IRAM
Institut de Radioastronomie Millimétrique
Institut für Radioastronomie im Millimeterbereich
Instituto de Radioastronomía Milimétrica

Newsletter

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Contents

Calendar

March 10th, 2005 17:00h CET (UT + 1 hour):

Deadline for the submission of IRAM observing proposals for the period from May 15, 2005 to November 15, 2005.

June 27-28th, 2005:
Executive Council meeting in Madrid, Spain

Pre-Announcement: 3rd Millimeter Observing School in Pradollano

IRAM is currently planning the 3rd Millimeter Observing School which will take place in the fall of 2005 (probably September) in Pradollano (Sierra Nevada, Spain).

The purpose of this school is to introduce young astronomers into the field of radio astronomy at mm-wavelengths with special emphasis on single dish observations. The school will comprise a series of lectures, work in groups and observations with the IRAM 30-m telescope.

Details will be announced as soon as possible on our web pages (http://www.iram.es/IRAMES/events/summerSchool2005/) and in future issues of the IRAM Newsletter.

Rainer Mauersberger and Michael Grewing

Changes in the IRAM Direction

We welcome Pierre COX who has started as the new IRAM Deputy Director on January 1st, 2005, succeeding Michel GUELIN who has been serving in this function for more than 5 years.

With his dedication, competence and energy, Michel has helped very much to steer IRAM successfully through a very difficult period. Michel deserves a lot of credit for the scientific activities and technical developments that have been possible during these years. We wish him similar success in his new task as Head of the newly founded Astronomy Division which comprises all groups where astronomers are presently engaged in scientific, operational and software development activities (Astronomers' Group, PdB Science Operations Group, Science Software Group, and - possibly - an ALMA User Support Group).

The changes at the beginning of this year will be followed by more changes at the beginning of 2006. Pierre COX has ben nominated as the next IRAM Director after my retirement at the end of 2005, and a new Deputy Director will take office at that time, too.

We very much welcome these changes. They are very important for IRAM's future development, not only during this but also the next decade.

Michael GREWING

News from the 30m Telescope

An "Animated Portrait" of the IRAM 30-m shown in an art exhibition in Glasgow

The Scottish artist Will Duke was so impressed by the technical perfection of the IRAM 30-m Telescope and its scientific potential that he decided to create an animated portrait of the antenna and display a monitor with the animation at an art exhibition in a gallery called "Tramway" in Glasgow, Scotland. "Tramway" is a well respected contemporary gallery with an international audience. Will Duke is planning to show his work again at other galleries. He invites the users and friends of the Pico Veleta Observatory to have a look on his website http://www.willduke.net/animation.htm on which he is displaying the animation of the 30-m antenna and other samples of his work.

Rainer Mauersberger

Travel funds for European astronomers

IRAM is one of the organizations partipating in the RadioNet project, an initiative funded by the European Commission within the FP6 Programme to improve and encourage communication among astronomers of the European Community. Transnational access (TNA) is the largest RadioNet programme and provides funding for travel expenses incurred by eligible users for carrying out their observations or reducing their data. As a partner of RadioNet, IRAM has now some limited TNA funds to pay travel expenses for European users. Detailed information about user eligibility, TNA contacts, policies and travel claims for the IRAM 30m telescope and Plateau de Bure Interferometer can be found on the RadioNet home page at `http://www.radionet-eu.org`.

Observers requesting TNA support will be asked to provide the necessary personal and professional information to IRAM.

R. Neri (neri@iram.fr) & C. Thum (thum@iram.fr)

Proposals for IRAM Telescopes

The next deadline for submission of observing proposals on IRAM telescopes, both the interferometer and the 30m, is

March 10th, 2005 17:00h CET (UT + 1 hour)

The scheduling period extends from May 15, 2005 to November 15, 2005, covering roughly the summer period at our observatories.

Proposals should be submitted through our web–based submission facility. Instructions are found on our web page at URL:

http://www.iram.fr/GENERAL/submission/submission.html

The submission facility will be opened about three weeks before the proposal deadline. Proposal form pages and the 30m time estimator are available now.

Please avoid last minute submissions when the network could temporarily be congested. As an insurance against network congestion or failure, we still accept, in well justified cases, proposals submitted by:

- fax to number: (+33) 476 42 54 69 or by
- ordinary mail addressed to:

  IRAM Scientific Secretariat,
300, rue de la Piscine,
F-38406 St. Martin d'Hères, France

Proposals sent by e–mail are not accepted. Color plots will be printed/copied in grey scale. If color is considered essential for the understanding of a specific figure, a respective remark should be added in the figure caption. The color version may then be consulted in the electronic proposal by the referees.

Soon after the deadline the IRAM Scientific Secretariat sends an acknowledgement of receipt to the Principal Investigator of each proposal correctly received, together with the proposal registration number. To avoid the allocation of several numbers for the same proposal, send in your proposal *only once*. Note that the web facility allows cancellation and modification of proposals before the deadline. The facility also allows to view the proposal in its final form as it appears after re–compilation at IRAM. We urge proposers to make use of this facility as we always receive a number of proposals with serious formal defects (figures missing, blank pages, etc.).

Valid proposals contain the official cover page, up to two pages of text describing the scientific aims, and up to two more pages of figures, tables, and references. Proposals should *not exceed these 5 pages* of scientific material. Excepting the technical pages for the interferometer, longer proposals will be cut.

Proposals should be self-explanatory, clearly state the aims, and explain the need of the requested telescope. The amount of time requested should be carefully justified (see below).

The cover page, in postscript or in LaTeX format, and the LaTeX style file `proposal.sty` may be obtained from the IRAM web pages[1] at URL `../GENERAL/submission/proposal.html`. In case of problems, contact the secretary, Cathy Berjaud (e–mail: `berjaud@iram.fr`). Please, make sure that your proposals use the current form pages.

In all cases, indicate on the proposal cover page whether your proposal is (or is not) a *resubmission* of a previously rejected proposal or a *continuation* of a previously accepted interferometer or 30m proposal. We request that the proposers describe very briefly in the introductory paragraph (automatically generated header "Proposal history: ") why the proposal is being resubmitted (e.g. improved scientific justification) or is proposed to be continued (e.g. last observations suffered from bad weather).

Do not use characters smaller than 11pt. This could render your proposal illegible when copied or faxed. If we notice any formal problems sufficiently before the deadline, we will make an effort to contact the principal investigator and solve the problem together.

Applications for **zero spacing observations** have been simplified. If the need for complementary 30m observations is evident already at the time when the PdB interferometer proposal is prepared, just note this need on the interferometer proposal. A separate proposal for the 30m telescope is not required anymore. The blank form for Interferometer proposals now contains a new bullet, labelled "zero spacing" which should be checked if 30m observations are requested to fill in the missing zero spacings. The interferometer style file will prompt for an additional paragraph in which the scientific need for the zero spacings and all observational details, like size of map, sampling density and rms noise, spectral resolution, receiver configuration and time requested, are described

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[1] from here on we give only relative URL addresses. In the absolute address the leading two dots (..) have to be replaced by the address of one of our mirror sites: http://www.iram.fr or http://www.iram.es.

Call for Observing Proposals on the 30m Telescope

Summary

Proposals for three types of receivers will be considered for the coming summer semester:

1. the observatory's set of four dual polarization heterodyne receivers centered at wavelengths of 3, 2, 1.3, and 1.1 mm.
2. the 9 pixel dual–polarization heterodyne receiver array, HERA, operating at 1.3 mm wavelength
3. a 1.2 mm bolometer array with 37 or 117 pixels

Emphasis will be put on observations at the longer wavelengths. In total, about 2800 hours of observing time will be available, which should allow scheduling of a few longer programmes (up to $\sim$ 150 hours).

The main news, proposal formalities, details of the various receivers, and observing modes are described below.

What is new ?

During the coming semester we expect the New **Control System (NCS)** to go into operation. CAMAC interfaces and VAX computers will finally be retired. Hardware control will be through VME based systems, mostly running Linux, and all user-interface and data processing software will run on Linux.

The transition to the NCS is planned in two major steps. First, starting in the second half of September, NCS version 1 will be installed and tested, supporting a subset of features identified as "essential". Most current observing modes, including on–off, wobbler switching, and on–the–fly maps, will be available for bolometers, single–pixel SIS receivers, and HERA. We are reviewing a detailed list of these "essential" features of NCS v 1 and will publish it on the IRAM web site.

Other observing modes and new features will be made available in a second step, for which the details and timing will depend in part on the demands of the new proposals.

We therefore expect that a few proposals requesting rare observing modes not included in NCS v1, may experience scheduling constraints.

Working with the NCS will be easy for observers used to the current control system, although some commands will change in order to support new features. A user's guide for the NCS will be available before any projects get scheduled under the NCS, and we will provide special support for observations with the NCS.

The extended **tuning range** of the 3mm receivers (down to 77 GHz in LSB with good USB rejection, and near–DSB operation in the 72 – 77 GHz range) is now routinely available, with the proviso that a 1.3mm receiver housed in the same dewar as a 3mm receiver used below 80 GHz is not available. No hardware modifications are needed anymore. However, due to the rapid variation (with frequency) of the sideband ratio, special care must be taken with calibration. Recipes are described in a test report (available at ./IRAMFR/PV/veleta.htm). The report also contains a collection of 72 – 80 GHz reference spectra. Proposers should use the time estimator which will include the correct receiver temperature at the low frequencies and an extra overhead for calibration.

The **dual polarization HERA** started to give satisfactory results at the time of writing. The necessary expansion of the IF distribution system is made, and the backend WILMA has been debugged. Residual problems (one dead detector, some instabilities) will be investigated this spring.

Like last summer, a **bolometer array**, most likely the 117–channel MAMBO II which should be used for observing time estimates, will be available. Somewhat depending on the LST ranges requested by the new proposals, one or more smaller sessions of pooled observations will be scheduled.

Applications

On the official cover page, please fill in the line 'special requirements' if you request either polarimetric observations, service or remote observing. If the observations need or have to avoid specific dates, enter them here. If there are periods when you cannot observe for personal reasons, please specify them here.

We insist upon receiving, with proposals for heterodyne receivers, a complete list of frequencies corrected for source redshift (to 0.1 GHz) and precise positions. If in very special cases the proposers do not feel to be in a position to give this information, they should take up contact with the scheduler (thum@iram.fr). The proposers should also specify on the cover sheet which receivers they plan to use.

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 the source list in J2000 coordinates. This list *must 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 adhere to the format indicated on the proposal form (no hand writing, please). If your source list is longer (e.g. more than 15 sources) than what fits onto the cover page, please use the LaTeXmacro `\extendedsourcelist`.

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 hours.

If time has already been given to a 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.

Reminders

A handbook ("The 30m Manual") collects most of the information necessary to plan 30m telescope observations[6]. The report entitled "Calibration of spectral line data at the IRAM 30m telescope" explains in detail the applied calibration procedure. Both documents can be retrieved from the URL ./IRAMES/otherDocuments/manuals/index.html. A catalog of well calibrated spectra for a range of sources and transitions (Mauersberger et al. [9]) is very useful for monitoring spectral line calibration. A copy of the 30m file with the calibrated spectra can be downloaded from the Spanish web site.

The astronomer on duty (whose schedule can be found at URL ./IRAMES/groups/astronomy/aodsched.html) should be contacted well in advance of an observing run for any special questions concerning the preparation of an observing run (e.g. setup of on-the-fly maps etc).

Frequency switching is available for both HERA and the observatory's standard SIS receivers. This observing mode is interesting for observations of narrow lines where flat baselines are not essential, although the spectral baselines with HERA are among the best known in frequency switching. Certain limitations exist with respect to maximum frequency throw ($\leq$ 45 km/s), backends, phase times etc.; for a detailed report see [4].

Observing time estimates

This matter needs special attention as a serious time underestimate may be considered as a sure sign of sloppy proposal preparation. We strongly recommend to use the web–based Time Estimator (URL: ./IRAMES/obstime/-time_estimator.html), whenever applicable. Versions 2.5 and higher handle heterodyne (single pixel and HERA) as well as bolometer observations with updated instrumental parameters. Suggestions and questions can be addressed to Axel Weiß (aweiss@iram.fr).

If very special observing modes are proposed which are not covered by the Time Estimator, proposers must give sufficient technical details so that their time estimate can be *reproduced.* In particular, the proposal must give values for T_{sys}, the spectral resolution, the expected antenna temperature of the signal, the signal/noise ratio which is aimed for, all overheads and dead times, and the resulting observing time. A technical report explaining how to estimate the telescope time needed to reach a given sensitivity level in various observing modes was published in the January 1995 issue[2] of the IRAM Newsletter [5]. It has been included in the 30m telescope Manual [6].

Proposers should base their time request on normal summer conditions, corresponding to 7mm of precipitable water vapor. Conditions during afternoons can be degraded due to anomalous refraction. The observing efficiency is then reduced and the temperature calibration is more uncertain than the typical 10 percent. If exceptionally good transmission or stability of the atmosphere is requested which may be reachable only in quasi–winter conditions, the proposers must clearly say so in their time estimate paragraph. Such proposals will however be particularly scrutinized.

Pooled observing

As in the previous summer semester, we plan to pool the bolometer and other suitable proposals together in one observing session, probably in October. The proposals participating in the pool are observed by Granada staff and cooperating external astronomers, coordinated by Axel Weiss. The participating proposals are grouped according to their demand on weather quality, and they get observed following the priorities assigned by the program committee. The organization of the observing pool is described at ./IRAMES/observing/flexible/flexible.html. Typically, the bolometer proposals are included in the pool, but very weather sensitive heterodyne proposals may also request inclusion in the pool. Bolometer and heterodyne proposals which are particularly weather tolerant qualify as backup for the pool. Participation in the pool is voluntary, and the respective box on the proposal form should be checked.

Service observing

To facilitate the execution of short (≤8 h) programmes, we propose "service observing" for some easy to observe programmes *with only one set of tunings.* Observations are made by the local staff using precisely laid–out instructions by the principal investigator. For this type of observation, we request an acknowledgement of the IRAM staff member's help in the forthcoming publication. If you are interested by this mode of observing, specify it as a "special requirement" in the proposal form. IRAM will then decide which proposals can actually be accepted for this mode.

Remote observing

This observing mode where the remote observer actually controls the telescope very much like on Pico Veleta, is available from the downtown Granada office, from the MPIfR in Bonn, from the ENS in Paris, from the OAN in Madrid (near Parque de Retiro), and from IRAM in Grenoble. This observing mode is available to projects without any particular technical demands and to experienced 30m users. The prospective remote observer should note "remote observing" as a special requirement in the proposal cover sheet.

After time has been awarded to a proposal, the P.I. is requested to give sufficient detail to the secretary, Cathy Berjaud (berjaud@iram.fr) on how the remote observer can be contacted. Please note that IRAM is not responsible for the remote stations in Paris, Madrid, or Bonn.

Remote observers affiliated with the MPIfR or other institutes near Bonn should contact Dirk Muders (dmuders@mpifr-bonn.mpg.de) at MPIfR for a short introduction to the remote observing station. Remote observers in the Paris area may contact M. Gerin (gerin@lra.ens.fr) for arrangements. Astronomers who want to use the Madrid station are requested to contact Javier Alcolea (j.alcolea@oan.es). Remote observers in or near Grenoble please contact H. Wiesemeyer (wiesemey@iram.fr) at IRAM. Observers visiting the 30m might opt to do some of their observing from Granada if it eases their travel constraints. In this case, a Granada astronomer should be contacted as soon as possible, arrangements on very short notice may not always be possible.

Technical Information about the 30m Telescope

This section gives all the technical details of observations with the 30m telescope that the typical user will have to know. A concise summary of telescope characteristics is published on the IRAM web pages.

The **HE**terodyne **R**eceiver **A**rray is expected to be available for most of next summer. The 9 dual–polarization pixels are arranged in the form of a center–filled square and are separated by 24″. Each beam is split into two linear polarizations (after a successful upgrade in March) which couple to separate SIS mixers. The 18 mixers feed 18 independent IF chains. Each set of 9 mixers is pumped by a separate local oscillator system. The same positions can thus be observed simultaneously at any two frequencies inside the HERA tuning range (210-276 GHz).

A derotator optical assembly can be set to keep the 9 pixel pattern stationary in the equatorial or horizontal

[2] electronically available via the WWW starting at URL on our web pages `./IRAMFR/PV/ARN/newsletter.html`

coordinates. Receiver characteristics (of the single polarization system) are listed in Tab. 1, and an updated user manual (version 1.7) is available on our web page.

Frequency tuning of HERA, although fully under remote control and automatic, is substantially more complicated than for the observatory's other SIS receivers. Although the tuning is still known for only a few frequencies, (the 3 CO isotopes at 230.5, 220.4, and 219.6 GHz; CS at 244.9 GHz; HCN at 265.9 GHz; HCO^+ at 267.6 GHz; DCN and $HC^{15}N$ at 217.2 and 259 GHz; H_2CO at 225.7 GHz; H30α at 231.9 GHz), HERA proposals for any frequency within the nominal tuning range of 210 – 276 GHz are encouraged. Despite good progress being made with semi–automatic tuning procedures, there may still be some difficult frequency spots. HERA observers are therefore well advised to send a list of their frequencies to Granada at least 2 weeks ahead of their run.

HERA can be connected to three sets of backends:

- ▷ VESPA with the following combinations of nominal resolution (KHz) and maximum bandwidth (MHz): 20/40, 40/80, 80/160, 320/320, 1250/640. The maximum bandwidth can actually be split into two individual bands for each of the 18 detectors at most resolutions. These individual bands can be shifted separately up to ±200 MHz offsets from the sky frequency (see also the sections on backends below).
- ▷ a low spectral resolution (4 MHz channel spacing) filter spectrometer covering the full IF bandwidth of 1 GHz. Nine units (one per HERA pixel) are available. Note that only one polarization of the full array is thus connectable to these filter banks.
- ▷ WILMA with a 1 GHz wide band for each of the 18 detectors. The bands have 512 spectral channels spaced out by 2 MHz. WILMA will be available after successful completion of the current tests.

HERA is operational in two basic spectroscopic observing modes: *(i)* raster maps of areas typically not smaller than $1'$, in position, wobbler, or frequency switching modes, and *(ii)* on–the–fly maps of moderate size (typically $2' - 10'$). Extragalactic proposals should take into account the current limitations of OTF line maps, as described in the User Manual, due to baseline instabilities induced by residual calibration errors. HERA proposers should use the web–based Time Estimator. For details about observing with HERA, consult the User manual. The HERA project scientist Karl Schuster (schuster@iram.fr), or Albrecht Sievers (sievers@iram.es),the astronomer in charge of HERA, may also be contacted.

The single pixel heterodyne receivers

Four dual polarization SIS receivers are available at the telescope for the upcoming observing season. They are designated according to the dewar in which they are housed (A, B, C, or D), followed by the center frequency (in GHz) of their tuning range. Their main characteristics are summarised in Tab. 1. All receivers are linearly polarized with the E–vectors, before rotation in the Martin–Puplett interferometers, either horizontal or vertical in the Nasmyth cabin. Up to four of these eight receivers can be combined for simultaneous observations in the four ways depicted in Tab. 1. Note that they cannot be combined with HERA nor with the bolometers. Also listed are typical system temperatures which apply to normal summer weather (7mm of water) at the center of the tuning range and at 45° elevation. All receivers are tuned by the operators from the control room. Experience shows that it normally takes not more than 15 min to tune four such receivers.

Extended tuning range: 72 – 80 GHz

Several molecules of high astrophysical importance have transitions in the frequency band 66 – 80 GHz, i.e. between the atmospheric O_2 absorption band and the low frequency edge of the nominal 3mm tuning range (see Tab.1). Tests have shown that both 3mm receivers, A 100 and B 100 have good performance (good USB rejection and system temperature) in the range 80 – 77 GHz. The receivers become increasingly DSB below 77 GHz, until their behavior becomes erratic around 72 GHz. Due to the rapid variation of the image gain, special care must be exercised with calibration. A new image gain calibration tool is provided and described in the test report available on the IRAM web site (at ./IRAMFR/PV/veleta.htm). The report includes a set of reference spectra.

Following the considerable demand for this frequency range in the last 2 semesters, the LO hardware has been simplified. As a result, observations in the 72 – 80 GHz range do not require any special arrangements, except that the A 230 (B 230) receiver is unusable when the A 100 (B 100) receiver is used below 80 GHz.

General point about receiver operations

Tuning of the single pixel/dual polarization receivers is now considerably faster and more reproducible than before. Particular frequencies, like those in the range 72 – 80 GHz or those near a limit of the tuning range, may still be problematic. In these cases, we recommend to check with a Granada receiver engineer at least two weeks before the observations. HERA observers, however, are requested to send their frequencies as soon as their project gets scheduled.

Polarimeter XPOL

An upgrade of the IF polarimeter [16] is now available, where the cross correlation between the IF signals from a pair of orthogonally polarized receivers is made digitally in VESPA. The new observing procedure, designated

Table 1: Heterodyne receivers available for the next summer observing semester. Performance figures are based on recent measurements at the telescope. T^*_{sys} is the SSB system temperature in the T^*_A scale at the nominal center of the tuning range, assuming average summer conditions (pwv = 7mm) and 45° elevation. g_i is the rejection factor of the image side band. ν_{IF} and $\Delta\nu_{IF}$ are the IF center frequency and width.

receiver	polari– zation	combinations 1	2	3	4	tuning range GHz	T_{Rx}(SSB) K	g_i dB	ν_{IF} GHz	$\Delta\nu_{IF}$ GHz	T^*_{sys} K	remark
A 100	V	1		3		80 - 115.5	60 - 80	> 20	1.5	0.5	120	
B 100	H	1			4	81 - 115.5	60 - 80	> 20	1.5	0.5	120	1
C 150	V		2		4	129 - 183	70 - 125	15 - 25	4.0	1.0	200	
D 150	H		2	3		129 - 183	80 - 125	8 - 17	4.0	1.0	200	
A 230	V	1		3		197 - 266	85 - 150	12 - 17	4.0	1.0	450	2
B 230	H	1			4	197 - 266	95 - 160	12 - 17	4.0	1.0	450	2
C 270	V		2		4	241 - 281	125 - 250	10 - 20	4.0	1.0	1000	3
D 270	H		2	3		241 - 281	150 - 250	9 - 13	4.0	1.0	1000	3
HERA	H/V					210 - 276	110 - 380	~ 10	4.0	1.0	400	2, 4

1: tuning range extended to ≥ 72 GHz under special conditions (see text)
2: noise increasing with frequency
3: performance at $\nu < 275$ GHz; noisier above 275 GHz.
4: tuning parameters are not yet complete

XPOL, generates simultaneous spectra of all 4 Stokes parameters. The following combinations of spectral resolution (kHz) and bandwidth (MHz) are available: 40/120, 80/240, 320/480, and 1250/640.

Although successful XPOL observations were made at several frequencies, experience is still limited, particularly with respect to long integrations and observations of extended sources. Data reduction software using CLASS enhanced with a graphical user interface is available (H. Wiesemeyer). A short guide (at ./IRAMFR/PV/veleta.htm) describes XPOL observations. Polarimetry proposals will be considered with the restriction that the target sources be not larger than the main beam.

MPIfR Bolometer arrays

The bolometer arrays, MAMBO–1 (37 pixels) and MAMBO–2 (117 pixels), are provided by the Max–Planck–Institut für Radioastronomie. They consist of concentric hexagonal rings of horns centered on the central horn. Spacing between horns is $\simeq 20''$. Each pixel has a HPBW of $11''$. We expect that MAMBO–2 will be normally used, but MAMBO–1 is kept as a backup.

The effective sensitivity of MAMBO–1 for onoff and mapping observations is 39 $\mathrm{mJy\,s^{\frac{1}{2}}}$. For MAMBO–2 effective sensitivities of 46 $\mathrm{mJy\,s^{\frac{1}{2}}}$ (ON/OFF mode) and 52 $\mathrm{mJy\,s^{\frac{1}{2}}}$ (mapping mode) were measured. The *rms*, in mJy, of a MAMBO–2 map is typically

$$rms = 0.4 f \sqrt{v_{scan} \Delta s}$$

where v_{scan}, in arc sec/sec, is the velocity in the scanning direction and Δs, in arc sec, is the step size in the orthogonal direction. The factor f is 1 (2) for sources of size $< 30''$ ($> 60''$). It is assumed that the map is made large enough that all beams cover the source. The sensitivities apply to bolometric summer conditions (τ(250GHz) $\sim$ 0.3, elevation 45 deg, and application of skynoise filtering algorithms). In cases where skynoise filtering algorithms are not or not fully effective (e.g. extended source structure, atmosphere not sufficiently stable), the effective sensitivity is typically about a factor of 2 worse. For those projects, only atmospheric conditions with low skynoise (i.e. stable atmosphere, no clouds, little turbulence) are recommened unless the expected signal is about 1 Jy/beam or stronger.

The bolometer arrays are mostly used in two basic observing modes, ON/OFF and mapping. Previous experience with MAMBO–2 shows that the ON/OFF reaches typically an rms noise of ~ 2.3 mJy in 10 min of total observing time (about 200 sec of ON source, or about 400 sec on sky integration time) under stable conditions. Up to 30 percent lower noise may be obtained in perfect weather. In this observing mode, the noise integrates down with time t as $\sqrt{t}$ to rms noise levels below 0.5 mJy.

In the mapping mode, the telescope is scanning in the direction of the wobbler throw (default: azimuth) in such a way that all pixels see the source once. A typical single map[3] with MAMBO–2 covering a fully and homogeneously sampled area of $150'' \times 150''$ (scanning speed:

[3]see also the Technical report by D. Teyssier and A. Sievers on a special fast mapping mode (IRAM Newsletter No. 41, p. 12, Aug. 1999).

5″per sec, raster step: 8″) reaches an rms of 2.8 mJy/beam in 1.9 hours if skynoise filtering is effective. Much more time is needed (see Time Estimator) if sky noise filtering cannot be used. The area actually scanned (8.0′ × 6.5′) must be larger than the map size (add the wobbler throw and the array size (4′), the source extent, and some allowance for baseline determination) if the EHK–algorithm is used to restore properly extended emission. Shorter scans may lead to problems in restoring extended structure. Mosaicing is also possible to map larger areas. Under many circumstances, maps may be co–added to reach lower noise levels. If maps with an rms $\lesssim$ 1 mJy are proposed, the proposers should contact the experts.

The bolometers are used with the wobbling secondary mirror (wobbling at a rate of 2 Hz). The wobbling direction which used to be fixed in azimuth, can now be freely chosen within some limits (see IRAM Newsletter No. 61). This allows in virtually all cases to adapt the wobbling/scanning direction to the source under study. Nevertheless, the orientation of the beams on the sky changes with hour angle due to parallactic and Nasmyth rotations, as the array is fixed in Nasmyth coordinates and the wobbler direction is fixed with respect to azimuth during a scan. Bolometer proposals participating in the pool have their observations (maps and ONOFFs) pre-reduced by a data quality monitor which runs scripts in the newly developed MOPSIC. This package, complete with all necessary scripts, is also installed for off-line data analysis in Granada and Grenoble. It is also available for distribution from the IRAM Data Base for Pooled Observations or directly from R. Zylka (zylka@iram.fr). The older software packages (NIC [7] and MOPSI[8]) are still available, but will not be updated.

Bolometer proposals will be pooled together like in previous semesters along with suitable heterodyne proposals as long as the respective PIs agree. The web–based time estimator handles well the usual bolometer observing modes, and its use is again strongly recommended. The time estimator uses rather precise estimates of the various overheads which will be applied to all bolometer proposals. If exceptionally low noise levels are requested which may be reachable only in a perfectly stable (quasi–winter) atmosphere, the proposers must clearly say so in their time estimate paragraph. Such proposals will however be particularly scrutinized. On the other extreme, if only strong sources are observed and moderate weather conditions are sufficient, the proposal may be used as a backup in the observing pool. The proposal should point out this circumstance, as it affects positively the chance that the proposal is accepted and observed.

Table 2: Main observational parameters of 30m telescope.

frequency [GHz]	θ_b ["] (1)	η_F (2)	η_{mb} (3)	S_ν/T_A^* [Jy/K]
86	29	0.95	0.78	6.0
110	22	0.95	0.75	6.3
145	17	0.93	0.69	6.7
170	14.5	0.93	0.65	7.1
210	12	0.91	0.57	7.9
235	10.5	0.91	0.51	8.7
260	9.5	0.88	0.46	9.5
279	9	0.88	0.42	10.4

(1) beam width (FWHP). A fit to all data gives:
$$\theta_b \text{ ["]} = 2460 \text{ / frequency [GHz]}$$
(2) forward efficiency (coupling efficiency to sky)
(3) main beam efficiency. Based on a fit of measured data to the Ruze formula:
$$\eta_{\rm mb} = 1.2\epsilon \exp(-(4\pi R\sigma/\lambda)^2)$$
with $\epsilon = 0.69$ and $R\sigma = 0.07$

The Telescope

Beam and Efficiencies

Table 2 lists the size of the telescope beam for the range of frequencies of interest. Forward and main beam efficiencies are also shown (see also the note by U. Lisenfeld and A. Sievers, IRAM Newsletter No. 47, Feb. 2001). The variation of the coupling efficiency to sources of different sizes can be estimated from plots in Greve et al. [12].

At 1.3 mm (and a fortiori at shorter wavelengths) a large fraction of the power pattern is distributed in an error beam which can be approximated by two Gaussians of FWHP $\simeq$ 170″ and 800″ (see [12] for details). Astronomers should take into account this error beam when converting antenna temperatures into brightness temperatures. A variable and sometimes large contribution to the error beam was known to come from telescope astigmatism[3]. Extensive work during the last years had shown that the astigmatism resulted from temperature differences between the telescope backup structure and the yoke. The recent installation of heaters in the yoke by J. Peñalver has nearly completely removed the astigmatism[15].

Pointing and Focusing

With the systematic use of inclinometers the telescope pointing became much more stable. Pointing sessions are now scheduled at larger intervals. The fitted pointing parameters typically yield an absolute rms pointing accuracy of better than 3″ [10]. Receivers are closely aligned (within $\leq$ 2″). Checking the pointing, focus, and receiver alignment is the responsibility of the observers (use a planet for alignment checks). Systematic (up to 0.4 mm) differences between the foci of various receivers can occasionally occur. In such a case the foci should be carefully monitored and a compromise value be chosen. Not doing so may result in broadened and distorted beams ([1]).

Wobbling Secondary

- Beam–throw is $\leq 240''$ depending on wobbling frequency. At 2 Hz, the maximum throw is $90''$
- Standard phase duration: 2 sec for spectral line observations, 0.25 sec for continuum observations.

Backends

The following four spectral line backends are available which can be individually connected to any single pixel receiver and, if indicated, also to HERA.

The 1 MHz filterbank consists of 4 units. Each unit has 256 channels with 1 MHz spacing and can be connected to different or the same receivers giving bandwidths between 256 MHz and 1024 MHz. The maximum bandwidth is available for only one receiver, naturally one having a 1 GHz wide IF bandwidth. Connection of the filterbank in the 1 GHz mode presently excludes the use of any other backend with the same receiver.

Other configurations of the 1 MHz filterbank include a setup in 2 units of 512 MHz connected to two different receivers, or 4 units of 256 MHz width connected to up to four (not necessarily) different receivers. Each unit can be shifted in steps of 32 MHz relative to the center frequency of the connected receiver.

The 100 KHz filterbank consists of 256 channels of 100 KHz spacing. It can be split into two halves, each movable inside the 500 MHz IF bandwidth, and connectable to two different single pixel receivers.

VESPA, the versatile spectrometric and polarimetric array, can be connected either to HERA or to a subset of 4 single pixel receivers, or to a pair of single pixel receivers for polarimetry. The many VESPA configurations and user modes are summarized in a Newsletter contribution [14] and in a user guide, but are best visualised on a demonstration program which can be downloaded from our web page at URL ./IRAMFR/PV/veleta.htm. Connected to a set of 4 single pixel receivers VESPA typically provides up to 12 000 spectral channels (on average 3 000 per receiver). Up to 18 000 channels are possible in special configurations. Nominal spectral resolutions range from 3.3 KHz to 1.25 MHz. Nominal bandwidths are in the range 10 — 512 MHz. When VESPA is connected to HERA, up to 18 000 spectral channels can be used with the following typical combinations of nominal resolution (KHz) and maximum bandwidth (MHz): 20/40, 40/80, 80/160, 320/320, 1250/640.

The 4 MHz filterbank consists of nine units. Each unit has 256 channels (spacing of 4 MHz, spectral resolution at 3 dB is 6.2 MHz) and thus covers a total bandwidth of 1 GHz. The 9 units are designed for connection to HERA, but a subset of 4 units can also be connected to the backend distribution box which feeds the single pixel spectral line receivers. All these receivers have a 1 GHz RF bandwidth except for A100 and B100 (500 MHz only). At the present time, a 4 MHz filterbank cannot be used simultaneously with the autocorrelator or the 100 KHz filterbank on the same receiver.

An on–line calibration routine automatically writes calibrated spectrometer data, including the 4 MHz filterbanks, to the Linux machines. The routine, although still experimental, works for all observing modes. A logical link named "data.30m" pointing to this file of calibrated spectra is made available in all newly created project accounts.

The **wideband autocorrelator WILMA** consists of 18 units. They can be connected to the 18 detectors of HERA. Each unit provides 512 spectral channels, spaced out by 2 MHz and thus covering a total bandwidth of 1 GHz. Each band is sliced into two 500 MHz subbands which are digitized with 2 bit/1GHz samplers. An informative technical overview of the architecture is available on the web page (URL: ../IRAMFR/-TA/backend/veleta/wilma/index.htm).

WILMA can be connected to the 18 detectors of HERA or, with 4 units maximum, to the single pixel receivers.

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in "Polarimetry in Astronomy", Ed. S.Fineschi, Proc.of SPIE Vol.4843, 272–283 (2003)

These reports are available upon request (see also previous Newsletters). Please write to Mrs. C. Berjaud, IRAM Grenoble (e–mail: `berjaud@iram.fr`).

Clemens Thum (thum@iram.fr) & Rainer Mauersberger (mauers@iram.fr)

News from the Plateau de Bure Interferometer

Plateau de Bure data header archive

In collaboration with the Centre des Données astronomiques de Strasbourg (CDS), the astronomical data headers for all projects observed since December 1990 with the Plateau de Bure Interferometer were made available on the Internet. For now, the archive provides information up to September 2003 on source coordinates, on-source integration time, frequencies, observing modes, array configurations, project identification codes, and other observational parameters.

The archive is already in its second release, and regular updates are planned in March and September. To preserve the confidentiality of all information submitted in the proposals, the data headers are protected for one year from the date of project completion. We welcome users' comments on the current release and suggestions on how it may be improved.

The CDS service is open for searching and listing without restrictions. The VizieR Catalogue Service at http://vizier.u-strasbg.fr/cgi-bin/VizieR provides direct access to the Plateau de Bure database: just enter `IRAM` or `B/IRAM` as catalogue name. We invite users of the Plateau de Bure Interferometer to consult the archive before proposing for observing time.

The policies about the release and proprietory rights for the associated raw data are currently under discussion.

Weather conditions and observations

We report excellent observing conditions up to mid January. High winds have somewhat reduced the observing efficiency, but today, as of January 31, we have observed 36 out of 46 A-rated and 31 B-rated programs, and already 7 have been classified as successfully completed.

As far as A-rated projects are concerned, we look forward to bring these to completion in the current winter semester. B-rated projects are likely to be observed only if they fall in a favorable LST range. We remind users of the Plateau de Bure interferometer that B-rated proposals which are not started before the end of the winter period have to be resubmitted again.

To optimize the observing efficiency with respect to the sun avoidance constraints of A-rated projects, the configuration schedule of the interferometer was slightly readjusted. The interferometer was moved to the most extended configuration (A) of the six element array at the end of December, and will move to the B configuration before mid February. We plan to move the array to the C configuration at the beginning of March, and finally switch to the most compact configuration (D) before the end of March. Global VLBI observations, which include the array in the 3mm phased-array mode, are planned from April 15 to 20, 2005. According to this plan, it will not be possible to complete projects requesting deep integrations and low-resolution mapping before the end of April.

Investigators, who wish to check the status of their project, may consult the interferometer schedule on the Web at `http://www.iram.fr/IRAMFR/PDB/-ongoing.html`. The page is updated every day.

Roberto NERI

Call for Observing Proposals on the Plateau de Bure Interferometer

Conditions for the next summer period

As every year, we plan to carry out extensive technical work during the summer period. Besides the usual maintenance of the antennas we plan this year to complete the northern track extension and start testing of N46, the new station at the end of the northern track. We hope to make it ready in time for the next winter period. At the same time, and if possible, we plan to proceed also with work on extending the eastern track, which, according to plans, should become available for the winter 2006/2007 scheduling period.

In parallel to these activities, we plan to carry out regular scientific observations during the whole period with the five element array. Taking these considerations into account, we are confident to be able to schedule about 20 to 30 projects.

We plan to start the maintenance before the end of May and to schedule the C and D configurations between June and October. For observations at high-angular resolution, we tentatively plan a move to the more extended B configuration and the switch back to the six element array for the end of October, i.e. before the end of the scheduling period.

We strongly encourage observers to submit proposals that can be executed during summer operating conditions. To keep the procedure as simple as possible, we ask to focus on:

- observations requesting the use of the 3mm receivers
- circumpolar sources or sources transiting at night between June and September,
- observations that qualify for the C and D configurations with 5 antennas.

For this call for proposals, note also the following aspects.

Proposal category

Proposals should be submitted for one of the five categories:

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

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

DUAL FREQ.: Proposals that ask for dual-frequency observations (i.e. simultaneous observations at 3mm and 1.3mm).

TIME FILLER: Proposals that have to be considered as background projects to fill in periods where the atmospheric conditions do not allow mapping, or eventually, to fill in gaps in the scheduling, or even periods when only a subset of the standard 5-antenna configurations will be available. These proposals will be carried out on a "best effort" basis only.

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

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

Configurations

Standard configurations for the summer period are:

5 antenna configurations	
Name	Stations
D	W05 W00 E03 N05 N09
C	W12 W09 E10 N05 N15
B	W12 E18 E23 N13 N20

Part of the projects will be scheduled at the end of the summer period when the six-element array is expected to be back in operation. Projects that will be observed with a subset of the five-element array, will be adjusted in uv-coverage and observing time.

The following configuration sets are available:

Set	Main purpose
D	"Low" resolution at 1.3mm
CD	3.5″ resolution at 3mm
BC	2″ resolution at 3mm

Finally, enter ANY in the proposal form if your project doesn't need any particular configuration. The scheduling of the B configuration depends on weather conditions and pressure on the C and D configurations, but will not be scheduled before the end of October.

Receivers

All antennas are equipped with fully operational dual frequency receivers. The available frequency range is 82 GHz to 116 GHz for the 3mm band, and 210 to 245 GHz for the 1.3mm band. The 3mm and 1.3mm receivers are aligned to within about 2″.

Below 105 GHz, receivers offer best performances in LSB tuning with high rejection (20 dB): expected system temperatures are 150 to 200 K for the summer time. Above 105 GHz, best performances are obtained with USB tuning, low rejection (4 to 6 dB): expected system temperatures are 300 to 450 K at 115 GHz. DSB tuning is possible over the whole frequency range, but the system temperature may degrade significantly. The 1.3mm receivers give DSB tuning with typical $T_{\rm REC}$ below 50 K. Expected SSB system temperature are 500 K.

The guaranteed tuning ranges are 82-116 GHz and 205-245 GHz. For details about observing at frequencies beyond the guaranteed tuning range of the 3mm and 1.3mm receivers, please get in touch with the Science Operations Group (sog@iram.fr).

Signal to Noise

The rms noise can be computed from

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

where

- $T_{\rm sys}$ is the system temperature in T_A^* scale (150 K below 110 GHz, 300 K at 115 GHz, 500 K at 230 GHz for sources at $\geq 20°$),
- $J_{\rm pK}$ 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 3mm, 0.8 at 1.3mm),
- $N_{\rm a}$ is the number of antennas (5), and $N_{\rm c}$ is the basic number of configurations (1 for D, 2 for CD, 2 for BC, and so on)
- $T_{\rm ON}$ is the integration time per configuration in seconds (2 to 8 hours, depending on source declination). Because of calibrations and antenna slew time, the effective on-source time is about 60-70% of the total observing time,
- B is the channel bandwidth in Hz (580 MHz for continuum, 40 kHz to 2.5 MHz for spectral line, according to spectral correlator setup).

Investigators have to specify the one sigma noise level which is necessary to achieve each individual goal of a proposal, and particularly for projects aiming at deep integrations.

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 8 independent units, each being tunable anywhere in the 110-680 MHz band, and providing 7 different modes of configuration (characterized in the following by couples of total bandwidth/number of channels). In the first 3 modes (LSB+USB): 320MHz/128, 160MHz/256, 80MHz/512 the two central channels may be perturbed by the Gibbs phenomenon (depending on continuum strength). When using these modes, it is recommended to avoid centering the most important part of the lines in the middle of the band of the correlator unit. In the remaining modes (LSB or USB): 160MHz/128, 80MHz/256, 40MHz/512 and 20MHz/512 the two central channels are not affected by the Gibbs phenomenon and, therefore, these modes should be preferred for spectroscopic studies. The 8 units can be independently placed either on the IF1 (3mm receiver) or on the IF2 (1.3mm receiver). For more details, please refer to the Web page at `http://www.iram.fr/TA/backend/cor6A/`

Sun Avoidance

For safety reasons, a sun avoidance circle has been set 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 the Science Operations Group (sog@iram.fr) 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 are advised to come for the reduction. Remote data reduction is possible, especially for experienced users of the Plateau de Bure Interferometer. Please contact your local contact if you're interested in this possibility.
- 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.
- In certain cases, proposers may have a look at the uv-tables as the observations progress. If necessary, and upon request, more information can be provided. Please contact the Science Operations Group (sog@iram.fr) if you are interested in this.
- CLIC evolves to cope with upgrades of the PdBI array. The newer versions are downward compatible with the previous releases. Observers who wish to finish data reduction at their home institute should obtain the most recent version of CLIC. Because differences between CLIC versions may potentially result in imaging errors if new data are reduced with an old package, we advise observers having a copy of CLIC to take special care in maintaining it up-to-date.

Local Contact

A local contact will be assigned to every A or B rated proposal which does not involve an in-house collaborator. He/she will assist you in the preparation of the observing procedures and provide help to reduce the data. Assistance is also provided before a deadline to help newcomers in the preparation of a proposal. 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. Note that your proposal must be complete and exact: the source position and velocity, as well as the requested frequency setup must be correctly given.

Non-standard observations

If you plan to execute a non-standard program please contact the Science Operations Group (sog@iram.fr) to discuss the 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://www.iram.fr/`

Roberto NERI

Scientific Results in Press

Repetitive Radio Reflector Surface Deformations

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Abstract:
Holography measurements of radio reflector surfaces have revealed temperature induced panel buckling. This buckling is a typical example of repetitive deformations which are not covered by the theory of systematic wavefront deformations, for instance of Zernike polynomial type. We present examples of repetitive surface deformations, and explain the corresponding beam patterns. The loss in main beam (on–axis) efficiency from repetitive deformations can be derived from the associated effective rms–value used in the Ruze relation; the full beam pattern can be derived from an exact diffraction calculation. We provide an example which shows that panel buckling affects

the beam pattern of the IRAM 30–m telescope, at the shortest wavelength of observation.

Accepted for publication in IEEE Trans. Antennas Propagation, 2005

Molecular hydrogen beyond the optical edge of an isolated spiral galaxy

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Abstract:
Knowledge about the outermost portions of galaxies is limited owing to the small amount of light coming from them. It is known that in many cases atomic hydrogen (H I) extends well beyond the optical radius. In the centres of galaxies, however, molecular hydrogen (H_2) usually dominates by a large factor, raising the question of whether H_2 is also abundant in the outer regions. Here we report the detection of emission from carbon monoxide (CO), the most abundant tracer of H_2, beyond the optical radius of the nearby galaxy NGC 4414. The host molecular clouds probably formed in the regions of relatively high H I column density and in the absence of spiral density waves. The relative strength of the lines from the two lowest rotational levels indicates that both the temperature and density of the H_2 are quite low compared to conditions closer to the centre. The inferred surface density of the molecular material continues the monotonic decrease from the inner regions. We conclude that although molecular clouds can form in the outer region of this galaxy, there is little mass associated with them.

Appeared in NATURE 3054, 20/10/2004

Detection of the SiNC radical in IRC+10216

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Abstract:
Following discovery of the free radical SiCN in the C-star envelope IRC+10216, we report the detection in the same source of its isomer SiNC (Fig. 1). The microwave spectra of SiNC and SiCN were studied in the laboratory and their rotational transition frequencies are accurately known. The ground fine structure state of SiNC, $^2\Pi_{1/2}$, gives rise to a series of rotational transitions, spaced by 12.8 GHz, each with Λ-doubling. Five weak lines are detected with the IRAM 30-m telescope at the frequencies

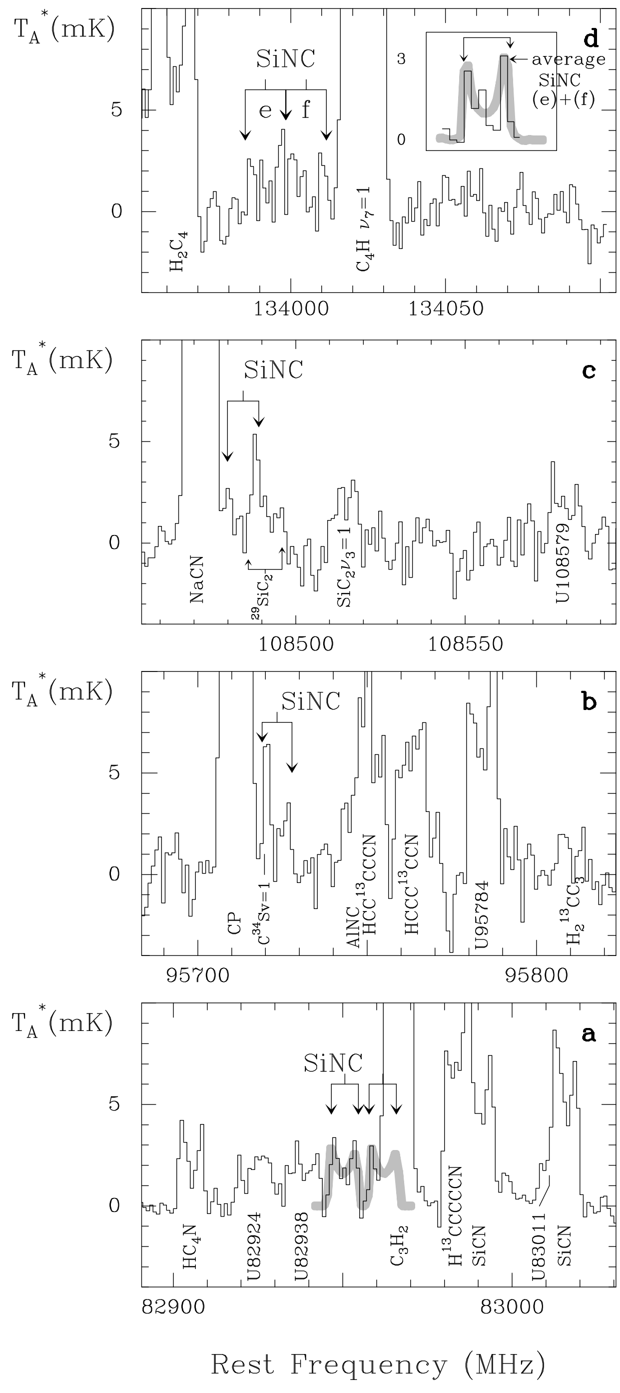

Figure 1: Spectra of 4 rotational transitions of SiNC observed with the IRAM 30-m telescope. Most lines are cusped in shape and have 29 km/s widths. The rest frequencies of the SiNC Lambda-doublet components are indicated by short vertical lines and the line edges by vertical arrows. The insert shows the average of the two 10.5-9.5 doublet components. The bottom spectrum has an r.m.s. noise of 0.5 mK/1-MHz channel and is one of the most sensitive spectra ever taken with the 30-m telescope.

of the $J = 6.5 \rightarrow 5.5$ (e), $7.5 \rightarrow 6.5$ (f), $8.5 \rightarrow 7.5$ (f) and $10.5 \rightarrow 9.5$ (e) and (f) rotational transitions. Other SiNC lines from these or adjacent rotational transitions are found to be blended with stronger lines from known molecules. The lines assigned to SiNC have a cusped shape, characteristic of species confined to a hollow shell in the outer circumstellar envelope. They are twice weaker than their SiCN counterparts, which have the same shape, and presumably arise in the same region of the envelope. SiNC and SiCN have about the same abundance in IRC+10216, $\approx 4 \times 10^{-9}$ with respect to H_2. This contrasts with HCN, HC_3N and HC_5N, for which the cyanide to isocyanide abundance ratio is >100.

Appeared in A&A, 426, p.L49-L52

Detection of two massive CO systems in 4C 41.17 at z = 3.8

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Abstract:
We have detected CO(4-3) in the z=3.8 radio galaxy 4C 41.17 with the IRAM Interferometer. The CO is in two massive ($M_{dyn} \approx 6 \times 10^{10} M_\odot$) systems separated by 1.″8 (13 kpc), and by 400 km s^{-1} in velocity, which coincide with two different dark lanes in a deep Lya image. One CO component coincides with the cm-radio core of the radio galaxy, and its redshift is close to that of the He II AGN line. The second CO component is near the base of a cone-shaped region southwest of the nucleus, which resembles the emission-line cones seen in nearby AGN and starburst galaxies. The characteristics of the CO sources and their mm/submm dust continuum are similar to those found in ultraluminous IR galaxies and in some high-z radio galaxies and quasars. The fact that 4C 41.17 contains two CO systems is further evidence for the role of mergers in the evolution of galaxies at high redshift.

Appeared in: A&A 430, L1-L4

Improvement of the IRAM 30-m Telescope from temperature measurements and finite element calculations

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Abstract:
Millimeter wavelength radio telescopes built in a conventional way from steel and aluminum require elaborate thermal control to guarantee small structural deformations and good observing performance. We describe the temperature monitoring system of the Institut de Radioastronomie Millimétrique 30-m telescope and the use of temperature measurements in finite-element calculations of structural deformations. These calculations reproduce with good precision the measured thermal deformations of the telescope and allow the investigation and localization of thermally important elements in the telescope structure. The data are used for calculation of temperature induced main reflector surface deformations and of the associated beam pattern, and for prediction and real-time correction of the focus. The pointing cannot be fully predicted since the available finite-element model does not include the Nasmyth focus cabin (and the concrete pedestal). The long-term investigation of the telescope's thermal behaviour led to an improvement of the thermal control system and to a better performance of the telescope.

Accepted for publication in IEEE Trans. on Antennas and Propagation

New Preprints

579. REPETITIVE RADIO REFLECTOR SURFACE DEFORMATIONS A. Greve, D. Morris 2005, *IEEE Trans. on Antennas & Propagation*

The IRAM Newsletter is edited by Michael Bremer at IRAM-Grenoble (e-mail address: `bremer@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 pages (`http://www.iram.fr/` or `http://www.iram.es/`), click on item "Events & News" and follow the links...

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