IRAM Newsletter

Number 32 July 16, 1997

Calendar

September 8th, 1997: Deadline for the submission of observing proposals for the period Nov. 15, 1997 to May 15, 1998.

December 1st, 2nd 1997: User Meeting

December 3rd 1997: Scientific Advisory Committee Meeting

Please Note

Starting from the present July issue, the IRAM Newsletter will appear on a quarterly basis, in January, March, July, and October.

Postdoctoral Position Open

A postdoctoral position in Astronomy is open at IRAM/Granada. *See Announcement on the last page of this Newsletter*

Contents

First Announcement of the IRAM User Meeting on December 1st and 2nd, 1997 in Grenoble

IRAM plans to organise a User Meeting on December 1st and 2nd, 1997 in Grenoble.

For this meeting we will try to find a new format as recommended by IRAM's Scientific Advisory Committee which had noticed with concern the low level of attendance at the last meeting and suggested the following : "In addition to the presentations of the status reports on the IRAM instruments and the development plans, to invite a number of leading scientists (preferably users of the IRAM instruments) to review the state of key problems in various fields of research (solar system, evolved stars, ISM, star-formation, nearby galaxies, high-z objects) and to discuss how the existing and future instrumentation of the IRAM telescopes could contribute to solving them."

As a consequence, we want to focus the scientific part of the meeting on a few key topics, introduced by a review talk, followed by short contributions and poster presentations, and leaving substantial time for discussions.

If you are interested to participate in this meeting — as we hope ! —, PLEASE, SEND A PRELIMINARY NOTICE to Mrs G.Matoso (`matoso@iram.fr`) in which you also indicate the title of any contribution you plan to make (oral and/or poster) BEFORE SEPTEMBER 15th, 1997. BASED ON YOUR RESPONSES we will propose a PRELIMINARY AGENDA FOR MEETING IN THE NEXT NEWSLETTER.

Michael GREWING

30th Meeting of the IRAM Council: Antenna 6 for the PdBI

The 30th meeting of the IRAM Executive Council was held on June 16th and 17th, 1997 at the IRAM Headquarters in Grenoble and included a visit to the Plateau de Bure Observatory.

The Council met for the first time under its new President, Dr. Alain BAUDRY, who welcomed several new members : Drs. Jean-Francois MINSTER and Geneviève DEBOUZY for the CNRS/INSU, Drs. Alberto BARCIA CANCIO and Manuel GARCIA PEREZ for the IGN, and Dr. Karl MENTEN for the MPG.

After having reviewed IRAM's activities in 1996, and after listening to the advice of the Scientific Advisory Committee, presented by its chairman, Dr. Jesus MARTIN PINTADO, the Council authorized new budget envelopes for 1997, decided on the running budget and the investment budget for 1998, and took note of IRAM's budget projections until 2001. Basically, the budget envelopes will remain constant as a consequence of current financial circumstances in the partner countries.

Given this situation, we are particularly grateful that the Council adopted an additional budget plan for the years 1997-1999 for the construction of a 6th Antenna for the Plateau de Bure Interferometer ! The proposal to extend the array to 6 antennas had been discussed in, and strongly recommended by the IRAM Advisory Committees since several years but it was only during the last 12 months that the IRAM partner organisations have found ways how to finance this additional investment. A particular effort has been made by the IGN, who agreed to make an exceptional contribution of 33% to the necessary funds. As a compensation, additional observing time is foreseen for collaborative Spanish/French and Spanish/German projects.

With these decisions by the IRAM Council, the IRAM instruments will be fully competitive for many years to come. However, the Council also started to discuss scenarios for the future development of (sub-)millimeter astronomy in Europe, and in a wider international context during the first decades of the next century. As a result, IRAM will continue to actively support the study activities for a Large Southern Hemisphere Array (LSA).

Michael GREWING

New Head of Administration

By the end of July, Manfred MALZACHER will be retiring. He has served for almost 18 years as the Head of the IRAM Administration, being responsible for personnel, financial and logistical matters at Grenoble as well as at the two observatories on Pico Veleta and the Plateau de Bure. The small but highly competent administrative group that exists today at IRAM has been built up under his leadership. Throughout the years the administration has supported in a very efficient way the various scientific and technical tasks that IRAM has executed.

As of August 1st, 1997 Michael LANGE will take over the responsibility as the Head of the IRAM Administration. Before he has served in the same position at the Max-Planck-Institute for Biophysics in Frankfurt, Germany for almost 15 years.

Michael GREWING

The LSA Study

In the framework of a Memorandum of Understanding signed by ESO, OSO, NFRA and IRAM to jointly study concepts for a Large Southern Array (LSA) at (sub-) millimeter wavelengths, a Combined Report has been completed in April 1997 and widely distributed by ESO. If needed, additional copies can be obtained either through ESO or IRAM. The report summarizes various scientific and technical aspects, and also includes some site testing studies.

In the meantime, the LSA-project has been presented to the ESO Council as well as to IRAM's Executive Council, and encouragement was given by both to pursue this study into the next phase. In the European context, the study is timely in order to have the LSA project ready as a candidate for European funding after the VLT funding will be completed. In the international context, the study is timely because of the advanced planning state of the MMA project in the United States and of another millimeter array project by Japan.

Given this situation, the question arises, of course, whether the different projects will continue to be developed independently, or if one should not establish a common framework for all of them, including the possibility of even merging two or all three of them, last not least in view of the fact that all three projects have been considering high altitude sites in northern Chile.

On June 25 and 26, 1997, a delegation from Europe led by Riccardo Giacconi, Director General of ESO, and Roy Booth, Chairman of the Study Board for the LSA Project, met with a delegation from the US in Charlottesville to discuss the situation and possible future developments. The meeting adopted a resolution in which both sides agree "to resolve to organize a partnership that will explore the union of the LSA and MMA into a single, common project to be located in Chile. Specifically, this partnership will study the technical, logistical, and operational aspects of a joint project. Of particular importance, the two antenna concepts currently under consideration will be studied to identify the best antenna size and design or combination of sizes to address the scientific goals of the two research communities. In doing so we will work through our observatories, utilizing the expertise in millimeter astronomy resident in research groups and institutions in our communities."

It is in fulfillment of this agreed action that we are now starting a enquiry in both the European and the American communities to evaluate the respective merits of two possible options for the design of a joint array.

In Option 1, the combined project would consist of a hybrid array of 40 8-m antennas and 25 to 35 15-m antennas. The 8-m antennas would have a surface accuracy (25 μm rms) and pointing accuracy ($1''$ rms) adequate for operation up to 800 GHz. The 15-m antennas would have similar surface accuracy, but the pointing accuracy ($1.5''$ rms) may only be adequate up to 350 GHz for high quality imaging by mosaicing.

In Option 2, the combined project would be an homogeneous array of 50 to 60 antennas of about 12 m diameter. The antennas would have 25μm surface accuracy and $1''$ pointing accuracy, making them suitable to high quality imaging of large fields up to 650 GHz.

In both options, the ultimate number of 15-m or 12-m antennas will depend on the cost.

A comparison of these two options shows that Option 1

- provides a larger collecting area at low frequencies
- also provides a larger collecting area at high frequencies for small field of views (for which the pointing accuracy is not critical)
- provides high quality imaging capabilities at the highest operational frequencies with restricted collecting area (40 x 8-m sub-array)

On the other hand, Option 2

- is simpler
- provides a priori better sensitivity for wide field imaging between 400 and 650 GHz
- is limited by pointing accuracy for operations above 650 GHz.

When considering the long term development of the project, it is conceivable (though not guaranteed) that the latter restriction may be removed (at least in low wind conditions at night time) by improvements in the pointing accuracy of the antennas. A similar improvement may also be possible for the 15-m antennas in Option 1.

Obviously the technical and scientific aspects of this alternative are quite complex; they are now subject of detailed discussions by specialized working groups.

Our purpose here is to obtain input from the European radio-astronomical community, on the scientific arguments in favor of one or the other of those two options. We would like you to examine quantitatively the respective merits of either option for the most demanding observing project(s) in your main field(s) of competence.

A typical list of questions, aimed at weighing the relative importance of high sensitivity and capability of wide field imaging, would be:

- What is the best observing frequency?
- What is the sensitivity needed?
- What is the range of spatial frequencies that should be sampled?
- Will mosaicing be needed in either option?
- Will the project be sensitivity limited in either option?
- Will the project be feasible in either option?

Please send your contributions by e-mail to: `lsa@iram.fr`.

Michael GREWING and Stéphane GUILLOTEAU

30m Telescope

Summer transport schedule to Pico Veleta

The road to the 30m telescope is now open. Please find below the transport schedule between the Granada office and the telescope. It is the same as last year, except for Thursday when the transport from the telescope to Granada now leaves at 17:00 hours. If the transport times do not fit your observing schedule at all (*e.g.* observing run starting on a Sunday evening), please contact IRAM Granada (Javier Lobato).

Summer transport schedule* (typically May – Nov).

	Departure from	
	Granada Office	the Telescope
Monday	08:15	10:30 and 17:00 (1)
Tuesday	08:15	10:30 and 17:00
Wednesday	(2)	(2)
Thursday	10:00	17:00
Friday	08:15	10:30 and 17:00
Saturday	(2)	(2)
Sunday	(2)	(2)

* Subject to modification.

Note 1: For the transport at 17:00, astronomers may be asked to drive themselves, in case an IRAM car is available.

Note 2: On Wednesday and the weekend no transport is foreseen, but an IRAM car may be available for those observers who know the way. Check first with IRAM Granada (Javier Lobato).

IRAM T–Shirts soon available again

T-shirts with the 30m telescope and IRAM logo will be soon available at the IRAM Granada office. Different sizes and colors have been ordered. Observers who wish to buy one should contact Esther Franzin at the reception. The price will be 750 Pesetas per item.

Wolfgang WILD

Improvements of the IRAM Spain computer network

During the past year, the computer network at IRAM Spain has been improved in several aspects:

Radio link between IRAM Granada and the Observatory

The old 64 KBit/sec radio link was replaced by a new link with 2 MBit/sec data transfer rate (faster by a factor of 32). The new system has been in operation for one year now and failed only once, when the antenna on top of the Observatory building filled up with snow during very bad weather.

New Radio link between IRAM Granada and the University of Granada

Our link to Internet goes via the University of Granada and the CICA (Centro Informatico Cientifico de Andalucia) in Sevilla. Last year we replaced the leased analog line by an ISDN line at 64 KBit/sec. Taking the high communication costs into consideration, we bought our own radio link equipment (Wavepoint from AT&T), which has now been operational since the end of June and runs at 2 MBits/sec. Not only have we achieved an increase in speed of a factor of 32, but also a link without operation cost. The investment in this type of short range radio link will amortize within six months. We used satellite TV dishes that we installed ourselves; I want to thank my colleagues S. Navarro and G. Galvez for their help.

With the new link to the University of Granada, our entry to Internet is at 2 MBit/sec; however bottlenecks certainly exist for communication with other countries. The Spanish research network now has a 22 MBit/sec link to Amsterdam, but the data packets to IRAM Grenoble have to travel through more than 20 routers.

Installation of a network switch at the Observatory

We installed an Ethernet switch at the Observatory. Our network is now split into several segments (antenna control, lab., data reduction). The switch puts Ethernet packets only on the segment to which the receiving device is connected. It is also used to filter bad packets, to bridge 10 MHz Ethernet and 100 MHz fast-Ethernet, and to monitor the network load (see below).

Installation of twisted pair cabling

We have now started to replace the old BNC network cables by twisted pair cables. One of the major problems with BNC has been that one malfunctioning station could break the whole network. Twisted pair cabling improves this by connecting all stations first to a so-called 'HUB' in a star topology.

We also need twisted-pair cables for faster networks like fast-Ethernet.

Fast Ethernet

We have installed equipment to use fast-Ethernet interfaces at the Observatory and in Granada. At the Observatory, we have now connected the two HP workstations to fast-Ethernet. In Granada, we have only connected some Windows and Linux systems.

Network Monitoring

The telescope operator now has a tool that displays the state of our network. This "free" software has been developed at the University of Braunschweig, Germany. The tool allows not only to see the state of the network but also to analyse the load and problems using the SNMP protocol.

Walter BRUNSWIG

Programme Committee News

The IRAM PC met on April 19th to discuss the observing proposals submitted for the summer period (May 15 to November 15, 1997). The recommendations are summarized below. The letter code refers to programmes that have been accepted (A), will be scheduled if time is available (B), or have been rejected (C).

30m-Telescope

Project	Rate	Project	Rate	Project	Rate	Project	Rate	Project	Rate
263.96	B	1.97	B	2.97	C	3.97	A	4.97	B
5.97	A	6.97	B	7.97	B	8.97	A	9.97	B
10.97	C	11.97	B	12.97	B	13.97	A	14.97	C
16.97	B	17.97	A	18.97	A	19.97	B	20.97	A
21.97	C	22.97	A	23.97	A	24.97	B	25.97	C
26.97	B	27.97	C	28.97	C	29.97	A	30.97	B
31.97	A	32.97	B	33.97	A	34.97	A	35.97	C
36.97	A	37.97	C	38.97	B	39.97	B	40.97	B
41.97	C	42.97	B	43.97	A	44.97	B	45.97	C
46.97	B	47.97	A	48.97	A	49.97	A	50.97	C
51.97	C	52.97	B	53.97	B	54.97	C	55.97	A
56.97	B	57.97	A	58.97	B	59.97	B	60.97	C
61.97	A	62.97	A	63.97	A	64.97	A	65.97	A
66.97	A	67.97	A	68.97	B	69.97	A	70.97	C
71.97	A	72.97	C	73.97	A	74.97	A	75.97	A
76.97	B	77.97	A	78.97	A	79.97	A	80.97	B
81.97	B	82.97	B	83.97	B	84.97	C	85.97	C
86.97	B	87.97	A	90.97	B	91.97	B	92.97	C
93.97	C	94.97	B	95.97	C	96.97	A	97.97	B
98.97	B	99.97	A	100.97	A				

Notes:

- Proposal 15.97 was considered as purely technical.
- We expect all A programmes to be scheduled on the 30m telescope although some with less time than originally requested. Only part of the B programmes will be scheduled. This will take into account scientific merit, crowding in certain right ascension ranges and general aspects of balance.

Michel GUÉLIN

Interferometer

Project	Rate	Project	Rate	Project	Rate	Project	Rate	Project	Rate
H001	A	H002	C	H003	C	H004	A	H005	B
H006	C	H007	C	H008	C	H009	B	H010	C
H011	B	H012	–	H013	C	H014	A	H015	C
H016	A	H017	C	H018	B/C	H019	C	H020	C
H021	C	H022	A	H023	A	H024	A	H025	A
H026	C	H027	C	H028	C	H029	C	H030	C
H031	C	H032	B	H033	A	H034	B	H035	C
H036	C	H037	C	H038	A	H039	A	H040	C
H041	A	H042	A	H043	B	H044	A	H045	B
H046	C	H047	C	H048	C	H049	A	H050	A
H051	B	H052	B	H053	C	H054	B	H055	C
H056	C	H057	B	H058	A	H059	A	H060	A
H061	A	H062	A						

The A programmes will be scheduled in priority. The B programmes will be scheduled taking into account scientific merit, crowding in certain right ascension ranges and general aspects of balance. B programmes will only be started in case of available observing time.

Note that during this period, refurbishment will start on the surface of Antenna 3, is addition to the usual summer maintenance work.

Stéphane GUILLOTEAU

Call for Observing Proposals on the 30m Telescope

The *next deadline* for the submission of observing proposals for the IRAM 30 m telescope is September 8th, 1997, midnight (24 h). The observing session will extend from Nov. 15, 1997 to May 15, 1998 and cover roughly the 'winter' period at Pico Veleta. Three types of proposals will be considered:

i) proposals at 3 mm, 2 mm and 1.2–1.3 mm wavelength using heterodyne receivers,

ii) proposals at 0.8 mm wavelength using a heterodyne receiver,

iii) proposals at 1.3 mm wavelength using a bolometer. The bolometer will be a 19 channel array belonging to the MPIfR.

Roughly 3000 hours of observing time will be available, which should allow scheduling of some longer consuming (e.g. 90–150 h) programmes with emphasis on 1.3 mm observations.

The 30-m telescope efficiency is still low at 0.8 mm ($B_{\rm eff} \simeq 17\%$) and the power radiated in the error beam twice larger than in the main beam. Pointing can also be marginal at this short wavelength in case the atmosphere is unstable. *The 0.8 mm proposals should discuss the effect of the error beam and of pointing errors on their observations.*

Please, find below some relevant information.

News

A new dual frequency (86–116 GHz/200–250 GHz) receiver will replace the 3mm1 and 230G1 receivers. Its performances will be better than those of the present receivers, but are not yet precisely known. We ask you therefore to use the current 3mm1 and 230G1 noise figures (see below) for the calculation of integration times. The 3mm and 1.3mm channels of this new receiver have the same polarizations as the current 3mm1 and 230G1, and can be used simultaneously either with the 2mm receiver, or the 3mm2 and 230G2 receivers (see below).

The 19-channel MPIfR bolometer will again be available this winter, presumably between December and March. This receiver showed good performance during last year's observing run, although signals weaker than 2–3 mJy/beam turned out difficult to detect and map reliably. This limitation is currently under study at Bonn and improvements can be expected in the future.

Reminders

The On-the-Fly observing mode (OTF) is implemented for heterodyne observations (with some limitations concerning data acquisition rate and reduction). In this mode, the telescope beam drifts continuously across the source, while data are dumped every 1s (or 2 s, depending on the number of frequency channels). Any scanning direction can be chosen and successive scans can be concatenated to make a map (like in the bolometer 'mapping' mode). Individual drift scans can have any length; they are interleaved with OFF source reference subscans of any duration. This mode ensures a better homogeneity of the data and can make a much more efficient use of observing time.

Up to 4 receivers can be used simultaneously for OTF observations. The backends can be the filter banks and/or the autocorrelators. OTF observations were carried out successfully since December 1995 on several programs. The large acquisition rate causes data storage and handling problems: although a new version of CLASS has been developed, the software is not yet user-friendly and remains experimental. Because of this situation, programmes using the OTF observing mode should involve an astronomer with a demonstrated experience in this technique on the 30m Telescope. Astronomers from the IRAM-Granada staff are willing to play this role. Please contact Drs. H. Ungerechts (`ungerech@iram.es`) or W. Wild (`wild@iram.es`) at IRAM-Granada well before the deadline for more information.

Frequency switching is possible. It yields satisfactory baselines within certain limitations (maximum frequency throw of 45 km/s, backends, phase times etc.; for details see [8]). Up to 3 receivers (e.g. 3mm1, 230G1 and 2mm) can be frequency switched simultaneously. Baselines are ordinarily flatter when using one single receiver.

An instantaneous IF bandwidth of 1 GHz is available for the 230G2 receiver. The two 1 MHz filter banks (512 MHz each) can be combined to provide 1 GHz bandwidth. The use of the 1 GHz wide filter bank excludes the simultaneous use of any other backend with the 230G2 receiver (the other receivers are not affected).

Many proposals underestimate the observing time needed to carry out the programme, even under excellent weather conditions. We ask you to pay special attention to this matter *as time underestimation is now a major criterion for proposal rejection.*

A handbook ("The 30m Manual") collecting most of the information necessary to plan 30-m telescope observations is available [10]. The report *Calibration of spectral line data at the IRAM 30m telescope* explains in detail the applied calibration procedure. Both documents can be retrieved through the IRAM Granada web pages (http://www.iram.es).

Finally, to help us keeping up a computerized source list, we ask you to fill in your 'list of objects' as explained below.

Applications

Your applications should be addressed as usual to:

IRAM Scientific Secretariat,
300 rue de la piscine,

F-38406 St Martin d'Hères, France.

All proposals must reach the Secretariat before September 8th, 1997, midnight. (Proposals sent by Fax will be accepted, provided they arrive by that time in a readable form; Fax (33/0) 476 42 54 69). Except for a duplicate of the source list (see below), no proposal should be sent by e-mail. You (i.e. the Principal Investigator) will receive by return mail an acknowledgement of reception and a proposal number.

To avoid the allocation of several numbers per proposal, send *only one* copy of your proposal, either by mail or by fax. In case your fax reaches us in time, but is incomplete or unreadable, we will try our best to contact you (your responsibility, however).

Your proposal will only be evaluated if submitted in the correct format (these forms are available by anonymous ftp from `iram.fr` in directory `dist/proposal`, as well as a Latex style file `proposal.sty`; or with the World Wide Web at URL `http://iram.fr/`). *Do not use characters smaller than 11pt*, which would make your proposal unreadable if we had to fax it to the members of the P.C.

On the title page, you must fill out the line 'special requirements' if you request spectral line on-the-fly observations, the polarimeter, 'service observing', or specific dates for time dependent observations (if there are periods when you cannot observe for personal reasons, please specify them here; beware, however, that they could be a motive for proposal rejection!).

We *insist* upon receiving, with proposals for heterodyne receivers, a complete list of frequencies *corrected* for source redshift (to 0.1 GHz, unless your frequencies are confidential). You should specify which receivers you plan to use. *Note that the use of the 2 mm receiver prevents the use of 3mm2 and 230G2, which, otherwise, can be used in parallel with receiver 3mm1 and 230G1 (see below).*

In order to avoid useless duplication of observations and to protect already accepted proposals, we keep up a computerized list of targets. We ask you to fill out carefully your source list. This list must imperatively contain *all the sources (and only those sources)* for which you request observing time. To allow electronic scanning of your source parameters, your list must be typed or printed following the format indicated on the proposal form (please, *do not hand write*). If your source list is long (e.g. more than 15 sources) you may print it on a separate page, *keeping the same format.*

The scientific aims of the proposed programme should be explained in 2 pages of text *maximum*, plus one page of figures and tables. Proposals should be self-explanatory, clearly state these aims, and explain the need of the 30m telescope. The amount of time requested should be carefully estimated and justified (see below); it should include pointing, focussing, and calibration checks and allow for receiver tunings (on average 20 min. per receiver).

A scientific project should not be artificially cut into several small projects but should rather be submitted as one bigger project, even if this means 100–150 hrs.

If time has already been given to one project but turned out to be insufficient, explain the reasons, e.g. indicate the amount of time lost due to bad weather or equipment failure; if the fraction of time lost is close to 100%, don't rewrite the proposal, except for an introductory paragraph. For continuation of proposals having led to publications, please give references to the latter. *In all cases, indicate on the first page whether your proposal is (or is not) the resubmission or the continuation of a previously submitted 30 m telescope proposal.*

Observing time estimates

Observing time estimates must take into account:

- receiver tunings (for heterodyne observations),
- pointing, focus, continuum and line calibrations (be aware that receiver alignment corrections, if needed, will eventually be counted against your observing time),
- telescope motions when changing sources as well as dead times due to telescope motion and/or data writing between ON and OFF subscans,
- integration time on source and comparison field(s).

The total integration time should be derived using the standard formula:

$$\Delta T_{MB} = \frac{\eta_{\rm F}}{\eta_{\rm B}} \frac{2T_{\rm sys}}{\sqrt{Bt}}$$

where $\eta_{\rm F}$ and $\eta_{\rm B}$ are the telescope forward and main beam efficiencies, $T_{\rm sys}$ is the system temperature above the atmosphere (in the antenna temperature scale), B the channel noise bandwidth, and t the total (ON + OFF) integration time. $T_{\rm sys}$ should be estimated for an 'average' winter humidity for 3mm, 2mm and 1.3mm observations (4 mm of precipitable water, or $\tau_{\rm zenith} = 0.3$ at 230 GHz) and for 'good' winter conditions (1.5 mm of water, or $\tau_{\rm zenith} = 0.4$ at 345 GHz) for 0.8 mm observations.

We ask you to specify in your proposal the parameter values ($T_{\rm sys}, \Delta T_{MB}, B$, total integration time, overheads and dead times) adopted in your calculation of the needed telescope time.

A technical report explaining how to estimate the telescope time needed to reach a given sensitivity level in various modes of observation was published in the January 1995 issue of the IRAM Newsletter [9] [1]. It has been included in the 30-m telescope Manual [10]. *You are asked to follow the guidelines given in this report (or to justify particular requirements) in your proposal.*

[1] electronically available by anonymous ftp at `iram.fr`, directory `dist/newsletter/jan95`, or via the WWW at URL `http://iram.fr/newsletter/`

Service observing

To facilitate the execution of short (≤8 h) programmes, we propose "service observing" for some easy to observe (e.g. short, single source) programmes *with only one set of tunings*. Observations are made by the local staff. This is a passive way of observing, no direct interaction with the telescope through OBS being possible. For this type of observation, we request an acknowledgement of the IRAM staff member's help in the forthcoming publication. Please, if you are interested by this mode of observing, specify it as a "special requirement" in the proposal form (IRAM will decide which proposals will actually go to that mode).

Programmes accepted for the May 1997 – Nov. 1997 period

A total of 100 proposals were submitted for the deadline of March 1997 (in addition to 15 short requests for discretionary time received in January and February 1997), 39 proposals were rated "A", 36 "B", the others "C" or "D". All the "A" and about half of the "B" programmes will actually get time on the telescope, some, however, with less time than requested. The telescope schedule is made until end of August; the programme PIs have been or are being notified.

Principal Investigators of accepted proposals receive with the telescope schedule a *Confirmation of Observing Time* form which we ask you to return, properly filled, by Fax to IRAM Granada *and* IRAM Grenoble (Scientific Secretariat, Fax (33/0) 476 42 54 69, attention Mrs. C. Berjaud). The list of frequencies to be observed (normally, the same as in the proposal) should arrive in Granada at least two weeks in advance. It is also only after we receive your confirmation in Grenoble that we will send out duly signed mission forms to those of you entitled to travel reimbursement.

If you have questions, please contact Mrs. C. Berjaud at IRAM Grenoble.

Relevant Information about the 30 m Telescope

(Please, see additional information in the IRAM Newsletters and in the internal reports listed below).

Receivers

The IF bandwidth of all heterodyne receivers is 500 MHz, except for 230G2 which, coupled to the 1MHz filter bank, has a 1 GHz bandwidth. The following table lists the present possible receiver combinations:

	Receiver Combinations				
Receivers	4-rec	3-rec		2/1-rec	
3mm1	*	*			
3mm2	*		*		
2mm		*		*	
230G1	*	*			
230G2	*		*		
0.8mm SIS			*	*	
Bolo					*

The present 3mm1 and 230G1 H polarization receivers will be replaced in October by two new systems located in a single dewar. Due to improvements in mixers, LO injection and optics, we expect significantly better system noise temperatures. As before, The V polarization 3 mm receiver (3mm2) *or* the V polarization 1.3mm receiver (230G2) will be usable with the new H polarization 3mm1 and 230G1 receivers with a high efficiency (in the latter case, at the request of the observer, a mirror will replace the dichroic mirror located on the V polarization ray path). Four receiver operation (3mm1+3mm2+230G1+230G2) using the dichroic mirror is possible, but will result in a significant increase in the noise of 230G2 (by > 70 K).

3 mm SIS receivers

The tuning band of the new 3mm1 (H polarization) receiver will remain 81 – 116 GHz; its receiver temperature will be better than 100 K over the entire band; the image side band rejection is expected to be at least 20 dB. The tuning band of the 3mm2 receiver is 82 – 116 GHz; its receiver temperature is between 70 and 90 K with image side band rejection between 25 and 30dB.

The high rejection of the USB improves the system temperature and the calibration accuracy, particularly for 115 GHz observations, for which the receiver image side band sees the bright oxygen 118.75 GHz atmospheric line.

It is important to check your calibration on strong reference sources (see IRAM line catalog and updates). Beware also of possible interference between the 'second' 1.3 mm receiver, 230G2, and this receiver when operating at harmonic frequencies (the two receivers receive the same polarization; the interference will be a strong and narrow line).

We expect to continue to use 3mm1 as the standard pointing receiver.

2 mm Receiver

Good and reliable performance over most of the band. Tunable from 129 GHz to 183 GHz with SSB; receiver temperatures of 70 to 150 K (130 to 155 GHz), and 150 to 400 K (155 to 183 GHz).

1.3 mm Receivers

- new 230G1 (H-polar): Operating band: 203.4 – 246 GHz. The SSB receiver temperature is 100 – 180 K in the standard reference plane.
- 230G2: The SSB receiver temperature over the nominal tuning range (210–250 GHz) is 150–250 K in the standard reference plane. The upper side band can be rejected by typically $\gtrsim$ 16 dB over this range. This receiver can be tuned to 267 GHz, although with a higher noise temperature ($T_{\rm SSB} \sim 600$ K).

0.8 mm Receiver

The IRAM 345 GHz SIS receiver already in operation last winter will be made available for a limited period of time. Its performances are:

- Operating band: 330 GHz - 360 GHz
- Image sideband rejection 4–6 dB
- Receiver temperature= 100 K (up to 345 GHz), 130–150 K above 345 GHz
- Feff= 0.8, Beff=0.17.

It can be operated either alone or, with some extra losses, simultaneously with 230G2 and 3mm2. The rejection of the image sideband reduces the contribution of the atmosphere to the system noise temperature and significantly lowers the latter. Although system temperatures lower than 500 K were recorded last winter with precipitable water vapour below 1mm, we ask you to adopt the more conservative value of 1.5 mm of H_2O, or $\tau_{zenith} = 0.4$ at 340 GHz, in your integration time calculations (see Fig. C.1 of the 30-m telescope manual). The values in the four last columns/lines of Table 4.3 of the 30-m telescope manual) should then be replaced by:

Freq(GHz)	pwv[mm]	τ	T^*_{sys}	$T^*_{\rm A,rms}$
340	1.5	0.4	720	0.059

for 10 min integration at an elevation of 50° in a 1 MHz bandwidth.

Efficiencies, interferences, error beam

The telescope efficiencies (main beam and aperture efficiency) are given in Appendix A of *The 30m Manual*, the IRAM Newsletter Nr. 18 (November 1994) and a one-page *IRAM 30m Telescope System Summary* (available at http://www.iram.es/Telescope/systsumm.ps).

Beware of possible interference of the 230G2 LO into the 3 mm receivers. *The 230G2 receiver cannot be operated with the 2 mm receiver*, since both receivers use the same control box and polarization. Switching from one receiver to the other is not straightforward. Please specify in the proposal form whether you choose to use the 2 mm receiver or 230G2.

At 1.3 mm (and *a fortiori* at shorter wavelengths) a large fraction of the receiver radiation pattern is distributed in an error beam (which can be approximated by two Gaussians of HPW $\simeq 170''$ and $800''$ — see A&A 274, p.144-146 for more details). Astronomers should take into account this error beam when converting antenna temperatures into brightness temperatures. The effect is particularly important at 0.8 mm, where the power radiated in the 'first' error beam $FWHP \simeq 120''$ is twice larger than in the main beam.

The MPIfR Bolometer array

The 19-channel MPIfR bolometer array which was installed at the telescope in February 1996 will be again available this winter. The horns are located at the center and on the sides of two concentric hexagons with beam spacings $\simeq 20''$. Each channel has a sensitivity of $\simeq 70$ mJy $s^{1/2}$ under good weather conditions and a HPBW of $11''$.

The bolometer will normally be operated by wobbling at 2 Hz the secondary mirror in azimuth. As the array if fixed in Nasmyth coordinates, the orientation of the 19 beams with respect to the sky and to the chopping direction changes with elevation. Special software is made available at the telescope for data reduction (NIC [11] and MOPS [12]). Last winter, due to alignment problems and poorly understood interferences, it turned out difficult to reliably detect and map sources with fluxes of less than 2-3 mJy per beam. The reasons for this are currently under study at MPIfR. Observers should be aware of these limitations and carefully plan their observations of weak sources (please contact IRAM for more informations).

Polarimeter

A polarimeter has been constructed by IRAM for measurements of *circular* polarization. It has already been used on the telescope (see e.g. the March 1994 issue of the IRAM Newsletter). The main technical features of the polarimeter are briefly described below.

The polarimeter consists of a dielectric quarter-wave plate working in transmission. It is rotated between two positions at $\pm 45^o$ by a motor, the switching time is $\simeq 0.3s$, and the phase time is adjustable. From the point of view of data acquisition, it functions like other switching devices, i.e. the chopper or the wobbler, and the *difference* between the RCP and LCP intensities is acquired.

There are quarter-wave plates available for 113.3 GHz and 86.24 GHz. At 113.3 GHz the transmission loss is $\simeq$ 2%, and its cross-polarization below 20 dB. The quarter-wave plate for 86.24 GHz has a transmission loss of $\leq 2\%$, and the cross-polarization below 26 dB. Similar plates could be fabricated for other frequencies if needed. Proposals for projects requiring the polarimeter can be submitted. They should clearly state the degree of technical performance that they demand. Besides the scientific evaluation, the acceptance and scheduling of such proposals will depend on their feasibility as judged from their requirements.

General point about receiver operations

We urge observers to restrict their frequency lists as much as possible and to send them early to Granada and Grenoble. For late arrivals (less than 2 weeks in advance), or a large number of frequencies, there is no guarantee for a prior test of the requested tunings.

Backends

There are 3 types of spectral line backends which can be individually connected to any receiver.

- The 1 MHz filterbank, consisting of 4 units with 256 MHz each. The units can be connected to different or the same receivers (giving bandwidths between 256 MHz and 1024 MHz, the latter only usable with 230G2). For example, two receivers could use 512 MHz each, or four receivers 256 MHz each, or combinations. Each unit can be shifted by steps of 32 MHz relative to the center frequency of the connected receiver. If all four units are combined to 1024 MHz and connected to 230G2, no other backend can be connected to 230G2.
- The 100 kHz filter bank, consisting of 256 channels of 100 kHz (splittable into two halves movable inside the 500 MHz instantaneous bandwidth, and connectable to two different receivers)
- The autocorrelator: The software treats the autocorrelator as one unit although physically it consists of two identical machines. The following numbers are to be understood for the complete autocorrelator setup. Available resolutions are 10, 20, 40, 80, 320 and 1250 kHz. The bandwidth is between 20 MHz and 2×512 MHz, depending on resolution. The correlator can be split into 8 independent subbands, each of which can be configured individually and connected to the same or different receivers. For the larger bandwidths (i.e. more than one subband of 80 MHz) usually a problem of platforming exists (i.e. baselines from the different subbands have slightly different levels).

Pointing / Focusing

Pointing sessions are made every one to two weeks; at present, the fitted pointing parameters yield an absolute pointing accuracy better than $3''$ (r.m.s.). We also try to keep the receivers as closely aligned as possible (to about $2''$, however, alignment can be lost occasionally). Checking the pointing, focus, and receiver alignment is the responsibility of the observers (use a planet for alignment checks). Note that 230 G2 and 230 G1 have foci differing by 0.4 mm. Using both receivers, you should carefully monitor the focus and choose a compromise value. Not doing so may result in broadened beams (e.g. HPW $15''$ and non-gaussian beams on one receiver [1]).

Wobbler

- Beam-throw: from 0 to $240''$ on either side of the source (avoid small amplitudes for line work).
- Standard phase duration: 2 s for spectral line observations.

REFERENCES

[1] Appendix I: Error beam and side lobes of the 30 m telescope at 1.3 mm, 2 mm and 3 mm wavelength in: Molecular Spiral Structure in Messier 51, S. Garcia-Burillo, M. Guélin, J. Cernicharo 1993 Astron. Astrophys. **274**, 144-146.

[2] A Small Users' Guide to NOD2 at the 30m telescope A. Sievers (Feb. 1993)

[3] Thermal behaviour of mm-wavelength radio telescopes A. Greve, M. Dan, J. Penalver 1992 (IRAM report 233)

[4] Interferometric measurement of tropospheric phase fluctuations at 86 GHz L. Olmi, D. Downes 1992 (IRAM report 238)

[5] Thermal design and thermal behaviour of Radio Telescope structures A. Greve 1992 (IRAM report 253)

[6] Astigmatism in reflector antennas: measurement and correction A. Greve, B. LeFloch, D. Morris, H. Hein, S. Navarro 1993 (IRAM report 289)

[7] Design parameters and measured performance of the IRAM 30-m millimeter radio telescope J. Baars, A. Greve, H. Hein, D. Morris, J. Penalver, C. Thum 1993 (IRAM report 298).

[8] Frequency switching at the 30m telescope C. Thum, A. Sievers, S. Navarro, W. Brunswig, J. Peñalver 1995, IRAM Tech. Report 228/95.

[9] Cookbook formulae for estimating observing times at the 30m telescope M. Guélin, C. Kramer, W. Wild (IRAM Newsletter January 1995)

[10] The 30m Manual: A Handbook for the 30m Telescope W. Wild 1995, IRAM Tech. Report 377/95, also available on WWW pages.

[11] NIC: Bolometer User's Guide D. Broguiere, R. Neri, A. Sievers 1996, IRAM Tech. Report.

[12] Pocket Cookbook for MOPS software R. Zylka 1996.

These reports are available upon request (see also previous Newsletters). Please write to Mrs. C. Berjaud, IRAM Grenoble.

Michel GUÉLIN, Wolfgang WILD

Call for Observing Proposals on the Plateau de Bure Interferometer

Observing proposals are invited for the IRAM Plateau de Bure Interferometer (PdBI), for the period Nov. 15, 1997 to May 15, 1998. The deadline for applications is September 8th, 1997. The available frequency range will be 82 GHz to 116 GHz for the 3mm band, and 210-245 GHz for the 1.3 mm band.

Details of the PdBI and the observing procedures are given in the document "An Introduction to the IRAM Plateau de Bure Interferometer" (copies can be obtained from the address below, or from Internet via the World-Wide-Web; use IRAM's home page `http://iram.fr/`). Proposers should read this document carefully before submitting any proposal.

Proposals should be sent to

IRAM Scientific Secretariat
Interferometer Observing Proposal
300 Rue de la Piscine
F-38406 Saint Martin d'Hères Cedex
FRANCE

IRAM expects to schedule and complete between 30 to 50 projects in this period, with an elapsed time of at least two months between start and end of any given project. Selection will be based on scientific merit, technical feasibility, and adequacy to the instrument.

For this call for proposals, please note the following:

Proposal Category:

Proposals should be submitted for one of the 4 categories defined below:

Category 1: Proposals that ask for 3mm data ONLY. 1.3 mm receivers can still be used to provide either phase stability information or purely qualitative information such as the mere existence of fringes.

Category 2: Proposals that ask for 1.3mm data ONLY. 3mm receivers will be used for pointing and calibration purposes, but cannot provide any imaging.

Category 3: Proposals that ask for dual-frequency observations.

Category 4: Exploratory proposals: Proposals whose scientific interest justifies the attempt to use the PdB array beyond its guaranteed capabilities. This category includes for example observing at non-standard frequencies for which tuning cannot be guaranteed, and more generally all non-standard observations. These proposals will be carried out on a "best effort" basis.

The proposal category will have to be specified *on the proposal cover sheet*, and should be carefully considered by proposers.

Backup Projects for the May-Nov. 1997 period

Because of heavy antenna maintenance, backup projects for the last period have not all been scheduled. We urge proposers to re-submit them unless they have explicitly been notified of their effective scheduling.

Configurations

The available configurations include:

5 Antenna configurations	
Name	Stations
D	W05 W00 E03 N05 N09
C1	W05 W01 E10 N07 N13
C2	W12 W09 E10 N05 N15
B1	W12 E18 E23 N13 N20
B2	W23 W12 E12 N17 N29
A	W27 W23 E16 E24 N29

With 5 antennas, the following configuration sets are available:

Set	Configs	Main purpose
D	D	"Low" resolution at 1.3 mm
CD	D, C2 or C1	3.5″ resolution at 3mm, 1.8″ resolution at 1.3 mm
CC	C1, C2	Slightly higher resolution than CD.
BC	B1, C2	2″ resolution at 3 mm
BB	B1, B2, C2	Better sensitivity than BC
AB	A, B1, B2	1″ resolution at 3 mm, 0.5″ resolution at 1.3mm

There is a possibility of choice between CD and CC arrays when the C2 configuration has been performed for sources in which the resolution choice is unclear. At a higher resolution level, a similar choice between CC and BC or BB is possible.

1.3 mm band

All antennas are now equipped with fully operational dual frequency receivers. Experience of the last winter shows that 1.8″ can be easily reached (CD array). Sub-arc-second resolution has been obtained on a few projects, but cannot be guaranteed.

Note that the field of view at 1.3 mm is very restricted (about 20″).

Atmospheric Phase Compensation

Software is available to provide real-time atmospheric phase compensation on spectral and continuum data, as well as a-posteriori processing for continuum data. Experience shows that a final phase noise below 30 degrees at 230 GHz is obtained under good circumstances.

Dual-frequency operation

The 3mm and 1.3mm receivers are aligned to within about 2″.

Signal to Noise

The rms noise can be computed from

$$\sigma = \frac{J_{\rm pK} T_{\rm SYS}}{\eta\sqrt{N_{\rm a}(N_{\rm a}-1)N_{\rm c}TB}} \quad (1)$$

where

- $T_{\rm SYS}$ is the system temperature in T_r^* scale (150 K below 110 GHz, 300 K at 115 GHz, 500 K at 230 GHz)
- $J_{\rm pK}$ is the conversion factor from Kelvin to Jansky (30 at 3mm, 50 at 1.3mm)
- η is an efficiency factor due to atmospheric phase noise (0.9 at 3 mm, 0.6 at 1.3 mm)
- $N_{\rm a}$ is the number of antennas (5), and $N_{\rm c}$ is the basic number of configurations (with 5 antennas 1 for D, 2 for CD, 3 for BC)
  item T is the integration time per configuration in seconds (3 to 8 hours, depending on source declination)
- B is the channel bandwidth in Hz (500 MHz for continuum, 40 kHz to 2.5 MHz for spectral line, according to spectral correlator setup)

Receivers

Below 110 GHz, receivers offer best performance in LSB tuning with high rejection (20 dB): expected system temperatures are (in $T_{\rm R}^*$ scale) 100 to 150 K for the winter time. Above 110 GHz, best performance is obtained with USB tuning, low rejection (4 to 6 dB): expected system temperatures are 250 K at 115 GHz. DSB tuning is possible over the whole frequency range, but the system temperature may degrade significantly.

The 1.3 mm receivers give DSB tuning with typical $T_{\rm REC}$ below 50 K. Expected SSB system temperature are 250 to 350 K. The guaranteed tuning range is 210-245 GHz, but it may be possible to reach lower frequencies for specific cases. Higher frequencies are not feasible because of limitations in the triplers.

Coordinates and Velocities

The interferometer operates in the J2000.0 system. For best positioning accuracy, source coordinates *must* be in the J2000.0 system; position errors up to 0.3″ may occur otherwise.

Please do not forget to specify LSR velocities for the sources. For pure continuum projects, the "special" velocity `NULL` (no Doppler tracking) can be used.

Coordinates and velocities in the proposal MUST BE CORRECT: A coordinate error is a potential cause for proposal rejection.

Correlator

The correlator has 6 independent units, each being tunable anywhere in the 110-610 MHz band, and providing 4 choices of bandwidth/channel configuration: 160 MHz/64, 80 MHz/128, 40 MHz/256 and 20 MHz/256. For the 40, 80 and 160 MHz bandwidth, the two central channels may be perturbed by the Gibbs phenomenon (depending on continuum strength): it is recommended to avoid centering the most important part of the lines in the middle of the band of the correlator unit.

The 6 units can be independently placed either on IF1 (3 mm receiver) or on IF2 (1.3 mm receiver).

40 kHz resolution

One (and *only one*) of the 6 units has been retrofitted to offer a higher frequency resolution (40 kHz instead of 80 kHz). This is obtained by operating at half clock speed and inserting an anti-aliasing filter of effective bandwidth 8 MHz. Because the filter reduces the input power to the sampler, this unit should be placed near the maximum amplitude of the IF bandpass: band edges must be avoided.

Sun Avoidance

For safety reasons, the sun avoidance circle has been extended to 45 degrees. Please take this into account for your sources *and* for the calibrators.

Mosaics

The PdBI has mosaicing capabilities, but the pointing accuracy may be a limiting factor at the highest frequencies. Please contact S.Guilloteau in case of doubts.

Data reduction

Proposers should be aware of constraints for data reduction:

- In general, data should be reduced **in Grenoble**. Proposers will not come for the observations, but will have to come for the reduction.
- We keep the data reduction schedule very flexible, but wish to avoid the presence of more than 2 groups at the same time in Grenoble. Please contact us in advance.
- IRAM may consider splitting the data reduction in two phases: intermediate calibration and final mapping. Such a splitting is often necessary for the high resolution images. In such a case, the proposers must be ready to come at IRAM for fast data reduction of the "compact" configurations.
- CLIC is still evolving fast to cope with the evolution of the PdBI array. The newer versions are upward compatible with the previous releases, but the reverse is not true. Observers wanting to finish data reduction at their home institute should obtain an updated version of CLIC, which is now available. Because differences between CLIC versions may potentially result in imaging errors if new data is reduced with an old package, we insist that observers having a copy of CLIC take special care in maintaining it up-to-date.

Data reduction will be carried out on the dedicated HP workstations.

Local contact
Depending upon the programme complexity, IRAM may require an in-house collaborator instead of the normal local contact.

Technical pre-screening
All proposals will be reviewed for technical feasibility in parallel to being sent to the members of the Programme Committee. Please help in this task by submitting technically precise proposals. Scientific justification should be kept within 2 pages. Note that your proposal must be complete and exact: **velocities, position and frequency setup must be exactly specified**.

Non-standard observations
Please contact S.Guilloteau in case of doubt about non-standard program feasibility.

The documentation for the IRAM Plateau de Bure Interferometer includes documents of general interest to potential users:

- An Introduction to the IRAM Plateau de Bure Interferometer.
- IRAM Plateau de Bure Interferometer: Calibration CookBook.
- IRAM Plateau de Bure Interferometer: Mapping CookBook.
- IRAM Plateau de Bure Interferometer: Frequency Setup.
- CLIC: Continuum and Line Interferometer Calibration.

More specialized documents are also available; they are intended for observers on the site (IRAM on-duty astronomers, operators, or observers with non-standard programmes):

- IRAM Plateau de Bure Interferometer: OBS Users Guide.
- IRAM Plateau de Bure Interferometer: Amplitude Calibration.
- IRAM Plateau de Bure Interferometer: Flux Measurements.
- IRAM Plateau de Bure Interferometer: Pointing Parameters.
- IRAM Plateau de Bure Interferometer: Trouble Shooting Guide.

All documents can be retrieved on Internet via the World-Wide-Web. IRAM's home page is `http://iram.fr/`

Finally, we would like to stress again the importance of the quality of the observing proposal. The technical preparation of observing proposals is unfortunately often insufficient. In the past, proposals were received which did not even include exact observing frequencies or even source coordinates, or worse, with coordinates with the wrong epoch !... The IRAM interferometer is a powerful, but complex and unique instrument, and proposal preparation requires special care. Information is available in the documentation, and the IRAM staff can help in case of doubts if contacted well before the deadline. Note that the proposal should not only justify the scientific interest, but also demonstrate how the Plateau de Bure interferometer will bring new information.

Stéphane GUILLOTEAU

Scientific results

^{12}CO $J = 1 - 0$ SYNTHESIS IMAGES OF A DENSE TORUS IN M 2-9

J. Zweigle([1]), R. Neri([1]), R. Bachiller([2]), V. Bujarrabal([2]), M. Grewing([1])
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Abstract: We have mapped the ^{12}CO $J=1-0$ emission in the bipolar planetary nebula M 2-9 using the IRAM interferometer. From the maps we were able to investigate in detail the morphology and the kinematics of the molecular gas. The data are best explained by assuming that the molecular gas is concentrated in an expanding, clumpy torus.

The torus, which surrounds the nucleus of M 2-9, has a mean diameter of about 6″. Its symmetry axis is tilted by 17° with respect to the plane of the sky. The de-projected expansion velocity is 7 km s^{-1}, and its kinematical age is about 2100 years assuming a distance of 1 kpc. The lower limit for the total mass of the molecular gas is estimated to be $9 \cdot 10^{-3} M_\odot$, i.e. at least comparable to the ionized mass in the nebula (Figure 1).

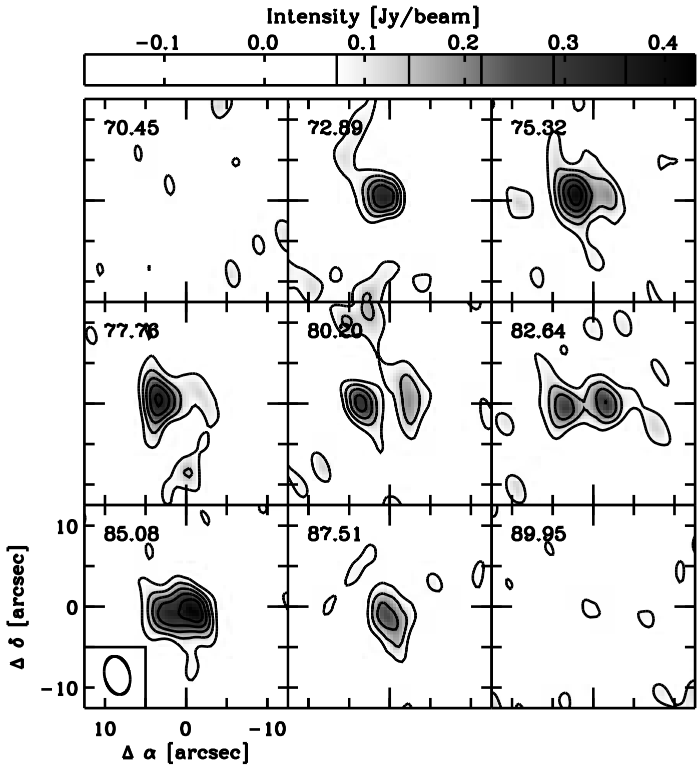

Figure 1: Maps of the ^{12}CO $J=1$–0 intensity for the LSR velocities indicated in the upper left corner of each box (contours: 72 (2 σ), 144, 216, 288, and 360 mJy beam^{-1}). The spatial units are offsets in arcseconds with respect to the assumed position for the central star. Up is north and left is east. The Gaussian clean beam (4.8″ × 3.1″ at a position angle of 13°) is inserted in the lower left map. In order to increase the signal to noise ratio in the maps we smoothed the channels to a velocity resolution of 2.4 km s^{-1}. The r.m.s. noise in the maps is about 36 mJy beam^{-1}.

THE MASS AND TEMPERATURE DISTRIBUTION IN THE PROTOPLANETARY NEBULA M1–92: ^{13}CO INTERFEROMETRIC OBSERVATIONS

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Abstract: We present high-resolution ^{13}CO$J = 1-0$ maps of the protoplanetary nebula M1-92, Minkowski's Footprint, obtained with the IRAM interferometer at Plateau de Bure. Previous ^{12}CO$J = 1-0$ maps and single-dish observations of the $J=1-0$, $J=2-1$ and $J=3-2$ transitions in both isotopic substitutions are also discussed. The cartography confirms the axial symmetry and complex structure already found from ^{12}CO data. The gas velocity presents a dominant axial component that increases in absolute value from the center, up to a (de-projected) velocity of 70 km s^{-1}. Most of the observed emission is at velocities clearly above the expected AGB expansion kinematics. This fact, together with a remarkable continuity found along the axis in the structure and velocity of the nebula, is interpreted as showing that the present CO nebula has been shaped by momentum transport from the fast post-AGB flow to the rest of the (AGB) envelope, probably by means of a bow-like shock.

The comparison of the different transitions is used to deduce the physical conditions in the molecular gas. Most of the observed (post-shock) material is found to have a low temperature of about 15 K, indicating that the cooling processes are efficient after the passage of the shock. Typical densities of $3\,10^4 - 2\,10^5$ cm^{-3} are deduced, corresponding to a total gas mass of about 1 $M_\odot$. This high value shows that most of the nebular material is molecular and probed by the CO observations. Therefore, our maps effectively represent the disruption of the AGB envelope by the passage of a shock, allowing a description of the physical conditions in the nebula during this evolutionary phase.

THE MOLECULAR OUTFLOW AND CO BULLETS IN HH111

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Abstract: We present high angular resolution observations of the molecular outflow associated with the optical jet and HH objects of the HH111 system. Interferometric observations in the CO J=2–1 and J=1–0 lines of the high velocity bullets associated with HH111 are presented for the first time. The molecular gas in these high velocity clumps has moderate kinetic temperature and a mass of a few $10^{-4}\,M_\odot$ per bullet. We favor the view that HH jets and CO bullets, which represent different manifestations of the same physical phenomena, are driving the low-velocity molecular outflow (Fig. 2.)

1.3 MM PLATEAU DE BURE OBSERVATIONS OF IRC+10216

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Abstract: The Plateau de Bure millimeter-wave interferometer has been used at 1.3mm wavelength to observe the prototype carbon-star IRC+10216 in the continuum and in the $v = 1, J = 13 - 11$ transition of SiS at 234.8 GHz. The 3mm continuum and the $v = (0, 2^0, 2), J = 1-0$ HCN transition were simultaneously observed. The source of vibrationally excited SiS appears resolved, and a source size of $\sim 0.4''$ or 7 10^{14}cm (10 stellar radii) is derived, in agreement with a crude model of line formation (Fig. 3).

New Preprints

441. The interstellar medium in the edge-on galaxy NGC 5907: Cold dust and molecular line emission
M. Dumke, J. Braine, M. Krause, R. Zylka, R. Wielebinski, M. Guélin
1997, *Astronomy and Astrophysics*

442. The mass and temperature distribution in the protoplanetary nebula M1–92: ^{13}CO interferometric observations
V. Bujarrabal, J. Alcolea, R. Neri, M. Grewing
1997, *Astronomy and Astrophysics*

443. The molecular outflow and CO bullets in HH111
J. Cernicharo, R. Neri, Bo Reipurth
1997, *IAU No. 182*
Herbig-Haro Flows and the Birth of Low Mass Stars Chamonix, France, 1997

444. Disks and outflows as seen from the IRAM Interferometer
S. Guilloteau, A. Dutrey, F. Gueth
1997, *IAU No. 182*
Herbig-Haro Flows and the Birth of Low Mass Stars Chamonix, France, 1997

445. ^{12}CO J = 1–0 synthesis images of a dense torus in M2–9
J. Zweigle, R. Neri, R. Bachiller, V. Bujarrabal, M. Grewing
1997, *Astronomy and Astrophysics*

446. Models of bipolar molecular outflows
S. Cabrit, A. Raga, F. Gueth
1997, *IAU No. 182*
Herbig-Haro Flows and the Birth of Low Mass Stars Chamonix, France, 1997

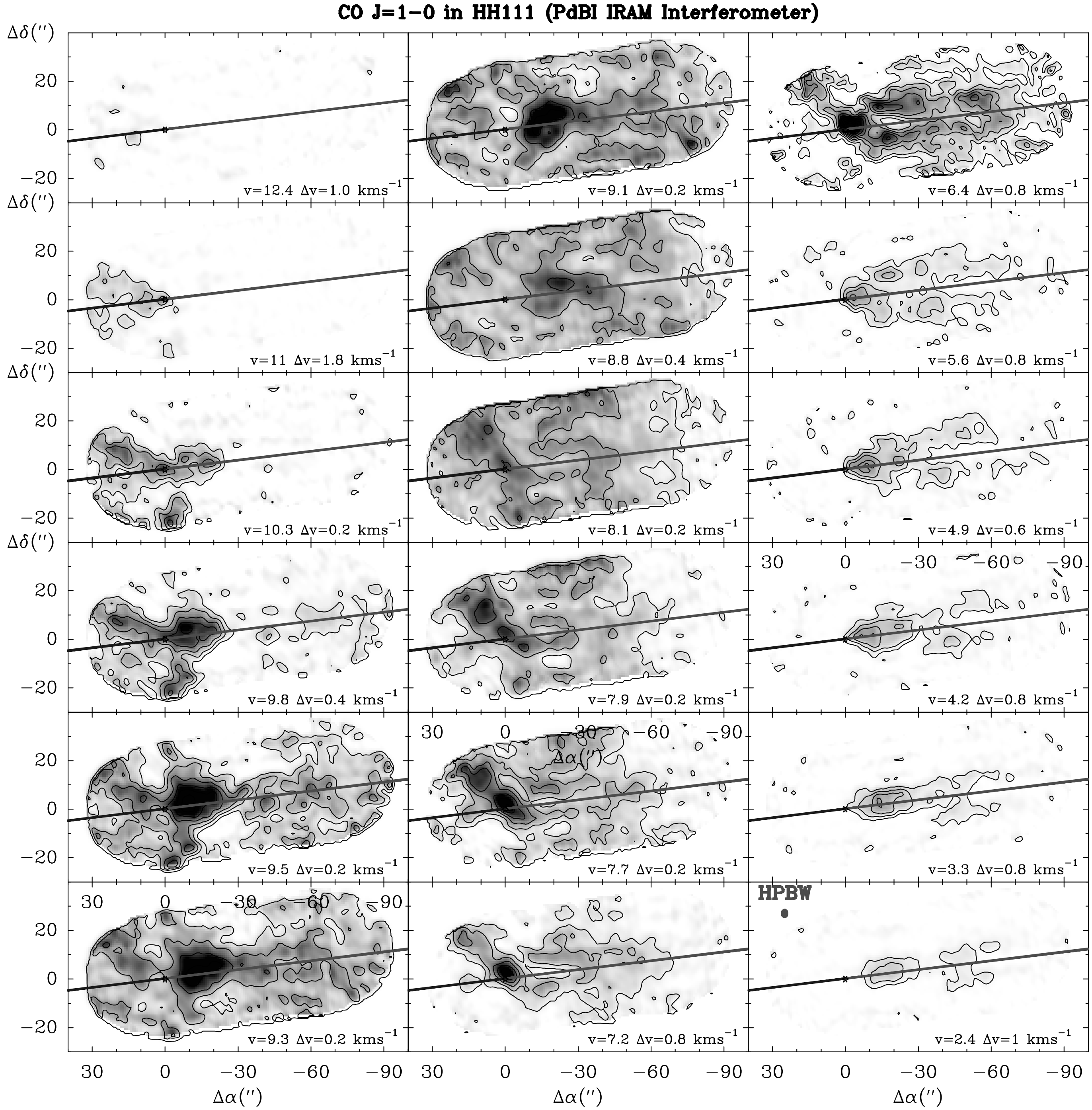

Figure 2: Interferometric maps of the J=1-0 CO emission taken with the PdBI. The maps result from a mosaic of overlapping 5 fields covering 120". The HPBW is 2.5"x3.5" and is indicated in the lower-right panel. Zero spacing data from the 30-m has been merged with the PdBI data. The thick line in each panel indicates the orientation of the HH111 optical jet.

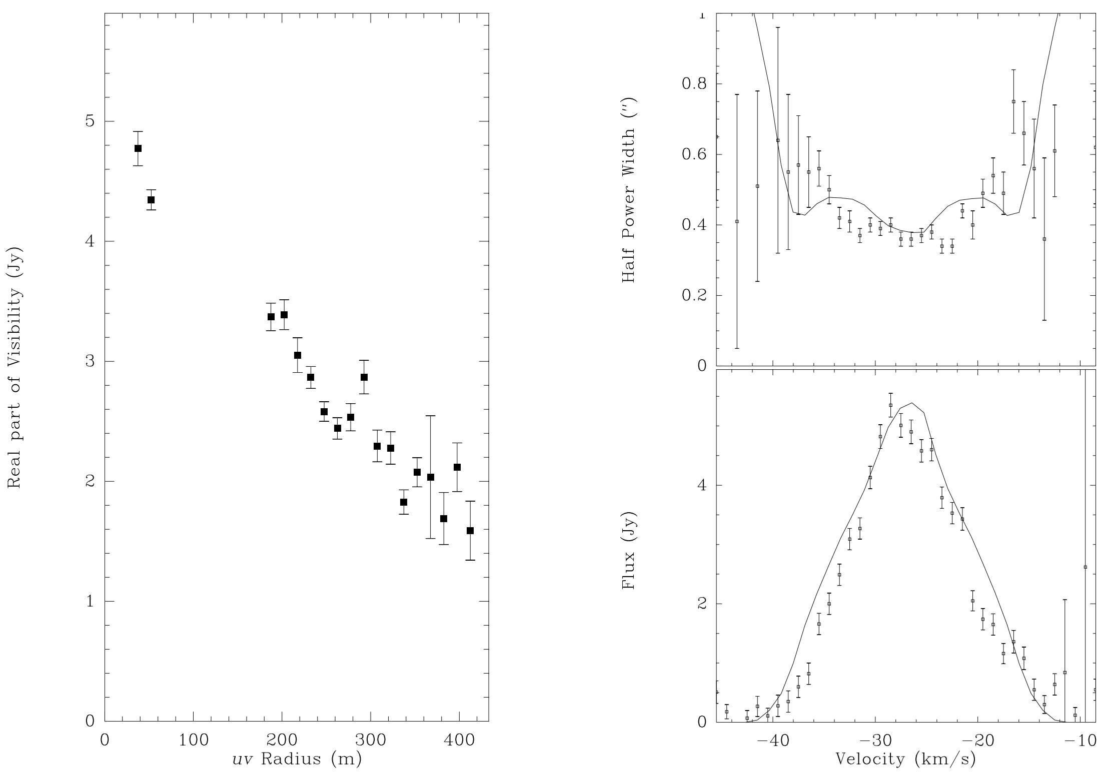

Figure 3: Left: SiS ($v = 1$) line emission for IRC+10216: Real part of visibility versus antenna spacing in m . Line channels between -32 and -22 $km\,s^{-1}$ have been averaged, and the continuum has been subtracted. Right: Gaussian fit parameters to the SiS line emission, as a function of velocity: Full width at half maximum and line flux, as a function of LSR velocity. The continuous line shows the line parameters predicted by the model.

The IRAM Newsletter is edited by Robert LUCAS at IRAM-Grenoble (e-mail address: `lucas@iram.fr`).
In order to reduce costs we are now sending paper copies of this Newsletter to astronomical libraries only. The IRAM Newsletter is available in electronic form:

- by using the World Wide Web: 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 Alpha 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 Postcript 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 NEWSSERV` *your name*

to the following e-mail address:

`newsserv@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		
	from abroad:	33 476 82 49 00	33 476 51 59 38
	from France:	0 476 82 49 00	0 476 51 59 38
Plateau de Bure	Institut de Radioastronomie Millimétrique, Observatoire du Plateau de Bure, 05250 St Etienne en Dévoluy, France		
	from abroad:	33 492 52 53 60	33 492 52 53 61
	from France:	0 492 52 53 60	0 492 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		
	starting April 15:	(34) 58 48 20 02	(34) 58 48 11 48

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.

Postdoctoral Position Open

IRAM — Institut de Radioastronomie Millimétrique

Applications are invited for a

POSTDOCTORAL POSITION IN ASTRONOMY

at IRAM Granada/Spain.

IRAM Granada operates the 30m millimeter wave telescope, located 50 km from Granada in the Sierra Nevada at an altitude of 3000 m, and offices (laboratories/library/administration) in the town of Granada. The total size of the group is about 30 persons.

The post-doc astronomer is expected :

- to participate in projects to improve the telescope system in such areas as software, receivers, backends and optics, as well as to play a role in the ongoing development and improvement of observing possibilities (such as spectral line on-the-fly observing and frequency switching)
- to carry out part of the regular test observations (pointing, calibration, etc.) and participate in their analysis
- to regularly participate in the astronomer-on-duty service at the 30 m telescope to support guest observers.

These activities will occupy about 50% of the post-doc's time. In addition he/she has the possibility to pursue his/her own scientific projects, also in collaboration with IRAM astronomers and/or outside groups.

The applicant should have a Ph.D. in astronomy or physics and preferably some experience in observational astronomy. Knowledge in some areas related to the hardware or software of a millimeter wave telescope is an advantage. The ability to work at high altitude (3000 m) is essential. Good knowledge of English is required.

The initial appointment will be for a period of two years with the possibility of renewal. Applications should be submitted before September 30th, 1997, to:

Prof. Dr. M. Grewing
Director
IRAM
300 rue de la Piscine
Domaine Universitaire
F-38406 St. Martin d'Hères Cedex, France
e-mail: grewing@iram.fr

Further information can be obtained from Dr. W. Wild, Station Manager, e-mail: wild@iram.es