



Report of the 16th GTC user's committee meeting August 30+31, 2017 CALP La Palma

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Issues from the last report and reply by the GTC director

- **Post-observation support**

GTC has support astronomers assigned to each instrument as “instrument specialist” who serve as point of contact for the observer. There are plans to establish a “Data Reduction Helpdesk” through which the user can contact the instrument specialist. For the moment the astronomer will only provide advice and point the observer to the most updated pipelines and data reduction scripts, but will not provide direct help with the data reduction. This might be changed in the future.

There will be a dedicated web space with the most updated data reduction scripts available, provided by the users or GTC astronomers. GTC does not have the capacity currently to develop missing instrument pipelines.

GTC is going to organize a data reduction school in Garafía (La Palma) in spring next year, for which funding through the *Red de Infraestructuras de Astronomía* (RIA) has already been secured. The first school was initially planned for this fall but due to logistical difficulties had to be shifted to 2018.

The GUC highly appreciates the efforts by GTC made in this respect and thinks they will be very useful for the community.

- **GUC presentations public**

The presentations given by GTC staff at the GUC meeting will be made public on the GUC webpages. The publication of the presentation of instrument updates and statuses are subject to the consent of the instrument PIs.

- **External evaluation of GTC AO+FRIDA**

An evaluation of GTC AO by an external panel has been done, and the results were presented at the GUC meeting. However, this did not include an evaluation of FRIDA as was requested. For further information see the dedicated section in this report.

- **Involvement of the community in future instrumentation planning**

An open process is expected to start in early 2018 and the results will be discussed at the VIth “Science with the GTC” meeting.

- **NEFER recommendation**

NEFER is expected to be tested in autumn 2017. If the tests deliver favorable results, NEFER could be installed in early 2018. The final decision and timeline will be determined after the tests are completed.

GTC updates

GTC director

- **Funding situation:** The budget for the entire telescope has not changed since 2015 and little changes are expected for the budget of 2018. However, new FEDER-MINECO funds have just been approved for the following upgrades and projects:
 - New detector for OSIRIS
 - Refurbishment of CanariCam
 - 3 probe arms for MIRADAS
 - Automation of operations (2018-2021)
 - Obsolescence control (2017-2022)
- **GTC archive:** The GTC archive at LAEFF will be updated. All observing data will now be immediately put into the archive and first made public after the proprietary period. During proposal preparation, proposers will have to check whether their data are already on the archive in order to avoid duplications.
- **Outreach:** GTC has no dedicated communication office, efforts are made by the other staff members. Visits to the telescope are currently arranged by a private company that charges 9€/visitor but does not pay anything to GTC. A new outreach video that will be shown to visitors before the telescope tour was produced. The video has been shown to the GUC and was well received.
- **New webpage:** A new webpage is in preparation but the final release has been delayed until the beginning of 2018.
- **Strategic plan:** GTC has to deliver a strategic plan to MINECO by the end of 2017.
- **Remote control room:** A remote control room at the CALP is expected to be ready by January 2018. The control room will be mostly for training purposes and engineering work. Protocols are being developed for installing further remote control rooms elsewhere (e.g UF is planning to install another control room). Further extensions of “cloning” the control rooms are in planning. These clones are only intended for remote observing and will have very limited access to the GTC control system.

Operations

The telescope time devoted to science observations continues to be high and queue overhead losses are now below 1%. This can be even further improved if EMIR can observe already in twilight. From semesters 17A through 18A only ~80% time is available for science due to commissionings and preparations of focal stations. In winter, ~40% of the night is lost due to weather (usually, observations are stopped if the seeing degrades to >2.5 arcsec). Some of this could be compensated by filler programs and GTC highly encourages submitting more filler proposals.

OSIRIS keeps being the most demanded instrument and long-slit (*LS*) the most frequently used mode with over 90% demand until 2017A. In the demand for observing time for (the extended semester) 2017B ~33% of the time was taken by EMIR compared to 55% for OSIRIS. So far, GTC has observed a total of 9800h since the start of science operations. 80% of Q1 and 50% of Q2 programs are completed. Requests for international time are below the allocated maximum. The general oversubscription keeps being low with a factor of around 2.5.

The GUC had requested some statistics on the impact of ToO observations in the last meeting. The number of ToO hours executed increased to 50-70h in the past years, but the rate of executed vs. allocated time has remained constant around 0.5-0.6. Currently, about 50-70 triggers are received per semester, which means about one ToO trigger every two effective science nights.

RA between 10-12h is still significantly oversubscribed by highly ranked proposals and hence competition is very high. This is also mentioned in the call for proposals.

The scientific output of the telescope in number of papers per year has not been keeping up with the constant rise in the first years of telescope operations. This is despite the fact that GTC is delivering more science time than ever. The reason for this is currently unknown. Roughly 50% of papers with GTC data have a first author from the GTC community. DDT programs have a higher productivity level and produce one paper per 8h, regular programs one per 28h. Only 60% of all completed proposals have resulted in a paper (however, for ESO this number is even lower with only 50%). The lag between observations and publication is 5 years at ESO, GTC is working on corresponding numbers.

The GUC was inquiring whether there are a considerable number of cases where the first authors had been working at an institute within the GTC community by the time they requested the observations, but have since then moved abroad. The number of those publications seems to be small, so the reason for the high number of PIs from outside the GTC community remains unknown.

Maintenance and development

Technical losses have been down to about 6.1% and can only be further decreased if more investments in maintenance are done. The maintenance and development departments suffer from a continuous lack of funding as does the rest of the telescope.

An important point is the decrease in reflectivity of M1+M2+M3 which is now down to ~60% (with an optimum of 68% in past years). Strong calima episodes have been contributing to this as well as delays in re-aluminization (this year only 10 segments have been recoated compared to 32 in 2016). M3, which had been the main source for the decrease in overall reflectivity, will be re-aluminized soon. The upper dome shutter had some problem in safety mode leading to one night of observation loss.

A concern for when the AO system will be installed are the vibrations at the telescope (e.g. at M1 the noise increased by a factor of 3 since 2008). The reason for this increase is still unknown and not related e.g. to the cold-heads of EMIR since the vibrations had been at a similar level prior to the installation of EMIR. The current vibrations would lead to ~5% degradation of the Strehl ratio.

Ongoing and future projects in maintenance and development are the following:

- Upgrade of the dome shutters (to be done this year)
- Works on the focal stations FC-F (MEGARA) and FC-E (future CanariCam FC)
- Refurbishment of CanariCam
- Cassegrain focus: has to be installed by Dec. 2019 due to the time limit of the funding. Deadline for proposals from companies will be Sept. 29.
- Replacement of the main axes which are reaching the end of their scheduled lifetime
- "Atmosportal", a meteorological database, close to completion
- New operations panels, close to completion

Instrument updates

MEGARA

MEGARA had 3 commissioning runs from June - August 2017 with a total of 30 days + 30 nights. Official first light was on July 24. According to the MEGARA team, both observing modes are fully functioning. A few issues need to be solved still: 1) there is a misalignment between pupil and rotator leading to flux loss in the order of a few percent, 2) the telescope pointing model needs to be improved and 3) the calibration unit had been somewhat unstable in the last commissioning run preventing night-time calibrations. The latter has been solved at the end of the commissioning run and is fully functioning.

The end of the contract was Aug. 31 and the instrument is now handed over to GTC. The evaluation of the commissioning run and the final documentation has been delivered by this date as well. GTC will be evaluating the results and the compliance with the requirements until the end of September.

MEGARA will not be offered in semester 2018A. The main reason for this was that the call for 2018A was issued before the completion of the commissioning phase and several preparations and test by GTC need to be done before it can be offered as facility instrument. Currently there are no plans that a Science Verification call will be issued.

The GUC urges GTC to make the instrument available to the community as soon as possible This is of great importance as demonstrated by the response of the GTC community to the survey done by the GUC in 2017 regarding instrument priorities where MEGARA scored among the highest. The GUC recommends that a Science Verification call is opened also as soon as possible. The GUC congratulates the MEGARA team and GTC for the completion of the instrument and acknowledges the hard work of the team.

FRIDA

FRIDA has had large delays due to manufacturing problems which have been finally resolved. Some lenses had problems with scratching from the mount upon cooling down and they had to be recoated. Integration of the focus mechanism and the IFU will be completed in 2017. Assembly and integration for several subsystems are ongoing (mechanisms, control cabinets), preparation for manufacturing of the cryostat are being done. A prototype for the optical bench is going to be done in September 2017. IAC has made progress on the ETC.

The current timeline foresees integration and testing to be completed until spring 2018, followed by integration at UNAM until the end of 2018. The complete system testing will be

done in 2019, acceptance and delivery to GTC is foreseen for 2020, which is at least one year after the expected arrival of the AO system.

The GUC is concerned about the continuous delays of FRIDA+AO and the difference in arrival times between the two subsystems. Also, the delays of the AO system might question the competitiveness of the instrument in light of other, already existing AO facilities (see also the AO evaluation report below). The GUC encourages close communication between the AO development and the FRIDA team to assure the best possible interaction between the two systems.

HiPERCAM

The instrument will be shipped to La Palma on Sep 29, 2017 and commissioned at the WHT. Commissioning at GTC will be done at the end of semester 17B (Jan-Feb 2018). The TAC allocated 140h of observing time in Jan-Feb 2018 to HiPERCAM, reflecting the large demand for this instrument. HiPERCAM has only a narrow time window to be used as it will be installed at the same focus that is later going to be taken by CanariCam and MIRADAS (FCass-E).

CIRCE

CIRCE was originally thought for filling the time gap until the installation of EMIR but has proven to deliver important science. The instrument has shown excellent sensitivity and image quality (down to <0.4 arcsec) despite working with an engineering grade detector. Highlights have been the time-series study of the black-hole binary V404 Cyg to be published in Science, Speckle imaging of the Galactic center, now being extended to central star clusters and polarimetry capabilities (not available for EMIR) with an RMS down to $\sim 0.1\%$.

CIRCE will be decommissioned in September 2017 and there are currently no plans to reinstall it in the future. For further information on already obtained data, please contact the CIRCE PI (Steve Eikenberry).

MIRADAS

MIRADAS is a multi-arm NIR spectrograph with each arm being a standard cross-dispersed echelon spectrograph. A macro-slicer with 3 slices will provide seeing independent resolution. 12 arms are now securely funded through different funding agencies. The performances in test of the optics have been very promising, e.g. the peak efficiency of the echelle grating is 72% compared to the 50% minimum requirements which implies a few tenths of magnitudes in sensitivity improvement.

All optics have been delivered as well as the spectrograph camera. Cryo-mechanisms are being tested. The vacuum jacket arrived slightly damaged/banged and will be repaired in the US. Full integration is going to be finished in late 2017, the acceptance test is scheduled for Nov/Dec. 2017. After that it will undergo testing in 2018 and is expected to be delivered in late 2018. Commissioning is scheduled for 2019.

HORS

HORS has a last possibility for commissioning in September 2017. If the results are not satisfactory, the instrument project will be, unfortunately, abandoned. The financial impact for GTC having to return FEDER funds would be small in this case.

Facility instrument upgrades and refurbishments

OSIRIS

Funds for a new detector for OSIRIS have been received (see above). However, due to the long procurement of such detectors plus the necessary time for commissioning, the detector will not be integrated before 2019. There is the possibility that it might clash with the time when OSIRIS is moved to the Cassegrain focus.

NEFER will be tested with the normal OSIRIS detector in 2017 and will take the slot of the (little demanded) blue TF (which however can be put back if needed). For further information on NEFER, please refer to the last GUC report.

EMIR

EMIR has been offered in an extended semester 2017B. The detector of EMIR is tilted in two directions leading to a severe defocusing outside a $\sim 3 \times 3$ arcmin FOV and at different degrees at different parts of the detector. The GTC is ready to attempt a correction in November during the scheduled downtime of the instrument, but this has yet to be confirmed by the EMIR team. The time frame for the commissioning of the MOS is also still uncertain and should not be done before the correction of the detector tilt.

The GUC expressed its concern about accumulated delays in the EMIR commissioning. Given the strong interest of the community for EMIR, the GUC urges GTC/IAC to make sure EMIR is available with all the modes offered as soon as possible giving the necessary steps to this goal a high priority.

CanariCam

Funds for the refurbishment of CanariCam have been recently approved but there will be some delay due to the late arrival of the funds. It is possible that the reinstallation of CanariCam might clash with the arrival of MIRADAS, scheduled for summer 2018. CanariCam will still be valuable even after the launch of JWST due to its unique MIR polarimetry capabilities.

TAC summary

For semester 2017B 184 proposals have been received, of which 57% were requesting GTC time (=105 proposals). This is higher than in previous semesters, which is likely due to the new instruments offered (EMIR + HiPERCAM).

88% of the submitted proposals have been accepted. The 12 rejected proposals are ToO and MOS programs. 6 filler programs and 10 proposals requesting visitor mode were accepted.

Slightly less time was requested for ToO proposals in 2017B. 12 ToO programs with a total of 127h were granted. From 2017B on, ToO programs will not be accepted if they are ranked in Q3 or Q4, the same is the case for MOS proposals, unless the masks have been already fabricated. If competing ToO programs are both triggered for the same target, the one with higher ranking always gets priority in observation, unless observations for the lower ranked proposal have already been started. The rules for ToO proposals are stated clearly on the TAC webpages.

Proposals in Q1 have “rollover” status, meaning that they can be transferred to the next two semesters if they have not been fully executed in the semester they were requested.

Large Programs are offered again in the call for 2018A, but only for EMIR. The TAC recommends LPs to have high priority as they have been running well in the past, but the TAC will also review the priorities for LPs in each semester again.

The TAC again highlights the success of DDT proposals. 47% of DDT proposals (for OSIRIS, CIRCE and CanariCam) have been accepted. Only a single EMIR DDT has been approved so far. All DDT programs except 3 have been completed. Most DDT PIs are from Spain, 2 programs have been requested by Florida and 1 from Mexico. The productivity is rather high with 14 regular papers, 2 in Nature and 9 Letters published. The maximum time granted for DDT is not being reached. *The GUC explicitly encourages the community to apply for DDT time.*

AO evaluation report

An external panel evaluated the technical feasibility of the AO system in context of the meeting on “Adaptive Optics for Extremely Large Telescopes” in Tenerife on June 25-30. The panel consisted of the following members: Gelys Trancho (TMT, chair), Marcos van Dam (Flat Wavefronts), Benoit Neichel (LAM), Jason Chin (Keck Obs.) .

The AO system currently under development for GTC is a single-conjugate system with a natural guide star (NGS) in the basic concept and a possible extension to a laser guide star (LGS) facility. According to the instrument PI, the panel does not see any major showstoppers and it thinks the AO system will bring GTC at the forefront of high angular resolution observations.

The largest concerns from the panel were the lack of an AO instrument scientist, the tight schedule and the fact that M1 is not phased to the precision needed (it needs to go down to 30 nm from the current 150 nm). Furthermore, several interfaces with the telescope are not closed. The panel also evaluated the need for an atmospheric dispersion corrector (ADC) and LGS facility.

The following recommendation resulted from this evaluation:

- Inclusion of an AO scientist.
- Regular meetings with GTC to resolve the issues with the interfaces
- Prepare the community for AO to ensure the facility gets properly exploited scientifically
- Make a single tool for simulations and AO control
- The ADC is not needed for the basic option and should be delayed. An ADC is not commonly used either at other AO facilities.
- LGS would turn the facility into a more competitive system, but should currently be postponed as there is no instrument planned at the moment which could make full use of this.

The AO system is expected to be ready by the end of 2018, however, FRIDA will not be delivered before 2020. The system will have a test camera, but this camera only has J+H bands and not other capabilities.

The GUC is still concerned about the scientific timeliness of FRIDA+AO in light of other facilities worldwide. This has not been addressed with the technical evaluation of the instrument and the GUC keeps requesting a scientific evaluation. The GUC suggests to involve the FRIDA science team in evaluating and analyzing the current science cases as well as possible science cases for the LGS. FRIDA's strengths seem to be the large FOV and the capability of medium/high resolution IFU spectroscopy. The GUC agrees with the review panel to select a designated project scientist.

The project is arriving late compared to other 8-10m class telescopes, on the other hand, a 10m telescope without AO might be little competitive in the future (e.g. 30% of Keck publications are using AO capabilities). Also, the community needs to get involved and prepared for AO as there seems to be currently little interest.

The GUC requested access to the full report emitted by the review panel but this was not granted on the basis that it contains too many technical details.

Communication of GUC results

- **GUC report:** The GUC reports will be made public within one month after the meeting. This will allow the community a timely access to the information and recommendations discussed in the meeting and encourage a timely reaction by GTC.
- **Dissemination to the community:** The report will be sent to the Spanish community through the SEA list (as has been done already for the last report) and to the Mexican and UF communities by their respective representatives in the GUC. As mentioned above, the presentations given at the GUC meeting will be made public at the GUC webpages.

Summary

We remind the community of the following points:

- The community is encouraged to apply for filler programs and DDT proposals
- Large Programs (LPs) are accepted again and have been highly successful. Application for LPs is encouraged (but currently only possible for EMIR)
- Visitor observations are usually more useful than queue programs. The PIs should consider applying for visitor time if possible
- International time at GTC is little used

Oversubscription of observing time is still low and productivity has not increased in the last year, which is a change of tendency with respect to previous years. This might be related to the lack of scientific personnel in Spain and is under investigation.

Instruments:

- MEGARA:
 - Commissioning has ended on Aug. 31, both modes are tested and working. Commissioning results are being evaluated in September.
 - MEGARA is not offered in 2018A
 - The GUC recommends that a Science Verification call is issued as soon as possible.
- EMIR:
 - The MOS mode has not been commissioned yet and commissioning is not recommended before the correction of the detector tilt. The latter might be delayed by a few months until spring 2018.
 - The GUC recommends to make the full functionality of EMIR a high priority issue.
- FRIDA+AO:
 - The GUC keeps requesting a scientific assessment of the timeliness of FRIDA+AO, including updates on the science drivers and the impact on them by the delays in the schedule.
 - The GUC acknowledges the progress being made and the review of the technical side but is concerned about the scientific impact of the instrument.