30	Options for IRAM's participation in future projects and General Discussion	
17:30-17:45	Low mass star formation: observations and non-LTE modelling	H.Wiesemeyer
17:45-18:00	Identification of molecular clouds in M81	N.Brouillet
18:00-18:15	The M82 central region in Hydrogen mm recombination lines	V.Strelnitski
18:15-18:30	CO and H_2 in the merging system Arp 299	F.Casoli
18:30- ???	Informal Reception at IRAM	

May 8th: Visit to the Plateau de Bure Interferometer

09:00	Departure from Grenoble
11:00	Departure from the lower Station of the telepherique
14:30	Departure from the Plateau de Bure
17:00	Return to Grenoble

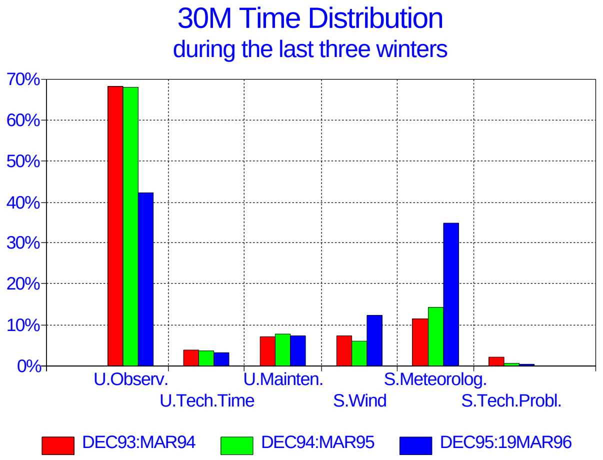

Figure 1: Distribution of 30m telescope time for the last two and present winter. More than twice the time has been lost this winter because of bad weather and wind.

Table 1: Transport to and from the 30m telescope: Winter schedule (typically Nov – May, depending on snow conditions).

	Departure from Granada Office	Departure from the Telescope
Monday	08:15	10:45
Tuesday	08:15	10:45 and 16:15
Wednesday	No transport (see Note)	No transport (see Note)
Thursday	10:00	15:00
Friday	08:15	10:45 and 16:15

Note: Person transport (morning hours) may be available after contact and agreement with IRAM Granada (Javier Lobato).

Winter transport schedule to Pico Veleta

The persisting bad weather has sometimes made the transport to the telescope quite difficult or even impossible. We urge observers to take into account possible delays of the transport between Granada and the telescope when they plan their trips to the 30m telescope. Table 1 gives the transport times during the winter

Wolfgang WILD

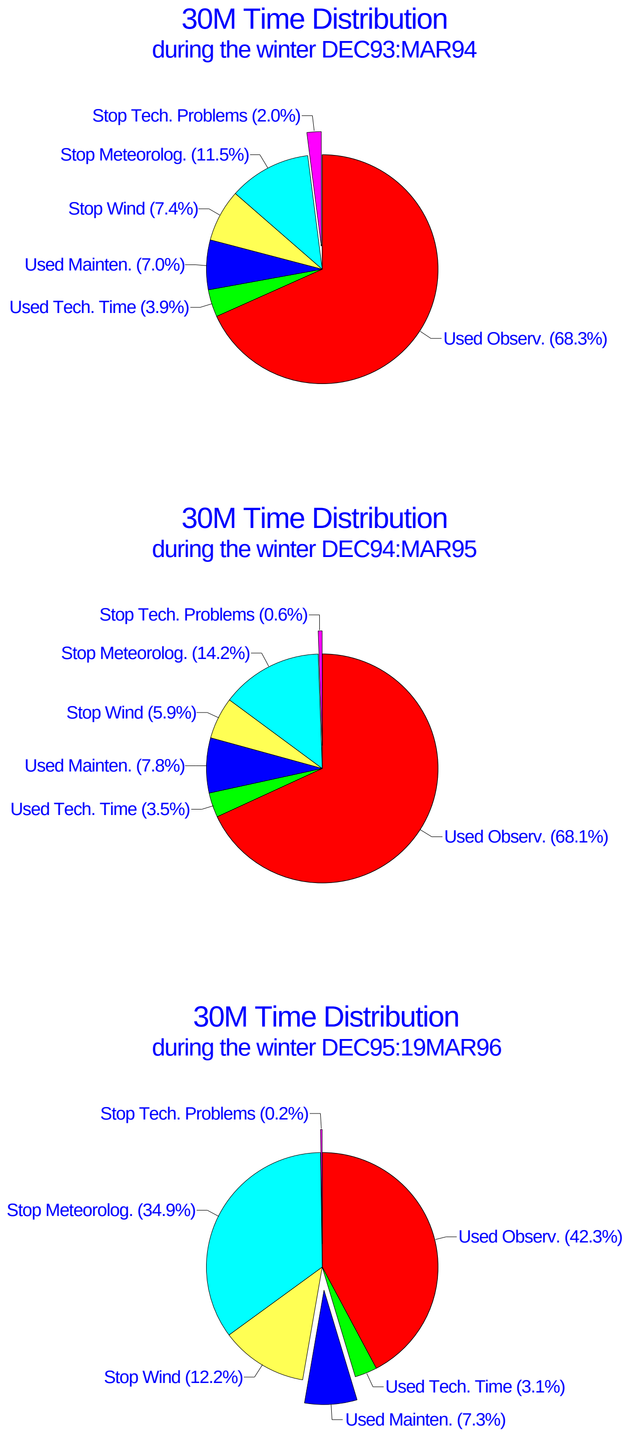

Figure 2: Details of the 30m telescope time distribution for the winter 1993/94, 1994/95, and 1995/96.

Interferometer

Data Reduction

Data obtained in November showed a significant dependence of the phase as a function of elevation, resulting in artefacts in the images. This effect is proportional to the frequency and was not significant at 3mm. It is caused by the non-intersection of the Azimuth and Elevation axes; a complete analysis of 22 sessions of baseline measurements carried on in 1995 and early 1996 allowed us to determine the most accurate values for this parameter: $-1.0 \pm 0.1, 0.35 \pm 0.1, 1.40 \pm 0.1$ on antennas 2,3,4 respectively, antenna 1 being taken as the reference.

Since all projects have been affected, a command procedure has been set up to compensate the phase errors introduced by this effect. It has to be applied to the original data before performing the phase calibration.

Several temporary problems with the real-time calibration software are also automatically fixed by the same command procedure.

Schedule

The interferometer has been in long baselines configuration for longer than expected, because large amount of snow prevented moving the antennas. As a result, it is unlikely that we can properly schedule the B1 and B2 configurations because of the weather conditions we expect during the spring.

Preliminary analyses of the long baseline data indicate that sub-arcsec angular resolution was indeed achieved, with good phase stability even at 230 GHz on several projects.

Stéphane GUILLOTEAU

Software

NIC, the software in the user friendly environment of SIC and GREG for the processing of continuum data obtained with multibeam bolometers, is finally available for general release. The data reduction package, developed in collaboration with the CEA in Saclay, the MPIfR in Bonn and the Observatoire de Grenoble, is part of the MAR96 release of the GILDAS software.

You will need bolometer data in the Nic2-Multi-Byte (NMB) format if you plan to reduce it with NIC. The format is system independent so NMB data can be copied to any computer system without further conversion. NIC processes any scan in the NMB format, including focus, pointing and skydip scans. A program is available to convert raw data to the NMB format for vms and unix based systems. To obtain a copy send the one line message “`SENDME VAXTONMB`” to `nic@iram.fr`.

Data obtained during this year’s bolometer campaigns need at least NIC Version 1.3-04, as it requires the appropriate time conversion routines. The MAR96 version of NIC is more extended and advanced than the Version 1.3-04, in particular for the preparation of observations. Standard data reduction procedures are available to simplify one’s first steps with NIC.

We will continue working on NIC and need your feedback. If you feel your e-mail address should be on a list of addresses of bolometer users who will in the future be informed on new developments concerning the multibeam bolometer software, please send the one line message “`SUBSCRIBE`” to the same account as above.

Roberto NERI

Scientific results

Discovery of the C8H radical

J. Cernicharo ([1]), M. Guélin ([2])
([1])Observatorio Astronomico Nacional, apartado 1143, E–28800 Alcalá de Henares, Spain
([2])IRAM, 300 Rue de la piscine, F–38406 S^{t} Martin d'Hères, France

Abstract: Searching for C_7H and C_8H in the carbon star envelope IRC+10216, we have identified 10 lines with harmonically related frequencies and with regularly increasing intensities (3 lines in the IRAM 3 mm spectral survey and 7 lines in the 7 mm Nobeyama survey of Kawaguchi et al., 1995). The rest frequencies can be closely fitted with the standard expression for the energies of a linear molecule with a rotational constant B = 586.676 MHz, a distortion constant D = 6.3 Hz, and half-integer quantum numbers J. The value of B is within 0.1% of that predicted by Pauzat et al. (1991) for the $^2\Pi$ ground state of C_8H and the value of D typical of a linear acetylenic chain of C_8H's weight. Since the half-integer J numbers are also consistent with a $^2\Pi$ state, we concluded that we had very probably discovered C_8H. The non detection of Λ-doubling, as well as of a second series of lines corresponding to the other fine structure state, suggested that the C_8H ground state is inverted and that we were observing the $^2\Pi_{3/2}$ state.

Our identification is now confirmed in the laboratory: M. Carthy et al. (1996) succeeded in detecting 30 millimeter lines arising from the new radical in an acetylene discharge and confirmed that their carrier is indeed C_8H.

The rotation temperature diagram of the C_8H lines observed in IRC+10216 is shown in Fig. 1. The fitted straight line yields a rotation temperature T_{rot}= 52 K and a beam-averaged column density $N = 5.5\,10^{12}$ cm^{-2}. This latter is a factor of 30 lower than the column density of C_6H; it is similar to the column density predicted by Millar & Herbst (1991) in the case of a medium-large acetylene abundance ($[H_2C_2]/[H_2]$= 2.5 10^{-5})

We found no trace of C_7H in either the 30-m telescope, or the 45-m telescope data.

References:
- Kawaguchi, K., Kasai, Y., Ishikawa, S., Kaifu, N. 1995, PASJ 47, 853
- McCarthy, M.C., Travers, M.J., Kovacs, A., Gottlieb, C.A., Thaddeus, P. et al. 1996, A&A *in press*
- Millar, T.J., Herbst, E. 1994, A&A 288, 561
- Pauzat, F., Ellinger, Y., McLean, A.D. 1991, ApJ 369, L13

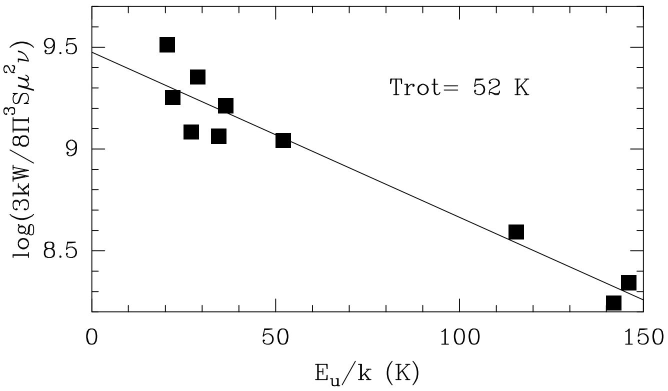

Figure 3: The rotational temperature diagram of the 10 lines assigned to C_8H. Typical errors on the line integrated intensities W are 20%.

NGC 1569: the molecular and ionized gas near the superluminous star clusters A and B

A. Greve, R. Becker, L.E.B. Johansson, C.D. McKeith

Abstract: The starburst in the irregular galaxy NGC 1569 has produced two superluminous star clusters A and B which strongly influence their surroundings through UV radiation, stellar winds, supernova explosions, and an outflow of very hot gas. Close to A and B is located the most prominent H II region of NGC 1569; our CO observations indicate that it contains ~ 2 10^6 $M_\odot$ molecular gas which probably still feeds star formation of its internal stellar cluster.

When comparing the molecular gas mass, calculated for Galactic conditions, and the virial mass we obtain a conversion factor ~ 20 times higher than the Galactic value. However, we believe that the molecular clouds near the stellar clusters are not in kinematic equilibrium so that the virial theorem does not apply; we therefore reject this conversion factor as unrealistic. Our spectroscopic observations seem to indicate an optical counterpart of the H I cavity around A, though being smaller in extent, and a surrounding shell of ionized gas of ~ 50 pc diameter.

The compact galaxy NGC 1705 contains a stellar cluster even brighter than A and B. We did not detect CO in this galaxy.

to be published in A&A

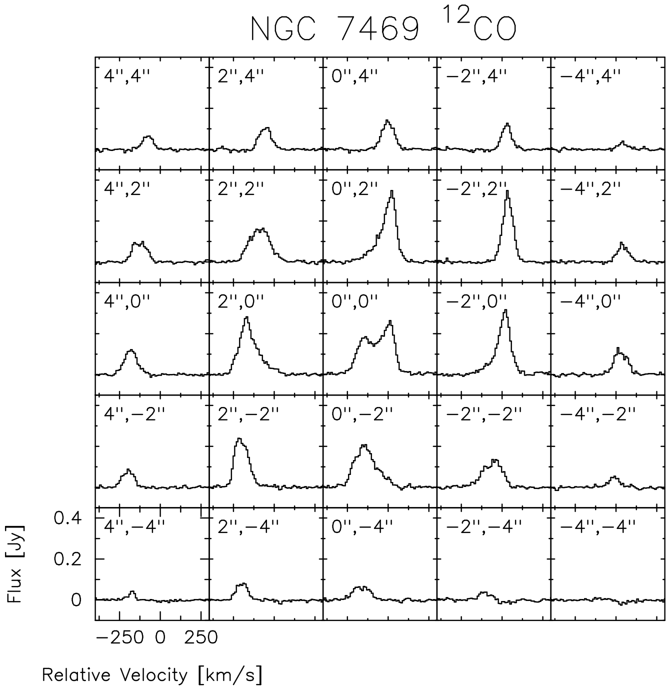

Figure 4: Sample spectra from the central 8″ of the 2.5″ spatial resolution CO map. Spectral resolution is 10 $\mathrm{km\,s^{-1}}$. The 2″ spacing of the spectra are indicated in the upper left corner of each box as offsets relative to the nuclear pointing position. The velocity scale is relative to the "nominal" systemic *LSR* velocity of 4925 $\mathrm{km\,s^{-1}}$.

THE KINEMATICS AND DISTRIBUTION OF THE MOLECULAR GAS IN THE CIRCUMNUCLEAR REGION OF NGC 7469

L.J. Tacconi, R. Genzel, L.E. Tacconi-Garman, and J.F. Gallimore
Max-Planck-Institut für extraterrestrische Physik, Postfach 1603, D-85740 Garching, Germany

Abstract: We have made a ^{12}CO J=1→0 map of the Seyfert 1 galaxy, NGC 7469 at 2.5″ spatial resolution with the IRAM millimeter interferometer. The high signal-to-noise ratio of these data and the spectral resolution of 10 km $\mathrm{s^{-1}}$ have allowed us to glean *kinematic* details on spatial scales smaller than this (see Figure). From model fits we find that the molecular gas comes from a combination of a 1.5″ radius circumnuclear ring and a central gas concentration associated with the narrow line region (NLR). This structure is very similar to the molecular structure seen in the Seyfert 2 galaxy NGC 1068, and is consistent with current unified schemes for Seyfert galaxies. The velocity distribution has a slowly rising (not solid-body) rotation curve. The gas lies in a plane with a low inclination angle of ∼25°. These kinematic parameters imply a dynamical mass of $\sim 2.0\times10^{10}$ $M_\odot$ in the central 5″ (1.6 kpc), with the molecular mass dominating the dynamical mass. The dynamical measurements thus allow a calibration of the H_2–to–CO conversion factor in a Seyfert galaxy. We find that the NGC 7469 conversion factor is ∼1.5 times the Galactic value.

New Preprints

387. Interferometric molecular line observations of the circumstellar envelope(s) around U Camelopardalis
M. Lindqvist, R. Lucas, H. Olofsson, A. Omont, K. Eriksson, B. Gustafsson
1996, *Astron. and Astrophys.*

388. Evolution of outflow activity around low-mass embedded young stellar objects
S. Bontemps, P. André, S. Terebey, S. Cabrit
1996, *Astron. and Astrophys.*

389. Huge outgassing of carbon monoxide from comet Hale-Bopp at large heliocentric distance
N. Biver, H. Rauer, D. Despois, R. Moreno, G. Paubert, D. Bockelée-Morvan, P. Colom, J. Crovisier, E. Gérard, L. Jorda
1996, *Nature*

390. Radio line observations of comet 109P/Swift-Tuttle at IRAM
D. Despois, N. Biver, D. Bockelée-Morvan, P. Colom, J. Crovisier, G. Paubert
1996, *Planetary and Space Science*

391. Mapping the cold dust in edge-on galaxies at 1.2 mm wavelength
N. Neininger, M. Guélin
1996, in *New Extragalactic Perspectives In the New South Africa*, ed. D. Block, Kluwer, Dordrecht

392. Dust and gas in the outer parts of galaxies
J. Lequeux, M. Guélin
1996, in *New Extragalactic Perspectives In the New South Africa*, ed. D. Block, Kluwer, Dordrecht

393. Chemistry in the high density molecular interface sourrounding the Orion nebula
A. Fuente, A. Rodriguez-Franco, J. Martin-Pintado
1996, *Astron. and Astrophys.*

394. The asymmetric bipolar flow in OH231.8+4.2
J. Alcolea, V. Bujarrabal, C. Sanchez-Contreras
1996, *Astron. and Astrophys.*

395. NGC 1569: the molecular and ionized gas near the superluminous star clusters A and B
A. Greve, R. Becker, L.E.B. Johansson, C.D. McKeith
1996, *Astron. and Astrophys.*

396. Discovery of the C_8H radical
J. Cernicharo, M. Guélin
1996, *Astron. and Astrophys.*

397. Bipolar molecular outflows from young stars and protostars
R. Bachiller
1996, *Ann. Review of Astronomy and Astrophysics*

398. Near-focus active optics: an inexpensive method to improve mm-wavelength radio telescopes
A. Greve, J.W.M. Baars, J. Penalver, B. LeFloch
1996, *Radio Science*

399. Probing the initial conditions of star formation: the structure of the prestellar core L1689B
P. André, D. Ward-Thompson, F.Motte
1996, *Astron. and Astrophys.*

The IRAM Newsletter is edited by Robert LUCAS at IRAM-Grenoble (e-mail address: `lucas@iram.fr`).

The IRAM Newsletter is available in electronic form:

- by using the World Wide Web and NCSA Mosaic: from the IRAM home page (`http://iram.fr/`), click on item "Newsletter" and follow the links...
- by means of an anonymous `ftp` account, opened at IRAM for Internet users. To access those files, please connect through `ftp` to `iram.fr` (or `193.48.252.22`) and read the `README` file. Several subdirectories are available:

Directory	Contents
`/dist/newsletter`	Recent issues of this Newsletter (one subdirectory per issue)
e.g. `/dist/newsletter/jul95`	jul95.ps is the Postscript file for the July 1995 issue.
`/dist/doc`	Documentation on IRAM telescopes and software
`/dist/proposal`	Proposal forms and Latex files to aid proposal preparation
`/dist/soft`	distribution files for reduction software

- by means of an electronic mail file server installed at IRAM (on the VAX machine IRAM04). This file server is a file distribution service that uses electronic mail facilities to deliver files. To communicate with it you should send a message to the electronic address:

  `newsserv@iram.grenet.fr`

  For instance, to obtain a copy of the May 1992 issue, just send the one line message:

  `SENDME MAY92.PS`

  to the above electronic address. You will receive later a mail message containing the IRAM Newsletter in Postscript code. Please discard all the e-mail header information with a text editor, and send the file to a Postscript laser printer.

  More information may be obtained by sending the one line message:

  `HELP`

  Note that this file server also contains Postscript files of the proposal forms and of Plateau de Bure documentation.

We also compile a list of e-mail addresses of IRAM users (e.g., in order to send warning messages when the Newsletter is available, but also to provide fast information, if needed). If you feel your address should be on this list, please send the one line message:

`SUBSCRIBE`

to the following e-mail address:

`iramusers-request@iram.grenet.fr`

Both addresses are valid on Internet, EARN-Bitnet and EAN .... Please keep R. Lucas informed of any problem you may encounter.

IRAM Addresses:

	Address:	Telephone:	Fax:
Grenoble	Institut de Radioastronomie Millimétrique, 300 rue de la Piscine, Domaine Universitaire, 38406 St Martin d'Hères Cedex, France	(33) 76 82 49 00	(33) 76 51 59 38
Plateau de Bure	Institut de Radioastronomie Millimétrique, Observatoire du Plateau de Bure, 05250 St Etienne en Dévoluy, France	(33) 92 52 53 60	(33) 92 52 53 61
Granada	Instituto de Radioastronomía Milimétrica, Avenida Divina Pastora 7, Núcleo Central, 18012 Granada, España	(34) 58 22 88 99	(34) 58 22 23 63
Pico Veleta	Instituto de Radioastronomía Milimétrica, Estación Radioastronómica IRAM-IGN del Pico Veleta, Sierra Nevada, 18012 Granada, España	(34) 58 48 80 00	(34) 58 48 80 82

E-Mail Addresses:

- IRAM-Grenoble: `username@iram.fr`
- IRAM-Granada: `username@iram.es`

The `username` is generally the last name of the person to be contacted.