IRAM Newsletter

Number 30 January 31, 1997

Calendar

March 6th, 1997: Deadline for the submission of observing proposals for the period May 15, 1997 to Nov. 15, 1997.

15-17 April 1997: "The Far InfraRed and Submillimetre Universe", An ESA/IRAM Symposium devoted to the Far InfraRed and Submillimetre Telescope (FIRST) cornerstone mission. IRAM will be responsible for the local organisation.

Contents

30m Telescope

Weather at Pico Veleta

The winter hit with all his strength most of Spain (as well as the rest of Europe). In the Sierra Nevada, after the early heavy snow falls of September and October, there was even more snow in December. From December 10 to January 11, only a few hours of observations were possible due to the persistent bad weather: the whole 7-channel bolometer session in December was lost, and following heterodyne observers were not much luckier. By now an average of about 3 meters of snow has accumulated in the telescope area, with snow heights up to 8 meters in some places. The heavy and abundant rain falls in the south of Spain caused floods, significant losses for the agricultural sector, and road damage.

On January 11, the weather finally became excellent. As usual, however, observers coming to the 30m telescope should bring a warm jacket and good shoes.

Wolfgang WILD

Interferometer

Southern France, too, has suffered from exceptionally bad weather during the last two months of 1996. This resulted in a significant delay in the scheduled interferometer observations. More than two meters of snow have accumulated on the Plateau de Bure, and cleaning the tracks to access the extended configuration will require several days, despite the improved equipment.

Icing conditions also caused a serious cable car problem just before Christmas. The maintenance team worked for 10 days before normal operations could be restored. The Plateau de Bure staff exchanges during this period had to be performed by helicopter, when weather conditions allowed.

The accumulated delay is large enough to cause some scheduling problems even for "A" proposals, because some sources will approach the sun avoidance period relatively soon. IRAM will contact the PIs of projects which might not be carried out or might have to be truncated. "B" proposals are unlikely to be scheduled unless they fall in a favorable LST range.

Software

A new release (named DEC96) of the GILDAS software is available. It incorporates a new window-like user interface, on systems supporting Motif. The release is complete for HPUX, AIX and Dec-OSF1 systems. However, the new facilities are not available on SunOS, Solaris, Ultrix and Linux.

The window interface allows SIC-based programs to create user-defined windows to modify SIC variables and activate commands or command procedures. It also provides a more intuitive, self-documented input for GILDAS tasks.

Stéphane GUILLOTEAU

Call for Observing Proposals for the 30-m Telescope

The *next deadline* for the submission of observing proposals for the IRAM 30 m telescope is March 6th, 1997, midnight. The observing session will extend from May 15, 1997 to Nov. 15, 1997 and cover roughly the 'summer' period at Pico Veleta. Only proposals at 3 mm, 2 mm and 1.3 mm wavelength using heterodyne receivers will be considered. There will be no observing session with the bolometers.

In total, roughly 3000 h of observing time will be available. This should allow to schedule at least some bigger programmes needing in the order of 100 hours (or even more). No new call for 'key programmes' is issued for this period.

Please, find below some relevant information as well as a copy of the proposal form.

Reminders

An On-the-Fly observing mode (OTF) for heterodyne observations works on an experimental basis at the 30m telescope. In this mode, the telescope beam drifts continuously across the source, while data are dumped at a rate of up to once every 1 or 2 seconds, depending on the backends and number of frequency channels. Any scanning direction can be chosen and successive scans can be concatenated to make a map. Individual scans can have any length; they are preceded and/or followed by OFF-source reference scans of any duration. This mode ensures a better homogeneity of the data and a much more efficient use of observing time. It is well suited for the observations of large (larger than about 1' x 1'), fully-sampled maps of relatively strong (typically $\geq$ 1 K) emission lines. Up to 4 receivers can be used simultaneously. The backends can be the filter banks and/or the autocorrelators.

By now OTF observations have been carried out successfully on several programs. Our experience shows that in its current form OTF is not appropriate when weak or broad (> about 30 km/s) lines are observed and/or the best possible spectral baselines are required.

All data processing, from raw backend-counts to maps, is done off-line on an HP workstation. Because of the very large amount of data, a special setup of software and disk space is needed, and there is no automatic computation of calibrated spectra (".30m files") and no real-time display of the data during observations. We are working on improvements of the observing mode, and we are developing new versions of CAL and CLASS with specific enhancements for OTF data, but at present the software remains experimental.

Because of the special requirements of this observing mode and its present shortcomings, projects using OTF observing need to involve an astronomer of the IRAM-Granada team, who will be responsible for the technical aspects and for the data reduction.

If you want to use OTF, please note it on the proposal form “special requirement” line, and contact H.Ungerechts (ungerechts@iram.es) or W.Wild (wild@iram.es) at IRAM-Granada well before the proposal deadline for more information.

Frequency switching is possible with up to 3 receivers switched simultaneously. The baseline quality depends on the receiver, the tuned frequency, frequency throw, phase time, and atmosphere, and is usually better at 3 mm than at 1 mm. Certain limitations exist (maximum frequency throw of 45 km/s, backends, phase times etc.; for details see [8], or contact IRAM-Granada). Baselines may be better when using one single receiver. Observers should be prepared to use another observing mode if the baseline quality is not sufficient for their project.

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 collecting most of the information necessary to plan 30-m telescope observations is available [10].

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 March 6th, 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 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/proposal/proposal.html`). *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 the polarimeter, ‘service observing’, spectral line on-the-fly (OTF) mapping, 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, focusing, 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' summer humidity for 3mm, 2mm and 1.3mm observations (7 mm of precipitable water, or $\tau_{\rm zenith} = 0.5$ at 230 GHz).

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.*

Service observing

To facilitate the execution of short ($\leq$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).

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

Programmes accepted for the Nov. 1996 – May 1997 period

A total of 133 proposals were submitted for the deadline of Sep. 1996. 48 proposals were rated "A", 26 "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 mid-March; 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. For more information for Visiting Astronomers to the 30m telescope, travel to Granada, and the fax forms *Confirmation of Observing Time* and *Confirmation of Travel dates*, see the IRAM Granada WWW pages (http://iram.es/).

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:

	Rec. Combinations			
Receivers	4-Rec.	3-Rec.		
3mm1	*	*	*	*
3mm2	*		*	
2mm				*
230G1	*	*	*	*
230G2	*	*		

The second 3 mm receiver (3mm2) can be used simultaneously with the 3mm1 receiver and the 230G1 with a high efficiency. Four receiver operation (3mm1+3mm2+230G1+230G2) is possible, but it results in a significant increase in the noise of 230G2.

3 mm SIS receivers

The tuning band of the 3mm1 receiver is 81 – 116 GHz; its receiver temperature is between 100 and 140 K, the image side band rejection is between 25 dB and 30 dB. The tuning band of the 3mm2 receiver is 82 – 116 GHz; its receiver temperature is between 70 and 90 K with the same range of image side band rejection.

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).

3mm1 is also used 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

- 230G1: 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 100–130 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). See the March 1994 Newsletter for more details.

0.8 mm Receiver, bolometers

Not available during this observing session.

Efficiencies, error beam, interferences

Telescope efficiencies (main beam and aperture) are given in IRAM Newsletter Nr. 18 (November 1994), in the *30m Manual* [10], and are available too on a one page *IRAM 30m Telescope System Summary* (see IRAM Granada WWW pages, http://iram.es/).

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.

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.

Polarimeter

A polarimeter has been constructed by IRAM for measurements of *circular* polarization. It has 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.

The present quarter-wave plate has been designed for 113.3 GHz. Its transmission loss is $\simeq 2\%$, and its cross-polarization below 20 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

At present there are 3 types of spectral line backends (the AOS is under repair) which can be individually connected to any receiver.

- The 1MHz filter bank, 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 100kHz 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 $\times$ 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) a problem of platforming may exist (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 IRAM WWW pages at http://iram.fr/veleta.ps .

[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 for the Plateau de Bure Interferometer

Observing proposals are invited for the IRAM Plateau de Bure Interferometer (PdBI), for the period May 15, 1997 to Nov. 15, 1997. The deadline for applications is March 6th, 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 `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 20 to 30 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 proposal, please note the following:

Proposal Category Proposal should be submitted in one of the 4 **strict** 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. The maximum available baseline length will be about 300 m.

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. The maximum available baseline length will be about 200 m.

Category 3: Proposals that ask for dual-frequency observations. The maximum available baseline length will be about 200 m.

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 long baselines observations, non standard frequencies for which tuning cannot be guaranteed, and more generally all non standard observations. These proposals will be carried 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.

Maintenance Heavy maintenance is foreseen for antennas 1 to 4. Accordingly, the Plateau de Bure array will operate:
- in 4 antenna configuration for May to August.
- in 5 antenna configuration for September, October and November.

Configurations The configurations are given in Table 1.

1.3 mm band and dual-frequency observations
All antennas are now equipped with fully operational dual frequency receivers. The 3mm and 1.3mm receivers are aligned to within about $2''$, allowing proper dual frequency observations.

Experience based on the past year shows that 1.3 mm observations are seldom feasible in summer time, and that such observations are possible only for objects transiting during the night of the August to October period. Accordingly, 1.3mm or dual-frequency projects for other objects will be considered as "Category 4" proposals, i.e. will be carried out on a best effort basis only, weather permitting.

Very long baselines: configuration A Configuration A *will NOT be scheduled* for the next session.

Signal to Noise The rms noise can be computed from

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

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 (22 at 3mm, 35 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 (4 or 5), and $N_{\rm c}$ is the basic number of configurations (with 4 antennas: 2 for D, 3 for CD, 4 for BC; with 5 antennas 1 for D, 2 for CD, 3 for BC)
- 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 performances in LSB tuning with high rejection (20 dB): expected system temperatures are (in $T_{\rm R}^*$ scale) 150 to 200 K for the summer time. Above 110 GHz, best performances are obtained with USB tuning, low rejection (4 to 6 dB): expected system temperatures are 300 K at 115 GHz. DSB tuning is possible over the

Table 1: Plateau de Bure Interferometer: available configuration sets

4 Antenna configurations	
Name	Stations
D1	W05 W00 E03 N05
D2	W10 W01 E03 N09
C1	W20 W05 N09 N17
C2	E10 W09 N03 N15
B1	E16 E24 N11 N17
B2	W12 W09 E24 N20
A1	W27 W20 E23 N29
A2	W23 E04 E24 N29

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 PdB interferometer offers 6 configuration sets:

Set	4 ant Config.	5 Ant Config.	Main purpose
D	D1, D2	D	"Low" resolution at 1.3 mm
CD	D1, C1, C2	D, C2 or C1	3.5″ resolution at 3mm, 1.8″ resolution at 1.3 mm
CC	n.a.	C1, C2	Slightly higher resolution than CD.
BC	C1, C2, B1, B2	B1, C2	2″ resolution at 3 mm
BB	n.a.	B1, B2, C2	Better sensitivity than BC
AB	B1, B2, A1, A2	A, B1, B2	1″ resolution at 3 mm

There is a possibility of choice between CD and CC arrays when configuration C2 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.

whole frequency range, but the system temperature may degrade significantly.

The 1.3 mm receivers give DSB tuning with typical T_{REC} below 50 K. Expected SSB system temperature are 400 to 500 K. However a relatively narrow resonance significantly degrades the performances near 245 GHz. 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 of 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 will 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 absolutely 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 are 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 program 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 program 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 programs):

- 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 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

Chemistry of Protosolar-like nebulae: The molecular content of the DM Tau and GG Tau disks

A.Dutrey, S.Guilloteau, M.Guélin,
Institut de Radio Astronomie Millimétrique, 300 Rue de la Piscine, F-38406 Saint Martin d'Hères, France

Abstract: We report the detection of CN, HCN, HNC, CS, HCO^+, C_2H and H_2CO (ortho and para) in the protoplanetary disks of DM Tau and GG Tau. For the first time organic molecules are observed in objects representative of the presolar nebula. These molecules are under-abundant with respect to the standard dense clouds. The depletions in the "outer" disk of DM Tau ($100 < r < 900$ AU), derived from the line intensities and state of excitation, range from $f \simeq 5$ (for CO) to 100 (for H_2CO). The relatively large abundances of CN and C_2H are typical of a photon-dominated chemistry (Figs. 1, 2).
Accepted for publications in A&A 317, L2

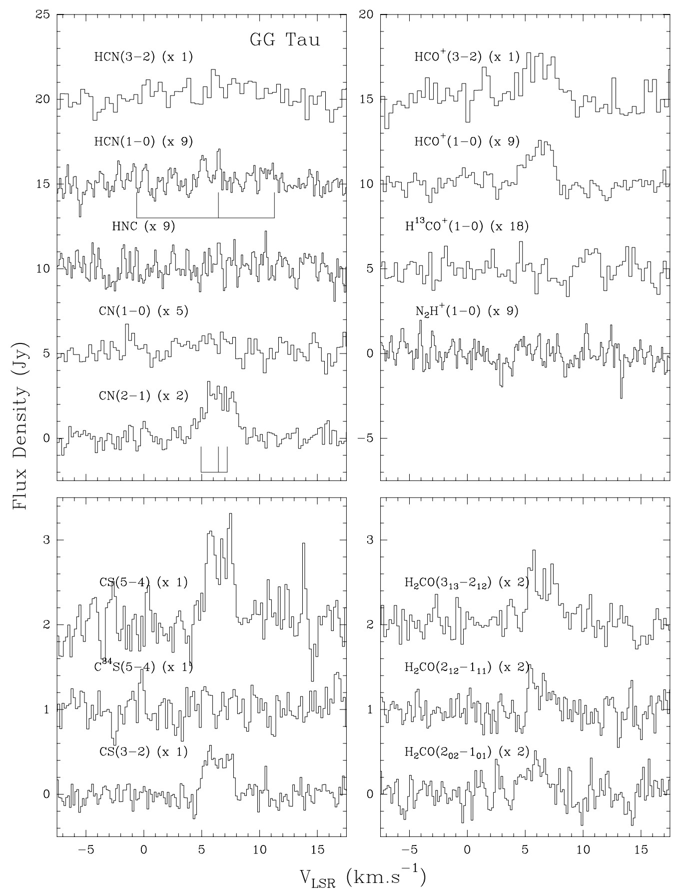

Figure 1: Line profiles observed toward GGT̃au. Integration time (*on + off*) is 4–8 h for each spectrum. Double-peaked profiles are observed for H_2CO 3_{13}–2_{12} and CS 3–2 and 5–4. They agree in position and width with the CO line profiles. Hyperfine components of HCN and CN are indicated.

Starbursts in barred spiral galaxies – II. Molecular and optical study of three Wolf-Rayet galaxies

T. Contini([1]), H. Wozniak([2]), S. Considère([3]), and E. Davoust([1])
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([2]) Observatoire de Marseille, URA CNRS 237, 2 Place Le Verrier, F-13248 Marseille Cedex 4, France
([3]) Observatoire de Besançon, EP CNRS 123, B.P. 1615, F-25010 Besançon Cedex, France

Abstract: We have searched for dense molecular gas in three barred spiral galaxies with young starbursts, NGC 3049, 5430 and 6764, which are known Wolf-Rayet galaxies. We detected HCN in the latter two, and CS was marginally detected in NGC 6764.

The dense molecular gas contents of the three galaxies are compared to those of other galaxies and to other indicators of star formation. The HCN luminosities (relative to the CO and far infrared ones) in these galaxies with very young starbursts are consistent with those observed in galaxies with older starbursts and in normal galaxies, and so are our upper limits to the CS intensities (relative to CO).

The starburst ages evaluated from our spectrophotometric observations are in the range 3.4 to 6.0 Myr. A circum-nuclear ring is apparent on our images of NGC 5430, the galaxy with the oldest central starburst; this galaxy also has the widest molecular lines. The central star formation rates derived from the Hα luminosity are consistent with those expected from the global FIR luminosities, and are correlated with the HCN luminosities.

Finally, an independent estimate of the H_2 column density is obtained by optical spectrophotometry; it leads to a H_2 column density to CO intensity ratio which is about 2 to 3 times lower than the standard value, because the CO intensities of the three galaxies are higher than average, relative to their far infrared fluxes.

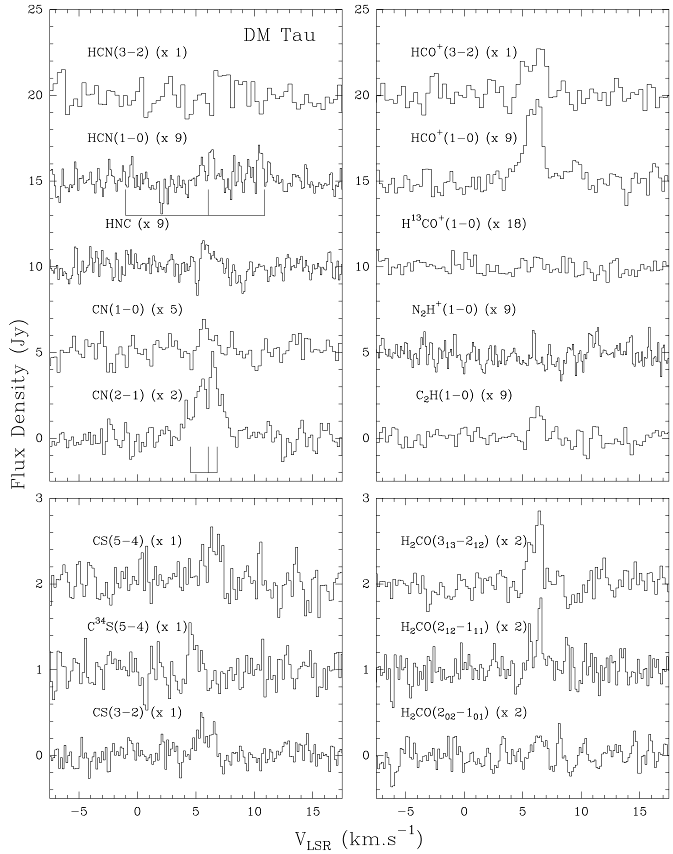

Figure 2: Same as Fig. 1, for DM$\tilde{T}$au.

A correlation between CO linewidth and starburst age in barred spiral galaxies

T. Contini(1), H. Wozniak(2), S. Considère(3), and E. Davoust(1)
(1) Observatoire Midi-Pyrénées, UMR 5572, 14 Avenue E. Belin, F-31400 Toulouse, France
(2) Observatoire de Marseille, URA CNRS 237, 2 Place Le Verrier, F-13248 Marseille Cedex 4, France
(3) Observatoire de Besançon, EP CNRS 123, B.P. 1615, F-25010 Besançon Cedex, France

Abstract: New CO(1→0) and CO(2→1) profiles complemented by data from the literature are used to obtain CO linewidths for 29 barred spiral galaxies with young nuclear starbursts. The ages of the starbursts were estimated from optical spectroscopy and recent evolutionary synthesis models. The CO linewidths and the starburst ages are correlated : galaxies with young (4-6 Myr) starbursts display narrow ($\lesssim$ 100 km.s^{-1}) CO line while those with older starbursts show broader CO lines. We discuss several scenarios of the gas dynamics during the nuclear starbursts' evolution to interpret the correlation.

New Preprints

422. CO emission from 3C48
J.E. Wink, S. Guilloteau, T.L. Wilson
1996, *Astronomy and Astrophysics*

423. Chemistry of protosolar-like nebulae: The molecular content of the DM Tau and GG Tau disks
A. Dutrey, S. Guilloteau, M. Guélin
1997, *Astronomy and Astrophysics*

424. Successive SiO shocks along the L1448 jet axis
A. Dutrey, S. Guilloteau, R. Bachiller
1997, *Astronomy and Astrophysics*

425. A hot ring in the SGR B2 molecular cloud
P. de Vicente, J. Martin-Pintado, T.L. Wilson
1997, *Astronomy and Astrophysics*

426. SiO emission from the Galactic Center molecular clouds
J. Martin-Pintado, P. de Vicente, A. Fuente, P. Planesas
1997, *Astrophys. Journal*

427. Millimetric and optical observations of Chiron
H. Rauer, N. Biver, J. Crovisier, D. Bockelée-Morvan, P. Colom, D. Despois, W.-H. Ip, L. Jorda, E. Lellouch, G. Paubert, N. Thomas
1997, *Planetary and Space Science*

428. A correlation between CO linewidth and starburst age in barred spiral galaxies
T. Contini, H. Wozniak, S. Considère, E. Davoust
1997, *Astronomy and Astrophysics*

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

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- 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:

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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:

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  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:

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