



## ANNOUNCEMENT OF OPPORTUNITY FOR OBSERVING TIME AT THE GRAN TELESCOPIO CANARIAS



**SEMESTER 2024A: March 1<sup>st</sup>, 2024 – August 31<sup>st</sup>, 2024**

Submission deadline: **2 October 2023, 22:59 (Canary Islands time)**

GRANTECAN opens a call for observing proposals for Semester 2024A with the 10.4-m Gran Telescopio Canarias (GTC) for its user community. This semester runs from March 1<sup>st</sup> 2024 until August 31<sup>st</sup> 2024. Time is open for both queue-scheduled and classical visitor-mode observing.

All interested applicants must use the IAC's CAT on-line system for submitting their proposals. This can be found at <http://www.iac.es/OOCC/night-cat/call-for-proposals/> where instructions are also provided. The **deadline for submission is 2 October 2023 at 22:59 local time in the Canary Islands (or 21:59 UT)**. Proposals that are approved by the respective time allocation committees will be asked to provide detailed observing information in "Phase 2" of the submission process. For a more extensive description of how the observing process at GTC is organized, refer to <http://www.gtc.iac.es/observing/>

We note that the Time Allocation Committees may decide to extend the duration of the observing period for certain programs over more than one semester.

### INSTRUMENTATION OFFERED

**OSIRIS, MEGARA, EMIR, HiPERCAM**

### WHAT'S NEW

**New higher sensitivity detectors are available both for OSIRIS and EMIR instruments.**

**Due to pending upgrade works for MEGARA MOS positioners, MEGARA MOS mode will not be available for S24A.**

**HiPERCAM is operative at Folded Cass G focal station, including the new COMPO component.**

**MIRADAS Near Infrared MOS spectrograph is expected to be available by late-2023. A special call for proposals for this instrument will be produced once the commissioning is completed.**

**Large-Programs are offered in S24A for MEGARA (IFU mode) and OSIRIS (imaging and longslit spectroscopy modes).**

## IMPORTANT NOTICES

The 0 to 2 hours and 12 to 14 hours R.A. ranges are highly subscribed by ongoing high-priority large programmes, while the 20 to 23 hours R.A. range is generally undersubscribed.

Bright moon time is undersubscribed (this time is mostly reserved for observations with EMIR).

We encourage users to request Visitor Mode when observing conditions are especially suitable for this mode. Observing efficiency is notably larger than in queue observations, and GRANTECAN offers some flexibility in the scheduling of this mode to increase the chance of success of the proposal. Remote Visitor Mode is also supported in GTC.

### 1. Available observing time

During Semester 2024A the majority of the available observing time will be used for science operations, with some 20% being needed for telescope improvement and instrument commissioning that will be preferentially carried out during bright time. The remaining 80% will be dedicated to programs that are granted time under this call, as well as guaranteed time for instrument builders and for the CCI International Time.

We note that the R.A. ranges from 0 to 2 hours and 12 to 14 hours are highly subscribed by approved high-priority large programs. Hence there will be strong competition for time in these R.A. bands, in particular during dark/grey time and under good seeing conditions (see Figure 1 as an example).

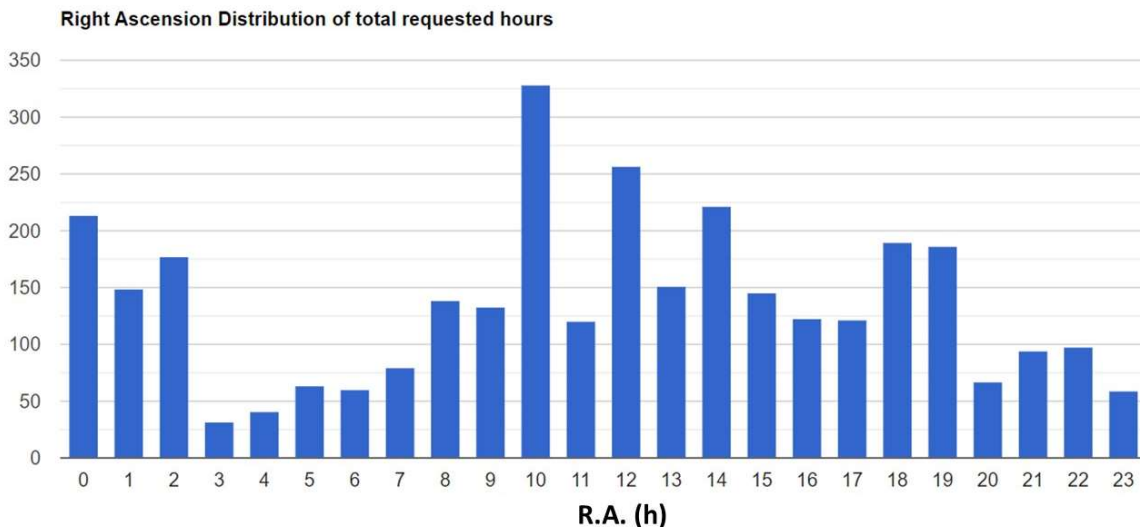


Figure 1: R.A. distribution for OBs that were requested to be executed in S23A+S23B. Note the high oversubscription in RA=0-2h and 12-14h and the relatively low demand for RA=20-23h.

**GTC accepts target-of-opportunity (ToOs) override proposals.** GTC's procedure for triggering ToO observations can be found at <http://www.gtc.iac.es/observing/too.php>.

For S24A, **Large Programmes can be requested at GTC** (*GTC Large Programmes, GTC-LP*). These programs can request a maximum of 100 hours per semester of the CAT observing time at the GTC. A GTC-LP is defined as a program with the potential to lead to a major advance in a specific field of astrophysics, requiring a minimum of 100 hours of GTC time which can be distributed during 1 to 4 semesters. In addition to a strong scientific justification, proposers should have the necessary manpower and tools for a quick and comprehensive analysis of the data and publication of the results. As this observing time is deduced from the CAT share, **only PIs from Spanish institutions can apply for GTC-LPs**. There are no rules or restrictions about co-applicants. By the time of this announcement, **only MEGARA (IFU mode) and OSIRIS (imaging and longslit spectroscopy modes), can be requested for the execution of a GTC-LP**. Full details on this kind of programs, and how to proceed, can be found at:

<http://research.iac.es/OOCC/night-cat/regular-and-large-proposals/>

## 2. Instrumentation

Details of the instruments can be found at <http://www.gtc.iac.es/instruments/>, including the observing programs for guaranteed time and their reserved targets.

### OSIRIS+:

The OSIRIS optical spectrograph and imager will be available at the Cassegrain focal station with its new monolithic blue sensitivity CCD (OSIRIS+). Available observing modes are:

- Broad-band imaging
- Medium-band imaging (SHARDS filters)
- Long-slit spectroscopy
- Multi-object spectroscopy

The MOS mode has the following important constraint: MOS observations will only be carried out for proposals that are highly ranked by the TACs (i.e., A or B ranked bands). Proposals requesting MOS mode that are not sufficiently highly ranked will hence be rejected. **Due to the change to a new OSIRIS CCD, previously produced masks are no longer usable**. For further practical limitations we point the interested reader to <http://www.gtc.iac.es/instruments/osiris+/osirisMOS.php>. Slit widths as narrow as 0.63 arcsec are allowed, but users always must be aware of the 0.1 arcsec (r.m.s.) accuracy achievable in the slit positioning when defining the scientific goals of the program.

We emphasize the availability of a large medium-band filter set, referred to as the SHARDS filters in reference to the project led by Dr. Pérez González who has offered these filters for general use. Further details, and how to apply for their use, may be found at [http://www.gtc.iac.es/instruments/osiris/osiris.php#SHARDS\\_Filters](http://www.gtc.iac.es/instruments/osiris/osiris.php#SHARDS_Filters).

**Note that OSIRIS new CCD is available from January 2023. Therefore, OSIRIS would make use of this new monolithic blue-sensitive detector in S24A.**

### EMIR:

The EMIR near-infrared wide-field imager and medium-resolution spectrograph will be available in the Nasmyth-A focal station. Observing modes offered in the present call are:

- Broad-band imaging (Y, J, H, Ks filters).
- Narrow-band imaging ([FeII],[FeII]<sub>cont</sub>,Br $\gamma$ , Br $\gamma$ <sub>cont</sub>,H $_2$ (1-0),H $_2$ (2-1)).
- Long-slit spectroscopy (0.6", 0.8", 1.0", 1.2", 1.6", and 5.0" slit widths).
- Multi-Object spectroscopy.

See <http://www.gtc.iac.es/instruments/emir/emir.php> for detailed information.

**Note that new EMIR detector is available from June 2023. Therefore, EMIR would make use of this new higher sensitive detector in S24A.**

#### MEGARA:

For Semester 2023B MEGARA optical spectrograph **will be available only for integral-field Unit (IFU) observations** at intermediate-to-high spectral resolutions (R~5,500, 12,000 and 20,000 for the LR, MR and HR modes respectively). For more information, see <http://www.gtc.iac.es/instruments/megara/megara.php>.

#### HiPERCAM:

The HiPERCAM high-speed, multi-band imager is a GTC visitor instrument (P.I. Vik Dhillon) that has been **permanently** installed at the new Folded-Cass G focal station. HiPERCAM provides simultaneously imaging in 5 channels (u', g', r', i', z'), at (windowed) rates over 1 kHz in a FOV of 2.8' x 1.4' with a 0.081"/pix plate scale.

**HiPERCAM was installed at FCass G focal station in mid-April 2023, including the new COMPO subsystem, which offers autoguiding capabilities and increases the FOV available to look for suitable reference stars for differential photometry.**

Further information about the instrument is found in the GTC web pages at <http://www.gtc.iac.es/instruments/hipercam/hipercam.php> and/or contacting the instrument PI at [vik.dhillon@sheffield.ac.uk](mailto:vik.dhillon@sheffield.ac.uk)

### 3. Reserved objects

The science teams of OSIRIS, MEGARA, EMIR and HiPERCAM are granted guaranteed observing time. The objects and observing modes planned for their observations on GTC are reserved for the exclusive use by the instrument science teams. Target lists of reserved objects may be found on the instrument web pages at <http://www.gtc.iac.es/instruments/>, following the links for the corresponding instrument.

### 4. Telescope status

There is no significant change from previous semesters.

## 5. Observing overheads

It is important to make realistic estimates of the observing overheads at the time of writing a proposal, as well as when completing the Phase-2 observing definition. As a guideline, for an **OSIRIS** observation in both imaging and spectroscopy mode a total overhead of 10 minutes per observing block should be accounted for, while for tunable filter imaging the total overhead increases to about 20 minutes, to account for the TF calibration process. In the case of **MEGARA**, 10 min are assumed for target acquisition in IFU mode and the same applies for **HIPERCAM**, where 10 min are accounted for pointing/configuring the instrument during the target acquisition.

In the case of **EMIR**, an observation in imaging mode a total overhead of 10 minutes per observing block should be accounted for, while for longslit/multiobject spectroscopy the total overhead increases to about 20 minutes, to account for the CSU configuration and acquisition process, except in the case of telluric standard observations where CSU re-configuration is not necessary and only 10 min of overheads are accounted for. In addition to the overheads for target acquisition and instrument/telescope setup, there are also overheads associated to the observing technique. For typical science exposures, open-shutter efficiency for EMIR is about 70% in imaging and 90% in spectroscopy (including dithering, readout overheads, etc.). To optimize the telescope time for a predefined on-source integration time, applicants should use the *EMIR efficiency calculator* available at:

[www.iac.es/proyecto/emir/pages/observing-with-emir/observing-tools/efficiency-calculator.php](http://www.iac.es/proyecto/emir/pages/observing-with-emir/observing-tools/efficiency-calculator.php)

To accurately estimate overheads, a Phase 2 simulator is available at <http://gtc-phase2.gtc.iac.es/science/F2/>. We strongly recommend the use of this simulator to determine the total telescope time to be requested in the present call for proposals.

**In the case of the use of the OSIRIS tunable filter as well as when observing with EMIR**, for reasons of overall efficiency and since these calibrations are specific for each observing program, **we require that applicants define their night-time calibrations also as observing blocks**. The time necessary for these calibrations will be charged to the observing program and should therefore be included in the time request.

See <http://www.gtc.iac.es/observing/> for further details.

## 6. Telescope Support Model

Observations can be either carried out in *queue-scheduled service mode* by trained GTC support astronomers, or the PIs may express their preference to personally execute the observations on specific nights proposed by the GTC team (*classical visitor mode*). The PI must clearly indicate her/his preference in the proposal form by selecting the appropriate option -“service” or “classical”, and in the latter case should define a valid backup program that can be carried out if the observing conditions required for the principal program are not met.

Queue scheduling provides flexibility in the execution of the observations optimizing the science return of the telescope. Priority is given to the scientifically most highly ranked proposal that is suitable for the observing conditions. Statistically, proposals with relaxed observing constraints will have a better chance of being completed successfully. In classical visitor mode, on the other hand, dates of observation are fixed by the GTC team and the risk of poor weather conditions and technical failures rests with the PI, but has the advantage that the observing plan can be adapted by the PI in real time which may result in further increasing the efficiency of the observations. **Considering the low demand for visitor mode observations, GRANTECAN provides some flexibility of the**

**scheduling of visitor nights**, i.e., by allocating some extra time that increases the chance of success of the proposal.

In classical visitor mode, the PI will normally be present at the telescope during the observations, although the interaction with the telescope system will mostly be carried out by trained observatory personnel. The data are immediately made available to the PI. **Remote visitor mode is also supported in GTC.** If on the scheduled dates the PI cannot travel to the observatory, then the GTC support astronomer will carry out the observations in service mode, with the possibility of remote connection of the PI that allows real-time assessment of the data quality and the opportunity to adjust the observing parameters (in this regard, **remote visitor mode functionality has been enhanced during the last year, providing a better access to the scientific data and telescope status**).

**Visitor programs will only be admitted for those programs that fall in the top of the TACs ranked list (A or B ranked bands).** Lower ranked programs will automatically be placed in the observing queue, except for those requesting observing modes that are only admitted in visitor mode (e.g. programs using high-speed readout modes of OSIRIS). GRANTECAN will aim to follow the preference of the PI when drawing up the observing schedule, but no guarantee can be given that all preferences can and will be honored.

Data obtained in queue mode are provided to the users via GTC FTP service once they pass the data quality assessment. Files are available for a 50-days period, so we recommend users to retrieve these and inform GTC as quickly as possible if any problem is found with the quality of data, so that GTC can assess the problem and, if necessary, repeat the observations. **All observations are also copied to the GTC Public Science Archive, hosted at the Center for Astrobiology in Madrid (<http://gtc.sdc.cab.inta-csic.es/gtc>), which can also be used to avoid duplications when preparing a proposal. After publication, all GTC PIs and co-Is will be contacted by the CAB archive staff and invited to send their reduced data products for public release to the astronomical community through the GTC archive.**

For questions related to data analysis once the observations are retrieved from the GTC FTP service, **a specific Phase-3 tool located at:**

<http://gtc-phase2.gtc.iac.es/science/F3/phase3start.php>

**has been developed to communicate your problems to GTC staff, including also some support in the data reduction process.**

Publications that result from data taken with the Gran Telescopio Canarias must credit the use of this telescope in the following way: *"Based on observations made with the Gran Telescopio Canarias (GTC), installed in the Spanish Observatorio del Roque de los Muchachos of the Instituto de Astrofísica de Canarias, in the island of La Palma"*. In the particular case of each instrument, corresponding credits can be found at:

[http://www.gtc.iac.es/observing/observing.php#Publications\\_and\\_acknowledgements](http://www.gtc.iac.es/observing/observing.php#Publications_and_acknowledgements)

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