



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



**SEMESTER 2019B: September 1<sup>st</sup>, 2019 – February 29<sup>th</sup>, 2020**

Submission deadline: **3 April 2019, 22:59 (Canary Islands time)**

GRANTECAN opens a call for observing proposals for Semester 2019B with the 10.4-m Gran Telescopio Canarias (GTC) for its user community. This semester runs from September 1<sup>st</sup> 2019 until February 29<sup>th</sup> 2020. 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 also instructions are provided. The **deadline for submission is 3 April 2019 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 please 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.

### WHAT'S NEW

**HORuS high-resolution spectrograph is offered as a visiting instrument during an extended semester starting on July 2019.**

**HiPERCAM high-speed, 5-band visiting imager is offered only for observations to be executed at the beginning of the semester (September-October 2019).**

**CanariCam mid-infrared instrument is offered for observations to be executed on October-December 2019.**

**OSIRIS is expected to be dismantled at the end of the semester, in which case it will not be available in S20A.**

### IMPORTANT NOTICES

**Semester 2019B provides the last opportunity window for requesting HiPERCAM and CanariCam instruments at GTC.**

**The 10 to 12 hours R.A. range is highly subscribed by approved high-priority large programs, while the 3 to 7 hours R.A. range is generally undersubscribed.**

**Bright moon time is undersubscribed.**

Users are encouraged to take advantage of these opportunities.

## 1. Available observing time

During semester 2019B 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. range from 10 to 12 hours is highly subscribed by approved high-priority large programs. Hence there will strong competition for time in these R.A. bands, in particular during dark/grey time and under good seeing conditions.

**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 S19B, **no Large Programmes are offered at GTC.**

## 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 Nasmyth-B focal station. Available observing modes are:

- Broad-band imaging
- Medium-band imaging (SHARDS filters)
- Long-slit spectroscopy
- Multi-object spectroscopy
- Tunable filter imaging using the "red" and "blue" tunable filters, as well as the scanning Fabry-Perot NEFER.
- Frame transfer and fast photometry mode (only supported in visitor-observing mode)

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) unless the requested masks were already produced in previous semesters. The reason for this is to increase the possibilities to exploit the significant investment in designing and producing the multi-slit masks. Proposals requesting MOS mode that are not sufficiently highly ranked will hence be rejected. For further practical limitations we point the interested reader to <http://www.gtc.iac.es/instruments/osiris/osirisMOS.php>. Note that from S16A onwards, 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)

**It's important to note that OSIRIS will be likely removed at the end of this semester for migration to the Cassegrain focus during 2020.**

### 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<sub>2</sub>(1-0),H<sub>2</sub>(2-1)).
- Long-slit spectroscopy (0.6", 0.8", 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.

### MEGARA:

For semester S19B MEGARA optical spectrograph will be available with all its capabilities, both integral-field Unit (IFU) and multi-object spectroscopy (MOS) 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 is located at the Folded-Cass E focus. 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 and CanariCam instruments will be sharing the same focal station during S19B until the arrival of MIRADAS by the end of 2019. For this reason, **HiPERCAM applicants must be aware that observations for S19B must be concentrated at the beginning of the semester (September-October 2019).**

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)

### CanariCam:

This instrument, located in Folded-Cass E focus, is offered in the following observing modes: imaging and low-resolution spectroscopy in the 10 and 20 micron bands, imaging polarimetry, and spectro-polarimetry modes. See <http://www.gtc.iac.es/instruments/canaricam/canaricam.php>.

The upper limit of the **precipitable water vapor limit (PWV) for observations in the 10 micron N-band is 15 mm**, as the effect of water vapor in the N-band is not very significant. Since Q-band observations are much more sensitive to precipitable water vapour content of the atmosphere, these observations must be defined in separate observing blocks, unless they do not impose a limit on the water vapor content.

**CanariCam is offered on a "shared risk" basis for S19B**, as the instrument has not been received at the telescope at the time of this call for proposals. **Final observing modes available will be confirmed at the beginning of the semester. Also, due to the arrival of MIRADAS by the end of 2019, observations with CanariCam during S19B will be executed between October and December 2019.**

## **HORuS:**

The High Optical Resolution Ultra-Stable Spectrograph (HORuS) is a visitor instrument placed at Nasmyth-B focal plane, shared with OSIRIS, using a 3x3 IFU (2.3x2.3 arcsec) that provides a FWHM resolving power of about 25,000 in almost continuous coverage between 380 and 690 nm. For more information, see <http://www.gtc.iac.es/instruments/hors/horus.php> and/or contacting the instrument PI at [callende@iac.es](mailto:callende@iac.es).

Despite Semester S19B runs from September 2019 to February 2020, in order to enhance the HORuS instrument exploitation, **HORuS proposals for S19B will be allowed to be executed from July 1<sup>st</sup> 2019 onwards, extending the target visibility to earlier R.A. values. Applicants can take advantage of this increased flexibility when preparing the proposals. HORuS will be available until OSIRIS is dismantled from Nasmyth B focal station (see above).**

### **3. Reserved objects**

The science teams of OSIRIS, MEGARA, EMIR, CanariCam, HORuS 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. For **MEGARA**, 10 min are also assumed for target acquisition in IFU mode, while 15 min are considered for Multi Object Spectroscopy mode. Finally, both for **HiPERCAM** and **HORuS**, the same overheads than OSIRIS/MEGARA (10 minutes per observing block) will be considered for pointing/configuring the instrument.

In the case of **CanariCam**, in addition to the overheads for target acquisition and instrument and telescope setup, which are 10 minutes in the case of imaging and spectroscopy, there are also overheads associated to the chopping and nodding technique. Such overheads are obtained by multiplying by a factor of 3.1 or 3.7 the on-source time, in the case of imaging and spectroscopy, respectively. Note that these numbers serve as a guide only and may vary according to the detailed definition of the OB (for example, they don't include the time for acquisition and throughslit images, if required, as they depend on the exposure time needed).

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 and when using Canaricam or 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.

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.

**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. PIs will be contacted by the CAB archive staff and asked to submit their reduced data once published.**

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