

# Report of the 15th GTC user's committee (GUC) meeting

## March 17&18, 2017

### IAC, La Laguna, Tenerife

#### Attendants:

Christina Thöne (IAA, chair), Carme Gallart (IAC), Jesús Gallego (UCM), Rafael Guzman (UF), Silvia Mateos (IFCA), Pablo Rodríguez Gil (IAC), Montserrat Villar Martín (CAB), Sergey Zharikov (UNAM)

#### Reply to the issues from the last report

- **External evaluation of FRIDA-AO**

The GUC had requested an evaluation of the progress and the timeliness of the FRIDA + AO instrument. The GTC will fulfill this request by putting together a small panel of experts at an already scheduled AO meeting. The results will be made public afterwards and discussed in the next GUC meeting.

- **Lack of observing proposals from postdocs and low oversubscription rate**

The GUC had been worried about the decreasing number of postdocs in Spain and the implications for observing proposals and publications. The situation has not improved in the last year and the oversubscription is still very low (see the TAC section below). However, the oversubscription might rise now due to EMIR being offered and MEGARA being commissioned.

- **Better organisation of GUC meetings**

The past meetings had been too long and there had been many presentations by the instrument teams and others that had little updates. The meeting organisation has now improved significantly and times are being met both for the presentations and for the discussions of the GUC.

#### Instrumentation plan and community survey

The GUC had conducted a survey in spring 2016 to get a better idea of the priorities of the community towards instrument updates and future instrumentation and to help GTC if decisions have to be taken. The result of this survey was presented in the previous GUC meeting and the detailed evaluation can be found in the corresponding GUC meeting report.

GTC is currently severely understaffed in all departments including astronomers, technicians and administration personnel. The current instrumentation plan is funded by the Canarian government FEDER funds, which implies that all the planned instruments have to be delivered, or the funds have to be returned. This gives GTC very little option for changing the instrumentation plan.

*The GUC expresses its concern about the severe lack of funding and this should be addressed with the funding agencies.*

GTC is currently submitting a Development plan to the ministry and the steering committee met in February to discuss about the plan. However, the report on the survey was not discussed in that meeting. The last general review of the instrumentation plan had been in 2013. The GUC considers that this would have been an excellent opportunity to transmit the views of the GTC community regarding future instrumentation for the telescope.

GTC has been asked by the ministry to appoint a scientific and technological advisory committee which will be done shortly. This will also involve the instrumentation plan for the next years. Furthermore, a plan for instruments beyond 2020 should be made soon.

*The GUC urges GTC to involve the community in future instrumentation plans.*

## Report from the director and the observatory

### Funding situation

The director stresses the problem with budget and staffing. Hires at GTC have been frozen since the start of the crisis and only replacements for personnel retiring or leaving are permitted. The budget for GTC has been flat in the past years and the budget for 2017 is currently still unknown. Limited budget and resources lead to increased delays, unfortunately, well trained people are also leaving GTC, worsening the situation.

External funds had been obtained for the following projects: 1) buying a new detector for OSIRIS, 2) refurbish Canaricam and 3) complete MIRADAS. Due to the stop of all purchase expenses (“corralito”) in July 2016 purchases had been locked until now. They have been finally made available again in July 2017, which, however, means a significant delay in the planned schedule of these projects.

### Communication to the community and the public

- GTC wants to become more transparent to the community concerning the different functions within the organisation (administration, science, engineering and development).
- GTC is launching a new webpage in July. For the general public visiting the GTC there will be an update of the information displayed at the telescope and new efforts are being done to improve the currently outdated material. There is no dedicated funding available, hence this will come from efforts in addition to the normal duties of the staff.
- There is a need for increased post-observing support by the telescope beyond the standard quality control of the data. GTC is developing a helpdesk with some internal pipelines for data reduction for OSIRIS, CIRCE and EMIR which will be made available before the end of 2017.

### Agreement with China

GTC signed a formal agreement with the NAOC in September 2016. Both parties are establishing a committee to advance the formal admission of China to GTC. In the meanwhile China can purchase observing time. The final contribution by China is planned to be on the order of 5%. China plans to enter into GTC by providing an instrument.

The idea is to provide an ESPRESSO-like instrument with very high resolution in the VIS range to look for exoplanets and stellar abundances. The timescale for this instrument is about 5 years and it will be a GTC facility instrument. *The GUC expresses its concern that the community was not asked about the choice of the instrument and urges GTC to better involve the community in defining future instrumentation.*

### Operations

Downtime at the telescope is now down to the limit and operation efficiency at maximum. In 16A >900h were observed, in 16B >850h, making it the most successful winter semester at GTC. In general, 80% of Q1 and Q2 programs are completed, this number is similar to ESO. Since GTC started operating, a total of 470 programs and 9000h of observations have been completed.

The current instrumentation plan foresees the following commissioning runs and tests:

- HORS is currently waiting for a new commissioning window in September 2017
- MEGARA until the end of August 2017 with a total of 30 nights
- Acceptance test of MIRADAS from July 2017 onwards
- Installation of EMIR MOS (before August 2017)
- Preparations for installation of the Cassegrain E focus in 2017
- HiPERCAM installation in December 2017
- Canaricam will be back at the telescope in 2018 after refurbishment

Here again it is stressed that there is a lack of staff for such an ambitious instrumentation plan. With all these instruments installed, there will be more instruments than support astronomers!

HiPERCAM will be tested at WHT in mid October and moved to GTC in December 2017. HiPERCAM will be a stand-alone instrument and the instrument team will do the observations during specific observing runs. During this time, they will also teach the GTC staff how to use the instruments in order to allow doing ToOs. There will be a shared risk call for proposals for

observing in Jan-Feb 2018. HiPERCAM will get one hour of observing time for the team for every 7h observed (this is the same as for any other visitor instrument). Canaricam and HiPERCAM will share the same focus, but HiPERCAM will be used primarily in summer when Canaricam is less efficient.

## **Instrument updates**

### **OSIRIS**

OSIRIS had almost a month of downtime in late 2016 due to a controller failure which was replaced with parts from ELMER and IAC. An exhaustive characterisation of the problem and the new controller was done. A new calibration plan is being implemented where not all calibration files are taken each night as there are too many instruments now at the telescope.

The OSIRIS MOS mode has raised in demand, but the most successful and demanded mode is still the standard longslit.

### **EMIR**

EMIR has been installed at the telescope in summer 2016 and has undergone 21 nights of commissioning. Science verification (SV) has been done in January but was delayed due to an electronics problem. The SV call had been oversubscribed by a factor of 6. 13 programs had been accepted covering all different grisms offered, but only 7.5h could be observed.

The ETC of EMIR has proven to be correct and it was presented by the instrument PI, but calculating the efficiency using the S/N calculator seems to be somewhat complicated. GTC has made their own reduction scripts as the offline pipeline development in python had been put on hold.

EMIR will be offered as regular instrument from semester 17B on. There will be some downtime in Nov. 2017 for about 1.5 months to correct the tilt of the detector which currently leads to the problem that only the innermost 4 x 4 arcmin are in focus.

*The GUC congratulates the EMIR team for the successful installation.*

### **CIRCE**

CIRCE has been a complementary instrument to EMIR. Highlights of the instrument have been fast photometry of V404 Cyg which is under revision in Science, a K-band speckle holography image of the Galactic center and simultaneous observations of Sgr A\* involving CIRCE, Spitzer, Chandra and NuSTAR, profiting from the flexible observing possibilities at GTC.

Commissioning of the polarimetry mode, the last missing observing mode of CIRCE, has been completed with very good results. There has been a separate call for using the polarimetry mode in early 2017.

CIRCE will be decommissioned in September 2017 according to plan. 175h have been observed in total. Programs in Q1+Q2 in semester 17A will be allowed to switch to EMIR. An upgraded CIRCE instrument called ARDISE is under study at the Univ. of Florida.

### **MEGARA**

MEGARA was shipped to GTC on March 21, arrived on March 28 and has since been installed and commissioned at the telescope. First light was on July 24.

*The GUC congratulates the MEGARA team to the completion of the instrument and in the name of the community is looking forward to use the instrument.*

### **HORS**

HORS had first light in 2015, however, the instrument had severe problems due to poor throughput of the fibre owing to a bad fibre link and the stability of the acquisition arm. There has been no activity in 2016. The throughput is still only at 62% due to the gaps in the micro lenses (which lead to a loss of 20%). HORS is currently waiting for getting time for commissioning which is currently scheduled for September 2017.

## **MIRADAS**

The instrument has had large funding problems in the past due to the exchange rate USD-EUR and only very few arms out of the 12 planned were funded. Now the situation has improved and 9 arms are externally funded while 3 more are funded by GTC. Each arm provides a  $3.7 \times 1.2$  arcsec FOV. The gratings used proved to be more efficient than anticipated with a peak efficiency of 72% over the 50% target.

Assembly and integration are ongoing, the final design review will be held before the end of 2017. Delivery to GTC is scheduled for June 2018 and commissioning some time in 2019.

## **GTC-AO**

In the last months, four new engineers could be hired for this project. Electronics and calibrations are finished, the wave-front sensor is being integrated. The AO system has been published in an SPIE proceeding and process can be checked on the following website:

<http://www.iac.es/proyectos.php?op1=7&op2=18&id=10&lang=en>

The current schedule forces a project review in summer 2017, the integration for late 2017 and installation at the telescope in late 2018. An update to a laser guide star system (LGS) is funded by the Canarian government until 2021.

## **FRIDA**

A major issue with FRIDA reported in previous meetings had been the delivery of mechanics not meeting specifications by the CIDESI company which turned out to be a problem with the CNC machine that was known by the manufacturer. This problem is now solved and the mechanics are working. The detector to be used is still an H2 since there is a lack of funds to purchase a newer IR detector.

The IFU is going through an acceptance test at UNAM in August 2017. Other mechanical parts and cryogenics are still pending. The current timeline forces integration of the instrument in 2017 and delivery in 2019. The delivery crucially depends on the commissioning of GTC-AO and the Nasmyth B focus.

*The GUC acknowledges the progress made for FRIDA but still thinks that FRIDA + AO are being delivered too late to GTC to make a significant impact in science.*

## **Evaluation of NEFER as visitor instrument to GTC**

NEFER is rather a proposed upgrade than a visitor instrument to GTC as it will be introducing a new mode to OSIRIS. It consists of a module to be added to the OSIRIS TFs to provide a Fabry Perot (FP) scanning mode. This allows for a very high spectral resolution of  $R \sim 20,000$  in two windows from 6300-7000 and 8000-9000 Å over the entire  $7 \times 7$  arcmin FOV of OSIRIS. The module is planned to be implemented in two phases: Phase (1) uses the existing OSIRIS detector and can be implemented with minimal interruption of the operations. It would install an etalon and some additional interference filters. Phase (2) would replace the existing detector with a 4k x 4k photon counting detector with rapid readout developed by LAM. Phase 2 has not been proposed yet and would not be installed before 2018.

The scientific driver of NEFER are kinematical studies of gas dynamics. At low redshift, NEFER wants to study gas dynamics in galaxies to resolve questions on feedback mechanisms responsible for star-formation processes, super bubbles in galaxies and it can study kinematics in SN remnants to bow-shocks. At intermediate redshift, the aim is to study galaxies in different environments while at high redshift extended emission in Ly $\alpha$  is the main goal. The technique of NEFER is similar to radio astronomy data and would complement those. NEFER builds on the experience with GH $\alpha$ FaS at the WHT.

## Recommendations by the GUC

- NEFER seems to be interesting for the GTC community and fills a niche that is not available at many large telescopes. The GUC recognizes that it would add an additional interesting capability to OSIRIS.
- The GUC appreciates the experience of the team proposing NEFER with this kind of study.
- An advantage of NEFER phase I is that it would take very few resources at the GTC side (at first sight), since it is basically a small upgrade of OSIRIS.
- Calibrations of the mode seem to be difficult, however, the NEFER team will provide free support for data calibration.
- NEFER has some interesting science cases for galaxy evolution in the low redshift Universe (bubbles, mergers) but the GUC is not convinced that it has a large advantage at high redshifts compared to existing methods.
- It is not completely clear to the GUC why a 10m-class telescope is needed for this science since there is a similar facility at WHT. The NEFER team replied to this and stresses that GTC allows a factor of 14 in FOV and exposure time compared to WHT.
- To the GUC it is not clear what the exact agreement is on the usage of this facility for the community. In other instruments (e.g. HiPERCAM), 1 out of 6 nights is guaranteed time for the instrument team. For NEFER, no agreement has been discussed yet, as it is basically just an additional mode for OSIRIS. The GUC would like to see some clarification on this.

*In general, the GUC is very concerned about the high number of visitor instrument proposals, in particular considering the lack of sufficient technical staff at the observatory. The GUC therefore suggests to stop allowing for new visitor instruments during the next few periods when several instruments and facilities will have to be commissioned.*

## **Updates from the Time Allocation Committee**

The number of observing proposals has gone down from 85 to 68 for GTC between period 16A and 17A, but this decrease has been the case for all telescopes at ORM. The total requested time also has gone down to 1000h which leads to 94% of all proposals being accepted (only 4 proposals were rejected). There has been a large oversubscription for EMIR SV proposals and the oversubscription has gone up in period 17B due to EMIR but the overall oversubscription is still below a factor of 2. In general, there has been less proposals by postdocs and from institutes with a significant decrease in postdoc positions, which is worrying. It is currently also unclear how many PhD theses are based on GTC data.

There has been an increase in the number of ToO proposals compared to semester 16B (18 with a total of 131h), possibly due to FRB and GW proposals. However, only about 50-60% of the requested time of ToO proposals get used in the end. Normally, ToO programs do not interrupt ongoing OBs, if the requester wants to do so, the time of the interrupted OB gets also charged on the ToO program so that there are no losses for the regular program.

*The GUC requested from GTC to make some statistics on the number and impact of ToO triggers. The TAC might also consider not to allow ToO programs with lower ranks (Q2/Q3) as this is the case in other telescopes.*

DDT programs have turned out to be very successful, the acceptance rate is around 50%. 30 DDT PIs have been from Spain (15 from IAC) but none from Mexico. The scientific output has resulted, among others, in 2 papers in Nature and 6 letters.

*We strongly encourage the Mexican community to apply for DDT time.*

The TAC and the GUC are somewhat concerned about the general scientific output of the observations. The average number of hours per paper is 27, which is significantly higher than at other telescopes. Concerning publications, only 50% of papers with GTC data have a PI from the consortium. However, data obtained through DDT time usually gets published by the (Spanish) PI.

Overall, the publication output has been flat the last years. About 10% of all papers are based on CanariCam data.

The scientific output might also have to do with difficulties in data reduction, e.g. it took one year to properly calibrate the data from the SHARDS filters used in OSIRIS. The GUC therefore specifically welcomes the suggestion by GTC to organize summer schools to train people on existing instrument data.

*The GUC would favour to involve the community in sharing their own data reduction scripts and methods via a publicly available database (github, webpage etc.). Another suggestion would be to organize workshops to make reduction scripts in the style of a „hack day“, e.g. through the RIA (Red de Infraestructura Astronómica). Such a workshop or reduction scripts could be considered a point in favour for e.g. large programs.*

## **Other updates and issues of interest to the community**

### **Remote observing possibilities**

The University of Florida is planning to make a virtual interface and/or control room within the next half year. GTC also plans to make a „copy“ of the control room at the sea level facility for training purposes. Both sides will join efforts.

### **Observing data**

- Proprietary time is 1 year calculated from the date of the observations (not the end of the semester). Data are now also available on ftp shortly after having been obtained and after passing QC.
- The community is reminded that the data on this ftp server will only be available for 50 days after the observations have been obtained and the data need to have been downloaded by then.
- Some community members suggested to provide more information on the observations that have been done in order to be able to check the progress and observing conditions as it is e.g. done at ESO.

### **Involvement of the community**

- GUC members intend to make a seminar after the GUC meeting at their respective institutes to communicate the results and updates and to collect feedback from the community
- The GUC will write an email to the SEA with the most important points of the report and the report attached.
- The presentations given at the GUC meeting by the instrument teams and the telescope staff will be made available to the public.

*The GUC wants to thank the entire GTC team and the different instrument groups for their great efforts and excellent achievements despite working under very precarious conditions!*

*August 23, 2017  
the GTC user's committee*