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

Newsletter

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Contents

Access to the IRAM Telescopes for Scientists from EU Countries

IRAM is one of the participating institutes in the RadioNet Project that has been accepted by the European Commission for funding within the FP6 Programme. Details about this project can be found at http://www.radionet-eu.org .
As part of the RadioNet Project, **transnational access (TNA) to existing observing facilities** is financially supported. Both IRAM Observatories, the 30m-telescope on Pico Veleta, Spain and the 6-element interferometer on the Plateau de Bure are included in the TNA programme. IRAM has committed 5% of the available observing at both observatories to this scheme and will receive corresponding funding. While so far IRAM was paying travel and lodging only for scientists from France, Germany and Spain, affiliated with the IRAM funding organisations, the new scheme allows us to pay the travel and lodging for scientists from all other EU countries.
Included in this Newsletter are the **new calls for proposals for observing time**, for the summer period 2004, and we explicitly encourage applications under the new TNA scheme. All proposals will undergo the same evaluation process by the IRAM Programme Committee, and telescope time will be granted on the basis of scientific merit.

Michael GREWING

Calendar

March 4th, 2004 17:00h MET (UT + 1 hour):

Deadline for the submission of observing proposals for the period from May 15, 2004 to Nov 15, 2004.

April 1st and 2nd, 2004:
Program committee meeting

Fourth IRAM Millimeter Interferometry School – First Announcement

IRAM organizes this year its **Fourth Millimeter Interferometry School**.

The school will take place at the IRAM headquarters (Grenoble, France) in autumn 2004.

If you are interested, please contact us by sending an Email to Cathy Berjaud (berjaud@iram.fr) or to Helmut Wiesemeyer (wiesemey@iram.fr).

Please check regularly the announcements at http://www.iram.fr/IRAMFR/IS/school.htm

We will update the site, and put further information on the exact date and the possibility of funding.

The school is intended for PhD students, post-docs and scientists who want to acquire a good knowledge of interferometry techniques at mm wavelengths. In the same spirit as the previous three interferometry schools, the courses will be focused on the Plateau de Bure interferometer, with an outlook to the next generation interferometer ALMA. Demonstration sessions will help the participants to become familiar with the reduction and imaging of Plateau de Bure data and the related technology. We would like to encourage participants to present posters related to their scientific work.

Please consult the proceedings of the first and second IRAM interferometry schools at http://www.iram.fr/-IRAMFR/IS/archive.html The proceedings of the second interferometry school are also available in printed form upon request (ed. Anne Dutrey, ISBN 2-9516869).

The lectures of the third IRAM interferometry school can be found at http://www.iram.fr/IRAMFR/IS/-lectures.html.

Helmut WIESEMEYER

Personnel Changes

IRAM Granada

Manuela "Manolita" Aguila has retired in May 2003. She has been chief cook at Pico Veleta Observatory right from its beginnings. Visitors to the observatory appreciated her cooking with typical Andalusian food such as her famous Paella. We wish Manolita all the best, especially good health.

Carmen Ruiz (many visitors know her already as substitute cook) was hired as cook and cleaner for the Pico Veleta Observatory starting in October 2003.

On December 1st 2003, Miguel Angel Perez-Torres started as a Ramon y Cajal Fellow at Pico Veleta observatory.

Rainer MAUERSBERGER

IRAM Grenoble

On December 31st, Philippe SABON has left the IRAM SIS group. We wish him all the best for his future career.

The astronomer's group welcomes Aris KARASTERGIOU, who has arrived on February 1st to work for six months as a visiting astronomer at IRAM.

Michael BREMER

Visiting Committee appointed to advise on IRAM's long-term Future

Under Paul VandenBout as Chairman, a Visiting Committee appointed by the IRAM Executive Council has started its work to advise on IRAM's long-term future. In addition to the Chaiman, the following members have accepted to serve on this evaluation panel: Chris Carilli, Richard Hills, Malcolm Longair, Anneila Sargent, and Malcolm Walmsley.

The committee has been given the following mandate:

1. to evaluate the international standing, productivity and competitiveness of the IRAM facilities and the science carried out with them,
2. to advise and comment on IRAM's plans and priorities for its mid-term development plan,
3. to advise on the role of IRAM in the ALMA era, considering the 10 years road map and the institutional boundary conditions,
4. to comment on the role and competitiveness of the IRAM telescopes in the ALMA era beyond 2012.

In a series of meetings and telecons, and the exchange of written material, the committee will prepare its report by the fall of 2004.

As an input to this process, IRAM will try to compile **feedback from the current users** of the IRAM Observatories about questions like how much the instrumentation, the observing modes, the software, and the data reduction support that are offered are optimised for their respective scientific projects, and what future instrumentation/observing modes the users would like to see. We will use the e-mail distribution list of the Newsletter to make this inquiry.

Michael GREWING

Workshop about IRAM in the Herschel/Planck/ALMA Era

As part of the ongoing evaluation and long-term planning exercise for which a Visiting Committee has been appointed by IRAM's Executive Council, a workshop was held in Grenoble in the period December 17-19, 2003, with the title "IRAM in the Herschel/Planck/ALMA era".

The meeting was attended by some 60 scientists. All scientific areas to which the IRAM telescopes have contributed in the past were reviewed by invited speakers, who had also been asked to describe as much as possible the future interest in using the IRAM telescopes for the respective scientific topics. On the last day of the meeting, an outlook was given of new instrumental developments that are planned or considered as future options, not only at IRAM but also at other mm-wavelength observatories.

The presentations have been collected on the IRAM anonymous ftp-account in the directory pub/guelin/Dec-workshop from which they can be downloaded. Note, however, that not all contributions are already in their final form.

Michael GREWING and Michel GUÉLIN

Proposals for IRAM Telescopes

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

March 4th, 2004 17:00h MET (UT + 1 hour)

The scheduling period extends from May 15, 2004 to Nov 15, 2004, 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: (33/0) 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 the proposers want their color plots to be passed on to the program committee, the **entire proposal** must be sent in by ordinary mail in **12 copies**.

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. This is particularly important at the current deadline, since the style file has been modified at a number of places for facilitating a detailed computerized handling of the proposals.

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. In both cases 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 wiped out by 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.

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

[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 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 heterodyne receiver array, HERA, operating at 1.3 mm wavelength
3. a 1.2 mm bolometer array with at least 37 pixels

Emphasis will be put on observations at the longer wavelengths. In total, about 3000 hours of observing time will be available, which should allow scheduling of a few longer programmes (up to ~ 150 hours).

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

What is new ?

The **tuning range** of the 3mm receivers, nominally 80 – 115.5 GHz, has been slightly extended toward lower frequencies. Test with B100 fed by an alternate local oscillator showed that this receiver works correctly in SSB and high USB rejection down to 77 GHz. Below this frequency, the USB rejection progressively weakens, until the mixer becomes fully DSB near 72 GHz. At still lower fequencies, however, the tuning behavior is very irregular, and high USB gain ($g_i \gg 1$) makes the receiver very noisy and calibration difficult. Faulty responses of the receiver at higher frequencies (due to mixing products with harmonics of the LO) were, however, not detected. Corresponding tests with A100 will be made in May.

Applications for frequencies down to ≥ 72 GHz will be considered. Requests for frequencies below 77 GHz should describe the precision of the calibration needed. Due to their special LO hardware requirements the accepted proposals will be scheduled together in one block.

Proposers should use the time estimator which will include the correct receiver temperature at the low frequencies and an extra overhead for calibration.

The **second polarization module** of HERA is planned to be installed this March. Given the risk involved in this upgrade and the fact that most observational parameters are not yet precisely know for the full dual polarization array, we request HERA proposers to still use the parameters of the present single polarization array when estimating integration times.

The upgraded HERA, dubbed HERA–2, makes necessary an **expansion of the IF distribution** system. A whole new set of the 100m long IF cables has been installed together with switching units which permit flexible connections to continuum detectors, attenuators, and the increasing complement of backends.

A new broadband autocorrelator, WILMA (Wideband Line Multiple Autocorrelator), has been shipped to Pico Veleta. This autocorrelator, designed for use with the dual polarization HERA frontend, consists of 18 units each of which handles the full 1 GHz IF band of one HERA detector. Each WILMA band has 512 spectral channels with a spacing of 2 MHz. Most of the acquisition software is ready, and the instrument is currently undergoing extensive tests. WILMA is expected to be available when HERA–2 is operational.

The 117 pixel bolometer array **MAMBO–2**, which still has a slightly inferior point source sensitivity compared to MAMBO–1, will be shipped to the MPIfR for several minor upgrades. MAMBO–2 is expected to be available again in autumn when the bulk of the accepted bolometer proposals will be scheduled. During summer MAMBO–1 is available for time critical observations and other technical work.

Zero spacing observations needed for a proposed PdB Interferometer observation no longer require a parallel proposal for the 30m telescope. It is sufficient to mark "zero spacing" on the interferometer proposal form and give the necessary scientific and technical information in an additional paragraph of the Bure proposal. We strongly recommend to use the 30m time estimator.

When the need for zero spacing data becomes obvious only after the reduction of the Bure observations, we still request a separate and self–contained proposal for the 30m telescope.

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 **newly provided LaTeX** macro `\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 highe 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, along with suitable heterodyne proposals. 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 ($\leq$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.

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

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 F. Bertoldi (bertoldi@mpifr-bonn.mpg.de) or 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.

HERA

The **HE**terodyne **R**eceiver **A**rray is expected to be available for most of next summer. The 9 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 seperate 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 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 only known for 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 will be considered, but we cannot guarantee at this moment that these proposals can actually be done. In any case, HERA observers should send the list of their frequencies to Granada as early as possible.

HERA can be connected to three sets of backends: 20pt0pt

- ▷ 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 availble 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. Karl Schuster (schuster@iram.fr), the HERA project scientist, or Albrecht Sievers, the astronomer in charge of HERA (sievers@iram.es), may also be contacted.

Given the risk involved in the upgrade and considering that some relevant observational parameters are not yet well known for the full array, we request HERA proposers to use the parameters of the present single polarization array when estimating integration times. As mentioned above, the times scheduled for the successful proposals may then be adjusted, once the parameters of the full array are known.

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.

Tuning range extended below 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 were thus started to investigate whether and how far the nominal tuning range can be extended downwards. First results were obtained with B100 which show that this receiver works correctly in SSB and high USB rejection down to 77 GHz when fed with a suitable foreign local oscillator. Below this frequency, the USB rejection progressively weakens, until the mixer becomes fully DSB near 72 GHz. At still lower fequencies, however, the tuning behavior is very irregular, and high USB gain ($g_i \gg 1$) makes the receiver very noisy and calibration difficult. Corresponding tests with A100 will be made in May. A detailed test report is available on the IRAM web site (at ../IRAMFR/PV/veleta.html).

Given the partially encouraging test results, applications for fequencies down to ≥ 72 GHz will be considered. Requests for frequencies below 77 GHz should, however, describe the precision of the calibration needed. Due to their special LO hardware requirements the accepted proposals will be scheduled together in one block.

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 near a limit of the tuning range, may still be problematic, and we recommend in such cases 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.

Table 1: Heterodyne receivers available for the summer 2004 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 $\geq$ 72 GHz under special conditions (see text)
2: noise increasing with frequency
3: performance at ν < 275 GHz; noisier above 275 GHz.
4: tuning parameters are not yet complete

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 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.html) 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. Since in the mapping mode all beams cover the inner region of the map area, MAMBO–2 turns out to be more sensitive if areas of $2'$ and larger are to be mapped (see the Time Estimator). The sensitivities apply to bolometric summer conditions (τ(250GHz) ~0.4, 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 scanned in azimuth (also the direction of the wobbler throw) 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: $5''$per sec, raster step: $8''$) reaches an rms of 2.8 mJy/beam

[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).

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 ($7.3' \times 6.5'$) must be larger than the map size by the wobbler throw and the array size ($4'$) if extended emssion is to be properly restored. 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, but this may require very sophisticated data reduction (please contact the experts). If maps with an rms $\lesssim 1$ mJy are proposed, the proposers must indicate how they plan to reach this ambitious goal.

The bolometers are used with the wobbling secondary mirror (wobbling at a rate of 2 Hz in azimuth). 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. 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.

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].

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: θ_b ["] = 2460 / 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 $R\sigma = 0.07$

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 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.html. 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 **new autocorrelator WILMA** consists of 18 units which connect 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 backend section (URL: ../IRAMFR/-TA/backend/veleta/wilma/index.html) of our web pages.

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] Astigmatism in reflector antennas: measurement and correction A. Greve, B. Lefloch, D. Morris, H. Hein, S. Navarro 1994, IEEE Trans. Ant. Propag. AP–42, 1345

[4] Frequency switching at the 30m telescope C. Thum, A. Sievers, S. Navarro, W. Brunswig, J. Peñalver 1995, IRAM Tech. Report 228/95. (../IRAMES/otherDocuments/manuals/-Report/fsw_doc.ps)

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

[6] The 30m Manual: A Handbook for the 30m Telescope (version 2), W. Wild 1995 IRAM Tech. Report 377/95, also available on the web at ../IRAMES/otherDocuments/manuals/-manual_v20.ps

[7] NIC: Bolometer User's Guide D. Broguière, R. Neri, A. Sievers, and H. Wiesemeyer 2000, IRAM Technical Report (../IRAMFR/-GS/NIC/documentation.html); see also the NIC home page at ../IRAMFR/GS/-nic.html with further relevant technical reports.

[8] Pocket Cookbook for MOPSI software R. Zylka 1996, available at ../IRAMES/-otherDocuments/manuals/Datared/pockcoo.ps.

[9] Line Calibrators at $\lambda = 1.3$, 2, and 3mm. R. Mauersberger, M. Guélin, J. Martín–Pintado,

C. Thum, J. Cernicharo, H. Hein, and S.Navarro 1989, A&A Suppl. 79, 217

[10] The Pointing of the IRAM 30m Telescope
A. Greve, J.–F. Panis, and C. Thum 1996, A&A Suppl. 115, 379

[11] The gain–elevation correction of the IRAM 30m Telescope
A. Greve, R. Neri, and A. Sievers 1998, A&A Suppl. 132, 413

[12] The beam pattern of the IRAM 30m Telescope
A. Greve, C. Kramer, and W. Wild 1998, A&A Suppl. 133, 271

[13] A Time Estimator for Observations at the IRAM 30m Telescope, D. Teyssier 1999, IRAM/Granada Technical Note (../IRAMES/-obstime/time_estimator.html)

[14] VESPA is operational
G. Paubert & C. Thum 2002,
IRAM Newsletter No. 54, 6
(../IRAMFR/PV/veleta.htm and ../IRAMES-/otherDocuments/manuals/vespa_ug.ps)

[15] First results from the IRAM 30m telescope improved thermal control system
J. Peñalver, A. Greve, and M. Bremer 2002, IRAM Newsletter No. 54, 8

[16] A Versatile IF Polarimeter at the IRAM 30m Telescope
C. Thum, H. Wiesemeyer, D. Morris, S. Navarro, and M. Torres
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)

Plateau de Bure Interferometer

Science Operations Group

In order to further enhance the productivity of the Plateau de Bure array, it has been decided to create a science operations group (SOG) to ensure an optimum operation and evolution of the Plateau de Bure interferometer.

As of January 1st, four astronomers have been appointed to the science operations group: Arancha Castro-Carrizo, Raphael Moreno, Jan Martin Winters, and Roberto Neri who will coordinate the group activities.

The SOG is staffed with astronomers that will regularly act as Astronomers on Duty (AOD), provide technical support and expertise on the Plateau de Bure array to investigators and visiting astronomers, and interact with the scientific software development group for developments related to the long-term future of the interferometer.

In case of questions related to science, calibration, pipeline-processing and archiving of Plateau de Bure data, interested users may contact the SOG at sog@iram.fr.

Weather conditions and observations

After excellent observing conditions in December, the weather reports for the Plateau de Bure could not have been worse in January: high winds and large amounts of snow have cut down the observing efficiency to about 10% in the last four weeks. As of January 28th, we have observed 15 out of 21 A-rated and 39 B-rated programs, and only 1 has 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, but a drastic improvement in the weather conditions is now necessary if we wish to get all A-rated projects through the A, C and D configurations. 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 scheduling efficiency, the configuration schedule of the interferometer was adjusted to the requirements of A-rated projects. The interferometer was moved to the B configuration at the beginning of December, and will move to the A configurations - the most extended six antenna configuration - as soon as the weather permits. We plan now to move the array to the C configuration at the beginning of March, and finally switch to the D configuration - the most compact - still before the end of March. According to these plans, it will not be possible to complete projects requesting deep integrations and low-resolution mapping before mid April. Global VLBI observations are planned at the end of April which include the

Plateau de Bure interferometer in the 3mm phased-array mode.

Investigators who wish to check the status of their project, may consult the interferometer schedule on the Web at ../IRAMFR/PDB/ongoing.html. The page is updated two times a day.

Call for 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 to complete the northern track extension, prepare N46 - the new station at the end of the northern track - for the next winter period, and procede with the drilling of the elevator shaft for the new access to the Plateau de Bure Observatory.

Despite these technical 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 at the latest by the end of May and to schedule two configurations (C and D) between June and October. For observers interested in high-angular resolution studies, we tentatively plan a switch back to the six element array and move to an extended configuration (B) 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 CD configuration with 5 antennas.

Details on receivers, signal to noise, atmospheric phase compensation, observing modes, data reduction and local contacts have not changed, and can be found in the January 1999 issue of the IRAM Newsletter. For this call for proposals, please note the following specificities:

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 to operation. Projects that should be observed with four antennas only, will be adjusted in uv-coverage and observing time.

The following configuration sets are available:

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

Finally, enter ANY in the proposal form if your project doesn't need any particular configuration. Note, that the B configuration will become available only at the very end of the summer period depending on weather conditions and pressure on the C and D configurations.

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) like in the old correlator. 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/IRAMFR/TA/backend/cor6A/.

Roberto NERI

Scientific Results in Press

Mapping the cold molecular gas in a cooling flow cluster: Abell 1795

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Abstract:
Cold molecular gas is found in several clusters of galaxies (Edge, 2001, Salomé & Combes, 2003): single dish telescope observations in CO(1-0) and CO(2-1) emission lines have revealed the existence of large amounts of cold gas (up to $\propto 10^{11} M_{\odot}$) in the central region of cooling flow clusters. We present here interferometric observations performed with the IRAM Plateau de Bure interferometer in Abell 1795. Comparison with IRAM 30m data shows the cold gas detected is extended suggesting a cooling flow origin. The CO features identified are very similar to the structures observed in Hα and with the star forming regions observed through UV continuum excess. A large fraction of the cold gas is not centered on the central cD, but located near brightest X-ray emitting regions along the North-West orientated radio lobe. The cold gas kinematics is consistent with the optical nebulosity behaviour in the very central region. It is not in rotation around the central cD : a velocity gradient shows the cold gas might be cooled gas from the intra-cluster medium being accreted by the central galaxy. The optical filaments, aligned with the cD orbit, are intimately related to the radio jets and lobes. The material fueling the star formation certainly comes from the deposited gas, cooling more efficiently along the edge of the radio lobes. Even if some heating mechanisms are present, these millimetric observations show that an effective cooling to very low temperatures indeed occurs and is probably accelerated by the presence of the radio source.

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Molecular gas in NUclei of GAlaxies (NUGA). II. The ringed LINER NGC 7217

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Abstract:
We present CO(1-0) and CO(2-1) maps of the LINER galaxy NGC 7217, obtained with the IRAM interferometer, at $2.4'' \times 1.9''$ and $1.2'' \times 0.8''$ resolution respectively. The nuclear ring (at $r = 12'' = 0.8$ kpc) dominates the CO maps, and has a remarkable sharp surface density gradient at its inner edge. The latter is the site of the stellar/Hα ring, while the CO emission ring extends farther or is broader (500-600 pc). This means that the star formation has been more intense toward the inner edge of the CO ring, in a thin layer, just at the location of the high gas density gradient. The CO(2-1)/CO(1-0) ratio is close to 1, typical of warm optically thick gas with high density. The overall morphology of the ring is quite circular, with no evidence of non-circular velocities. In the CO(2-1) map, a central concentration might be associated with the circumnuclear ionized gas detected inside r=3$''$ and interpreted as a polar ring in the literature. The CO(2-1) emission inside 3$''$ coincides with a spiral dust lane, clearly seen in the HST V − I color image.

N-body simulations including gas dissipation and star formation are performed to better understand the nature of the nuclear ring observed. The observed rotation curve of NGC 7217 allows two possibilities, according to the adopted mass for the disk: (1) either the disk is massive, allowing a strong bar to develop, or (2) it is dominated in mass by an extended bulge/stellar halo, and supports only a mild oval distortion. The amount of gas also plays an important role in the disk stability, and therefore the initial gas fraction was varied, with star formation reducing the total gas fraction to the observed value.

The present observations support only the bulge-dominated model, which is able to account for the nuclear ring in CO and its position relative to the stellar and Hα ring. In this model, the gas content was higher in the recent past (having been consumed via star formation), and the structures formed were more self-gravitating. Only a mild bar formed, which has now vanished, but the stars formed in the highest gas density peaks toward the inner edge of the nuclear ring, which corresponds to the observed thin stellar ring. We see no evidence for an ongoing fueling of the nucleus; instead, gas inside the ring is presently experiencing an outward flow. To account for the nuclear activity, some gas infall and fueling must have occured in the recent past (a few Myr ago), since some, albeit very small, CO emission is detected at the very

center. These observations have been made in the context of the NUclei of GAlaxies (NUGA) project, aimed at the study of the different mechanisms for gas fueling of AGN.

Based on observations carried out with the IRAM Plateau de Bure Interferometer and IRAM 30 m telescope. IRAM is supported by INSU/CNRS (France), MPG (Germany) and IGN (Spain).

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IRAS 23385+6053: A candidate protostellar massive object

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Abstract:
We present the results of a multi-line and continuum study towards the source IRAS 23385+6053 performed with the IRAM-30 m telescope, the Plateau de Bure Interferometer, the Very Large Array Interferometer and the James Clerk Maxwell Telescope. We have obtained single-dish maps in the $C^{18}O$ (1-0), $C^{17}O$ (1-0) and (2-1) rotational lines, interferometric maps in the CH_3C_2H (13-12) line, NH_3(1,1) and (2,2) inversion transitions, and single-pointing observations of the CH_3C_2H(6-5), (8-7) and (13-12) rotational lines. The new results confirm our earlier findings, namely that IRAS 23385+6053 is a good candidate high-mass protostellar object, precursor of an ultracompact HII region.

The source is roughly composed of two regions: a molecular core $\approx 0.03/0.04$ pc in size, with a temperature of ≈ 40 K and an H_2 volume density of the order of 10^7 cm^{-3}, and an extended halo of diameter ≈ 0.4 pc, with an average kinetic temperature of ≈ 15 K and H_2 volume density of the order of 10^5 cm^{-3}. The core temperature is much smaller than what is typically found in molecular cores of the same diameter surrounding massive ZAMS stars. From the continuum spectrum we deduce that the core luminosity is between 150 and 1.6×10^4 $L_\odot$, and we believe that the upper limit is near the "true" source luminosity. Moreover, by comparing the H_2 volume density obtained at different radii from the IRAS source, we find that the halo has a density profile of the type $n_{H_2} \propto r^{-2.3}$. This suggests that the source is gravitationally unstable. The latter hypothesis is also supported by a low virial-to-gas mass ratio (MVIR/Mgas ≤ 0.3). Finally, we demonstrate that the temperature at the core surface is consistent with a core luminosity of $10^3 L_\odot$ and conclude that we might be observing a protostar still accreting material from its parental cloud, the mass of which is at present $\approx 6M_\odot$.

Based on observations carried out with the IRAM Plateau de Bure Interferometer. IRAM is supported by INSU/CNRS (France), MPG (Germany) and IGN (Spain).

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Non-Gaussian velocity shears in the environment of low mass dense cores

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Abstract:
We report on a novel kind of small scale structure in molecular clouds found in IRAM-30m and CSO maps of ^{12}CO and ^{13}CO lines around low mass starless dense cores. These structures come to light as the locus of the extrema of velocity shears in the maps, computed as the increments at small scale (≈ 0.02 pc) of the line velocity centroids. These extrema populate the non-Gaussian wings of the shear probability distribution function (shear-PDF) built for each map. They form elongated structures of variable thickness, ranging from less than 0.02 pc for those unresolved, up to 0.08 pc. They are essentially pure velocity structures. We propose that these small scale structures of velocity shear extrema trace the locations of enhanced dissipation in interstellar turbulence. In this picture, we find that a significant fraction of the turbulent energy present in the field would be dissipating in structures filling less than a few % of the cloud volume.

Appendices A, B and Figs. 5, 13-15, 17 and 18 are only available in electronic form at http://www.edpsciences.org

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The association between masers and outflows in massive star forming regions

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Abstract:
We report the results of a single-dish survey of molecular outflows towards a homogeneous sample of 136 ultracompact H II regions for which we had previously obtained observations in the methanol 6.7 GHz and water 22.2 GHz maser lines. The line profiles of the ^{13}CO J = 1–0 and 2–1 transitions have been compared to those of the corresponding lines of the $C^{18}O$ isotopomer to reveal the occurrence of line wings and hence of molecular outflows. We found 53 outflows resulting in an overall detection rate of ~39%. The probability to have an outflow increases to about 50% in regions with maser emission, whereas it is about 25% in those without masers. If we consider just the outflow sources, the chance to find a maser is very high: 74%, without a significant difference between H_2O and CH_3OH. These results strongly confirm from a statistical point of view that both types of masers are closely associated with the evolutionary phase when outflows occur.
The temperatures and optical depths of the molecular cloud hosting the ultracompact H II regions and the comparison between the detection rates suggest a tentative evolutionary scheme for massive star forming regions: the earliest phase is associated with maser emission and with an outflow not yet developed enough to be detected with single-dish observations; then maser emission disappears while the outflow is still present; and finally, only the ultracompact H II region without masers or outflows is present.

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The IRAM Newsletter is edited by Michael Bremer at IRAM-Grenoble (e-mail address: `bremer@iram.fr`).

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