



Call for the next generation of instruments for the Gran Telescopio Canarias

Ten years have passed since the beginning of the operations of the Gran Telescopio Canarias (GTC). As of February 2018, over 11,300 hours of observation produced scientific data leading to the publication of 358 refereed papers. A tremendous effort has been done to make the GTC an efficient machine -in terms of amount of observing time that it delivers to the community every semester- equipped with modern scientific instruments. Equally important, the knowledge that our scientific community has gained about the GTC has provided precious feedback to optimize its use and development.

We are now in the process of implementing the GTC instrumentation plan approved in 2013. The installation of EMIR in 2016, MEGARA in 2017, HiPERCAM and the refurbished CanariCam in 2018, and the instruments coming in the following years (MIRADAS, GTAO+FRIDA, and an ultra-stable high-resolution spectrograph developed by China)¹ shows the continuous and sometimes frenetic development process that the GTC is experiencing. The present instrumentation plan will be completed around 2022. At that time, six or seven science instruments will fill the large suite of focal stations of the GTC. They should guarantee the scientific competitiveness of the telescope for several years to come, also considering that the GTC will continue to be the largest optical telescope in operation.

Even so, it is time to think about the future. Defining and building new instruments is a complex process that takes a minimum of five years. This puts us to around 2025, when the new generation of extremely large telescopes will presumably start operation. An obvious question to answer is therefore what the role of the GTC will be in the era of the ELTs. The GTC was originally designed to be a versatile telescope able to respond to the variety of scientific needs of its community. In the second half of next decade, will the GTC continue to be an all-terrain telescope, or should we move to a different paradigm making it a specialized telescope, anticipating what it is probably its destiny in a farther future? It should be considered that presently the main potential of the GTC, in addition to its large collecting area, resides in its versatility, fine image quality, highly flexible queue-service observing mode, and – in the case of Spain- the large amount of observing time available, which in principle allows to tackle much more ambitious scientific projects than other communities can do.

With this letter, we open a process to define the next generation of GTC instruments. It goes without saying that the main driver must be science. We also believe that the input of the whole GTC community is vital to address the process from a wide perspective, taking advantage of the expertise that our community has gained with its participation in many front-end astronomical projects and facilities. Young and mid-career astronomers should have a pivot role in the process, not only because of its timescale, but also to provide innovative and visionary ideas anticipating the future trends of observational astrophysics.

¹ For details on the present instrumentation plan and its timeline, see <http://www.gtc.iac.es/instruments/instrumentation.php>

The timeline of the process, as we propose below, takes advantage of the opportunity for open discussion provided by the conference “VIth Science with the GTC “, to be held at the University of Valencia in mid-December 2018. These are the main steps:

- With this letter we open the call for ideas for science instruments for the GTC to insure its scientific competitiveness from ~2025 on;
- These ideas, in the form of “Concept papers”, should be sent to GRANTECAN by 1 November 2018, and they will immediately be made publicly available in its web page.
- At the conference “VIth science with the GTC” in Valencia, there will be a special session with oral presentation of the Concept Papers and a general discussion.
- Based on suggestions originated during the conference and immediately after, improved final version of the Concept Papers should be submitted to GRANTECAN by 28 February 2019.
- These proposals will then be evaluated by an appropriate external panel (the GTC Scientific and Technical Advisory Committee or an ad-hoc panel), and a decision on the instrument(s) to be developed will be taken by the GTC Steering Committee (CSUG) in its summer 2019 meeting. A search for funding will then immediately start, followed by a tendering process to adjudicate the development of the selected instrument(s).

Concerning the structure of the Concept Papers, we expect short documents (two or three pages) that include: 1) a description of the science driver; 2) the instrument concept and top-level requirements; 3) an evaluation of the international context and competitiveness of the instrument when it will be available to the community; 4) a basic budget and timeline estimates, and 5) the list of the proposing team, with the indication on whether the team would also be interested in developing the proposed instrument. As presently there is no funding commitment from the GTC funding agencies, it is not possible to set the maximum cost of the instrument(s) to be proposed. However, considering past experience, 10 million euros in total (*hardware* only) can be taken as a reference value.

Concept Papers should be sent by email to director@gtc.iac.es.

6 April 2018,

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GTC Director