Proposals for IRAM Telescopes

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

18 September 2014, 17:00 CEST (UT + 2 hours)

The scheduling period extends from 1 December 2014 to 31 May 2015.

Proposals should be submitted through the new ***P**roposal **M**anagement **S**ystem* (**PMS**) at URL:

http://pms.iram.fr/pms/

The editor of the proposal will have to create a PMS account to be able to login and prepare/submit proposals. To do so, just click the URL above and follow the instructions on-screen.

The submission procedure consists in filling in an on-line form with the details of the requested observations (source coordinates, receiver setups, array configuration, etc.), and to upload a single file in pdf format containing the scientific and technical justification. A LaTeX template is provided from the PMS submission page for your convenience. You may customize this file, or generate the pdf file with another software, but in any case **proposers should respect the following requirements**: (1) A normal proposal may contain up to two pages of text describing the scientific aims (4 pages for a Large Program, see below) (2) you may add up to two pages of figures, tables, and references, and (3) the font size must be 11pt or larger.

For a proposal to be complete, PMS requires that all authors validate their identity (e–mail and affiliation) and their participation to the proposal before the deadline. The editor of the proposal will have to send invitations to all authors through PMS by clicking an *invitation* button. Authors will then receive an e–mail asking them to validate their contact information already entered in PMS by the proposal editor. This does not require the authors to create an account in PMS. We urge proposal editors to invite the authors through PMS well before the deadline to give them enough time to validate their identity before the deadline.

PMS will be opened for submission of new proposals for the winter semester about three weeks before the deadline. Proposers may modify their proposals in PMS until the deadline, in which case the *submit* button must be activated again after modification of the proposal. Please avoid last minute submissions when the network could be congested. If you experience any difficulty with the submission process in PMS, please contact us at `pms-feedback@iram.fr` for help. You may also use this e–mail address for bug reports, general questions and comments. Your feedback would help us improve PMS.

Detailed information on time estimates, special observing modes, technical information and references for both the IRAM interferometer and the IRAM 30m telescope can be found on the IRAM web site:

`http://www.iram-institute.org/`

and then following the links under the `science users` tab.

Proposers may use the CDS (*Centre des Données astronomiques de Strasbourg*) to check whether a source has already been observed at the 30m telescope or the PdB interferometer. We recommend to use the `VizieR Catalogue Service` to query[1] the header data of IRAM observations obtained since September 2009 for the 30m, and since 1990 for the PdBI.

We encourage the submission of **Large Observing Programs** (see the announcement at the end of this call).

Soon after the deadline the IRAM Scientific Secretariat sends an acknowledgment of receipt to the Principal Investigator of each proposal correctly submitted, together with the proposal registration number.

Publications resulting from Plateau de Bure interferometer or 30m telescope observations should acknowledge this in a footnote "Based on observations carried out with the IRAM Plateau de Bure Interferometer [30m telescope]. IRAM is supported by INSU/CNRS (France), MPG (Germany) and IGN (Spain)". IRAM welcomes an acknowledgment to the IRAM staff for help provided during the observations and for data reduction.

N. Billot & J.M. Winters

[1]search *IRAM* as catalogue name.

Travel funds for European astronomers

Observations using IRAM telescopes continue to be supported by RadioNet under the European Framework Programme 7. A budget is available for travel by European astronomers through the Trans National Access (TNA) Programme.

As before, travel may be supported to the 30m telescope for observations (contact: N. Billot) and to Grenoble for reduction of interferometer data (contact: R. Neri). Detailed information about the eligibility, policies, and travel claims can be found on the RadioNet home page at `http://www.radionet-eu.org`. The Principal Investigators of IRAM proposals eligible for TNA funding will be informed individually.

All TNA-eligible projects that are scheduled at the Plateau de Bure Interferometer or at the 30m telescope should acknowledge the support from the European Commission by including the following sentence in the publications resulting from their observations at IRAM facilities: “The research leading to these results has received funding from the European Commission Seventh Framework Programme (FP/2007-2013) under grant agreement No 283393 (RadioNet3).”

R. Neri & N. Billot

Call for Observing Proposals on the 30m Telescope

Summary

Proposals for four instruments will be considered for the coming winter semester (1 December 2014 to 31 May 2015):

1. the **E**ight **MI**xer **R**eceiver EMIR, consisting of dual-polarization receivers, and operating in the four bands at 3, 2, 1.3, and 0.9 mm wavelengths,
2. the 9 pixel dual–polarization heterodyne receiver array, HERA, operating at 1.3 mm wavelength,
3. GISMO, a 2 mm bolometer camera with a fully sampled field-of-view of $1.8' \times 3.6'$.
4. and NIKA, a dual-band imaging camera operating at 1.2 and 2 mm simultaneously, with a fully sampled field-of-view of $1.9'$ in diameter.

During the winter semester emphasis will be put on observations at the shorter wavelengths but 3 mm proposals are also encouraged, particularly if they are suited for medium or low quality weather backup. As in previous semesters, we will offer several weeks of pooled observations in order to optimize the use of the telescope at short wavelengths. Proposers are requested to use the EMIR and HERA time estimators which are available online via the `IRAM 30m webpage`. A document describing GISMO and NIKA observing time estimates is also provided on this webpage as well as a python script convenient for computing time estimate numbers.
We continue to call for Large Programs using any of the heterodyne instruments. No Large Program will be accepted for GISMO nor NIKA.

In preparation for the installation of the new continuum camera NIKA2 at the telescope, which is planned for autumn 2015, the optics in the receiver cabin need to be upgraded to be able to feed the wide field-of-view of the camera. This major upgrade will take place in spring 2015 and will require about 2 weeks of telescope time.

N. Billot & C. Kramer

Non-trivial changes with respect to the previous Call for Proposals are marked in red. This document contains active links marked with a different font for an easy access to documentation, e.g. `IRAM web pages`.

Applications

Proposals should be submitted through the ***P**roposal **M**anagement **S**ystem* (**PMS**) at URL:

`http://pms.iram.fr/pms/`

Should you experience any difficulties using this tool or preparing your proposal, please contact us at `pms-feedback@iram.fr` describing the issue you encountered.

While preparing your proposal, attention should be given to the *Constraints* field in which you should enter blocked out dates when you are not available for observing. Proposers requesting observations which need atmospheric opacities better than typical for the semester (corresponding to 7 mm pwv in summer and 4 mm in winter) should give the maximum acceptable value of precipitable water vapor in the corresponding field of the technical forms.

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.

The Telescope

This section gives a brief description of the 30m telescope characteristics. A more detailed summary is available on the `IRAM web pages`.

Pointing and Focusing

The telescope absolute rms pointing accuracy is better than $3''$ [6]. Observers are recommended to check the telescope pointing every 1 to 2 hours, depending on frequency, and the focus values every 2 to 4 hours and at sunrise/sunset. Checking the pointing, focus, and receiver alignment is the responsibility of the observers (use a planet for alignment checks).

Wobbling Secondary

- Beam–throw is $\leqslant 240''$ depending on wobbling frequency. At 2 Hz, the maximum throw is $90''$
- Standard phase duration: 2 sec for spectral line observations, 0.26 sec for continuum observations.

Unnecessarily large wobbler throws should be avoided, since they introduce a loss of gain, particularly at the higher frequencies, and imply a loss of observing efficiency (more dead time).

Telescope beam widths and efficiencies

Updated tables of telescope efficiencies and error beam parameters between 80 and 350 GHz are provided in [9]. These numbers are valid since September 2002, and they supersede the values compiled in [8] which were measured before 1998. The history of telescope main beam and aperture efficiencies, as well as the half power beam widths, are also listed on the `30m homepage`.

Receivers

NIKA

The New IRAM KID Array (NIKA) is a dual-band imaging camera built for the 30m telescope by an international consortium lead by Alain Benoit and Alessandro Monfardini from the *Institut Néel* in Grenoble, France.

The camera is equipped with a novel type of supraconducting detectors called KIDs (Kinetic Inductance Detectors). The focal plane consists of two filled arrays operating at 100 mK, delivered by a continuous closed-cycle dilution fridge, and optimized for observations in the atmospheric windows at 2 mm (150 GHz) and 1.2 mm (260 GHz), with broad spectral band-passes of 35 and 50 GHz, respectively. A dichroic is used to split the long/short wavelengths such that both channels observe the sky simultaneously with a common instantaneous field-of-view of $1.9'$ in diameter. The 2 mm (1.2 mm) array is made up of 132 (224) square pixels spaced by $9.8''$ ($6.8''$) providing a sampling of $0.7\,F\lambda$ ($0.8\,F\lambda$). Pixels are not polarization-sensitive. The half-power beamwidths were measured to be $17.5''$ and $12''$ at 2 and 1.2 mm, respectively. The camera conservative sensitivity to point sources, or Noise Equivalent Flux Density (NEFD), is 14 and 35 mJy$\cdot\sqrt{\mathrm{s}}$ at 2 and 1.2 mm, respectively.

In parallel to astronomical observations, the KIDs can be used as total power detectors, which provide a direct measurement of the atmosphere opacity along the line-of-sight for each scan. Skydips must be performed once a day to adjust the calibration of the total power – opacity relationship. The opacity ratio τ_{2mm}/τ_{1mm} is about 0.6.

The control of the instrument is done via automatic tuning sequences between each scan, and an expert from the NIKA team constantly monitors the behavior of the camera. The observer interacts with the telescope/instrument through the regular PaKo software.

On-line data processing tools will be provided to the observers to obtain rapid feedback on pointing, focus, photometric calibration, and skydip observations. An off-line data processing package is also being prepared and will be delivered to the observers in due time.

We offer two standard observing modes where data are taken continuously while the telescope follows either Lissajous curves, or zig-zag patterns. Neither mode makes use of the secondary mirror to modulate the signal. The Lissajous observing mode should be used exclusively on point sources (optimum observing efficiency with the source on–array at all time). The traditional zig-zag scanning pattern is to be used for mapping extended emission or covering large areas (up to $30' \times 30'$).

More information about NIKA, in particular results from previous technical campaigns, reference publications, and guidelines for observing time estimates, have been compiled and are available at the following URL:

`http://www.iram.es/IRAMES/mainWiki/NIKA/Main`

For this semester, NIKA is offered for about 1 week of pooled time with support from the NIKA team. All projects will be evaluated by the IRAM program committee, and accepted projects will be observed on a “shared risk” basis. No large Programs will be accepted for NIKA.

GISMO

The Goddard-IRAM Superconducting 2 mm Observer (GISMO) is a bolometer camera that consists of 8×16 close-packed pixels with super conducting transition edge sensors (TES). The TES are read out by time domain SQUID multiplexers. The pixels are spaced by $13.75''$ and they fill the entire field of view of the camera ($1.83' \times 3.66'$). The telescope half-power beamwidth was measured to be near the expected diffraction limit of $16.7''$. GISMO's sensitivity is $\sim$14 mJy$\cdot\sqrt{\text{s}}$, which is the median NEFD measured during the past observing runs (cf. reports by Bruni et al. and Hermelo et al. at the URL below). The NEFD is found to improve to about 12 mJy$\cdot\sqrt{\text{s}}$ for maps observed with very fast scanning speed.

We have compiled reports that describe in detail the instrument performances as measured during the past GISMO pool sessions. In particular the reports provide updates on the camera sensitivity, telescope overheads, flux reproducibility, and sensitivity penalties when trying to recover extended emission. These reports are available at the following URL:

`http://www.iram.es/IRAMES/mainWiki/GISMO/Main`

We offer two standard observing modes where data are taken continuously while the telescope follows either Lissajous curves, or OTF zig-zag patterns. Neither mode makes use of the secondary mirror to modulate the signal. An automated pipeline merges the GISMO data with the telescope data streams to create FITS files which are automatically processed by the reduction software *CRUSH*, to create logs, pointing results, and a first quick view of the data. An on-line log is also created automatically which includes a standard pipeline quick view of the observed maps. *CRUSH* is regularly updated to account for the latest performances measured at the observatory. It is the only reduction software available for GISMO data, and IRAM will not provide support for data reduction with *CRUSH*. This software is developed by A. Kovács, and it is publicly available `on-line` with ample documentation.

For this semester, GISMO is offered for about 1 week of pooled time with support from the Goddard team. All projects will be evaluated by the IRAM program committee. Accepted projects will be observed on a “shared risk” basis. Note also that no large programs will be accepted for GISMO.

The document describing how to derive observing time estimates for GISMO, as well as a convenient python script, is available at the `URL` mentioned above.

EMIR

Overview: The spectral line receiver EMIR (**E**ight **MI**xer **R**eceiver) operates in the 3, 2, 1.3 and 0.9 mm atmospheric windows (Fig. 1). These four bands are designated as E 090, E 150, E 230, and E 330 according to their approximate center frequencies in GHz. Each band provides two orthogonal linear polarization channels tuned to the same frequency as they share a single common local oscillator. The eight individual receivers of EMIR are very well aligned with offsets below $2''$ between bands and below $1''$ between polarizations of any one band. EMIR offers very competitive noise temperatures

Table 1: GISMO and NIKA characteristics.

Parameter	NIKA		GISMO
Band	1.2 mm	2 mm	2 mm
NEFD [$\mathrm{mJy} \cdot \sqrt{\mathrm{s}}$]	35	14	14
HPBW [″]	12	17.5	16.7
FOV [′]	⌀ 1.9	⌀ 1.9	1.83×3.66
Valid pixels	136	114	100

and wide bandwidths. The band E 330 is offered for regular use under very good weather conditions (pwv < 2 mm).

All EMIR bands are equipped with dual sideband (2SB) mixers that offer 8 GHz of instantaneous bandwidth per sideband and per polarization (Fig. 2).

Table 2 lists the main characteristics of the EMIR receiver. A thorough description of the EMIR receiver is available in Carter et al. [15], and its users guide is available at the EMIR web page at:

`http://www.iram.es/IRAMES/mainWiki/EmirforAstronomers`.

Selection of EMIR bands: A set of warm switchable mirrors and dichroic elements are used for combining EMIR beams, or for directing the beams towards calibration loads.

In its simplest configuration, the warm optics unit selects a single EMIR band for observation. This mode avoids the use of slightly lossy dichroic elements and therefore offers the best receiver noise temperatures.

In its dual-beam configuration, the dichroic mirrors combine the beams of two receivers such that they look at the same position on the sky and have the same focus values within 0.3 mm. The following band combinations are possible: E 090 and E 150, E 090 and E 230, or E 150 and E 330 (see Tab. 2). The combination of bands is not polarization selective, i.e. the combined beams will stay dual polarization. The loss of these dichroic mirrors, which is small over most of the accessible frequency range, increases however the receiver temperatures by 10–15 K. A few disadvantageous frequency combinations (e.g. HCN, HNC and HCO^+ observed with E 090 and E 230) lead to a substantial increase of the receiver noise (see the `EMIR homepage` for details). The observer is therefore advised to carefully evaluate whether an observation involving two different bands is more efficiently made in parallel or in series.

Calibration Considerations: EMIR has its own calibration system. The external warm optics provides ambient temperature loads and mirrors reflecting the beams back onto the 15 K stage of the cryostat. This system is expected to be very reliable and constant over time. The absolute calibration accuracy is around 10% or better depending on the band considered.

All EMIR bands are equipped with tunerless sideband separation mixers, allowing simultaneous observations of both sidebands in separate IF bands. These mixers have been characterized in the laboratory for their image rejection and are expected to have the same performance on site (> 10 dB). Below the lower frequency end of the tuning range ($\nu < 83$ GHz) the behavior of image band rejection is expected to be erratic, and such observations are therefore discouraged. On–site measurements of the rejection is no longer straightforward for these mixers, since the Martin–Puplett interferometers are not available anymore for sideband separation. As the optimum way of calibrating the image rejection is still under study, users who propose observations which rely on an enhanced accuracy of calibration of image gains should mention this request in the proposal.

Unwanted harmonics of the local oscillator may generate ghost lines in the data. A report [10] has been prepared to inform the observers on the current status of this issue and give observational examples showing how to detect such ghost lines.

Doppler–tracking and velocity scale: It is common practice at radio observatories to correct the frequency of an observation for the strongly time variable velocity of the Observatory with respect to the solar system barycenter. This guarantees that lines observed near the Doppler–tracked frequency, usually the band center, always have the correct

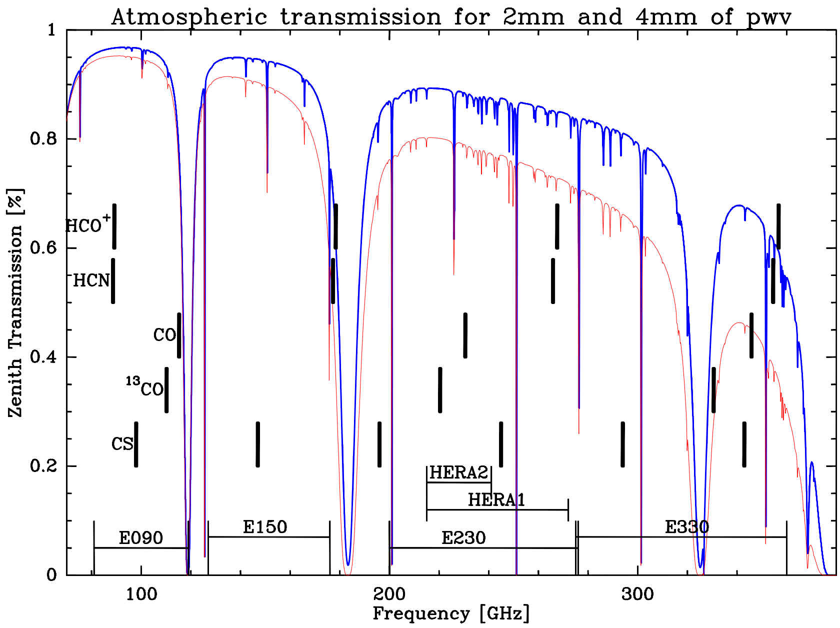

Figure 1: Atmospheric transmission at the 30m site between 60 and 400 GHz for 2 and 4 mm of precipitable water vapor, derived from the ATM model. The EMIR bands are indicated and the frequencies of a few important molecular transitions are marked.

barycentric velocity, independent of the time of observation. At the 30m, the local oscillator and its synthesizers are constantly adjusted during observations to track the changing Doppler factor for one spectral line with its rest frequency. This causes a slight shift of lines observed simultaneously at a different frequency. This shift is proportional to the frequency difference and the Doppler factor. CLASS corrects for this shift by adapting the spectral resolution. For details, see a report by Buchbender et al. which is available at the EMIR web page mentioned above.

Connection to backends: The IF transport system consists of eight IF cables, each with a 4 GHz bandwidth, thus providing a total bandwidth of 32 GHz. This bandwidth can be entirely covered by the FTS units, within limitations, at a spectral resolution of 200 kHz (see the backends section below for details).

An **IF switch box** in the receiver cabin is used to select 8 EMIR channels of 4 GHz bandwidth each. The design of the box allows the selection of all commonly used combinations of EMIR bands. A detailed description of the (im)possible sub-band combinations is available on the `EMIR homepage`.

A convenient script has been made available on the `EMIR homepage` to help observers prepare EMIR setups when several lines are targeted with the high resolution backends (VESPA and FTS at 50 kHz resolution). It displays lines of interest and the frequency coverage of both backends in both sidebands of one of the four EMIR receivers. This is particularly convenient when trying to determine the local oscillator frequency that would allow the simultaneous observation of several lines.

HERA

The **HE**terodyne **R**eceiver **A**rray (HERA) consists of 9 dual–polarization pixels arranged in the form of a center–filled square separated by 24″. Each beam is split into two linear polarizations 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:

HERA1: 210 - 276 GHz
HERA2: 210 - 242 GHz

Observations have shown that the noise temperature of the pixels of the HERA2 array may vary across the 1 GHz IF band. The highest noise occurs towards the band edges which are, unfortunately, picked up when HERA is connected with VESPA whose narrow observing band is located close to the lower edge of the 1 GHz band. Therefore, while not

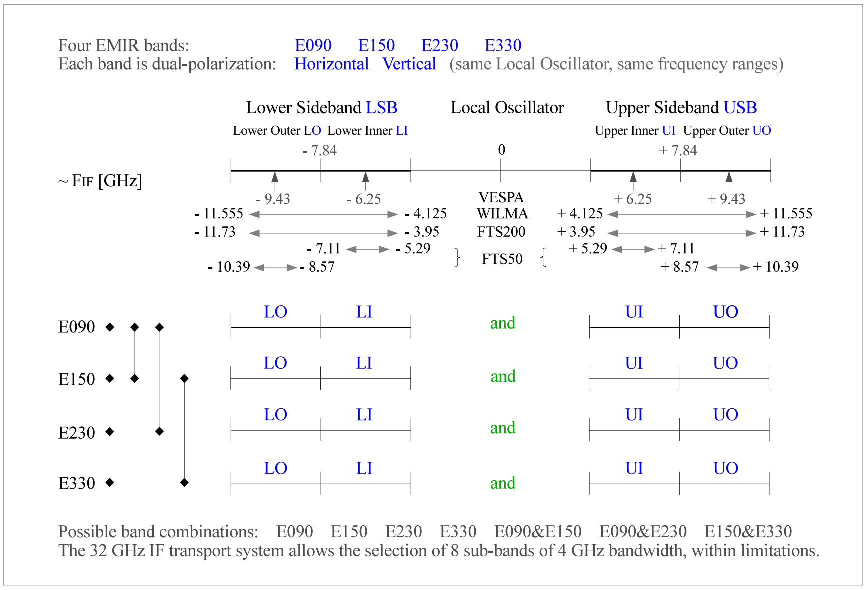

Figure 2: Visual overview of EMIR bands. Eight sub-bands can be transported to backends for a total of 32 GHz instantaneous bandwidth. Frequencies shown above the frequency scale indicate the central frequencies of the (sub-)bands. Frequencies at the sideband edges give the frequency coverage of the backends.

as important for wide band observations with centered IF band, the system noise in narrow mode is higher (factor 1.5 – 2) as compared to the HERA1 array. We do not recommend to use HERA2 for frequencies > 241 GHz. Note also that 2 pixels of HERA2 (number 4 and 9) show strong instabilities and should be flagged in the data reduction.

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

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 $2' - 10'$) in position or frequency switching mode.

HERA can be connected to three sets of backends: the FTS, VESPA, and WILMA. When connected to HERA, these backends offer spectral resolutions ranging from 20 kHz to 2 MHz over bandwidths ranging from 40 MHz to the entire 1 GHz bandwidth of HERA. The backend section below provides a description of the available backend configurations.

For details about observing with HERA, consult the `HERA manual`, or the following URL:

`http://www.iram.es/IRAMES/mainWiki/HeraforAstronomers`

The new pool coordinator, Claudia Marka (marka@iram.es) may also be contacted.

Frequency switching

Frequency switching is available for both HERA polarizations as well as for EMIR. This observing mode is interesting for observations of narrow lines where flat baselines are not essential. Certain limitations exist with respect to maximum frequency throw ($\leqslant$ 45 km/s), backends, phase times etc.; for a detailed report see [2]. This report also explains how to identify *mesospheric lines* which may easily be confused in some cases with genuine astronomical lines from cold clouds.

Backends

The following three spectral line backends can be individually connected to any EMIR band or to

Table 2: EMIR Frontend characteristics foreseen for this semester. The sky frequency range, F_{sky}, refers to the center of the outer IF sub-bands. The lower (LSB) and upper (USB) sideband frequency range is also specified. 2SB stands for dual sideband mixers, and H/V for horizontal and vertical polarizations. T_{sb} and T_{db} are the SSB receiver temperatures in single– and dual–band observations, respectively. Note that T_{db} includes a 15 K noise contribution from the dichroics. The standard frequency range of the E 330 band can be extended to 370 GHz with the YIG Local Oscillator. Observations above 350 GHz are run on a shared-risk basis. The nominal frequency range of the E 150 receiver is 129-177 GHz. It can however be extended to the range 124-184 GHz with good performances of receiver temperatures and sideband ratios but the calibration around the atmospheric water line at 183.31 GHz would require special care.

EMIR band	F_{sky} GHz	mixer type	polarization	bandwidth GHz	T_{sb} K	G_{im} dB	combinations E 0/2	E 1/3	E 0/1	T_{db} K
E 090	83 – 117	2SB	H/V	8	50	> 13	X		X	65
(LSB)	*83 – 97*									
(USB)	*93 – 117*									
E 150	124 – 177 (184)	2SB	H/V	8	50	> 10		X	X	65
(LSB)	*124 – 168*									
(USB)	*141 – 177 (184)*									
E 230	202 – 274	2SB	H/V	8	80	> 13	X			95
(LSB)	*202 – 263*									
(USB)	*217 – 274*									
E 330	277 – 350 (370)	2SB	H/V	8	80	> 10		X		95
(LSB)	*277 – 335*									
(USB)	*297 – 350 (370)*									

HERA. Specific documentation on the backends available at the 30m telescope can be found on the wiki page at:

`http://www.iram.es/IRAMES/mainWiki/Backends`

Fast Fourier Transform Spectrometer

The FTS can be connected to EMIR or HERA. It consists of a series of 24 FTS modules purchased from Radiometer Physics (Klein et al. [16, 17]). All FTS units work either at 200 kHz resolution or 50 kHz resolution. It is not possible to set them individually to different resolutions. At 200 kHz resolution, the 24 units provide 32 GHz of instantaneous bandwidth where each block of 3 FTS units covers a contiguous 4 GHz band of EMIR. At 50 kHz resolution, 3 FTS units cover the inner 1.8 GHz of the 4 GHz EMIR bands (see Fig. 2 for the exact frequency coverage). When connected to HERA, the FTS can cover each of the 18 pixels over a bandwidth of 1 GHz in the low spectral resolution mode, or over a reduced bandwidth of 625 MHz in the high spectral resolution mode.

Note that spectra may show platforming between the FTS units. For deep integrations on faint broad lines, we recommend to use WILMA in parallel.

VESPA

The Versatile Spectrometric and Polarimetric Array can be connected to HERA and EMIR. It is also used for polarimetry measurements (see Polarimetry section below). When connected to a set of 4 IF channels from EMIR, VESPA typically provides up to 12 000 spectral channels (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 to 512 MHz. VESPA basebands can be offset from band center by up to ±250 MHz. When VESPA is connected to HERA, up to 18 000 spectral channels can be used with the following combinations of nominal resolution (kHz) and maximum bandwidth (MHz): 20/40, 40/80, 80/160, 320/320, 1250/640. For each one of these configurations, 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 by up to ±250 MHz offsets from the sky frequency. The many VESPA configurations and user modes are summarized in a `Newsletter contribution` [11] and in the `user guide`.

WILMA

The wideband autocorrelator WILMA consists of 18 units. Each unit provides 512 spectral channels, spaced out by 2 MHz and thus covering a total bandwidth of 1 GHz. WILMA can be connected to the 18 detectors of HERA, thus covering the entire bandwidth of both polarizations. A subset of 16 units can also be connected to EMIR covering a bandwidth of 4 × 4 GHz at a 2 MHz resolution. A technical overview of the architecture of WILMA is available at the following URL:

`http://www.iram.fr/IRAMFR/TA/backend/veleta/wilma/index.htm`

4 MHz filterbank

The 4 MHz filter bank has been decommissioned in June 2014.

Polarimetry

Polarimetric observations can be made using a dual–polarization band of EMIR connected to VESPA in a setup designated as XPOL. 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, and 320/480. More complex observing modes where VESPA is split into two bands are also possible (see the VESPA `user guide` [11]). A technical description of XPOL, along with sample observing scripts and beam maps, are available on a new webpage at:

`http://www.iram.es/IRAMES/mainWiki/PolarimetryforAstronomers`

XPOL has been tested for the EMIR bands E 090 and E 230. XPOL profits from the improved performance of EMIR in several respects: smaller or negligible phase drifts, small and stable offsets between the two polarizations, and negligible decorrelation losses.

The presence of polarised sidelobes makes observations of extended sources complicated as those sidelobes rotate with elevation, possibly because of the off–axis installation of EMIR. *Proposals for observation of extended sources should demonstrate that their observations are feasible in the presence of the known sidelobes.*

Proposals for polarimetric observations may be submitted for all EMIR bands, although E 330 still requires some commissioning tests that are scheduled for this semester. Astronomers interested in using XPOL are invited to get in touch with Clemens Thum (thum@iram.es).

Observing time estimates

We strongly recommend to use the `on-line time estimator` available at the following URL:

`http://www.iram-institute.org/EN/content-page-150-7-55-150-0-0.html`

It can handle both heterodyne instruments EMIR and HERA. A concise document describing time estimates for GISMO and NIKA observations is available on the `GISMO` and `NIKA` webpages. A python script is also provided on this webpage to derive numerical values for NIKA and GISMO time estimates.

If very special heterodyne 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 $T_{\rm sys}$, the spectral resolution, the expected antenna temperature of the signal, the signal/noise ratio that is aimed for, all overheads and dead times, and the resulting observing time.

Proposers should base their time request on normal winter conditions, corresponding to 4 mm of precipitable water vapor (pwv). Conditions during afternoons can be degraded due to anomalous refraction. The observing efficiency is then reduced and the flux/temperature calibration is more uncertain than the typical 10 percent.

Proposers requesting observations which need pwv values lower than 4 mm should enter the maximum acceptable pwv value on the PMS proposal page. Very demanding proposals, e.g. observations using E 330 above 300 GHz, or some very deep and/or high frequency continuum observations, may need pwv values $\leqslant$ 2mm. These observations will be scheduled in a pool.

Organizational aspects

Pooled observing

The pooled observing mode offers a flexible way of scheduling weather demanding projects. Contrary to the traditional scheduling where a fixed time slot is reserved in advance for a given project, pooled projects are scheduled dynamically during pool sessions, typically two weeks long, to better exploit the best weather conditions at the Pico Veleta. For instance accepted EMIR or HERA high frequency ($\lambda \leqslant 1.3$ mm) proposals may be pooled into the "1 mm weather" queue, in which case they would be observed when the atmospheric precipitable water vapor column (pwv) falls below 5 mm. Similarly, projects requesting less than 2 mm of pwv are usually pooled into the "best weather" queue. A correct specification of the pwv on the technical summary page is therefore very important. Heterodyne proposals which are particularly weather-tolerant are used as backup projects during pool sessions to fill in the gaps between periods of good weather conditions. Pooled observations are offered since 2002 at the 30m telescope, and they have proven to be a very efficient and successful mode of observations. Note that all GISMO and NIKA proposals will be scheduled in dedicated pools.

Participation in the pools may be requested explicitly by ticking the appropriate box on the proposal form. The 30m scheduler may also select projects that would benefit most from the pool scheduling flexibility, or are otherwise well suited to be included in the pools. Pooled observations should be simple and straightforward to carry out, using only standard setups. For instance polarization measurements using XPOL are not appropriate for pool observing.

Proposals participating in the pools will be observed by the PIs and Co-Is of participating projects, and the IRAM staff. The pool observations will be organized by the pool coordinators, Claudia Marka and Israel Hermelo. The organization of the observing pools is described in more details on the `IRAM 30m web site`. Questions concerning the pool organization can be directed to the scheduler (scheduler30m@iram.es) or to the pool coordinators (hermelo@iram.es and marka@iram.es).

Service observing

To facilitate the execution of short (⩽8 h) programs, we propose "service observing" for some easy to observe programs *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 in 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

`Remote observing` with the 30m telescope is now routinely possible. The telescope is controlled in real time via vnc–viewers. Remote observations are restricted to experienced 30m observers who have been granted less than 10 to 20 hours of observing time. Please contact the scheduler, Nicolas Billot, at least 2 weeks in advance if you plan to conduct remote observations. Please provide us with the project ID number, the name of observer, and the site from where the observations will be run.

Note that remote observations are best conducted from dedicated remote stations (Granada or Madrid). They offer large screens to accommodate the various displays necessary for the command interface and to monitor the observations. Other advantages are the readily available documentation and a phone, as well as local help that is usually available. As a safeguard, please email observing instructions and macros to the Astronomer of Duty (AoD) and/or operator. A detailed user guide for remote observing is available on request.

Reminders

For any questions regarding the telescope and the control programs, we recommend to consult the `summary of telescope parameters` and the `NCS web pages`.
The applied calibration procedure is explained in depth in a dedicated report entitled "`Calibration of spectral line data`" available at:

`http://www.iram.es/IRAMES/mainWiki/CalibrationPapers`

The astronomer on duty may be contacted for any special questions concerning the preparation of an observing run. The AoD schedule is available at

`http://www.iram.es/IRAMES/mainWiki/AstronomerOnDutySchedule`

If your observations with GISMO at the 30m telescope result in a publication, please acknowledge support from the GISMO team and include a reference to Staguhn et al. 2008 [14].

If your observations with NIKA at the 30m telescope result in a publication, please acknowledge support from the NIKA team[2].

References

[1] 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

[2] Frequency switching at the 30m telescope
C. Thum, A. Sievers, S. Navarro, W. Brunswig,

[2] `http://ipag.osug.fr/nika2`

J. Peñalver 1995, IRAM Tech. Report 228/95. available at the spanish web site

[3] The 30m Manual: A Handbook for the 30m Telescope (version 2), W. Wild 1995 IRAM Tech. Report 377/95, also available from the 30m web site.

[4] GILDAS web page at http://www.iram.fr/IRAMFR/GILDAS/

[5] 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

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

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

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

[9] Improvement of the IRAM 30m telescope beam pattern C. Kramer, J. Penalver, A. Greve 2013, (here).

[10] EMIR ghost lines C. Kramer, A. Navarrini, S. Navarro, and J. Cernicharo (2014). Available on the EMIR homepage.

[11] IRAM Newsletter 54 (December 2002) and Short guide to VESPA G. Paubert (2002).

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

[13] 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), (here).

[14] Instrument performance of GISMO, a 2 millimeter TES bolometer camera used at the IRAM 30 m Telescope Staguhn et al., Proc. of SPIE, Vol. 7020 (2008)

[15] The EMIR multi-band mm-wave receiver for the IRAM 30m telescope M. Carter, B. Lazareff, D. Maier, J.-y. Chenu, A.-l. Fontana, Y. Bortolotti, C. Boucher, A. Navarrini, S. Blanchet, A. Greve, D. John, C. Kramer, F. Morel, S. Navarro, J. Pealver, K. Schuster and C. Thum A&A, 538, A89, 2012, (here).

[16] The Next Generation of Fast Fourier Transform Spectrometer Klein B., Kramer I, Hochgurtel S., Güsten R., Bell A., Meyer K., and Chetik V. 19th International Symposium on Space Terahertz Technology, Groningen, 28-30 April 2008, (here).

[17] Fast Fourier Transform Spectrometer Klein B., Kramer I, Hochgurtel S., Güsten R., Bell A., Meyer K., and Chetik V. 20th International Symposium on Space Terahertz Technology, Charlottesville, 20-22 April 2009, (here).

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

Nicolas Billot & Carsten Kramer

News from the Plateau de Bure Interferometer

NOEMA: Progress of antenna 7 construction

Construction of the first NOEMA antenna is progressing well. The azimuth and elevation axes were aligned, the receiver cabin was mounted on the pedestal, the central hub is in place, and assembly of the reflector back structure has started. In the next months, the subreflector is foreseen to be put in place and the reflector will be equipped with panels. The commissioning of antenna 7 is expected to take place in fall/winter and the antenna may become available for observations early 2015. In the following Call for Proposals, proposers are however asked to assume that only six antennas will be available during the winter semester.

NOEMA: Correlator upgrades

Work is in progress on the IF processor to feed the signals of up to eight antennas to the wide-band correlator WideX, and to upgrade the corresponding real-time software. The narrow-band correlator, being a separate system, will remain able to process the signals of up to six antennas. To provide optimum flexibility for high spectral resolution studies with the narrow-band correlator, a switch will be enabled to select any subset of six antennas in the array. In particular, mapping projects on Galactic spectral lines will profit in the future from this flexibility.

Weather conditions and observing

Observing conditions this spring were quite good in terms of atmospheric opacity and stability during March and April, and allowed for useful 1 mm observations until beginning of May. Reasonable 3 mm and occasionally acceptable 2 mm observing conditions are currently still met during the second part of the night and typically lasting until around noon.

We moved the array from its A configuration into the second most extended configuration (B) on March 11, i.e about 2 weeks later than in previous years. The C configuration was scheduled from March 29 to April 20, after which the interferometer was moved back into the most compact configuration (6D).

The array entered into its 5D summer configuration on May 20, when the antenna maintenance period started. Antenna maintenance is reduced to a minimum level again this summer in order to provide the necessary resources for finalizing the construction of the first NOEMA antenna. The maintenance period is foreseen to end in the second half of September.

All but four A-rated projects requesting the extended A- and B-configurations could be completed this year. The need to carry over some of these projects for observations in the extended configurations to the next winter semester is currently under investigation.

Plateau de Bure participated in the global spring 3 mm VLBI session, scheduled from May 22 to 28 and performed with about 50% observing efficiency; the rest was lost due to adverse weather conditions. For this fall, global 3 mm VLBI observations are planned from September 25 to 29.

To guarantee a good accuracy of the antenna surfaces, holographic measurements are being done for each antenna and, when necessary, appropriate panel adjustments are applied to keep the surface roughness within specifications.

As far as A-rated projects are concerned, we hope to bring most of them to completion before the end of the summer 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 as well as time-filler programs, which are not started before the proposal deadline, have to be resubmitted.

Investigators who wish to check the status of their project may consult the `interferometer schedule` on the Web. This page is updated daily.

Jan Martin WINTERS

Call for Observing Proposals on the Plateau de Bure Interferometer

Non-trivial changes with respect to the previous Call for Proposals are marked in red. This document contains active links marked with a different font for an easy access to documentation, e.g. to the general `IRAM web pages`.

Conditions for the next winter session

Commissioning of the 1st NOEMA antenna has high priority and will extend into the upcoming winter semester. This will have impact on normal observations for all configurations, including the extended configurations A and B. Observations of newly accepted proposals in these configurations will have to be treated on a best effort basis.

For those proposals that turn out in the end to be observed with seven antennas, we might get in touch with the PIs in order to optimize their observations in terms of observing time and uv coverage. For the time being, proposers should however assume that six antennas will be available, which will be arranged in the standard 6 antenna configurations (see below).

A preliminary configuration schedule for the winter period is outlined below. Adjustments to this provisional configuration planning will be made according to commissioning requirements in the frame of NOEMA, proposal pressure (in particular on the band 4 receiver), weather conditions, and other contingencies. The configuration schedule given below should be taken as a rough guideline, in particular when the requested astronomical targets cannot be observed during the entire winter period because of sun avoidance constraints.

Conf	Scheduling Priority Winter 14/15
C	December
(D	December – January)
A	January – February, best effort
B	February – March, best effort
C	March – April
D	April – May

For proposals requesting the set of AB configurations that include the longest baselines, up to 760 m, we ask to focus on bright compact sources, possibly at high declination.

We invite proposers to submit proposals also for observations at 3 mm. When the atmospheric conditions are not good enough at 1.3 mm or at 2 mm, 3 mm projects will be observed: in a typical winter, 20-30% of the time used for observations is found to be poor at 1.3 mm, but still excellent at 3 mm.

General Proposal Considerations

Please give high importance to the quality of your proposal. The Plateau de Bure Interferometer is a powerful, but complex instrument, and proposal preparation requires special care. In particular, your proposal should not only justify the scientific interest, but also the need for the Plateau de Bure interferometer. Proposers should also note in their application whether the same or a similar proposal was or is intended to be submitted to ALMA, in which case a special justification is required why IRAM interferometer time is needed.

Don't hesitate to contact the Plateau de Bure Interferometer Science Operations Group (sog@iram.fr) in case of doubts and for questions related to the preparation of a proposal.

Proposal category

Proposals should be submitted through the `Proposal Management System PMS` for one of the four categories:

STANDARD: Proposals that ask for a total of less than 100 h of observing time and to use the interferometer within its guaranteed capabilities (see
the following sections in this Call for Proposals and the documentation `An Introduction to the IRAM interferometer`).

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

SPECIAL: Exploratory 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.

LARGE PROGRAM: This category is offered on both IRAM instruments, see section *Large Observing Programs* at the end of this call for a detailed explanation. In the frame of NOEMA, additional antennas and more receiver bandwidth are expected to become available during the "lifetime" of a Large Program. For this Call for Proposals, the observing time request should be based on the availability and performance of the current 6 element array, though. We might adjust it and/or review the observing strategy in response to PI needs and enhanced array's capabilities.

The proposal category will have to be specified on the `PMS` web form and should be carefully considered by proposers.

Within each of these categories, observations in one or several of the following frequency bands can be requested:

BAND 1: Proposals that ask for 3 mm data (80 to 116 GHz).

BAND 2: Proposals that ask for 2 mm data (129 to 177 GHz). Band 1 receivers can be used for pointing and calibration purposes, but cannot provide any imaging.

BAND 3: Proposals that ask for 1.3 mm data (201 to 267 GHz). Band 1 receivers can be used for pointing and calibration purposes, but cannot provide any imaging.

BAND 4: Proposals that request observations in the 0.8 mm window (277 to 371 GHz). Band 1 receivers can be used for pointing and calibration purposes, but cannot provide any imaging.

Short spacing observations on the 30m telescope should directly be requested on the interferometer proposal web form through `PMS`. A separate proposal for the 30m telescope is not required. The interferometer proposal form contains a box, labeled "Request for 30m short spacings" which should then be checked. The user will automatically be prompted to fill in an additional paragraph in which the need for the short spacings should be justified. It is essential to give here all observational details, including size and type of map, rms noise, spectral resolution, receiver, and time requested.

Configurations of the six-antenna array

The six-element array can be arranged in the following configurations:

Conf	Stations					
A	W27	E68	N46	E04	E24	N29
B	W27	E23	N46	W12	E12	N20
C	W12	E10	N17	W09	E04	N11
D	W08	E03	N11	W05	N02	N07

The general properties of these configurations are:

- `A` alone is well suited for mapping or size measurements of very compact, strong sources. It provides a resolution of 0.8″ at 100 GHz, ∼0.35″ at 230 GHz.
- `B` alone yields ∼1.2″ at 100 GHz and, in combination with A provides a ∼1.0″ beam at 100 GHz with very low sidelobe levels. It is mainly used for relatively strong sources.
- `C` provides a fairly complete coverage of the uv-plane (low sidelobe level) and is well adapted to combine with D for low angular resolution studies (∼3.5″ at 100 GHz, ∼1.5″ at 230 GHz) and with B for higher resolution (∼1.7″ at 100 GHz, ∼0.7″ at 230 GHz). C alone (∼2.7″ at 100 GHz, ∼1.2″ at 230 GHz) is also well suited for snapshot and size measurements, and for detection experiments at low declination.
- `D` alone is best suited for deep integration and coarse mapping experiments (resolution ∼ 5″ at 100 GHz). This configuration provides both the highest sensitivity and the lowest atmospheric phase noise.

The four configurations can be used in different combinations to achieve complementary sampling of the uv-plane, and to improve on angular resolution and sensitivity. Mosaicing is usually done with D or CD, but the combination BCD can also be requested for high resolution mosaics. Check the ANY bullet in the proposal form if the scientific goals can be reached with any of the four configurations or their subsets. There is a possibility on the web form to restrict the choice of configurations, e.g., to C or D, if your project qualifies for ANY of the compact configurations.
Please consult the documentation
`An Introduction to the IRAM interferometer`
for further details.

Receivers

All antennas are equipped with dual polarization receivers for the 3 mm, 2 mm, 1.3 mm, and 0.8 mm atmospheric windows. The frequency ranges are 80 GHz to 116 GHz for band 1, 129 GHz to 177 GHz for band 2, 201 to 267 GHz for band 3, and 277 to 371 GHz for band 4.

Each band is dual-polarization with the two RF channels, one per polarization, observing at the same frequency. The four bands are not co-aligned in the focal plane (and therefore are not aligned on the sky). Due to the pointing offsets between the four frequency bands, only one band can be observed at any time. Time-shared observations between band 1 and one of the other frequency bands (band 2, 3, or 4) are possible in well justified cases, they are

	Band 1	Band 2	Band 3	Band 4
RF range*/[GHz]	80–116	129–177	201–267	277–371
T_{rec}/[K] LSB	40–55	30–50	40–60	30–50
T_{rec}/[K] USB	40–55	40–80	50–70	30–50
G_{im}/[dB]	-10	-12 ... -10	-12 ... -8	-20
RF LSB/[GHz]	80–104	129–165	201–264	277-359
RF USB/[GHz]	104–116	164–177	264–267	289-371

* center of the 4.2-7.8 GHz IF band

however not very efficient. Please contact the Interferometer Science Operations Group (sog@iram.fr) to discuss the feasibility in case you are interested in using this mode.

The mixers for bands 1, 2, and 3 are single-sideband, backshort-tuned; they will usually be tuned LSB, except for the upper part of the frequency range in all three bands where the mixers will be tuned USB. The band 4 mixers are 2SB receivers, operated in SSB mode. They can be tuned LSB or USB throughout most of the accessible frequency range. The typical image rejection is 20 dB for band 4, 10 dB for bands 1, 2, and 3.

Signal to Noise

The rms noise can be computed from

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

where

- $J_{\rm pK}$ is the conversion factor from Kelvin to Jansky (22 Jy/K in band 1, 29 Jy/K in band 2, 35 Jy/K in band 3, and 45 Jy/K in band 4). These factors were determined for stable atmospheric conditions.
- η is an additional efficiency factor due to atmospheric phase noise ($\eta = 0.9$ in band 1, 0.85 in band 2, 0.8 in band 3, and 0.70 in band 4). These factors take into account average phase stability in typical winter conditions.
- $T_{\rm sys}$ is the system temperature ($T_{\rm sys}$ = 100 K below 110 GHz, 170 K between 110 and 116 GHz, 130 K in band 2 below 150 GHz, 170 K in band 2 above 150 GHz, 200 K in band 3, and 370 K in band 4 for sources at $\delta \geqslant 20^\circ$ and for typical winter conditions).
- $N_{\rm a}$ is the number of antennas (currently 6), and $N_{\rm c}$ is the number of configurations: 1 for D, 2 for CD, and so on.
- $T_{\rm ON}$ is the on-source integration time per configuration in seconds (2 to 8 hours, depending on source declination). Because of various calibration overheads, the total observing time is typically 1.6 $T_{\rm ON}$.
- B is the spectral bandwidth in Hz (40 kHz to 2.5 MHz for spectral line observations using the narrow-band correlator, and from about 2 MHz for line projects up to 3.6 GHz for continuum projects using WideX).
- $N_{\rm pol}$ is the number of polarizations: 1 for single polarization and 2 for dual polarization (see section *Correlators* for details).

Investigators have to specify in the "technical justification" and on the Technical Sheet the 1 sigma point source sensitivity which is necessary to achieve each individual goal of a proposal, and particularly for projects aiming at deep integrations. In case of mapping projects, PMS asks for the on-source time requested and calculates the resulting point-source sensitivities using Eq. (1). Please verify that your numbers match throughout the proposal.

Correlators

Wide-Band correlator (WideX)

At any given time, only one frequency band can be observed, but with the two orthogonal polarizations available. Each polarization delivers a 3.6 GHz bandwidth (from IF=4.2 to 7.8 GHz). The two 3.6-GHz bandwidths coincide in the sky frequency scale.

The wide-band correlator WideX gives access to the two 3.6 GHz wide IF bands simultaneously. WideX provides a fixed spectral resolution of 1.95 MHz over the full bandwidth and is available in parallel to the narrow-band correlator. WideX is capable of correlating the signals of up to 8 antennas.

Narrow-Band Correlator

The narrow-band correlator accepts as input two signals of 1 GHz bandwidth, that must be selected within the 3.6 GHz delivered by the receiver. In practice, the IF processor splits the two input 4.2–7.8 GHz bands in four 1 GHz wide "quarters", labeled *Q1…Q4*. Two of these quarters must be selected as narrow-band correlator inputs. Only six antennas can be processed with the narrow-band correlator. The system allows the following choices:

– first correlator entry can only be Q1 HOR, or Q2 HOR, or Q3 VER, or Q4 VER

– second correlator entry can only be Q1 VER, or Q2 VER, or Q3 HOR, or Q4 HOR

where HOR and VER refer to the two polarizations:

Quarter IF1 [GHz]	Q1 4.2-5.2	Q2 5.0-6.0	Q3 6.0-7.0	Q4 6.8-7.8
input 1	HOR	HOR	VER	VER
input 2	VER	VER	HOR	HOR

Note, that the combination VER VER is not allowed.

How to observe two polarizations with the NB correlator? To observe simultaneously two polarizations at the same sky frequency, one must select the same quarter (Q1 or Q2 or Q3 or Q4) for the two narrow-band correlator entries. This will necessarily result in each entry seeing a different polarization. The system thus gives access to 1 GHz × 2 polarizations.

How to use the full 2 GHz bandwidth? If two different quarters are selected (any combination except VER VER is possible), a bandwidth of 2 GHz can be analyzed by the narrow-band correlator. Only one polarization per quarter is available in that case; this may or may not be the same polarization for the two chunks of 1 GHz.

Is there any overlap between the four quarters? In fact, the four available quarters are 1 GHz wide each, but with a small overlap between some of them: Q1 is 4.2 to 5.2 GHz, Q2 is 5.0 to 6.0 GHz, Q3 is 6.0 to 7.0 GHz, and Q4 is 6.8 to 7.8 GHz. This results from the combination of filters and LOs used in the IF processor.

Is the 2 GHz bandwidth necessarily continuous? No: any combination (except VER VER) of two quarters can be selected. Adjacent quarters will result in a (quasi) continuous 1.8 or 2 GHz band. Non-adjacent quarters will result in two separate 1 GHz bands.

Where is the selected sky frequency in the IF band? It would be natural to tune the receivers such that the selected sky frequency corresponds to the middle of the IF bandwidth, i.e. 6.0 GHz. However, this corresponds to the limit between Q2 and Q3. If your project depends on the narrow-band correlator, it is therefore highly recommended to center a line at the center of a quarter (see Section "ASTRO" below). In all bands, the receivers offer best performance in terms of receiver noise and sideband rejection in Q3 (i.e. the line will usually be centered at an IF1 frequency of 6500 MHz).

Spectral units of the narrow-band correlator

The narrow-band correlator has 8 independent units, which can be placed anywhere in the 100–1100 MHz band (1 GHz bandwidth). 7 different modes of configuration are available, characterized in the following by couples of total bandwidth/number of channels. In the 3 DSB modes (320MHz/128, 160MHz/256, 80MHz/512 – see Table) the two central channels may be perturbed by the Gibbs phenomenon if the observed source has a strong continuum. 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 SSB modes (160MHz/128, 80MHz/256, 40MHz/512, 20MHz/512) the two central channels are not affected by the Gibbs phenomenon and, therefore, these modes may be preferable for some spectroscopic studies.

Spacing (MHz)	Channels	Bandwidth (MHz)	Mode
0.039	1 × 512	20	SSB
0.078	1 × 512	40	SSB
0.156	2 × 256	80	DSB
0.312	1 × 256	80	SSB
0.625	2 × 128	160	DSB
1.250	1 × 128	160	SSB
2.500	2 × 64	320	DSB

Note that 5% of the passband is lost at both ends of each subband. The 8 units can be independently connected to the first or the second correlator entry, as selected by the IF processor (see above). Please note that the center frequency is expressed in the frequency range seen by the narrow-band correlator, i.e. 100 to 1100 MHz. The correspondence to the sky frequency depends on the quarters of the 3.6 GHz bandwidth which have been selected as correlator inputs and on the selected receiver side band (LSB or USB).

ASTRO

The software ASTRO can be used to simulate the receiver/correlator configuration.

The previous `LINE` command has been replaced by several new commands (see internal help; the following description applies to the current receiver system). The behavior of the `LINE` command can be changed by the `SELECT BURE 1995|2000|2006|2013` command, that selects the PdBI frontend/backend status corresponding to years 1995 (old receivers, 500 MHz bandwidth), 2000 (580 MHz bandwidth), 2006 (new receivers and new IF processor, 3.6 GHz bandwidth), 2013 (update of the LO system). Default is 2013:

- `LINE`: receiver tuning
- `NARROW`: selection of the narrow-band correlator inputs
- `SPECTRAL`: spectral correlator unit tuning
- `PLOT`: control of the plot parameters.

A typical session would be:

```
! choice of receiver tuning
line xyz 93.200 lsb 6500

! choice of the correlator windows
narrow Q3 Q3

! correlator unit #1, on entry 1
spectral 1  20 600 /narrow 1

! correlator unit #2, on entry 1
spectral 2  20 735 /narrow 1

! correlator unit #3, on entry 1
spectral 3 320 300 /narrow 1

! correlator unit #4, on entry 2
spectral 4 320 666 /narrow 2
...
```

The first step above:

```
! choice of receiver tuning
line xyz 93.200 lsb 6500
```

would produce a plot showing the full 3.6 GHz bandwidth delivered by the receivers that is accessible to WideX in dual polarization.

Astronomers are advised to download the most recent version of `GILDAS` to prepare their proposals.

Source coordinates and Velocities

The interferometer operates in the equatorial J2000.0 coordinate system. Please do not forget to specify either LSR velocities or redshifts for the sources. The source list must contain all the sources (and only those sources) for which observing time is requested. The list must adhere to the standard sexagesimal notation.

Any later request for a swap of targets has to be submitted for approval to the IRAM director and to be justified by new evidence or exceptional circumstances.

Sun Avoidance

For safety reasons, a sun avoidance circle is enforced that was recently reduced to 32 degrees from the sun. In the long term we aim to further reduce this sun avoidance limit.

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.

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 (write to sog@iram.fr) is also provided before a deadline to help in the preparation of a proposal. Depending on the program complexity, IRAM may require an in-house collaborator instead of the normal local contact.

Data reduction

Proposers should take the following into account with respect to reduction of their data:

- We recommend that proposers reduce their data in Grenoble. For the time being, remote data reduction can only be offered in exceptional cases and with some restrictions enforced on the VISITOR accounts. 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. Data reduction will be carried out on dedicated computers at IRAM. Please contact us in advance.

- In certain cases, proposers can be provided with updates as their observations progress. This service does not replace a careful data reduction after completion of the project. Please contact your local contact or PdBI's Science Operations Group (sog@iram.fr) if you are interested in observational updates.
- 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 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. The newer versions are downward compatible with the previous releases. Starting with the mar13 version of GILDAS, backward compatibility with PdBI receiver data older than 2007 is established.

Technical pre-screening

All proposals will be reviewed for technical feasibility in parallel to being made available to the members of the program 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 Interferometer Science Operations Group (sog@iram.fr) to discuss the feasibility.

Documentation

The documentation for the IRAM Plateau de Bure Interferometer includes documents of general interest to potential users and more specialized documents intended for observers on the site (IRAM on-duty astronomers, operators, or observers with non-standard programs). All documents can be retrieved from the `Plateau de Bure Documentation web pages`. Information on the current receiver system is given in the `Introduction to the IRAM Plateau de Bure Interferometer`, in this call for proposals, and in the `Calibration CookBook`.

Jan Martin WINTERS

Guidelines for Observing Time at the IRAM Facilities

Considering the much increased time requests for the IRAM telescopes over the last few years, taking into account the beginning of science operations of ALMA, and considering the substantial new investments of the IRAM partners into upgrading the current Plateau de Bure interferometer into NOEMA, the IRAM Council has decided the following guidelines for allocation of telescope time:

1. In deciding on proposal rankings the Program Committee is requested to take into account the publication record and impact of the proposers with previous IRAM telescope time allocations. The proposers should also note in their application whether the same or a similar proposal was or is intended to be submitted to ALMA, in which case a special justification is required why IRAM telescope time is needed.
2. Up to 15% of the available observing time may be invested into projects submitted by PIs affiliated with institutes in non-IRAM partner countries.
3. The fraction of time for Large Programs (a detailed description is given below) can be expanded to a total of about 50% of the scheduled telescope time on either of the IRAM telescopes. In order to ensure proper management of these programs in close interaction with the IRAM observatory, including the provision of suitable archive data products for the general scientific community, preference will be given to programs led by a PI located in one of the IRAM partner countries.
4. Once accepted, PIs of Large Programs cannot submit other proposals (as PI) during the active time of the Large Program.

Finally, we inform that the Partners will reserve time for mutually agreed "Observatory Programs" once the NOEMA upgrade is sufficiently advanced.

Large observing programs

IRAM offers the possibility to apply for observing time in the framework of a *Large Program* for the 30-meter telescope and the Plateau de Bure interferometer.

A Large Program should require more than 100 hours of observing time, spread over a maximum of three years, i.e. 6 contiguous semesters, or longer for programs requesting more than 1000 hours. IRAM will accept a limited number of Large Programs to be carried out per semester and instrument (30-meter and Plateau de Bure interferometer), allocating a maximum of 50% of observing time to such projects.

The Large Program should address strategic scientific issues leading to a breakthrough in the field. Large Programs should be coherent science projects, not reproducible by a combination of smaller normal proposals.

The Large Program proposals should contain a solid management plan ensuring an efficient turnover, including data reduction, analysis, and organization of the efforts.

Because of the large investment in observing time, but also of the inherent support from IRAM, it is advised that Large Programs involve one or more IRAM internal collaborators.

During the execution period of the Large Programs (ideally before mid-term), the team leading the Large Program should report to IRAM about the preliminary results and possible technical difficulties, so that IRAM could assess the progress made, assist with any problems encountered in the course of the observations, and, if needed, adjust the program scheduling.

The proprietary period ends 18 months after the end of the last scheduling semester in which the Large Program was observed. The raw data and processed data then enter the public domain. An extension of this proprietary period may be granted in exceptional cases only. A corresponding request will have to be submitted to the IRAM director.

Finally, it should be noted that following the guidelines decided by the IRAM Council, PIs of accepted Large Programs cannot submit other proposals (as PI) during the active time of the Large Program.

Because of the scope of the Large Programs and the need to explain the organization of the project, Large Program proposals will have a maximum length of 4 pages (plus up to 2 pages of figures, tables, or references). Large observing program proposals should be submitted using `PMS`; just check the "Large Program" bullet on the proposal submission main page. The following sections should be included: i) Scientific Rationale, ii) Immediate Objective, iii) Feasibility and Technical Justification, and iv) Organizational Issues. For the Plateau de Bure interferometer, the latter section must include a consideration of sun avoidance constraints and configuration scheduling.

The scientific evaluation of the Large Program proposals will be done by the Program Committee at large (all 12 members, except if there is a direct implication of one of the members in the proposal). External reviewers will be asked to evaluate Large Programs, if needed.

Note that a Large Program will either be accepted in its entirety or rejected, there will be no B–rating ("backup status") nor a partial acceptance/rejection of the proposal.

For the winter semester 2014/2015, the call for Large Programs will be open for the 30m telescope and the Plateau de Bure interferometer. For the 30m telescope, Large Programs may consider using HERA and EMIR.