IRAM NOEMA interferometer

Observing Capabilities and Current Status

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This document is updated twice a year to reflect the capabilities of the interferometer at the time of the *Call for Proposals* publication. Non-trivial changes with respect to the previous version are marked in red. Note that this document contains active links marked with a `different font` for easy access to the documentation, e.g. on the `NOEMA web pages`. The full links are also given on the last page of this document.

Contents

1 Progress of NOEMA/News

For the upcoming summer semester, the two compact configurations of NOEMA (C and D) will be offered. Due to the heavy work load planned during antenna maintenance this year, both the C and D configurations will be operated with the 10-antenna array. Two correlator modes of PolyFiX will be available which both cover the full bandwidth offered by NOEMA: one at 2 MHz spectral resolution that can be combined with additional high-spectral resolution windows at 62.5 kHz spacing, and one at 250 kHz spectral resolution. In particular, projects are encouraged that target sources where self-calibration techniques can be applied. Please contact the SOG at sog@iram.fr for questions about the feasibility of a program.

1.1 Frequency Cycling Observation Mode

NOEMA is pleased to introduce the frequency cycling observation mode, set to be available from the upcoming semester. This new mode further expands the scientific capabilities of the interferometer by enabling observations across a larger frequency range than is possible with a single frequency tuning. For this Call for Proposals, it will be offered on a shared risk basis.

The frequency cycling mode enables cyclic frequency switching over two or more tuning frequencies within a single observing track, facilitating observations across more than one spectral configuration of the correlator with customizable cycle integration times. The primary advantage of this feature is the ability to conduct nearly simultaneous observations over wide frequency ranges under almost identical conditions. This capability leads to the generation of high-quality broadband spectra characterized by high relative calibration accuracy and uniform noise levels, along with synthesized beam sizes that primarily scale with frequency.

The new mode is particularly suited for scientific goals that necessitate spectral data over large frequency ranges. Key applications include searching for galaxy redshifts through spectral line identification, conducting unbiased spectral surveys of galactic sources, leveraging data to determine spectral energy distributions more effectively, and observing transient events and phenomena that evolve over timescales of hours.
For the upcoming semester, this mode will be offered for observations in Band 1, with two tunings separated by 7.744 GHz by which it will be possible to cover contiguous frequency ranges of nearly 32 GHz. Observations will be conducted with a single spectral configuration of the correlator, offering spectral resolutions of 2 MHz or 250 kHz. The switching times between tuning frequencies can be tailored from a few minutes to several calibration cycles to meet specific scientific objectives.
Researchers interested in utilizing the frequency cycling observation mode and seeking assistance to ensure their proposals align with the mode's technical requirements are encouraged to reach out to the NOEMA Science Observations Group (sog@iram.fr).

1.2 Weather conditions and observing during the last months

The Plateau de Bure observatory faced an extended period of adverse weather conditions in terms of high winds and humid atmosphere that lasted for most of the time from October through January. Progress on the current winter projects was therefore quite slow and the reduction of the observing backlog did not meet expectations. Depending on the weather situation until the end of the semester, this may have a more or less severe impact on the observing time that can be allocated to new projects in the upcoming summer semester.

2 Conditions for the next Semester

Table 1: Configuration Schedule for the Summer 2024 period

Conf	Scheduling Priority
D	June – September
C	October – November

The summer semester is well adapted for low frequency (i.e., requesting observing frequencies below 150 GHz) and moderate angular resolution observations (see also Section 3.2). Atmospheric conditions usually improve toward the end of the semester and might be sometimes acceptable for the higher frequencies even during some summer nights, so that high frequency projects, targeting sources during night time[1], are more likely to be observed.

Self-calibration is a powerful process by which the quality and accuracy of astronomical data obtained can be improved. It involves calibrating the data using the observed sources themselves to mitigate errors caused by tropospheric phase fluctuations and calibration uncertainties introduced when combining observations from different array configurations and epochs. By leveraging self-calibration, the dynamic range in the image plane can be significantly increased and more robust scientific outcomes can be obtained. Here are a few simple criteria for self-calibration projects for NOEMA:

- high-precision absolute astrometry is not required
- as a reasonably high SNR is crucial to obtain reliable self-calibration solutions, verify that sources are bright enough. Compact sources with a minimum brightness of 4-5 mJy in the continuum at 90 GHz, 9-10 mJy at 140 GHz, and 15-20 mJy at 230 GHz are considered suitable for potential self-calibration.
- select sources with a simple underlying structure, especially sources whose continuum emission is largely confined within one synthesized beam. Complex structures can introduce ambiguities in the self-calibration process, which may hinder the convergence towards the expected level of calibration improvement.

These criteria may vary depending on the specific scientific goals of your project and the morphological complexity of the observed sources. In your proposal, please indicate on the technical sheet in PMS whether, in your view, the scientific objectives allow for self-calibration given the above criteria (i.e. tick the corresponding box "yes", "no", "maybe"). Self-calibration possibilities will be additionally assessed

[1] corresponding to sources that are visible for NOEMA in the LST range from roughly 15h to 03h for June to September and from 20h to 09h for October/November.

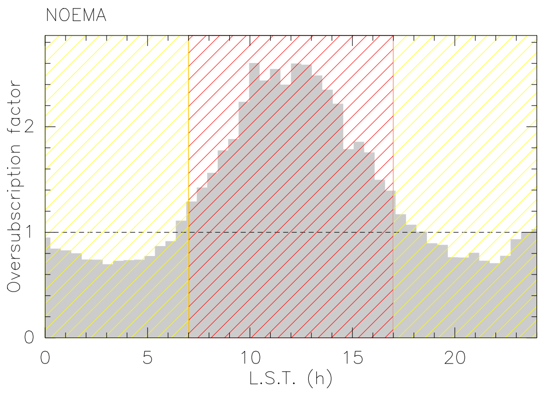

Figure 1: Oversubscription factor averaged over all NOEMA proposals submitted for the past observing semesters.

during the technical pre-screening.

Since the pressure on the C-configuration is expected to remain high in the 1 mm band, the submission of proposals for observations below 150 GHz requesting this configuration is strongly encouraged for the upcoming summer semester. In addition, science targets that can be either self-calibrated, are circumpolar, or request ANY configuration, and therefore allow flexible scheduling, are greatly welcome.

Please be aware that proposals focusing on extensively-studied extragalactic fields like COSMOS and GOODS-North significantly increase the competition for observing time, especially for sources within the Local Sidereal Time (LST) range between roughly 07h and 17h (see Fig. 1).

The following rules are in place for high priority and backup projects: all A-rated projects and the **already started sub-parts** of B-rated programs from the upcoming summer semester will be carried over into forthcoming observing semesters until completion. In case of doubts whether or not to resubmit a project from the on-going winter observing period, please get in touch with the Local Contact assigned to your project or with NOEMA's Science Operations Group (sog@iram.fr).

Investigators who wish to check the status of their project may consult the `interferometer schedule` on the IRAM website, which is updated daily.

3 General Proposal Considerations

Please give high importance to the quality of your proposal. The NOEMA interferometer is a powerful, but complex instrument, and proposal preparation requires special care, especially in light of its new capabilities. In particular, your proposal should not only justify the scientific interest, but also the need for NOEMA. Proposers should note in their application whether the same or a similar proposal was or is intended to be submitted to another observatory, in which case a special justification is required to explain why NOEMA time is needed.

Do not hesitate to contact the NOEMA Science Operations Group (sog@iram.fr) in case of doubts and for questions related to the preparation of a proposal.

3.1 Proposal Category

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

STANDARD: Proposals that ask for a total of less than 100 h of observing time and for the standard capabilities of NOEMA's current status (see the following sections).

TIME FILLER: Proposals that can be considered as backup 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 are available. A perfect time filler would aim at a low frequency detection on a circumpolar source. These proposals will be carried out on a "best effort" basis.

SPECIAL: Exploratory proposals, whose scientific interest justifies the attempt to use the array beyond its guaranteed capabilities. This category includes, for example, non-standard frequencies for which the tuning cannot be guaranteed, the currently experimental frequency cycling mode, i.e. cycling between two LO frequencies separated by 7.744 GHz at 3 mm using the same spectral setup, non-standard configurations, special needs with respect to calibration and more generally all non-standard observations. These proposals will be carried out on a "best effort" basis. PIs interested in special programs should contact the Science Operations Group (sog@iram.fr) well before the deadline to discuss feasibility and observing strategies.

LARGE PROGRAM: Under the current Call for Proposals, certain restrictions still apply (see the `Large Program Policy` on the IRAM web site for general details). Since NOEMA continues to develop new capabilities it is to be expected that some of these will become available during the "lifetime" of a Large Program, usually spanning over several observing semesters. The requested time and/or observing strategy may be reviewed and adapted in response to needs of the PI, and the enhanced array capabilities. In addition, less than the standard 50% of the total scheduled observing time will be reserved for *Large Programs* using NOEMA at this point. This restriction is necessary to account for the significant investment of technical time still needed as well as the large number of already active GT[2] projects. PIs who want to submit a new LP are strongly encouraged to get in touch with the NOEMA Science Operations Group (sog@iram.fr) well before the deadline to discuss the observational feasibility of their LP.

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

Within each of these categories, observations in Band 1, 2, and 3 can be requested, which are described in more detail in Section 3.3 and in Table 3.

Short spacing observations on the 30-meter telescope should be directly requested on the interferometer proposal web form through `PMS`. A separate proposal for the 30-meter telescope is not required. The interferometer proposal form contains a box, labeled "Request for 30-meter short spacings" which should then be checked. The user will automatically be prompted to fill in an additional paragraph in which the need for short spacing data should be justified. It is essential to provide all observational details, including size and type of map, rms noise, spectral resolution, receiver, and time requested. The following documents may help to prepare your short spacing observations: this `Presentation` (especially page 44 for a brief summary) given at the 11th Interferometry School and this `Technical Report`.

[2]guaranteed-time

For further assistance, please contact the Science Operations Group (sog@iram.fr).

3.2 Array Configurations

Two main configurations (C and D) are planned, providing optimum coverage of the uv-plane (see Table 2).
A detailed description of the beams expected for all configurations and their combinations and for sources at different declinations is provided `here`.
The two configurations can be combined to achieve complementary sampling of the uv-plane, and to improve on angular resolution and sensitivity. Check the ANY bullet in the proposal form if the scientific goals can be reached with any of the two proposed configurations. The ANY bullet is however only available if "Point source detection" is selected for the respective technical sheet in `PMS`. Due to ongoing work for the commissioning of the dual-band receivers and groundwork for the installation of the second PolyFiX correlator, combined with scheduled maintenance operations, both antenna configurations will now be operated using the 10-antenna array.

3.3 Receivers

All NOEMA antennas are equipped with 2SB receivers, providing low noise performance and excellent stability. The receivers provide two orthogonal linear polarizations in all three bands. Each of the two polarizations delivers a bandwidth of 7.744 GHz in the lower sideband (LSB) and the upper sideband (USB) simultaneously. The sky frequency ranges that can be covered in each band and further receiver characteristics are given in Table 3.

Receiver tuning will preferentially be done on a fixed LO frequency grid of 500 MHz step width on which the receiver performance is optimized. Tunings that deviate from this tuning grid (see also Section 3.4.1) are allowed, e.g., if not all desired lines can be covered when sticking to the grid.

3.4 PolyFiX correlator

PolyFiX can process a total instantaneous bandwidth of ∼15.5 GHz per polarization by combining the two 7.744 GHz wide sidebands (the *upper* and *lower* sideband) for up to twelve antennas. The centers of the two sidebands are separated by 15.488 GHz. Each sideband is composed of two adjacent *basebands* of ∼3.9 GHz width, called *inner* and

Table 2: Summer configurations for NOEMA

Name	Stations											
10D	W012	W008	W005	E010	E004	N017	N013	N009	N005	N002	—	—
10C	W023	W020	W009	E023	E018	E010	E003	N020	N017	N011	—	—

Table 3: Receiver characteristics

	Band 1	Band 2	Band 3
F_{LO1} range/[GHz]⋆	82.000–107.700	138.616–171.256	207.744–264.384
F_{sky} range/[GHz]⋆	70.384–119.316	127.000–182.872	196.128–276.000
T_{rec}/[K]⋆⋆	25–45	35–55	40–70
G_{im}/[dB]	-15...-10	-15...-10	-15 ... -10

⋆ Guaranteed LO1 frequency ranges per offered band. The LO1 frequency is the center frequency between the USB and LSB that can both be simultaneously observed in one tuning (see Fig 2). The center frequency of the USB (LSB) is separated by $+(-)7.744$ GHz from the LO1 frequency. With an effective width of 7.744 GHz per sideband the lowest and highest sky frequencies that can be covered per tuning are therefore $F_{sky}=F_{LO1}\pm11.616$ GHz. The lowest and highest LO1 frequencies per band define the F_{sky} ranges that are guaranteed under this Call.
⋆⋆ for LSB and USB.

outer baseband (see Fig. 2). In total, there are thus eight basebands which are fed into the correlator. The default spectral resolution is 2 MHz[3] throughout the 15.488 GHz effective bandwidth per polarization. For this low resolution mode, up to sixteen high-resolution *chunks* can be selected in each of the eight basebands (i.e. up to 128 chunks in total). Each of these has a width of 64 MHz and a spectral resolution of 62.5 kHz[3].
Alternatively, the 250 kHz[3] correlator mode of PolyFiX is available. Similar to the low resolution 2 MHz correlator mode, it covers the full 7.744 GHz bandwidth per sideband in dual polarization but at a significantly increased spectral resolution of 250 kHz. This mode cannot be combined with the very high spectral resolution windows at 62.5 kHz.
Please note that there is a "20 MHz wide confusion area" (≡ LO2 zone) around the center of each sideband, i.e., in between the inner and outer basebands. Due to the filter response of the correlator, the noise level is in addition increased by up to a factor of two within a width of ±50 MHz around the center in each sideband. Important spectral lines of interest should therefore not be placed in this region (see also pages 19 and 20 in `this PolyFiX tutorial`).

Observations of very strong, steep-sided spectral lines require special care in the choice of the spectral resolution. The so-called spectral leakage[4], a numerical effect inherent to the spectral processing using discrete Fourier transforms (FFT), shows up as, e.g., spurious wings for sharp spectral features (like galactic maser lines); sharp in this context means that the ratio between the noise and/or emission levels in adjacent channels attains −13.3 dB (i.e., ≃0.05). These strong lines should hence be observed with the highest currently offered spectral resolution of 62.5 kHz to minimize this effect. In case of questions, please do not hesitate to contact the NOEMA Science Operations Group (sog@iram.fr).

3.4.1 ASTRO

For simple PolyFiX spectral setups using only the 2 MHz or the 250 kHz spectral resolution full bandwidth mode, `PMS` can be used directly to prepare the frequency tuning and correlator setup in the respective technical sheet. For more complex setups, i.e. those using high spectral resolution windows or those needing an off-grid tuning, the ASTRO software should be used to set up the receiver and correlator configuration. A description of the PolyFiX correlator and of the commands provided in ASTRO to prepare the correlator configuration

[3] in case of PolyFiX, an FX correlator, the spectral response corresponds to a sinc^2 function, so that the theoretical spectral resolution is equivalent to 0.88 of the channel spacing. In practice, the effective spectral resolution, i.e. the best one that can be used for the final spectral data, is the channel spacing.

[4] the spectral response of PolyFiX corresponds to a sinc^2 function causing artificial peak sidelobes at a level of −13.3 dB in neighboring channels which is called spectral leakage.

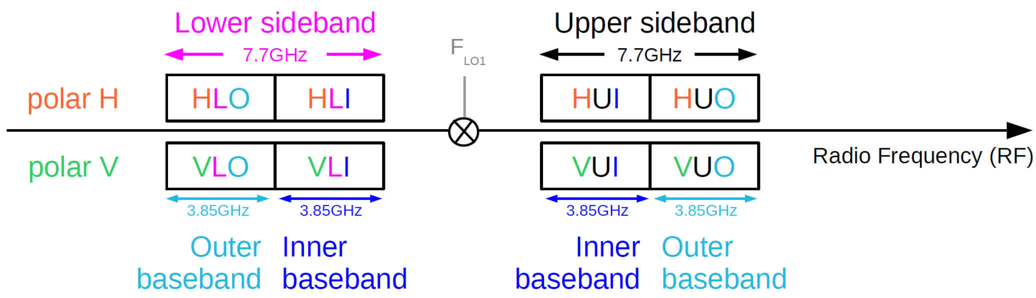

Figure 2: Basebands fed to the correlator

can be found in `this PolyFiX tutorial`. Please use the `latest version of GILDAS` (at least not earlier than feb24).

The essential ASTRO commands are:

- `TUNING`: receiver tuning
- `BASEBAND`: selection of baseband(s)
- `SPW`: selection of chunks to define high resolution spectral windows
- `PROPOSAL`: exports a script that needs to be uploaded to `PMS`

Receiver tuning is done on a fixed grid of LO frequencies, spaced by 500 MHz throughout each receiver band, on which the receiver performance is optimized. For a correct receiver tuning, either the source LSR velocity or the redshift is needed, or the (red)shifted frequencies should be used directly. In the latter case, the redshift (or LSR velocity) has to be set to zero in the source command. Also, the frequencies of molecular lines from the standard line catalogue in ASTRO that can be plotted over the spectrum (by setting `set lines on` in ASTRO) have to be redshifted by hand, i.e., a revised molecular catalogue needs to be uploaded in ASTRO (with `catalogue myfile.lin /LINE`) in that case. For more details see the internal help for the different ASTRO commands and `this PolyFiX tutorial`.

A typical session in ASTRO would be:

```
! Define a source with LSR velocity
SOURCE MYSOURCE EQ 2000 09:11:39.786 -
                   30:53:29.257 LSR 7.0

! choice of receiver tuning
TUNING 232.686 LSB 7500
! ASTRO will shift the IF centering by
! 180.6 MHz to match the tuning grid
! unless the option /FIXED_FREQ is used
! that allows off-grid tunings

TUNING 232.686 LSB 7319.4 /ZOOM
! Plots the selected receiver band only

BASEBAND /MODE 2000 62.5
! select all 8 basebands in the low
! 2 MHz resolution mode, allowing to
! define in addition the high spectral
! resolution windows at 62.5 kHz

! define and display high resolution
! spectral windows (central frequency
! and width specified)
SPW /FREQUENCY 244.9 0.2
SPW /FREQUENCY 245.6 0.2
SPW /FREQUENCY 232.686 0.03
SPW /FREQUENCY 230.538 0.08
SPW /FREQUENCY 231.15 0.3
!
! Or for the 250 kHz mode use
BASEBAND /MODE 250
...

PROPOSAL /FILE MyFile.astro
! write the series of commands
! to set up the instrument;
! THE MyFile.astro NEEDS TO BE
! UPLOADED TO PMS
```

The `TUNING` command produces a plot showing the full 15.488 GHz bandwidth covered by both sidebands. The TUNING command checks that the LO frequency is located on the 500 MHz-spaced tuning grid. If this is not the case, the command moves the tuned frequency to a neighboring IF center frequency that matches the grid. The option /FIXED_FREQ can be used to ignore the tuning grid (e.g., if using the tuning grid does not cover all desired lines with the proposed tuning or if a contiguous spectral scan is requested).

PMS will only load ASTRO scripts created with the PROPOSAL command (which uses the NOEMA OFFLINE syntax). This will allow PMS to show spectral coverages in a consistent way for any kind of project (including line markers at the correct rest frequency for redshifted sources for instance).

In order to select the 250 kHz resolution full bandwidth mode, you may want to use in ASTRO, `BASEBAND /MODE 250`, as described above. This mode cannot be combined with any high spectral resolution windows at 62.5 kHz spectral resolution but the more coarse 2 MHz spectral resolution will automatically be available in addition to the 250 kHz resolution.
Please note that all ASTRO setups used for proposals in semesters S21 or older cannot simply be copied and will need to be recreated for any new proposal in PMS or with ASTRO using the new syntax for the BASEBAND command and uploaded again to PMS. PMS will not automatically upgrade ASTRO scripts copied from an older proposal and will issue a warning if an ASTRO spectral line setup is uploaded using the old syntax. Please use the latest GILDAS version (at least feb24 or later).

In order to facilitate the preparation of line surveys or scans that need at least two contiguous frequency tunings in one band, ASTRO offers the command SPECSWEEP (see also this PolyFiX tutorial, pages 62 to 64):

```
! Define a source with LSR velocity
SOURCE MYSOURCE EQ 2000 09:11:39.786 -
                  30:53:29.257 LSR 7.0

! 2 tunings, starting at 78 GHz, using
! the default (2 MHz) full bandwidth
! correlator mode and creating 2 files
! (mysweep-1.astro, mysweep-2.astro)
! ready to be uploaded to a
! technical sheet in PMS
SPECSWEEP /NTUNING 2 78 /FILE mysweep

! OR

! 2 tunings, ending at 110 GHz, using
! the 250 kHz resolution full bandwidth
! correlator mode
SPECSWEEP 250 /NTUNING 2 110 MAX -
              /FILE mysweep
```

3.5 Sensitivity

Investigators will be asked in PMS to specify the requested telescope time for each Technical Sheet. PMS calculates the corresponding 1 sigma point-source sensitivity *for one representative frequency*. The representative frequency has to be within the frequency range covered by the setup, and for high spectral resolution projects within one of the high resolution spectral windows that are selected in the respective technical sheet. The representative frequency can be different from the actual tuning frequency. Please note, that due to the large bandwidth and the dual-sideband mode, the noise can vary significantly with frequency in the available frequency range. This is especially the case, if one of the sidebands is close to a receiver band edge and/or in the wing of an atmospheric absorption line, where significant differences in the noise can occur within and between the sidebands. This should be taken into consideration when setting the representative frequency for each tuning. Please note that PMS takes into account variations of the system temperature across the 15.488 GHz bandwidth to calculate the *continuum* sensitivity.

In order to facilitate the preparation of your proposals, an online sensitivity estimator is available on this link, which is identical to the one used in PMS. Please note that this online tool uses a number of approximations to keep it simple and user friendly. Some values (e.g., angular resolutions and brightness sensitivities) are therefore only indicative and are not guaranteed as such.

Investigators should specify and justify the telescope times and corresponding point-source sensitivities in the "technical justification" of their proposal. **Please verify that your numbers match throughout the proposal**.

3.6 Track-Sharing Mode

Each technical sheet, i.e. frequency tuning, can be connected to several sources in PMS. In case that sources sharing the same tuning, are reasonably close to each other, and need reasonably short integration times, `PMS` allows the PI to specify a track-sharing mode (**please check the track-sharing box in the technical sheet in `PMS`**), which will result in a lower overall telescope time due to reduced overheads. Please note that `PMS` will issue a warning should the maximum distance between the track-shared sources exceed the recommended 15 degrees and/or should the number of track-shared sources be larger than 15. These limitations have been chosen, among other reasons, to allow for gain calibrators that can still be reasonably close to all sources, and to reduce observing overheads due to slewing and calibration needs. However, the feasibility of track-sharing is not guaranteed even if no warning is given by `PMS`. Doppler tracking will be done by default on the mean LSR velocity of the targets. Users should check that the spectral lines of the two targets with the highest velocity difference to the mean velocity will not move out of the selected frequency range, which is especially important with respect to the frequency coverage of the selected high spectral resolution chunks. Therefore, special care has to be applied when configuring the spectral setup.

3.7 Source Coordinates and Velocities

The interferometer operates in the equatorial J2000.0 coordinate system. Please do not forget to specify the exact coordinates and 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. Source coordinates and velocities must be correct: wrong or incomplete source coordinates are a potential cause for proposal rejection.

A later swap of targets is not foreseen for regular projects.

Please note that targets below a declination of −30 degrees are not observable from the NOEMA site as their elevations hardly exceeds ≥10 deg during a reasonably long LST range. Very low-declination sources between declinations of −30 and −25 degrees are very difficult to observe and they do not rise much above 10 degrees in elevation and suffer from heavy antenna shadowing along the North-South track; if you are considering observing such a very low-declination source please contact the Science Operations Group well before the deadline (sog@iram.fr) to discuss feasibility and observing strategies.

3.8 Sun Avoidance

For optimal antenna performance, a sun avoidance circle is enforced at 32 degrees from the sun.

3.9 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.

3.9.1 Duplication Check

In order to ensure the most efficient use of the NOEMA interferometer, proposals will be checked for duplication during the technical pre-screening. Unless scientifically justified, proposals that aim to reach the same goals as programs observed in previous semesters with similar or equivalent observing configurations with respect to target selection, observing frequency, angular resolution and sensitivity will not be accepted. Header information of PdBI/NOEMA observations between December 1991 and March 2022 (for this Call) can be found in the CDS VizieR catalogue (*Centre de Données astronomiques de Strasbourg*). In the future, a tool will be available to perform a duplication check of proposals against programs observed in previous semesters. However, for this deadline PIs are kindly asked to contact the NOEMA Science Operations Group at sog@iram.fr in case of doubts concerning potential duplication of observing programs from the last years.

3.9.2 Protected Fields

Investigators should take note of the following protections put in place for GT programs when preparing their proposals:

- The **NIKA 2** protected GT observing fields are fenced against **new continuum driven** observations with NOEMA; the field coordinates and sizes are given on this `NIKA 2 homepage`

- Most **MIOP**[5] observing fields and sources are still protected against any new observing requests for which the science goals are similar to those of the respective MIOP; click on the following `MIOP homepage` for details on the protected fields and for the individual MIOP abstracts

Possible conflicts between GT programs and proposals submitted under this Call for Proposals will be flagged during the technical pre-screening and may result in the (partial or complete) rejection of the proposal. Investigators are hence expected to check their target coordinates against the protected GT fields when preparing their proposal. In case a conflicted source is wished to be kept, it must be demonstrated in the proposal that the scientific goals are significantly different from the GT programs. `PMS` will issue a general information when entering sources to the proposal. The information includes the links to the list of the coordinates for each GT field, ordered by project name or RA. In the future, a direct coordinate check will be implemented for these GT fields within `PMS`.

3.10 Non-standard Observations

If you plan to execute a non-standard program, please contact the NOEMA Science Operations Group (sog@iram.fr) well in advance of the deadline to discuss the feasibility and possible observing strategies. Non-standard observations are for example very large-field mosaics, projects that need special calibration (e.g., an RF bandpass calibration to better than a percent in order to detect a very weak line over a very strong continuum), projects that ask for the currently experimental frequency cycling mode, or projects that target frequencies that may fall (slightly) out of the guaranteed tuning ranges (see Table 3).

4 Documentation

Documentation for the IRAM NOEMA Interferometer can be retrieved from the `NOEMA Documentation web page`. Detailed up-to-date information is available in the description of the `Current NOEMA capabilities` (i.e., this document).

[5]MPG-IRAM Observatory Programs

5 Local Contacts

A Local Contact will be assigned to every A and B rated proposal that does not involve an in-house collaborator. The Local Contact 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 the 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.

6 Data Reduction

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

- Face-to-face data reduction visits to the IRAM Grenoble headquarters are welcome, but remote data reduction sessions are also offered. For both, face-to-face and remote data reduction sessions, the assigned reduction weeks must be respected and extensions can be granted in well justified and exceptional cases only. Please get in touch with your Local Contact for further details.

- The schedule for remote data reduction offers higher flexibility compared to in-person sessions. Due to the limited resources however, the number of concurrent data reduction sessions will be limited for both, remote and face-to-face sessions. Please contact us well in advance to organize your data reduction sessions.

- 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 NOEMA's Science Operations Group (sog@iram.fr) if you are interested in observational updates.

- Given significant upgrades and developments of the GILDAS software, calibration of NOEMA data has to be currently done **using the most recent version of the GILDAS package CLIC on specific computers at the IRAM headquarters in Grenoble**. Any post-reduction processing like imaging, cleaning etc. using, e.g., MAPPING, CLASS, or GREG, is possible with locally installed GILDAS packages at the users' home institute.

7 Links to online documentation mentioned in the text

NOEMA Web Pages:
https://iram-institute.org/science-portal/noema/

The Proposal Management System PMS:
http://oms.iram.fr/pms

Latest GILDAS Version:
http://www.iram.fr/~gildas/dist/index.html

Online NOEMA sensitivity estimator:
https://oms.iram.fr/tse/#noema

Interferometer Schedule:
http://www.iram.fr/IRAMFR/PDB/ongoing-last.html

Large Programs:
https://iram-institute.org/science-portal/proposals/lp/

Large Program Policy:
https://iram-institute.org/science-portal/proposals/lp/policy/

Interferometry School Presentation on Short-Spacings:
http://www.iram.fr/GENERAL/calls/Jerome-Pety-Mosaicking.pdf

Technical Report on Short-Spacings:
https://www.iram.fr/GENERAL/calls/IRAM_memo_2008-2-short-spacings.pdf

NOEMA Beam characteristics:
https://www.iram.fr/GENERAL/calls/NOEMA-beams.pdf

PolyFiX tutorial:
http://www.iram.fr/GENERAL/calls/demo-astro-noema.pdf

The CDS VizieR catalogue:
PdBI (header information on data obtained before 2016)
http://vizier.u-strasbg.fr/viz-bin/VizieR?-source=B/iram/pdbi

NOEMA (header information on data obtained after 2016)
http://vizier.u-strasbg.fr/viz-bin/VizieR?-source=B/iram/noema

NIKA 2 homepage:
http://www.iram.es/IRAMES/mainWiki/Continuum/NIKA2/

MIOP homepage:
https://iram-institute.org/science-portal/proposals/lp/miop/

NOEMA Documentation web pages:
https://iram-institute.org/science-portal/noema/documentation/

Current NOEMA capabilities:
http://www.iram.fr/GENERAL/calls/s24/NOEMACapabilities.pdf