



# **ESO Call for Proposals – P103**

**Proposal Deadline: 27 September 2018, 12:00 noon CEST**



# **Call for Proposals**

## **ESO Period 103**

**Proposal Deadline: 27 September 2018,  
12:00 noon Central European Summer Time**

**Issued 30 August 2018**

Preparation of the *ESO Call for Proposals* is the responsibility of the ESO Observing Programmes Office (OPO). For questions regarding preparation and submission of proposals to ESO telescopes, please contact the ESO Observing Programmes Office, [opo@eso.org](mailto:opo@eso.org).

The ESO Call for Proposals document is a fully linked pdf file with bookmarks that can be viewed with [Adobe Acrobat Reader](#) 4.0 or higher. Internal document links appear in red and external links appear in blue. Links are clickable and will navigate the reader through the document (internal links) or will open a web browser (external links).

*ESO Call for Proposals Editor:* Dimitri A. Gadotti

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*Director General*

# Contents

<b>I</b>	<b>Phase 1 Instructions</b>	<b>1</b>
<b>1</b>	<b>ESO Proposals Invited</b>	<b>1</b>
1.1	Important recent changes (since Periods 101 and 102)	2
1.2	Important reminders	9
1.3	Foreseen changes in the upcoming Periods	13
<b>2</b>	<b>Getting Started</b>	<b>14</b>
2.1	Exposure Time Calculators	15
2.2	The ESOFORM proposal package	15
2.2.1	ESOFORM: Important notes	16
2.3	Proposal Submission	16
<b>3</b>	<b>Visitor Instruments</b>	<b>17</b>
<b>II</b>	<b>Proposal Types, Policies, and Procedures</b>	<b>18</b>
<b>4</b>	<b>Proposal Types</b>	<b>18</b>
4.1	Normal Programmes	18
4.2	Monitoring Programmes	19
4.3	Large Programmes	20
4.4	Target of Opportunity	21
4.4.1	ToO using the Rapid Response Mode (RRM) system	22
4.5	Guaranteed Time Observations	24
4.6	Proposals for Calibration Programmes	24
4.7	Director's Discretionary Time	25
4.8	Host State Proposals	26
4.9	Non-Member State Proposals	26
4.10	VLT-XMM proposals	26
<b>5</b>	<b>Observing Modes</b>	<b>27</b>
5.1	Visitor Mode	27
5.1.1	ToO programme execution during VM observations	28
5.1.2	Designated Visitor Mode	28
5.2	Service Mode	28
5.2.1	Service Mode policies	29
<b>6</b>	<b>Policy Summary</b>	<b>30</b>
6.1	Who may submit, time allocation policies	30
6.2	Requesting use of non-standard observing configurations	31
6.3	Policy regarding offered/available observing configurations	31
6.4	Observing programme execution	32
6.4.1	Service Mode run execution	32
6.5	Phase 2 Service Mode policy: constraints and targets are binding	33
6.6	Pre-imaging runs	33
6.7	Data rights, archiving, data distribution	33
6.8	Publication of ESO telescope results	33
6.9	Press Releases	33
<b>III</b>	<b>Appendix</b>	<b>35</b>
<b>A</b>	<b>Acronyms</b>	<b>35</b>



## Part I

# Phase 1 Instructions

## 1 ESO Proposals Invited

The **European Southern Observatory (ESO)** invites proposals for observations at ESO telescopes during Period 103 (1 April 2019 – 30 September 2019). The following instruments are offered in this period:

### La Silla

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[\*\*EFOSC2\*\*](#) (ESO Faint Object SpeCtrograph 2)  
[\*\*HARPS\*\*](#) (High Accuracy Radial velocity Planetary Searcher)  
[\*\*SOFI\*\*](#) (Son of ISAAC)  
[\*\*ULTRACAM\*\*](#) (High speed, three channel CCD camera)

### Paranal

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[\*\*ESPRESSO\*\*](#) (Échelle SPectrograph for Rocky Exoplanets and Stable Spectroscopic Observations)  
[\*\*FLAMES\*\*](#) (Fibre Large Array Multi Element Spectrograph)  
[\*\*FORS2\*\*](#) (FOcal Reducer/low dispersion Spectrograph 2)  
[\*\*GRAVITY\*\*](#) (K-band instrument for precision narrow-angle astrometry and interferometric imaging)  
[\*\*HAWK-I\*\*](#) (High Acuity Wide field K-band Imager)  
[\*\*KMOS\*\*](#) (K-band Multi-Object Spectrograph)  
[\*\*MATISSE\*\*](#) (Multi-AperTure mid-Infrared SpectroScopic Experiment)  
[\*\*MUSE\*\*](#) (Multi Unit Spectroscopic Explorer)  
[\*\*NACO\*\*](#) (NAOS-CONICA: High Resolution NIR Camera and Spectrograph)  
[\*\*OMEGACAM\*\*](#) (Wide Field Imager for the VST at Paranal)  
[\*\*PIONIER\*\*](#) (Precision Integrated-Optics Near-infrared Imaging ExpeRiment)  
[\*\*SINFONI\*\*](#) (Spectrograph for INtegral Field Observations in the Near Infrared)  
[\*\*SPHERE\*\*](#) (Spectro-Polarimetric High-contrast Exoplanet REsearch)  
[\*\*UVES\*\*](#) (UV–Visual Échelle Spectrograph)  
[\*\*VIRCAM\*\*](#) (VISTA InfraRed CAMera)  
[\*\*X-SHOOTER\*\*](#) (UV–Visual–NIR medium resolution échelle spectrograph)

### Chajnantor

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[\*\*ARTEMIS\*\*](#) (ARchitectures de bolomètres pour des TÉlescopes à grand champ de vue dans le domaine sub-Millimétrique au Sol)  
[\*\*LABOCA\*\*](#) (Large Apex BOLometer CAMera)  
[\*\*nFLASH\*\*](#) (new FaciLity APEX Submillimeter Heterodyne instrument)  
[\*\*SEPIA\*\*](#) (Swedish ESO PI receiver for APEX)

Following the recommendations of the [Time Allocation Working Group](#) and the ESO-Chile committee, to mitigate the effects of unconscious bias inherent in any evaluation process, starting in Period 103, the email address, affiliation and country of the PI of each proposal will be made unavailable to the OPC. In addition, the names of the PI and CoIs will be listed alphabetically on the last page of the proposal, in such a way that the identity of the PI is unknown to the reviewers. These changes to every proposal are made immediately after submission when the proposal reaches the ESO system. PIs are urged to avoid wording that can lead to their identification. A complete removal of the names of PIs and CoIs from ESO proposals will be considered in the future.

The total solar eclipse visible from La Silla on 2 July 2019 at 20:40UT offers the opportunity for unique observations. Proposals for the NTT only are solicited for this unique event. Approved proposals will go through a thorough feasibility assessment in order to guarantee the safety of the telescope and instruments. Interested users should contact [opo@eso.org](mailto:opo@eso.org) and [lasilla@eso.org](mailto:lasilla@eso.org) well before the proposal submission deadline.

Further information can be found via the [Phase 1](#) webpage. Details on the instruments and ESO facilities offered in Period 103 can be found on the La Silla Paranal Observatory [Call for Proposals](#) webpage. The main characteristics of all Period 103 instruments offered at La Silla, Paranal and Chajnantor are described in the [Instrument Summary](#) table. Useful information about Phase 1 can be accessed from the [Important Links](#) webpage (*e.g.*, telescope pressure and definitions of observing constraints). Any updates after the release of this Call will be listed on the [Late Breaking News](#) webpage.

The ESO proposal submission deadline is:

**27 September 2018,  
12:00 noon Central European Summer Time.**

Please note that it is the responsibility of the Principal Investigator (PI) to resolve any verification or upload problems related to the instrument configuration, LaTeX file or associated figures well before the deadline. ESO cannot provide support beyond 11:00 CEST on the day of the deadline. The online receiver will switch off at 12:00 CEST. No submissions or amendments to submitted proposals can be accepted after this time.

In each submitted proposal, one single person, namely the PI, must be primarily responsible for that proposal. By submitting a proposal the PI agrees that he/she and his/her collaborators will act according to ESO's policies and regulations (including the conditions specified in the present Call for Proposals) if observing time is granted.

Any questions about policies or the practical aspects of proposal preparation should be addressed to the ESO Observing Programmes Office, [opo@eso.org](mailto:opo@eso.org). Enquiries related to the technical requirements of the planned observations should be sent to the User Support Department ([usd-help@eso.org](mailto:usd-help@eso.org)) for Paranal and Chajnantor and to [lasilla@eso.org](mailto:lasilla@eso.org) for La Silla.

This document outlines the main news concerning the Call, provides guidelines on how to prepare an ESO observing proposal, and outlines the policies related to ESO programmes. All the technical details related to the available facilities, telescopes and instruments are available through the ESO webpages. Part I of this Call for Proposals provides information on how to complete and submit a Phase 1 proposal to ESO, while Part II describes the policies and procedures regarding proposing for, carrying out, and publishing ESO observations.

ALMA proposals are handled through a separate channel. Further details are available via the [ALMA Science Portal at ESO](#).

## 1.1 Important recent changes (since Periods 101 and 102)

This section describes important changes which took place during Periods 101 and 102, as well as expected changes during Period 103.

- **General changes**

- **Recent changes:** News items related to the technical capabilities of the ESO instruments can be found via the [Recent Changes in Instrumentation](#) webpage. Before writing a proposal for observations with a given instrument, users are urged to check the corresponding News webpage, with details that may not be covered in this Call (*e.g.*, for X-SHOOTER: <http://www.eso.org/sci/facilities/paranal/instruments/xshooter/news.html>).
- **Volunteer PIs needed for testing distributed peer review:** ESO is considering to employ distributed peer review in the future as a method of proposal evaluation. A first



experiment will be conducted in parallel with this Call, for which ESO needs about 40 volunteer PIs. Their task will be to review and grade eight proposals from other volunteer PIs within a two-week period (8 – 19 October) and answer a short questionnaire. The evaluation will not replace the OPC process, but help ESO understand the pros and cons of this mode, compare the outcome with the OPC result, and evaluate the overall experience. PIs interested in helping ESO develop this mode should email [opo@eso.org](mailto:opo@eso.org) (subject: Distributed peer review) at their earliest convenience, but before 27 September.

- **Policy on requests for changing or adding new targets:** Teams asking for observations that envision the need for additions or changes of targets, or for adapting their observing strategy after the start of the Period (following, *e.g.*, TESS target releases), must declare it with a note in the Special Remarks section of the proposal (Box 5 of the proposal form). The note must include the time scale and the expected cadence of the target change requests. In addition, the proposals must provide scientific and technical justifications for such approach in their rationales (Boxes 7 and 8, respectively). The request will undergo a scientific review by the OPC and a technical feasibility assessment by the Observatory. Only proposals that are scientifically highly ranked and can be supported in terms of target list changes and strategy requirements will be considered for scheduling.

Please note that, as a rule, targets requested after proposal approval are not protected against target duplication from other programmes. Deviations from this rule will only be considered under exceptional circumstances, and will be treated in the same way as requests for extensions of the proprietary period.

- **Invitation to submit proposals for larger Normal Programmes:** ESO encourages the community to submit proposals for Normal Programmes making use of the full allowed range for the total requested time, *i.e.*, up to 99 hours. Over the last years, the median requested time per proposal for the VLT has steadily decreased and is now  $\approx 14$  hours. ESO has been actively working to ensure that the distribution of requested time is matched, after the allocation and scheduling processes, by the distribution of allocated time, thus guaranteeing that proposals of all lengths have equal chances of success.
- **Monitoring Programmes:** Monitoring Programme proposals enable users to request a limited amount of time to monitor targets over more than one Period. Proposers should use the normal proposal template with the appropriate macro in order to apply for a Monitoring Programme. See Sect. 4.2 for the detailed definition of a Monitoring Programme, the instruments offered for this programme type, and any associated restrictions.

No Monitoring Programmes are allowed on La Silla telescopes or VISTA in this Call. Starting in Period 103, Monitoring Programmes are allowed on the VST without restrictions on atmospheric conditions or lunar phase. On APEX, VLT and VLTI, Monitoring Programmes are subject to the same instrument restrictions as Large Programmes (see below).

- **Restrictions on Large and Monitoring Programmes:** NACO, SINFONI, MUSE in Narrow Field Mode, ESPRESSO in 4-UT mode, VIRCAM and MATISSE are not available for Large Programmes. The reasons for these restrictions are listed below. They apply to Monitoring Programmes as well:

- \* NACO is scheduled to be decommissioned at the end of Period 103;
- \* SINFONI will be decommissioned during Period 103, so that its Integral Field Unit SPIFFI can be integrated into ERIS;
- \* full characterisation of the performance and operational requirements of [MUSE+GALACSI](#) in Narrow Field Mode will be improved during Periods 102 and 103; all other MUSE modes are available for Large Programmes;
- \* the performance of ESPRESSO in 4-UT mode will be consolidated during a commissioning run in November and December 2018;
- \* Monitoring and Large Programme proposals will not be accepted for VIRCAM, as a major intervention on VISTA will take place early in Period 103;
- \* the commissioning of [MATISSE](#) continues in Periods 102 and 103.

Due to continuing technical activities on MATISSE and GRAVITY, as well as GTO commitments, the number of nights available on the VLTI amounts to approximately four weeks.

On the APEX telescope, Large Programme proposals will only be accepted for SEPIA and ARTEMIS.

See Sect. 4.3 for the detailed definition of a Large Programme and the instruments offered for this programme type.

- **Large Programmes with Target of Opportunity runs:** Since Period 102, Target of Opportunity (TOO) runs are allowed as part of Large Programmes, *i.e.*, Target of Opportunity observations can be requested over multiple semesters when justified. However, please note that Large Programme proposals with TOO runs cannot make use of the Rapid Response Mode.
- **Guaranteed Time Observations (GTO) proposals:** GTO programmes arise from contractual obligations between ESO and external consortia that build ESO instruments. GTO teams can use the Large Programme template of the ESOFORM package to request time in up to four Periods, provided that this is compatible with the corresponding GTO agreement. PIs should note that any GTO proposal requesting time through the Large Programme channel is subject to the same requirements to provide a detailed delivery plan for data products and other conditions governing the reporting on the progress of Large Programmes.  
If the GTO programme time request is for under 100 hours and only requires time in Period 103, the GTO team should fill in a Normal Programme template form specifying the GTO programme type and the appropriate GTO contract keyword as usual. Further information can be found in Sect. 4.5.
- **Guaranteed Time Observations** will be carried out in Period 103 with **GRAVITY** and **MATISSE** on the UTs and ATs, as well as with **ESPRESSO**, **NACO**, **SPHERE**, **MUSE**, **OMEGACAM**, **ULTRACAM**, **HARPS** and **ARTEMIS**. Please see Sect. 4.5 for information on the number of nights allocated to GTO programmes in Period 103. For details about the protected targets, please see: <http://www.eso.org/sci/observing/teles-alloc/gto/103.html>.

- **Paranal**

- Information regarding changes affecting Paranal instruments and facilities can be found at the [La Silla Paranal Observatory Call for Proposals](#) webpage.
- **Excellent condition proposals:** Seeing at Paranal is better than 0.5'' more than 5% of the time, while episodes of precipitable water vapour smaller than 0.5 mm are encountered six to seven nights per year (see [Kerber et al. 2014, MNRAS 439, 247](#)), mostly during the southern winter. ESO encourages the unique science that can be carried out under one or both of these conditions. Proposals designed to take advantage of one or both of these conditions should include the mention “Excellent condition proposal” in the `\SpecialRemarks` macro of the ESOFORM proposal form. In addition, users requiring excellent seeing conditions should specify 0.4'' in the `\ObservingRun` macro in their proposal. Excellent condition proposals must describe why their scientific objectives can only be achieved in these conditions.
- **VLT-XMM proposals:** Proposals are invited for scientific programmes requiring both VLT(I) and XMM-Newton observations (Sect. 4.10). These proposals may be submitted for the next XMM-Newton cycle, which extends over ESO Periods 103 and 104. However, proposers should take the limited availability of some of the VLT(I) instruments in Periods 103 and 104 into account; see the **Large Programme** item above and Sect. 1.3 for details on instrument availability.
- **Preparation tool for Service and Visitor Mode observations:** Since Period 102, the new web-based Phase 2 Proposal Preparation tool, [p2](#), is used for the preparation of all observations on Paranal. Users are invited to familiarise themselves with the tool via a [demo web interface](#) that does not require having a scheduled observing run. Further information is available on the [p2](#) webpages.

- **Target of Opportunity observations:** The implementation of [p2](#) leads to a change in the procedure for triggering Target of Opportunity observations starting in Period 103. Successful proposers of ToO runs will still have to prepare (usually dummy) OBs for their observations well ahead of the beginning of an observing Period (see Sect. 5.2). However, before triggering the ToO, the PI of the programme (or one of his/her delegates) will now use [p2](#) to directly update the OB with the relevant coordinates and exposure times, as well as insert configuration files if necessary, and attach a finding chart. The service observer will then execute the specified OB. If real time assessment of the observations can be beneficial for their scientific output, the [Paranal Observatory Eavesdropping Mode](#) can be requested at the time of the trigger; it will then be activated by the service observer at the start of the execution of the OB. Further details will be available on the Phase 2 [Target of Opportunity Procedures](#) webpage. Note that Rapid Response Mode observations are executed following a different procedure; in particular, it does not involve p2 at the time of the trigger (see the Phase 2 [Rapid Response Mode Procedures](#) webpage).
- **Instruments:**
  - \* **Distribution of VLT instruments:** In Period 103 the distribution of offered instruments on the UTs will be:
    - UT1: Nasmyth A: NACO; Cassegrain: FORS2; Nasmyth B: KMOS;
    - UT2: Nasmyth A: FLAMES; Cassegrain: X-SHOOTER; Nasmyth B: UVES;
    - UT3: Nasmyth A: SPHERE; Cassegrain: SINFONI;
    - UT4: Nasmyth A: HAWK-I; Nasmyth B: MUSE.
    - Incoherent Combined Coudé Focus: ESPRESSO, which can be operated from any of the four UTs in 1-UT mode and employs the four UTs simultaneously in 4-UT mode.

Note that SINFONI is likely to be taken out of operations during Period 103, possibly as early as June 2019.
  - \* [NACO](#): Due to unrecoverable problems, the visible wavefront sensor was decommissioned at the end of July 2018 and will not be offered in Period 103.
  - \* [FORS2](#): Since Period 102, the high time resolution modes (imaging, HIT-I; spectroscopy, HIT-S; and multi-object spectroscopy, HIT-MS) have been decommissioned and are therefore not offered any more.
  - \* [X-SHOOTER](#): The Calibration Plan was updated in what concerns the observation of telluric stars in Period 101. Please check the [X-SHOOTER News](#) webpage for details.
  - \* [VISIR](#) is not offered in Period 103: it will be modified and installed on UT4 for the [New Earths in the  \$\alpha\$  Cen Region \(NEAR\)](#) experiment during the first semester of 2019. It is foreseen that VISIR will be back for operations on UT3 during Period 104.
  - \* Following its upgrade into a cross-dispersed spectrograph, [CRIRES](#) will be installed and commissioned on the UT3 Nasmyth B focus in Periods 102 and 103. Depending on the results of the commissioning, CRIRES may be offered for observations in Period 104.
  - \* To allow for the installation of VISIR at the Cassegrain focus of UT4 for the NEAR experiment, [SINFONI](#) is installed on UT3 at the end of Period 102 and during the first months of Period 103. As a consequence, no observations requiring the Laser Guide Star can be executed during Period 103. SINFONI will be dismantled in the course of Period 103 as SPIFFI must be sent back to Europe for integration into ERIS. Therefore, proposals for Large and Monitoring programmes will not be accepted for SINFONI. Proposals for Normal programmes should take into account the limited amount of time that the instrument is available in the description of their immediate objectives.
  - \* All activities related to the installation and commissioning of the Adaptive Optics Facility on UT4 were completed in Period 101:
    - The combination of [HAWK-I](#) with the adaptive optics module [GRAAL](#) (GRound layer Adaptive optics Assisted by Lasers) in tip-tilt star free mode has been offered since Period 102.

- The combination of [MUSE](#) with the adaptive optics module [GALACSI](#) (Ground Atmospheric Layer Adaptive Corrector for Spectroscopic Imaging) in its Ground Layer Adaptive Optics mode (GLAO) has been offered since Period 101. The full capabilities of MUSE+GALACSI in this mode are currently been characterised and interested users should check the instrument webpages for the latest news. Potential users should note that a reference source identifier must be provided for all tip-tilt stars (TTS; see Sect. 3.17 of the ESOFORM User Manual).
  - The commissioning of [GALACSI](#) in its Laser Tomographic Adaptive Optics mode (LTAO) was completed during Period 101. The commissioning of the combination of this mode with [MUSE](#) in Narrow Field Mode was also completed during Period 101. It is now offered for the first time in Period 103.
  - \* [ESPRESSO](#) – the Échelle SPectrograph for Rocky Exoplanets and Stable Spectroscopic Observations – is located at the Incoherent Combined Coudé Focus (ICCF). Its commissioning in 1-UT mode was completed in Period 101. The 1-UT mode has been offered since Period 102. Two observing modes are available: (1) the High Resolution (HR) mode providing a spectral resolution of 140 000, with the diameter of the fibre aperture on sky of 1''; and (2) the Ultra High Resolution mode (UHR), providing a spectral resolution of 190 000, with the diameter of the fibre aperture on sky of 0.5''. ESPRESSO OBs for the 1-UT mode can be executed from any UT. The 4-UT mode is offered in Visitor Mode only in Period 103, during which observations will be scheduled in groups of consecutive nights. Users must request a total time that is an integer multiple of half-nights (corresponding to five hours in Period 103). Furthermore, the minimum duration of individual observing slots is one half-night. The 4-UT mode provides a medium resolution of 70 000 with the diameter of the fibre aperture on sky of 1''. Proposals requesting ESPRESSO in 4-UT mode must in particular justify its use compared to UVES. The performance of [ESPRESSO](#) is expected to improve following an intervention taking place in September and October 2018.
  - \* No focus is available for a **Visitor Instrument** on the VLT in Period 103.
  - \* Normal, Monitoring and Large Programme proposals are accepted for [OMEGACAM](#) in Period 103 without restrictions on atmospheric conditions, lunar phase or RA range.
  - \* For [VIRCAM](#), only Normal Programme proposals are accepted in Period 103, but without restrictions on atmospheric conditions, lunar phase or RA range.
- **VLTi:**
- \* ESO aims to increase the fraction of Service Mode for VLTi observations. PIs requesting Visitor Mode for VLTi should carefully justify their request.
  - \* Proposers should be aware that there is a **minimum time limit of one night** per baseline configuration for Visitor Mode runs requiring VLTi-AT observations. Proposers requiring shorter runs per baseline configuration should specify Service Mode observations. These restrictions do not apply to the VLTi-UT baselines.
  - \* The refurbishment of each of the four ATs was completed during Period 101. Their transmission increased by an average of 65% in the near-infrared.
  - \* The installation, verification and commissioning of NAOMI, the [New Adaptive Optics Module for Interferometry](#) – a low-order adaptive optics system for the ATs – will be completed in Period 102.
  - \* [GRAVITY](#):
    - ESO offers GRAVITY on the ATs for all offered configurations, as well as on the UTs with the visible (MACAO) and infrared (CIAO; off-axis only) adaptive optics systems, in both Service and Visitor Mode. For dual-field observations, swapping between two targets has been possible since Period 102.
    - Since Period 101, the AT astrometric configuration A0-G1-J2-K0 is offered for GRAVITY in Dual-Field mode only (see the [VLTi Configurations Overview](#)). To limit idle time, Service Mode programmes requesting the Large configuration (A0-G1-J2-J3) might be executed on the astrometric configuration instead, as these configurations show similar length and sky coverage.

- ESO invites proposals with the goal of performing astrometric measurements, a capability of GRAVITY which is still under development (see, *e.g.*, the following articles: [A&A 602, A94](#) or [The Messenger 170, 10](#)). Proposers who wish to use the astrometric capability and contribute to its development are invited to consult the [GRAVITY](#) webpage and contact the [astrometric team](#).
- \* [MATISSE](#) – the Multi-AperTure mid-Infrared SpectroScopic Experiment – is a second generation instrument operating on the VLT interferometer in the L ( $3.4\mu\text{m}$ ), M ( $4.6 - 5\mu\text{m}$ ) and N ( $8 - 13\mu\text{m}$ ) bands. Its commissioning started in Period 100 and will continue in Periods 102 and 103. Based on early commissioning results, MATISSE is offered with a limited set of capabilities in Period 103:
  - spectral resolving powers of  $R = 34, 506, \text{ and } 959$  in the L band and 30 in the N band (M band and additional resolving powers will be offered in the future);
  - the possibility of combining either four UTs (with MACAO only) or four ATs in standard VLTI configurations, providing six visibilities and four closure phases in one observation.

MATISSE resolves features as small as 3.5mas in the L band and as small as 8mas in the N band with the ATs, and 5mas and 12.5mas with the UTs, respectively. Monitoring and Large Programmes for MATISSE will not be accepted in Period 103, as a full characterisation of the instrument performance is ongoing. Various technical activities totalling approximately two months will take place in Period 103 during which MATISSE will not be available for operations. These activities include:

  - implementation and commissioning of GRA4MAT to use GRAVITY as a fringe tracker for MATISSE;
  - intervention on the cryo-cooling system, and
  - replacement of the Very High Resolution grating.
- \* ESO is working on a scheme to optimise operations for aperture synthesis with the VLTI. This scheme requires that proposals aiming at imaging reconstruction with PIONIER, GRAVITY or MATISSE with the ATs include the sentence “*This program aims at collecting VLTI data for reconstructing images.*” using the `\SpecialRemarks` macro. In addition, such proposals should request time corresponding to at least six concatenations (CAL-SCI for GRAVITY or MATISSE, or CAL-SCI-CAL-SCI-CAL for PIONIER) per object and per AT configuration. They should also specify the maximum period over which data can be collected, based on the expected evolution time scale of the target, with a minimum of ten days due to operational constraints.
- \* **VLTI Visitor Instrument:** No VLTI visitor focus is available in Period 103.

#### • La Silla

- Additional information regarding changes affecting La Silla instruments and facilities can be found at the [La Silla Paranal Observatory Call for Proposals](#) webpage.
- **3.6-m:** Approximately 58% of the available science time is committed to ongoing Large Programmes in Period 103 (see the [Telescope Pressure](#) webpage).
- **NTT:** The fraction of the available time on the NTT committed to ongoing Large Programmes is  $\sim 5\%$ . New Large Programmes for the NTT are therefore encouraged for this Period.
- **HARPS:** The Laser Frequency Comb is expected to be in regular operations since Period 102. Availability of the Laser Frequency Comb and instructions for its use will be announced in the [HARPS News](#) webpage.
- **ULTRACAM:** ULTRACAM is a high-speed imaging photometer designed to study faint astronomical objects at high temporal resolutions. ULTRACAM employs two dichroic beamsplitters and three frame-transfer CCD cameras to provide optical imaging with a field-of-view of  $6'$  and at frame rates of up to 300 Hz simultaneously in the  $u'g'r'$ ,  $u'g'i'$  or  $u'g'z'$  bands.

This PI instrument is offered to the ESO community for up to 5% of the observing time at the NTT in Period 103. Large Programmes will not be accepted. Operation of this PI

instrument requires the presence of the instrument team, so ULTRACAM programmes will preferentially be scheduled contiguously on periods of several nights. For questions on the instrument and observation strategies, users shall contact the instrument PI, Prof. Vik Dhillon (vik.dhillon[AT]sheffield.ac.uk), at least two weeks prior to submitting their proposal.

The ULTRACAM consortium is committed to support the PIs and observers from the ESO community that have been awarded telescope time with ULTRACAM. The ULTRACAM team will support the execution of the observations and the subsequent data reduction to allow the scientific exploitation of the data obtained with ULTRACAM. Proposers must check that their planned observations do not duplicate any protected targets specified for ULTRACAM in the [Period 103 GTO target protection](#) webpages.

- **Chajnantor**

- **Observing with APEX:** Information on the available APEX instruments and capabilities can be found on the [Observing with APEX](#) webpage. Additional information regarding changes affecting APEX instruments and facilities can be found at the [La Silla Paranal Observatory Call for Proposals](#) webpage.
- For a detailed description of the APEX instrument capabilities and links to observing time calculators see the [APEX instrumentation](#) webpage. The preliminary dates for the ESO observing time in Period 103 are 17 to 29 April, 19 to 30 June, and 15 August to 9 September. Time critical observations should only be requested within these time slots. Users are encouraged to check the latest version of the schedule at <http://www.apex-telescope.org/sciSchedule/>
- Since Period 101, ESO's share in the APEX collaboration has increased from 27% to 32%. The exact distribution of the observing time between the APEX partners can be found on the [APEX](#) webpages.
- **ARTEMIS:** In Period 103, both the 350 and 450 $\mu$ m channels are offered for simultaneous observations. This instrument is optimised for wide-field mapping of areas of at least  $4' \times 2'$ , and achieves similar mapping speeds at both wavelengths. An observing time calculator is available at <http://www.apex-telescope.org/bolometer/artemis/obscalc/>.
- **LABOCA:** The 870 $\mu$ m bolometer array is offered in Period 103 depending on a sufficient demand. No Large or Monitoring Programme proposals will be accepted for LABOCA, as its capabilities are expected to be superseded by a new bolometer array that has a wider field-of-view, namely, A-MKIDs.
- **nFLASH:** This new facility instrument is offered depending on a successful commissioning in Q1 2019. It will contain two receivers replacing the SHFI/APEX-1 and SHFI/APEX-3 receivers: nFLASH230, covering from 200 to 270 GHz, and nFLASH460, covering from 385 to 500 GHz. Both are dual polarization 2SB receivers, and can be used simultaneously. The nFLASH230 receiver has an IF bandwidth coverage of 8 GHz with a gap of 8 GHz between the two sidebands; the nFLASH460 receiver has a IF bandwidth coverage of 4 GHz per sideband. The backends are 4th generation Fourier Transform Spectrometers (FFTS4G) with 24 GHz bandwidth. An observing time calculator is available on <http://www.apex-telescope.org/heterodyne/calculator/>. In case of delays in the commissioning, proposals will be executed with the PI230 and FLASH receivers instead.
- **SEPIA:** This instrument can house three ALMA-type receiver cartridges: a band-5 receiver covering from 159 to 211 GHz; a new band-7 receiver covering from 272 to 376 GHz; and a band-9 receiver covering from 578 to 738 GHz. All three receivers are dual polarization 2SB. Only the band-5 receiver is available for Monitoring and Large programmes. The band-7 receiver is offered depending on a successful commissioning in Q1 2019, and replaces the SHFI/APEX-2 receiver. All receivers use the XFFTS backends, with IF bandwidth coverage of 4 GHz, and a gap of 8 GHz between the two sidebands. The band-7 and band-9 receivers may be upgraded to 8 GHz bandwidth in Q1 2019, depending on a successful commissioning. An observing time calculator for bands 5 and 9 is available on <http://www.apex-telescope.org/heterodyne/calculator/>.

- **CHAMP+**: This MPIfR PI instrument is not offered since Period 101 due to ongoing re-commissioning activities.
- **SHFI**: This instrument was decommissioned in September 2017, and is replaced by SEPIA and nFLASH.

## 1.2 Important reminders

- **General information**

- **ESO User Portal**: Proposals are submitted via a web upload procedure using the online tool Web Application for Submitting Proposals (WASP, following the “Submit an observing proposal” link in the Phase 1 card). This requires users to first log in to the ESO User Portal at: <http://www.eso.org/UserPortal> (see Sect. 2.2). **PIs and CoIs are urged to keep their affiliations and e-mail addresses up-to-date in the ESO User Portal.**
- **The information provided in the proposal is binding**: All observing runs must be executed as described in the proposal. Deviations from the proposal (either by observing different targets or by using different instrument modes or different constraints) may be allowed only under exceptional circumstances and after approval by ESO (see Sect. 6.5).
- **OPC evaluation of proposals**: Proposers should keep in mind the need for each OPC panel to cover a broad range of scientific areas. As a result, a particular proposal may not fall within the main area of specialisation of any of the panel members. Proposers should make sure that the context of their project and its relevance for general astrophysics, as well as any recent related results, are emphasised in a way that can be understood by their peers regardless of their expertise.
- **Proposal resubmissions**: If the proposal is a re-submission of an old proposal then the **OPC comments must be addressed** in this new submission.
- **Duration of one night**: Proposers are reminded that one night in Visitor Mode is defined to be 8 hours in even Periods and 10 hours in odd Periods on all ESO telescopes.
- **Observing conditions**: The definitions of the observing conditions for Phase 1 and Phase 2 can be found on the [Observing Conditions](#) webpage. Please note that the seeing is now defined as the seeing in the V band at zenith.
- **Seeing and Image Quality**: The seeing information to provide **in Box 3 of the proposal form is the seeing in the V band at zenith**. This ensures that the scheduling tool uniformly takes the seeing into account. Service mode users for approved programmes will enter the Image Quality for the airmass and wavelength of interest required for their observations as a constraint during Phase 2. The article “*On the Difference between Seeing and Image Quality*” ([Martinez et al. 2010, The Messenger 141, 5](#)) describes the meaning of these two quantities, and further information can be found on the [Observing Conditions](#) webpage.
- **Lunar Phase**: Proposers should note that setting the Moon requirement to ‘n’ in Box 3 of the ESIFORM Phase 1 proposal form means ‘no Moon *restriction*’ rather than ‘no Moon’. Proposers must instead set the Moon requirement to ‘d’ if they require dark time.
- **Precipitable Water Vapour (PWV)**: Users of the APEX instruments must specify PWV as an observing constraint during their Phase 1 and Phase 2 preparation. Examples are shown in the ESIFORM package template files (see also Sect. 2.2).
- **Any-weather proposals**: ESO strongly encourages programmes that can effectively exploit the worst observing conditions on the VLT. More specifically, we invite proposals that request  $> 1.2''$  seeing in the V band, thin/thick clouds and have no moon constraints on the four UTs, VLTI, VISTA and VST. These are particularly needed for VIRCAM and OMEGACAM. When preparing these proposals PIs should be aware that it is possible that only a fraction of their programme may be completed over the course of the semester. This is because these programmes will only be executed when the Service Mode queue is depleted of all higher-ranked runs.

- **Overheads:** Proposals must include all overheads when computing the total observing time request for both Service Mode and Visitor Mode runs (see the [Overheads](#) webpage). For Paranal instruments, the [p2 demo](#) web interface can be used to prepare mock observations and estimate the total execution time including overheads, while for La Silla observations, detailed computation can be obtained by running the [P2PP](#) tool in tutorial mode.
- **Justification of requested time and observing conditions:** Users must provide in Box 9 of the ESOFORM Phase 1 proposal form all details necessary to reproduce their ETC calculations to justify the time and observing conditions requested. Failing to do so may result in the Observatory concluding that the programme is not feasible.
- **PI access to raw and reduced data via the ESO Science Archive Facility <http://archive.eso.org>:** The ESO Science Archive Facility is the repository and access point to all data obtained with ESO telescopes. Principal Investigators of Service and Visitor Mode programmes (and their data delegates) have access to their proprietary raw data as soon as the data have been ingested in the ESO Archive, which typically happens a few hours after the observations. This moment is when the proprietary period starts. On the expiration of the proprietary period (typically one year), data become generally accessible without any further restriction. Access to the data is provided through the ESO User Portal. The [CalSelector](#) archive service for VLT instruments combines the science files with any ancillary files that are needed to process the data, (*e.g.*, acquisition images, calibrations, etc.).

In addition to raw data, science grade data products are available (updated on a monthly basis) for the following instrument modes: UVES cross-dispersed (with and without the image slicer), X-SHOOTER slit, FLAMES-GIRAFFE (in MEDUSA mode), MUSE, HAWK-I, HARPS, FEROS, and PIONIER. They are generated at ESO by running the corresponding data reduction pipelines in automatic mode and are subject to the same proprietary restrictions as the corresponding raw data they originate from, *i.e.*, for the duration of the proprietary period access is restricted to PIs and their data delegates. More information on the science data products and links to the query forms for the data access and download can be found on the Archive initial webpage and at the [ESO Data Streams](#) webpage.

- **Public Surveys:** Several public imaging surveys are being carried out on the VISTA and VST telescopes. The seven second generation VISTA Public Surveys are all in full operations now as the few remaining first generation of VISTA Public Surveys near completion. Details on both the ongoing and completed Public Surveys are available on the ESO [Public Surveys Projects](#) webpage.
- **Duplications:** Proposers must use the [Science Archive Facility](#) to check if observations equivalent to the proposed ones have been performed already. Proposers must also check that their planned observations do not duplicate Guaranteed Time proposals (see [GTO Plans for Period 103](#)) and ongoing [Public Survey](#) observations.
- **Target protection for Large GTO Programmes:** Since Period 100, Large GTO Programmes can span up to four Periods. This implies that such programmes can submit target protection lists that may be valid for a maximum of four Periods for targets that will effectively be observed. However, their nominal proprietary period remains with a maximum of one year starting as soon as the data have been ingested in the ESO Archive. Exceptions to this rule must be authorised by the Director General, and must be requested before the proposal is submitted.
- **Non-standard observing configurations:** The use of non-standard instrumental modes, configurations or filters requires prior approval by the ESO User Support Department. A detailed justification should be sent to [usd-help@eso.org](mailto:usd-help@eso.org) at least two weeks before the proposal submission deadline. If proposers wish to use non-standard filters in cryogenic instruments, further restrictions apply. See Sect. 6.2 for more details.
- **Backup programme:** Approval of a backup programme for Visitor Mode runs must be sought at least two weeks in advance of the observing run through the change request form as described in Sect. 5.1. Requests sent on shorter notice, in particular, less than 48 hours from the start of the run, may not be processed in time. In those cases, the



corresponding data will not be accessible from the ESO Science Archive Facility until the request is approved.

- **Paranal**

- **Observing mode on the VLT:** Departures from the observing mode requested by the proposers may be implemented by ESO so as to achieve a balanced distribution between Service Mode and Visitor Mode.

Proposers should request Service Mode for observations that benefit from the short-term scheduling flexibility allowed by this mode. Proposers may identify runs that lend themselves for observations in either Service or Visitor Mode by specifying one of the modes using the alternative run feature in Box 3 of the ESOFORM Phase 1 proposal form. Please note that if a certain instrument mode is offered exclusively in either Service Mode or Visitor Mode then this overrides these scheduling considerations.

Visitor mode runs are encouraged for those users who have never visited Paranal, even if the observations are straightforward. Users should make use of Box 8b of the ESOFORM Phase 1 proposal form to justify their preferred mode or why an alternative mode should also be considered.

- **Service Mode OBs:** Service Mode Observation Blocks (OBs) including all [overheads](#) can last up to a maximum of one hour. This rule also applies to concatenated OBs in most cases. Users are encouraged to read the [Service Mode rules](#) for more details. Longer OBs have to be specifically requested and justified at Phase 2 via a [waiver request](#), which is evaluated by the Observatory.
- **Pre-imaging for VLT instruments and modes:** If pre-imaging is required, a **separate pre-imaging run** must be specified in the proposal (to be executed in Service Mode). Failure to do so will result in the deduction of the time necessary for the pre-imaging from the allocation to the main part of the proposal (see Sect. 6.6).
- **Monitoring in Service Mode:** Monitoring a target in Service Mode in a particular Period is carried out on a best-effort basis only, *i.e.*, a monitoring sequence in any particular Period may be interrupted by long periods of unsuitable weather conditions, Visitor Mode scheduling or telescope unavailability. All the time needed to monitor targets in one observing Period should be included in one single run, even if multiple targets/fields are required.
- **Rapid Response Mode (RRM):** RRM is offered for certain instrument modes on FORS2, X-SHOOTER, UVES, SPHERE, SINFONI, HAWK-I and MUSE in Period 103. RRM observations that correspond to events with exceptional characteristics may be activated during either Service Mode or Visitor Mode runs, over which they have observational priority, unless the Service or Visitor mode runs involve strictly time-critical observations. See Sect. 4.4.1 for details on the RRM policies.
- **VISTA and VST:** Priority is given to advance the ongoing Public Surveys on these telescopes, but open time is available on both VST and VISTA. These observations are carried out in Service Mode only. Open time proposals should clearly justify their scientific goals and why they are not achievable through the scheduled Public Survey observations.  
Starting in Period 103, Normal, Monitoring and Large Programme proposals for the VST – and Normal Programme proposals for VISTA – are accepted without restrictions.  
Target of opportunity proposals will also be considered for both VST and VISTA.
- **Calibration Plans:** ESO has implemented calibration plans for all Paranal instruments. The primary purposes of these plans are to assure data quality, monitor instrument performance and calibrate science observations. Based on these plans, calibration data are obtained for certain standard instrument modes on a regular basis. Paranal calibration data are reviewed on a daily basis by Paranal Science Operations and the Garching Data Processing and Quality Control group.

A brief summary of the calibration data is available online for each instrument, *e.g.*, for FORS2: [FORS2 Pipeline: calibration data](#).

Please read the appropriate user manual and online documentation carefully, as not all instrument modes and/or configurations are covered to the same level of detail by the current calibration plans.

- \* **Service Mode runs:** The calibrations specified in the respective Calibration Plans are obtained systematically by the Observatory and do not need to be requested by the proposers. Proposals for Service Mode runs should only request the time needed for their science observations and, if applicable, night-time calibrations (including all operational overheads) beyond those listed in the published Calibration Plans.
- \* **Visitor Mode runs:** Night-time calibrations are the responsibility of the visiting astronomer with the following exception: up to approximately 30 minutes per night can be used by the observatory staff to obtain standard ESO calibrations. The calibrations will be used to monitor instrument performance and to assure a baseline calibration accuracy within the ESO Science Archive Facility. ESO does not guarantee that these standard calibration data will be sufficient to calibrate the Visitor Mode science observations to the accuracy desired. Proposers should plan accordingly for Visitor Mode runs.
- **Data reduction software:** In collaboration with the various instrument consortia, ESO has implemented data reduction pipelines for the most commonly used VLT/VLTI instrument modes. The ESO pipelines, including downloads and user manuals, can be found via the following webpage: [VLT/VLTI Pipelines](#).
- **Quality Control and Instrument Trending:** The ESO pipelines are used to monitor the performance of the various instruments and their temporal trends. Extensive information about Paranal data handling and processing (*e.g.*, zero points, colour terms, wavelength solutions) is maintained on the [ESO Quality Control webpages](#).

- **La Silla**

- **Support during observing runs and transportation schedule:** A streamlined operation is in effect in La Silla. La Silla instruments are offered in Visitor Mode and Designated Visitor Mode. The latter is offered on a best-effort basis, please see Sect. 5.1.2 for more information. Technical and logistical support will be delivered as usual by ESO staff, but no specific support astronomer is assigned. Note that the [transportation schedule](#) to and from La Silla may have an impact on the arrival and departure days of the observers at the site. Please check the online instructions for [visiting astronomers](#) for more details.
- There is a **minimum length of three nights for runs** to be executed with La Silla telescopes. Proposals including La Silla runs with a duration of less than 3 nights will be rejected at submission time by the automatic proposal reception system, with the following exceptions:
  1. There is no minimum duration for runs to be carried out with Visitor Instruments (see Sect. 3). However, in order to minimise the overheads associated with their installation and removal, such instruments are normally scheduled in blocks combining several contiguous runs. The length of these combined blocks should be typically at least three nights, and runs may be rejected at scheduling if this condition cannot be met.
  2. On the NTT, users can apply for combined runs using both EFOSC2 and SOFI. The total duration of each of these runs must be at least three nights. The combined runs must be requested using the instrument name “SOFOSC”. Details are also available in the ESOFORM User Manual.
  3. There is no minimum duration for runs of Calibration Programmes.
  4. In some science cases, an exception could be made if the observing strategy complies with the requirements for Designated Visitor Mode observations at La Silla. Please see next item and Sect. 5.1.2 for more details.

Note that the minimum duration requirement for La Silla is applicable to each individual run of a proposal involving a La Silla instrument (see Sect. 4 for more information about the definition of “programme” and “run”). More generally, proposals for long runs are

strongly encouraged on the La Silla telescopes. **The splitting of runs into sub-runs that have durations of less than a half-night should be avoided as much as possible, as this may prove impossible to schedule.**

- **Designated Visitor Mode (DVM) at La Silla:** DVM is offered at La Silla on a best-effort basis (see also Sect. 5.1.2). The three-night minimum length per run remains. Due to the reduced operations at La Silla DVM is being offered on a best-effort basis with the following restrictions: generally only one DVM run can be executed each night, so only the highest ranked runs are likely to qualify; the time requested each night must be rounded up to the nearest tenth of a night (*e.g.*, 0.1n rather than 0.07n); OBs scheduled in DVM must be submitted using p2pp v3.4.2 by the Phase 2 deadline. Please note that observations will be executed by a telescope operator and contact with the PI is therefore very limited.

If you would like to use DVM on either the 3.6-m telescope or the NTT you are requested to contact [opo@eso.org](mailto:opo@eso.org) well before the proposal submission deadline.

- **Pre-imaging:** Pre-imaging frames for EFOSC2 will have to be obtained at the beginning of the spectroscopic run. The resulting lower efficiency should be taken into account in the computation of the required execution time for the run.

In some cases, pre-imaging might be carried out during technical nights by the Observatory technical staff. Please contact [lasilla@eso.org](mailto:lasilla@eso.org) to check the feasibility of such observations for your programme.

- **Chajnantor**

- The upgrade of the **APEX** telescope was completed in April 2018. It consisted of: (1), the replacement of the M1 surface panels with panels of higher accuracy, optimising the telescope efficiency for high frequencies; (2), the replacement of the entire secondary with a new wobbler, allowing to switch between on and off positions separated by up to 10' at a rate of up to 2 Hz; (3), new telescope drives; and (4), a new shutter mechanism. In parallel, a new set of facility instruments is being installed (**SEPIA** and nFLASH), which replace the decommissioned **SHFI**.
- **APEX** is offered in Service Mode only. In exceptional cases (*e.g.*, moving targets), remote observing from Bonn (in collaboration with MPIfR) can be considered. Proposals requesting time from different APEX partners must mention the amount of time requested from MPIfR, Sweden or Chile in Box 5. Observations will be done for up to 24 hours per day, but users should be aware that afternoon conditions are often significantly worse than the conditions during the night or the morning. Observations using high frequency instruments (*i.e.*, ARTEMIS and SEPIA/band-9) should avoid the afternoon. APEX users should ensure that their proposal meets the following requirements:
  - \* specify if time is requested from other APEX partners in Box 5, using the macro `\SpecialRemarks`;
  - \* specify the requested PWV, using the macro `\Target` (Box 11), to allow a better distinction between observations requesting a range of atmospheric transparencies;
  - \* either indicate an appropriate off-source position or request time to find such a position if they wish to observe extended line-emitting regions;
  - \* merge all observations for any APEX instrument into a single run (note that this also applies to the different receivers of SEPIA). For Large Programmes this restriction should be understood as a single run per instrument and per Period. Separate runs should be specified for observations in different Periods.

### 1.3 Foreseen changes in the upcoming Periods

- **Starting in Period 104, Large Programmes will only be offered in even Periods, *i.e.*, Periods with proposal submission deadline in March.**

From Period 104 onwards, ESO will strive to execute Large Programmes over shorter periods of time (aiming at two semesters by default), while maintaining the ceiling set by Council

of 30% of the observing time allocated to Large Programmes. Thus, from Period 104, the community should submit Large Programmes that do not extend over a number of Periods larger than that set by their scientific requirements.

These measures follow the recommendations of ESO's Time Allocation Working Group, reviewed by the Scientific Technical Committee and Users Committee, and aiming at increasing the scientific impact of ESO's telescopes.

- As [NACO](#) will be decommissioned at the end of Period 103, it will not be offered in Period 104.
- ESO is evaluating the possibility of offering the UT1 Nasmyth A focus for a visitor instrument during Period 104. Interested users are invited to consult the following webpages: [Visitor Focus](#) and [Applications for Use of the VLT Visitor Focus](#).
- [MOONS](#) – the Multi-Object Optical and Near-infrared Spectrograph – is expected to be installed and commissioned at the UT1 Nasmyth A focus during the first quarter of 2021.
- Following its upgrade into a cross-dispersed échelle spectrograph, installation and commissioning of [CRIRES](#) on UT3 will take place in Period 102 and Period 103. Depending on a successful commissioning, CRIRES may be offered in Period 104.
- During a large fraction of Period 103, [VISIR](#) will be installed at the Cassegrain focus of UT4, to use its Deformable Secondary Mirror, for the [New Earths in the  \$\alpha\$  Cen Region \(NEAR\)](#) experiment. It is expected to be back on UT3 during Period 104.
- [SINFONI](#) will be decommissioned during Period 103 to allow the upgrade and integration of its Integral Field Unit [SPIFFI](#) within [ERIS](#), a high angular resolution imager and integral-field spectrograph using the AOF. ERIS is expected to be installed and commissioned during the first semester of 2020 at the UT4 Cassegrain focus.
- [GRAVITY](#): Provided a successful commissioning, CIAO in the on-axis mode may be offered in Period 104.
- Depending on a successful commissioning, additional modes for [MATISSE](#), the Multi-AperTure mid-Infrared SpectroScopic Experiment, may be offered in Period 104.
- ESO is evaluating the possibility of offering a focus at the VLTI for a visitor instrument during Period 104. Interested users are invited to consult the following webpages: [Visitor Focus](#) and [Applications for Use of the VLT Visitor Focus](#).
- Integration of [NIRPS](#) – the Near Infra-Red Planet Searcher – on the 3.6-m telescope is expected to start in mid-2019.
- [LABOCA](#): This 870 $\mu$ m bolometer array on APEX may be replaced by a camera with a wider field, namely, A-MKIDs, in 2019.
- **Backends**: A new set of facility backends with up to 64 GHz of instantaneous bandwidth is expected to be installed on APEX in the second half of 2018. It will serve the instruments [SEPIA](#) and nFLASH, allowing to record the full IF bandwidth of all receivers.

## 2 Getting Started

Observing proposals must contain a scientific case, a summary of the proposed observing programme, a list of desired instrument modes and configurations, a target list, and a precise definition of required observing conditions (seeing in V band at zenith, atmospheric transparency, lunar illumination, etc.).

In addition, a calculation of the number of hours/nights of observing time needed to accomplish the scientific goals must be carried out and summarized in the proposal. It is therefore important that proposers consult technical documentation or instrument experts regarding the instrument capabilities and sensitivities. The [overheads](#) webpage provides a summary table of all the overheads that should be accounted for. A more detailed computation can be obtained by running the

**Phase 2 Preparation Tool** (P2PP) in tutorial mode for La Silla observations, or the web-based tool **p2** for Paranal observations.

The definitions of the observing conditions for Phase 1 and Phase 2 can be found on the **Observing Conditions** webpage, which also shows the probability of the combined sky transparency and seeing values being realised throughout the year at Paranal.

The following sections give some additional information and references that should be useful to proposers.

## 2.1 Exposure Time Calculators

Exposure Time Calculators (ETCs) for ESO instruments are accessible directly on the ESO Web. For La Silla and Paranal instrumentation please see:

<http://www.eso.org/observing/etc>.

Proposers of VLTI observations with PIONIER should check the feasibility of their proposed observations with the visibility calculator, VisCalc, available from the **ETC page**. Visibility calculations for GRAVITY are included in the dedicated GRAVITY ETC. At Phase 2, users are also encouraged to select a suitable calibrator star for their planned observations using the CalVin tool, which is also available from the above link.

For APEX instrumentation please see:

<http://www.apex-telescope.org/instruments>.

Links to useful proposal preparation software tools (*e.g.*, the Object Observability Calculator, Airmass Calculator, Digitized Sky Survey) can be found at:

<http://www.eso.org/sci/observing/tools.html>.

Information on standard stars and sky characteristics, as well as additional tools, are available at

<http://www.eso.org/sci/facilities/paranal/sciops/tools.html>.

The parameters used by the ETCs are based on data collected during instrument commissioning and operations. The ETC parameters are frequently updated and changes will be reflected by the running “version number”. To help the observatory staff assess the technical feasibility of observations, proposers are requested to specify the version number of the ETC they used in the section “9. Justification of requested observing time and observing conditions” of their proposals.

Users should follow the appropriate link in the **ETC page** to make sure they are using the correct ETC version for their proposals for Period 103. Please note that while the sky background values used in the ETCs generally reflect actual conditions on Paranal, the newly introduced almanac mode, added to ETCs in Period 101, needs to be used to account for local effects such as those from zodiacal light.

Service Mode proposers are reminded that the requested observing conditions are binding in Phase 2 (see Sect. 6.5). The ETCs were modified in Period 96 and require the seeing in the V band at zenith in order to estimate the observing time necessary to complete the programme. Proposers should ensure that the observing conditions specified in the proposal are consistent with those used in the ETC. This is also true for the requested sky transparency and lunar phase. Non-photometric sky transparency can be simulated by adding 0.1/0.2 mag to the object magnitude for CLEAR/THIN-CIRRUS conditions respectively.

## 2.2 The ESIFORM proposal package

All Phase 1 proposals must be prepared using the ESIFORM proposal package configured for Period 103 as the package is updated every Period. The ESIFORM package may be obtained by logging into the ESO User Portal following the instructions at:

<http://www.eso.org/sci/observing/phase1/esoform.html>

The “ESOFORM User Manual” in the proposal package describes in detail how to fill the L<sup>A</sup>T<sub>E</sub>X template, and the information required to prepare a valid proposal.

### 2.2.1 ESOFORM: Important notes

- **Definition of Service Mode and Visitor Mode runs:** An observing programme, as described in a single proposal, may consist of one or more runs. Multiple runs should only be requested for observations with different instruments and/or for different observing modes (*e.g.*, Service Mode, Visitor Mode or pre-imaging runs) and/or for differing observing conditions (*e.g.*, seeing, transparency). In particular, Service Mode runs **should not** be split according to time-critical windows, or used to group targets according to their Right Ascensions. Proposers should split Visitor Mode observations at different epochs (*e.g.*, due to different target RAs) into separate runs.
- **Scheduling constraints** must be specified correctly as the telescope schedules are prepared using software that relies on accurate constraints [Alves 2005, [The Messenger, 119, 20](#) and Patat & Hussain 2013 in “*Organizations, People and Strategies in Astronomy 2*” ([OPSA 2, ed. Heck, p. 231](#))]. Observing/scheduling constraints that are not indicated or that are inaccurately specified in Box 12 of the ESOFORM are unlikely to be taken into account by the scheduler. **Retrofitting scheduling constraints after the release of the schedule is not possible.**
- **Precipitable water vapour (PWV) constraints:** PWV constraints must be specified for all APEX instruments in the “Additional Notes” column of the Target macro. Please see the ESOFORM User Manual for more details.
- **VLT-XMM proposals:** Proposers must indicate in the ESOFORM if they are applying for VLT-XMM time under the ESA-ESO agreement (see Sect. 4.10). VLT-XMM proposals may include observing runs to be executed in Period 103 and/or 104.
- **Proposal resubmissions:** If the proposal is a re-submission of an old proposal then the **OPC comments must be addressed** in this new submission.

## 2.3 Proposal Submission

Proposals must be submitted in their final version by the submission deadline:

**27 September 2018,  
12:00 noon Central European Summer Time.**

Proposal submission is done via a web upload procedure that can only be accessed by logging into the ESO User Portal at:

<http://www.eso.org/UserPortal>,

and following the “Submit an observing proposal” link in the Phase 1 card. Please note that the ESO deadline **will be strictly enforced**: users should plan accordingly. It is the PI’s responsibility to resolve any verification or upload problems related to the instrument configuration, L<sup>A</sup>T<sub>E</sub>X file or associated figures early as ESO cannot provide support for proposal submissions after 11:00 CEST on the day of the deadline. Requests for submissions or amendments after the deadline will not be considered.

In order to efficiently verify and submit your proposal, please note that:

- **Postscript figures are not accepted.** The proposals are compiled using the pdfL<sup>A</sup>T<sub>E</sub>X package which accepts only PDF (up to version 1.4) and JPEG file formats. Please note that there is a size limit of 1MB for each figure to be uploaded.

- Always compile your proposal locally with pdfL<sup>A</sup>T<sub>E</sub>X. Some of the checks are made at the L<sup>A</sup>T<sub>E</sub>X level and checking your proposal in this way will save you time. If there are errors please read the output carefully in order to identify the problem.
- Further checks are made by the web software (“the receiver”), which uploads your proposal and checks that it complies with ESO’s requirements. The receiver allows you to verify your proposal without actually submitting it. **You should take advantage of this feature to check that your proposal is technically correct well before the Phase 1 deadline.** This can be done by verifying a “skeleton” version of the proposal early; this version should contain all the technical details but not necessarily the full scientific description. This will ease the final submission process considerably.
- Plan ahead! Over past Periods, congestion of the proposal submission system has repeatedly occurred in the last few hours before the proposal deadline, leading to delays in response time that occasionally exceeded 1 hour. **Try to submit proposals at least one day before the deadline and avoid last-minute stress.**

At the end of the submission procedure an acknowledgment page is displayed with the Proposal ID. Please save this for your records. The PI of the proposal and the submitter will also receive a confirmation e-mail, but **the acknowledgment page is the official receipt**. If you are not sure if your proposal has successfully entered the system, **do not** re-submit it but rather contact ESO at [esoform@eso.org](mailto:esoform@eso.org).

Neither proposals nor corrections to proposals that are submitted after the deadline will be considered.

### 3 Visitor Instruments

Visitor instruments can be mounted at the NTT, the 3.6-m and APEX telescopes in order to permit innovative observations by teams with their stand-alone instruments or to test new instrumental concepts for the development of new facility instruments.

No foci are available for visitor instruments on the VLT or VLTI in Period 103. However, ESO is evaluating the possibility of offering the UT1 Nasmyth A focus, as well as a VLTI focus, for visitor instruments during Period 104.

The requirements for visitor instruments are substantially reduced compared to the requirements for fully integrated facility instruments. A set of guidelines on how to propose a visitor instrument and technical information is available through the links below:

- For the VLT: [Visitor Focus](#) and [Applications for Use of the VLT Visitor Focus](#);
- For the VLTI: [Visitor Focus](#) and [Applications for Use of the VLTI Visitor Focus](#).

Technical information on the interface to the NTT and 3.6-m telescopes is available at: <http://www.eso.org/sci/facilities/lasilla/instruments/visitor/VisitorInstruments.pdf>.

A set of guidelines on how to propose a visitor instrument on APEX is available at: <http://www.eso.org/sci/facilities/apex/instruments/apex-visitor/index.html>.

## Part II

# Proposal Types, Policies, and Procedures

## 4 Proposal Types

For Period 103 the list of proposal types is:

- Normal Programmes
- Monitoring Programmes
- Large Programmes
- Target of Opportunity
- Guaranteed Time Observations
- Calibration Programmes
- Director’s Discretionary Time

All proposals except Director’s Discretionary Time (DDT) proposals must be submitted by the current deadline. DDT proposals may be submitted at any time.

Only the Normal and Large Programme template forms should be used for the preparation of proposals. An observing programme, as described in a single proposal, may consist of several runs, *e.g.*, for observations with different instruments, or to be executed in different observing modes or at different epochs for Visitor Mode observations. Proposals for **Visitor Mode** observations (Sect. 5.1) must request time in nights, proposals for **Service Mode** observations (Sect. 5.2) must request time in hours. Note that any given proposal may request a mix of Visitor/Service Mode observations provided that they are split into separate runs. The definition of a single run differs for Service Mode and Visitor Mode observations; further guidelines are available in Sect. 2.2.1.

**Please note:** All proposers (Service and Visitor Mode) must include time for all overheads (telescope + instrument) in their proposals (see the [Overheads](#) webpage).

### 4.1 Normal Programmes

Most of the observing time on ESO telescopes will be allocated to **Normal Programmes** in Period 103. Available instruments are listed in Table 1. Proposers must use the standard L<sup>A</sup>T<sub>E</sub>X template (Sect. 2.2). The scientific case of the programme may take up to two pages including attachments (figures or tables). The scientific description contains two sections:

- A) Scientific Rationale
- B) Immediate Objective

Attachments such as figures are optional and are restricted to the second page of the scientific description, though the respective fractions of that page that are occupied by the scientific description and by the figures are left to the discretion of the proposer.

If the proposal contains runs requesting La Silla telescopes and instruments, the duration of each such run must be at least 3 nights, except for runs using Visitor Instruments or for combinations of contiguous EFOSC2 and SOFI runs (totalling at least 3 nights). In certain cases exceptions may be made for highly-ranked La Silla runs that require Designated Visitor Mode observations; see Sect. 5.1.2 for more details.



Table 1: Available Instruments for Normal Programmes

Telescope/Combined Focus	Instrument
UT1	FORS2, KMOS, NACO
UT2	FLAMES, UVES, X-SHOOTER
UT3	SINFONI <sup>1</sup> , SPHERE
UT4	HAWK-I, MUSE
ICCF	ESPRESSO <sup>2</sup>
VLTI	GRAVITY, MATISSE, PIONIER
VISTA	VIRCAM <sup>3</sup>
VST	OMEGACAM
NTT	EFOSC2, SOFI, SpecialNTT, ULTRACAM
3.6	HARPS, Special3.6
APEX	ARTEMIS, LABOCA, nFLASH, SEPIA <sup>4</sup> SpecialAPEX

<sup>1</sup> SINFONI is only offered in NoAO and NGS modes. There is no Laser Guide Star Facility on UT3.

<sup>2</sup> ESPRESSO in 1-UT mode can be operated from any of the 4 UTs.

<sup>3</sup> Normal Programmes for VIRCAM are encouraged for all weather conditions and RA ranges.

<sup>4</sup> Bands 5, 7 and 9 are offered.

## 4.2 Monitoring Programmes

Monitoring Programmes (MPs) are only accepted on some instruments (see Table 2). Sect. 1.1.1 explains the reasons for these restrictions.

Table 2: Available Instruments for Monitoring Programmes

Telescope/Combined Focus	Instrument
UT1	FORS2, KMOS
UT2	FLAMES, UVES, X-SHOOTER
UT3	SPHERE
UT4	HAWK-I, MUSE <sup>1</sup>
ICCF	ESPRESSO <sup>2</sup>
VLTI-UT	GRAVITY, PIONIER
VLTI-AT	GRAVITY, PIONIER
VST	OMEGACAM
APEX <sup>3</sup>	ARTEMIS, SEPIA <sup>4</sup>

<sup>1</sup> MUSE-GALACSI in NFM is not offered for Monitoring Programmes.

<sup>2</sup> ESPRESSO in 1-UT mode can be operated from any of the 4 UTs. ESPRESSO in 4-UT mode is not offered for Monitoring Programmes.

<sup>3</sup> APEX observations for approved Monitoring Programmes can only be carried out in the ESO time slots.

<sup>4</sup> Only band 5 is offered in Period 103.

An ESO Monitoring Programme is defined by the criteria listed below.

- A programme requiring less than 100 hours of ESO telescope time. For ESO telescopes, one night in Visitor Mode is defined to be 8 hours in even Periods and 10 hours in odd Periods.
- Both Service Mode and Visitor Mode observations are allowed. For Service Mode runs please note that the time request for each semester should be contained within a single run (per instrument and per constraint set) in order to enable observations within time-linked scheduling

containers.

- MP proposals must request a minimum of two Periods and can span up to four Periods.
- MP proposals will be judged in the same way as normal programmes but must be amongst the highest ranked programmes in order to be scheduled.
- For APEX instruments, observations for approved MPs can only be carried out in ESO time. Hence, targets can be monitored with a bi-monthly cadence at best.
- ToO programmes cannot be submitted as Monitoring Programmes (see Sect. 4.4).

Monitoring Programme proposals should be prepared using the appropriate macro in the L<sup>A</sup>T<sub>E</sub>X template for normal proposals, `template.tex`. See the ESOFORM User Manual for more details.

### 4.3 Large Programmes

Table 3: Available Instruments for Large Programmes

Telescope/Combined Focus	Instrument
UT1	FORS2, KMOS
UT2	FLAMES, UVES, X-SHOOTER
UT3	SPHERE
UT4	HAWK-I, MUSE <sup>1</sup>
ICCF	ESPRESSO <sup>2</sup>
VLTI-UT	GRAVITY, PIONIER
VLTI-AT	GRAVITY, PIONIER
VST	OMEGACAM
NTT	EFOSC2, SOFI, SpecialNTT
3.6	HARPS, Special3.6
APEX	ARTEMIS, SEPIA <sup>3</sup>

<sup>1</sup> MUSE-GALACSI in NFM is not offered for Large Programmes.

<sup>2</sup> ESPRESSO in 1-UT mode can be operated from any of the 4 UTs. ESPRESSO in 4-UT mode is not offered for Large Programmes.

<sup>3</sup> Only band 5 is offered in Period 103.

Large Programmes are only accepted on some instruments in Period 103 (see Table 3). See Sect. 1.1 for more information on the availability of instruments for Large Programmes in this Period.

Up to a maximum of 30% of the observing time distributed by the OPC on the VLT/VLTI can be allocated to Large Programmes. An ESO Large Programme is defined by the criteria listed below.

- A programme requiring a minimum of 100 hours of ESO telescope time. For ESO telescopes, one night in Visitor Mode is defined to be eight hours in even Periods and ten hours in odd Periods.
- A programme that has the potential to lead to a major advance or breakthrough in the field of study, has a strong scientific justification, and a plan for a quick and comprehensive effort of data reduction and analysis by a dedicated team.
- Large Programmes can span from one to four Periods (*i.e.*, up to a maximum of two consecutive years).
- A good organisational structure of the proposing team, availability of resources and relevant expertise must be demonstrated.
- ToO programmes cannot be submitted as Large Programmes (Sect. 4.4).

A special L<sup>A</sup>T<sub>E</sub>X template must be used for Large Programmes (Sect. 2.2). The proposers may use a total of three pages (not including figures) for the four sections of the scientific description:

- A) Scientific Rationale
- B) Immediate Objective
- C) Telescope Justification
- D) Observing Mode Justification (Visitor or Service)

An additional two pages of attachments are permitted. Proposers of Large Programmes should keep in mind that **the entire OPC** (across all scientific categories) as well as the specialised OPC panels will be evaluating their proposal, and that **they should clearly explain the relevance of the proposed programme to general astrophysics**.

If a Large Programme proposal contains runs requesting La Silla telescopes and instruments, the duration of each such run must be at least 3 nights.

Proposers should be aware that the PIs of successful proposals for Large Programmes are required to provide all data products (processed images and spectra, catalogues) to the ESO archive. PIs of Large Programmes are asked to take particular care when completing Sects. 6 and 7 in the L<sup>A</sup>T<sub>E</sub>X template form in which they must provide **detailed information on the data quality assessment and data reduction**. They are also required to include the planning for publication of data products (both in terms of content and timeline), which must be finalised within two years of the completion of the data acquisition for the programme. Large Programme proposals must include a precise timeline for the publication of data products in order to comply with ESO's policies.

Guidelines for the submission of these data products, including a description of the required meta-data and formats, can be found on the Phase 3 webpages; proposers are invited to write an e-mail to [usd-help@eso.org](mailto:usd-help@eso.org) for further information. The Phase 3 webpages can be found at: <http://www.eso.org/sci/observing/phase3.html>.

During the Period of execution of a Large Programme, and upon its completion, the PI is expected to report regularly to the OPC on the programme's progress. He/she may also be asked to outline the progress and/or outcome of the programme at ESO Large Programme and Survey workshops, similar to those of [October 13-15, 2008](#) or [October 05-09, 2015](#).

#### 4.4 Target of Opportunity

Normally, up to 5% of the available ESO general observing time may be used for **Target of Opportunity** (ToO) proposals. For events with exceptional characteristics ESO will also consider overriding Visitor Mode observations.

ESO recognises two categories of Targets of Opportunity:

1. **Unpredictable ToOs** are those concerning unpredictable astronomical events that require immediate observations. The occurrence of such events cannot be anticipated on a sufficient timeframe to allow them to be the subject of a proposal prepared by the regular proposal submission deadline. They **qualify for allocation of Director's Discretionary Time**. Corresponding requests for observing time should therefore be submitted as DDT proposals (Sect. 4.7). The 'TOO' run type can be selected if executions of observations must be triggered by the PI, as described below.
2. **Predictable ToOs** are those concerning predictable events in a generic sense only. These are typically (but not limited to) known transient phenomena and follow-up or coordinated observations of targets of special interest. Proposals aimed at studying such events are, in the ESO proposal terminology, ToO proposals.

ToO proposals must be submitted using the Normal Programme ESOFORM template. Proposals should be for generic targets and/or times. However, if accepted by the OPC the programme will not be executed until the PI (or his/her delegate) contacts ESO to request its activation after the predicted event has occurred. The observing strategy must be the one approved by the OPC, and the triggers may not exceed the allocated time and number of triggers granted. The observations will

be conducted in Service Mode and, in exceptional cases, ongoing programmes may be interrupted. Read more on the [ToO policy](#) webpage.

As ToO programmes may require a mixture of ToO runs and normal runs proposers are requested to specify the type of runs (TOO or normal) in the tenth (final) field of the `\ObservingRun` macro of the ESOFORM  $\LaTeX$  template. A more detailed description of types of ToO runs with accompanying examples can be found in the user manual of the [ESOFORM package](#).

**ToO runs** are defined as runs for which the target and/or observation epoch cannot be known more than one week before the observation needs to be executed. Within this time window, three different types of ToO runs are defined:

- Rapid Response Mode (RRM), for observations to be triggered via the automated Rapid Response Mode system within 4 hours after an event;
- Hard ToO runs, for manually triggered observations that must be carried out as soon as possible or at most within 48 hours of receipt of the trigger by the Observatory, or that involve a strict time constraint (*i.e.*, that must be executed during a specific night);
- Soft ToO runs, for manually triggered observations, for which the Observatory can receive notification more than 48 hours before execution, and which can be scheduled for execution with a flexibility of at least  $\pm 1$  day.

For all ToO runs, generic Observation Blocks (OBs) must be submitted by the PI at Phase 2 using [p2](#). Sect. 4.4.1 further describes RRM runs. OBs for Hard and Soft ToO runs will be scheduled for execution following the acceptance by ESO of an activation trigger. However, before triggering the ToO, the PI of the programme (or one of his/her delegates) must use [p2](#) to directly update the OB with the relevant coordinates and exposure times, as well as insert configuration files if necessary, and attach a finding chart. The service observer will then execute the specified OB. If real time assessment of the observations can be beneficial for their scientific output, the [Paranal Observatory Eavesdropping Mode](#) can be requested at the time of the trigger; it will then be activated by the service observer at the start of the execution of the OB.

Users submitting a ToO programme will need to indicate the number of targets per run and the requested number of triggers per target using the appropriate macros in the  $\LaTeX$  template. A trigger is defined as the request for execution of one Observation Block with a given instrument at a given epoch. Similar observations to be executed with the same instrument at different epochs count as different triggers, as do observations with different instruments at the same epoch.

Any observing request by other groups at the time an event occurs (*e.g.*, a DDT proposal), with exactly the same scientific goal and aiming at observing the same object, will be rejected by ESO. ToO runs are **not** carried over to the following Periods.

**It is important to note that:**

- Eventual follow up observations of a ToO target **must** make use of a normal (non-ToO) run, possibly with specific time constraints, if the observations must take place more than one week after reception of the first trigger for that object by ESO.
- Targets that are unknown at the time of the Phase 1 proposal submission but can be observed with or without specific (predictable) time constraints more than one week after they have been identified should be observed as part of normal (non-ToO) runs.

In both of these cases, the related OBs should be defined or updated by the PI once the target is known. The OBs should be stored in the ESO database with the complete information needed to allow them to be executed as part of the regular Service Mode queues.

#### 4.4.1 ToO using the Rapid Response Mode (RRM) system

During Period 103, ESO offers the VLT Rapid Response Mode (RRM) system for the following instruments: FORS2 on UT1, UVES and X-SHOOTER on UT2, SPHERE and SINFONI on UT3, and HAWK-I and MUSE on UT4.

RRM proposers should note that:

- an RRM trigger is a special ToO trigger that **can only be activated up to 4 hours after an event**.
- **RRM runs must be exclusively used for triggering the RRM system.** Therefore they must be specified as runs separate from hard or soft ToOs in the ESOFORM template. In particular, this means that:
  - observations to be executed in the same night of an event, but more than 4 hours after it, should be requested through a hard ToO trigger;
  - follow-up observations of a target observed using the RRM system must be requested through the activation of a hard or soft ToO trigger, or a non-ToO run, depending on the classification described above.
- As with ToO programmes, proposers will need to indicate in the L<sup>A</sup>T<sub>E</sub>X template the number of targets per run and the requested number of triggers per target.

Upon receiving an encoded alert indicating the coordinates of the target and the associated Observation Block (OB) to be executed, any ongoing integration will automatically be terminated and the RRM OB will be executed, unless the procedure is aborted by the operator due to safety concerns. (Note that contrary to ToO triggers, the triggering of RRM observations does not involve [p2](#).) Depending on the instrument and the target position, the telescope/instrument will be at the location of the target within about 6 minutes following the arrival of the alert at Paranal. Depending on the target brightness and instrument mode target acquisition may take some more time.

RRM observations in Period 103 are subject to the following restrictions:

- The requested instrument must already be in operation. No change of instrument (and telescope focus) is accepted by the automatic RRM system.
- RRM activations will be accepted during Service Mode and Visitor Mode runs. They have overriding priority over other observations, unless the latter are strictly time-critical.
- In particular, an RRM activation cannot interrupt an already on-going RRM observation.

Additionally, the following instrument specific restrictions apply:

- FORS2 can only be used in the broad-band imaging, long slit spectroscopic, imaging polarimetric and spectro-polarimetric modes;
- UVES can only be used with standard wavelength settings;
- during Period 103, the RRM for SPHERE is only offered in ZIMPOL imaging and polarimetry modes, IRDIS classical imaging mode, and IRDIFS in imaging mode;
- in HAWK-I all filters can be used, but the trigger requesters must follow the users' manual indications closely, as far as brightness restrictions of objects in the field are concerned;
- HAWK-I and MUSE are available in NoAO mode only;
- SINFONI is available in NGS and noAO mode but not in LGS mode.

More generally, RRM is only offered for specific instrument modes, as described in the user manuals of the respective instruments. Users interested in using RRM for modes not currently offered for RRM should enquire through [usd-help@eso.org](mailto:usd-help@eso.org) at least two weeks before the proposal submission deadline.

The delivery of the encoded alerts to Paranal is entirely the responsibility of the PI. Successful PIs will be asked to provide a set of OBs by the Phase 2 deadline, to be certified for execution as is done for other Service Mode runs. Details on the activation mechanisms and the preparation of RRM observations can be found at the Phase 2 [RRM Observation page](#).

## 4.5 Guaranteed Time Observations

**Guaranteed Time Observations** (GTO) arise from contractual obligations of ESO vis-à-vis the external consortia who build ESO instruments (see the [GTO Policy page](#)).

In Period 103, GTO teams can request time up to four Periods, if compatible with the corresponding GTO contract. These are called Large GTO programmes. Proposals for a Large GTO should be prepared using the ESOFORM Large Programme template, keeping the programme type as Large and entering the GTO contract keyword where specified. PIs should also note that any GTO proposal requesting time through the Large Programme channel is subject to the same requirements to provide a detailed delivery plan for data products and other conditions governing the reporting on the progress of Large Programmes.

If the GTO programme time request is for under 100 hours and only requires time in Period 103, the GTO team should fill in a Normal Programme template form specifying the GTO Programme Type and the appropriate GTO contract keyword.

All GTO proposals will be evaluated and ranked together with Normal and Large Programme proposals in order to provide feedback to the GTO teams on the scientific standing of their GTO programmes. In exceptional cases, badly ranked GTO proposals may not be scheduled. The policies describing the obligations of Guaranteed Time Observers are defined in Appendix 2 of the [ESO Council document ESO/Cou-996](#). VLT GTO policies were updated in December 2015 and are described in detail in the [ESO Council document ESO/Cou-1628](#).

GTO runs must be conducted in Visitor Mode (Sect. 5.1). The only exceptions are those explicitly stated in the contractual agreement between ESO and the corresponding external consortium. However ESO may exceptionally transfer some GTO runs from Visitor Mode to Service Mode for operational reasons (such as the availability of certain VLTI baselines or instruments).

Some GTO programmes require ToO runs<sup>1</sup> (see Sect. 4.4). If this is the case then this should be specified in the ESOFORM package using the `\ObservingRun` macro of the L<sup>A</sup>T<sub>E</sub>X template.

The table below provides a detailed description of the current commitment to GTO consortia.

GTO Contract	Telescope	Instrument	First Period	Last Period	Total entitlement (nights)	Remaining time (nights) <sup>(1)</sup>	Time in P103 (nights) <sup>(2)</sup>
ARTEMIS-consortium	APEX	ARTEMIS	95		(3)	-	
ESPRESSO	UT	ESPRESSO	102	109	273	242.0	9
INAF-OAC-VST	VST	OMEGACAM	88	107	(4)	-	20-25
INAF-OAC-UT	VLT	ALL	93	107	28	7.4	1
GRAVITY-consortium-UT <sup>(5)</sup>	VLTI-UT	GRAVITY	99	108	68.25	40.7	7
GRAVITY-consortium-AT	VLTI-AT	GRAVITY	97	106	157	111.8	28
LFC-consortium	3.6m	HARPS	102	105	80	70.0	23
MATISSE-consortium-UT <sup>(5)</sup>	UT	MATISSE	103	112	37.5	37.5	4
MATISSE-consortium-AT	AT	MATISSE	103	112	173	173.0	17
MUSE-consortium	UT4	MUSE	93	105	255	62.9	21
OmegaCAM-consortium-UT	VLT	ALL	80	107	40	5.4	1
OmegaCAM-consortium-VST	VST	OmegaCAM	88	107	(4)	-	30-35
PRIMA-DDL-consortium	UT1	NACO	96	105	120	25.5	9
SPHERE-consortium	UT3	SPHERE	94	103	260	32.8	33
VISA-MPG	VLTI	MIDI/GRAVITY	79	109	69	18.6	3

(1) At the start of P103.

(2) Average forecast: (remaining time)/(remaining semesters).

(3) The entitlement is 15% of the total science time for the whole duration of ARTEMIS operations. This corresponds to a maximum of 36 hours per semester.

(4) The entitlement is a fraction of the total science time for 10 years of operations.

(5) Nights with all 4 UTs.

*Last update: Aug 30, 2018*

## 4.6 Proposals for Calibration Programmes

ESO operates a large number of complex instruments with many possible configurations and observing modes. Although the Observatory executes a rigorous calibration plan for each instrument, ESO

<sup>1</sup>The possibility for GTO teams to request ToO observations as part of their guaranteed time is restricted to those cases in which this option is explicitly mentioned in the GTO contract.

does not have the resources to fully calibrate all potential capabilities of all instruments. On the other hand, the astronomical community has expressed interest to perform calibrations for certain uncalibrated or poorly calibrated modes, or to develop specialized software for certain calibration and data reduction tasks. **Calibration Programmes** allow users to complement the existing calibration of ESO instruments and to fill any existing gaps in the calibration coverage. Regular workshops are also held to bring together instrument scientists and astronomers in order to discuss their experiences and identify challenges in order to continuously improve calibration of ESO's instruments. The latest such workshop was held in Santiago, Chile from January 16-19, 2017; further details are available on the [2017 ESO Calibration workshop](#) webpage.

Up to 3% of all the available observing time may be made available for Calibration Programmes. Calibration Programme proposals will be evaluated by the OPC with a view to balancing the added calibration value for future science with the more immediate return of the regular science proposals of the current Period. Calibration Programmes are reviewed by ESO with regards to their technical and operational feasibility.

Successful proposers will be required to deliver documentation, data products and software to ESO to support future observing programmes. The procedure to be followed is described at <http://www.eso.org/sci/observing/phase3.html>. The raw calibration data, as well as the advanced calibration products that are obtained as part of Calibration Programmes are non-proprietary and made available to the entire community through the ESO archive, and the respective instrument webpages. Scientific publications that make use of the data or results of Calibration Programmes will have to make reference to the corresponding proposals.

Calibration Programme proposals must be submitted using the ESIFORM template for Normal Programmes. In Box 7A (entitled “*Scientific rationale*”) the proposers should clearly state the limits of the existing calibration plan and the expected improvement that can result from the proposed observations. Moreover, the proposal should emphasise the relevance and the overall scientific gain of the calibration techniques and products resulting from these observations. Calibration Programmes do not pertain to any of the standard OPC categories (A, B, C or D), since in general they are not directly related to a unique scientific area: the special subcategory code L0 should be used to distinguish them. The PIs of Calibration Programmes are required to deliver to ESO the resulting Advanced Data Products within one year of the completion of the corresponding observations.

## 4.7 Director’s Discretionary Time

Up to 5% of the general available observing time may be used for **Director’s Discretionary Time** (DDT) proposals in the current Period. These programmes are generally of short duration (< 5 hours), though a longer time request may be granted if justified by a strong science case. Only DDT proposals belonging to one of the following categories will be considered:

- proposals of ToO nature requiring the immediate observation of a sudden and *unexpected* astronomical event;
- proposals requesting observations on a highly competitive scientific topic;
- proposals asking for follow-up observations of a programme recently conducted from ground-based and/or space facilities, where a quick implementation should provide break-through results;
- proposals of a somewhat risky nature requesting a small amount of observing time to test the feasibility of a programme.

DDT programmes that have target of opportunity runs should mark their corresponding Run Types as “TOO” in the `\ObservingRun` macro. See the ESIFORM User Manual for more details. DDT programmes involving ToO runs should also fill in the `\TOORun` macros in the ESIFORM proposal template as instructed.

Approved DDT proposals are carried out in Service Mode on Paranal and Chajnantor, or in Visitor Mode override on La Silla. Very few non-time-critical DDT proposals are foreseen to be approved so

proposers should provide a clear justification (in Box 8b of the proposal form) why the programme should be considered for DDT allocation and why it was not submitted through the regular OPC channel. In the absence of such a justification, the proposal will not be considered for DDT allocation, and the proposers will be encouraged to resubmit their proposals for the next appropriate OPC submission deadline. *As a general rule, proposals originally submitted to the OPC that were not allocated time should not be submitted as DDT proposals.*

DDT proposals may be submitted at any time. They must be prepared using the special ESOFORM DDT template. Proposers must upload the DDT ESOFORM template and submit their DDT proposals by registering and logging into the ESO User Portal. More details can be found at:

<http://www.eso.org/sci/observing/phase1/esoform.html>.

DDT proposals are reviewed by a DDT committee, which issues recommendations to the Directorate for Science. Urgent requests must be clearly identified in Box 5 (Special Remarks) of the proposal form.

## 4.8 Host State Proposals

Qualifying proposals whose PI is affiliated with an institute of the Host State (Chile) are counted as *Host State Proposals*. The designation as *Host State Proposal* is independent of the fraction of non-member state CoIs. Chile’s participation is regulated by the “Interpretative, Supplementary and Amending Agreement” to the 1963 Convention (Sect. 6.1).

## 4.9 Non-Member State Proposals

A **Non-Member State Proposal** is a proposal where 2/3 or more of the proposers are not affiliated to ESO member state institutes, independently of the nationality of the proposers and of the affiliation of the PI. Non-member state proposals are submitted in the usual way, but a separate set of criteria are used for the review of such proposals (see Sect. 6.1).

## 4.10 VLT-XMM proposals

With the aim of taking full advantage of the complementarity of ground-based and space-borne observing facilities, ESA and ESO have agreed to establish an environment for those scientific programmes that require observations with both the XMM-Newton X-ray Observatory and the ESO VLT(I) telescopes to achieve outstanding and competitive results.

By agreement with the XMM-Newton Observatory, ESO may award up to 290 ksec ( $\sim 80$  hours) of XMM-Newton observing time. Similarly, the XMM-Newton project may award up to 80 hours of ESO VLT observing time. This applies to the duration of an XMM-Newton cycle, which normally extends over two ESO observing Periods. However, proposers should take the limited availability of some of the VLT(I) instruments in Periods 103 and 104 into account. See Sect. 1.1 for more details regarding instrument availability during these Periods.

Proposers wishing to make use of this opportunity will have to submit a single proposal in response to either the [XMM-Newton](#) or the ESO call for proposals: proposals for the same programme submitted to both observatories will be rejected. To submit a proposal to ESO, the Normal Programme template must be used. Such a proposal will be reviewed exclusively by the OPC. A proposal submitted to the XMM-Newton Observatory will be reviewed exclusively by the XMM-Newton OTAC. Proposals that request different amounts of observing time on each facility should be submitted to the Observatory for which the greatest amount of time is required. The primary criterion for the award of observing time is that both VLT and XMM-Newton data are required to meet the scientific objectives of the proposal. The project does not need to require simultaneous XMM-Newton and ESO telescope observations. Targets of Opportunity and “Triggered Observations” are excluded from this cooperative programme.

It is the proposers’ responsibility to provide a full and comprehensive scientific and technical justification for the requested observing time on both facilities. Both the ESO and XMM-Newton ob-



servatories will perform feasibility checks of the approved proposals. They each reserve the right to reject any observation determined to be unfeasible for any reason. The rejection by one Observatory could jeopardize the entire proposed science programme.

Apart from the above the general policies and procedures currently in force for the final selection of the proposals, the allocation of observing time, the execution of the observations, and the data rights remain unchanged for both ESO and the XMM-Newton Observatory.

## 5 Observing Modes

In Period 103, most VLT and VLTI instruments will be offered in two modes: *Visitor Mode* (VM) and *Service Mode* (SM). These modes have been extensively described in the Data Flow Operations section of the [December 1997](#) and [June 1998](#) issues of *The Messenger*. Further information can be found in the articles on Service Mode scheduling in the [September 2001](#) issue and the article, “*Fifteen Years of Service Mode Operations: Closing the Loop with the Community*” in the [December 2014](#) issue. As part of the Phase 1 proposal, investigators are requested to specify which mode they desire. While every effort will be made to follow the proposed observing mode, ESO does reserve the right to allocate time in a mode that is different from the one requested. Note especially the restrictions of available modes detailed in Sects. 5.1 and 5.2 (including Designated Visitor Mode), as well as the policy in Sect. 6.3.

The telescope, as well as the instruments, will be operated by observatory staff only. The astronomer interfaces with the telescope and instruments via Observation Blocks (OBs), produced using a Phase 2 preparation tool:

- La Silla observers must use the latest [P2PP](#) version for all La Silla observations.
- Paranal observers must use the web tool [p2](#) for their observations.

Complete information on the preparation of OBs in Phase 2 can be found on the [Phase 2 Observing Preparation](#) webpage.

### 5.1 Visitor Mode

In **Visitor Mode** (VM) the astronomer is physically present at the observatory during the observations. Each approved VM run will be allocated specific calendar nights. One of the programme investigators will travel to the Observatory and execute the observations. Visitor Mode is not offered on VST, VISTA or APEX.

Data acquisition for all ESO instruments will be done by executing Observation Blocks (OBs), *i.e.*, observing sequences specified by the astronomer that are based on templates provided by ESO. VM investigators are strongly encouraged to prepare their OBs before arriving on the site using [p2](#) for Paranal and [P2PP](#) for La Silla. At the telescope, OBs can be created or further modified in real-time (with the exception of the FORS2 MXU mode). VM investigators will be required to arrive on Paranal before the start of their observing run as follows: 24 hours for UVES, and 48 hours for all other instruments. On La Silla, visiting astronomers shall arrive 1 to 2 days before the start of the observations, and may leave the site up to 1 to 2 days after the end of their observing run according to the transportation schedule (see the [La Silla Science Operations](#) webpage). Observers should note that twilight during Visitor Mode runs is used by the observatory to acquire calibrations and will be given to observers on a best-effort basis.

Note that programmes must be executed as specified and approved at Phase 1. The proposer should prepare a backup/alternative programme to be executed in place of the primary programme if the observing conditions are not ideal. The original science case and goals should be followed. Such backup programmes must be approved by ESO at least two weeks in advance of the observing run. Requests sent on shorter notice, in particular within less than 48 hours from the start of the run, may not be processed on time. In those cases, the corresponding data will not be accessible from the ESO Science Archive Facility until the request is approved. The corresponding requests must be submitted via the web-based form available at the Target/Instrument Setup [Change Request](#)

webpage. If the conditions prevent the Visiting Astronomer's primary programme to be executed the telescope will be used for the execution of Service Mode observations, if no backup programme is in place and Service Mode observations are possible on that telescope. Raw data are available for download shortly after acquisition.

Please note that **VM proposers must include overheads** for all science exposures. Guidelines are provided in the [Overheads](#) webpage.

Though it is very rare, the Observatory may interrupt Visitor Mode observation to allow Service Mode observations. In general, the Observatory does not compensate for weather or technical losses of observing time. However, compensation may be granted by the Director of the Observatory under exceptional circumstances.

### 5.1.1 ToO programme execution during VM observations

VM observations may be interrupted by time-critical DDT or ToO programmes. As far as possible, the execution of observations for such programmes will be confined to scheduled Service Mode Periods. Under exceptional circumstances, the Director of the Observatory may decide to interrupt VM runs to allow ToO observations. ToO runs in the Rapid Response Mode (RRM) may also interrupt VM observations (see Sect. 4.4.1).

### 5.1.2 Designated Visitor Mode

ESO reserves the right to allocate telescope time in Designated Visitor Mode (DVM) instead of regular VM for any runs with a duration smaller than one night and a justified need for VM. The final decision will be based on the technical feasibility of the programme and Principal Investigators will be informed of their DVM time allocation via the web letters.

Designated VM observations on Paranal are scheduled on specific dates/slots as if they were regular Visitor Mode runs, but they are executed by an ESO staff member, in close contact (e.g. via phone, Skype or video link) with the Principal Investigator, or someone the PI designates to serve as the liaison with the Observatory. Since Period 100, a new web-based tool called POEM (Paranal Observatory Eavesdropping Mode) has been offered for observations in Designated Visitor Mode. Details on POEM are available in the [POEM Instructions](#) webpage. More details on DVM, including all requirements concerning the preparation of DVM runs are provided on the [Paranal Sciences Operations](#) webpages. As for normal Visitor Mode runs, the users can request additional science targets, instrument setup changes and backup targets. However, such requests must be submitted at least 4 days in advance of the run, in line with the submission of the overall material to the Observatory. Otherwise, such requests will not be processed.

Due to the reduced operations at La Silla, Designated Visitor Mode is being offered on a best-effort basis, with the following restrictions: in general, only one DVM programme per night can be executed so only the highest ranked runs are likely to be supported; OBs must be rounded up to the nearest tenth of a night (e.g., 0.1n rather than 0.07n) whenever possible; OBs scheduled in DVM must be submitted using p2pp v3.4.2 by the Phase 2 deadline; observations will be executed by a telescope operator and contact with the PI is therefore very limited. Please contact [opo@eso.org](mailto:opo@eso.org) **well before the proposal submission deadline** if you would like your programme to be considered for DVM at La Silla.

## 5.2 Service Mode

Over half of the total time available for observations on Paranal will be carried out in Service Mode (SM). SM is also the only mode supported for APEX, VST and VISTA. It is not offered on any La Silla telescope.

Investigators with runs allocated in SM will be required to specify their programme by submitting a Phase 2 package in advance to ESO. This package consists of OBs, finding charts, a Readme form and, if applicable, ephemerides. Observers intending to submit proposals to be executed in SM may

find it useful to familiarize themselves with the Phase 2 Service Mode [guidelines](#). Once the OBs are completed, they will be submitted to ESO for verification and acceptance.

Accepted OBs will be executed by ESO staff based on their OPC-recommended priority and a proper match between the requested and the actual observing conditions. An article about SM scheduling appeared in [The ESO Messenger \(2001, v. 105, p. 18\)](#). The article helps proposers understand how they may optimise their use of this observing mode, and it should be considered compulsory reading for SM proposers. SM PIs and their data delegates have direct access (via their personal ESO User Portal account) to their own raw proprietary data as soon as the data is ingested in the ESO Archive. Note that in Service Mode the proprietary period for a given science file starts as soon as the data are made electronically available to PIs or to those to whom they have delegated their data access rights.

Please note that **SM proposers must include overheads** for all science exposures. Guidelines are provided in the [Overheads](#) webpage.

ESO will absorb all the time required to complete the calibration sequences to the level of accuracy foreseen in the calibration plans as well as overheads associated with such calibrations. More information on the Paranal calibration plans can be found from the VLT/VLTI [Instrument Pipelines](#) webpage and the respective instrument User Manual. If those calibrations are not adequate, the SM proposer must include time for any additional calibrations including overheads.

Proposers are especially encouraged to request Service Mode (on Paranal) if their programme involves Target of Opportunity events or synoptic observing, or if they require the best observing conditions (which occur at unpredictable intervals). Further information on SM observing may be found in the [Service Mode Guidelines](#).

### 5.2.1 Service Mode policies

To ensure the efficiency of Service Mode (SM) observing, ESO has implemented a number of rules for procedures and limitations on SM runs. They need to be carefully considered at the time of preparing a proposal for SM observations and are summarised here. Please note that these items have important consequences on the way that execution overheads must be taken into account. Please consult the Phase 2 webpages for the latest information on [SM policies](#) and [SM OB rules](#). Proposers should note that Phase 1 constraints are [binding](#) (see Sect. 6.5).

- **Some observing strategies cannot be supported in Service Mode;** in particular, real-time decisions about complex OB sequencing, or decisions based on the outcome of previously executed OBs (like adjustment of integration times or execution of some OBs instead of others).
- **Observation Blocks (OBs) execution.** Since efficient SM operations require continuous flexibility to best match the OB constraints with actual observing conditions, OBs for a given run are normally scheduled non-contiguously. It is thus not possible to reduce acquisition overheads by requiring the sequential execution of OBs with the same target field. Exceptions to this are made for OBs within concatenation scheduling containers; also see the [Programmes with linked time requirements](#) item below.
- **Multi-mode, multi-configuration OBs are normally not permitted in SM.** Although multiple configurations within one OB may sometimes reduce overheads, scheduling and calibrating such OBs is extremely inefficient and can increase the calibration load to an unsustainable level. Examples of such multi-configuration OBs are those combining imaging and spectroscopy in a single OB, spectroscopy with multiple grisms or central wavelength settings, or imaging with a large number of filters (although most imagers allow multiple broadband filters in one OB). Multi-configuration OBs are accepted only if duly justified and authorized by means of a [Phase 2 Waiver Request](#).
- **OB Total Execution Time.** Proposers should make sure that all overheads, including telescope presetting and acquisition [overheads](#) have been properly included. For Paranal instruments, this can also be done using the [p2 demo interface](#) via a web browser.

- **OB execution times must be below 1 hour.** This rule also applies to concatenated OBs in most cases. Long OBs and concatenated OBs are more difficult to schedule and execute within the specified constraints because of the unpredictable evolution of the observing conditions. OBs taking more than one hour to execute are not normally accepted. Proposers are especially encouraged to plan for OBs substantially shorter than one hour if the execution conditions are particularly demanding, as the fulfillment of all the constraints during the entire execution time becomes more unlikely as the OB becomes longer. Please see the “[Service Mode OBs](#)” item in Sect. 1.2 for more information.

- **Fulfillment of Phase 2 constraints:** ESO will consider an OB as successfully executed if all the conditions in the constraint set are fulfilled. OBs executed under conditions marginally outside constraints by no more than 10% of the specified value will not be scheduled for re-execution. Please note that OBs executed marginally outside specified LST constraints by no more than 20 minutes will not be scheduled for re-execution. AO-assisted observations with NACO or SINFONI within 50% of the requested Strehl ratio will not be repeated (assuming that other constraints are suitably met).

VLTI OBs executed marginally outside the specified LST intervals by no more than 30 min will not be scheduled for re-execution.

- **Programmes with linked time requirements:** SM is also intended to support programmes with special timing requirements. However, proposers planning such programmes should keep in mind that at most 60% of both bright and dark time is allocated to SM (on Paranal), and that observing conditions cannot be predicted when a time-series is started. This means that timing sequences that are extremely long and/or complex, timing links that are very restrictive, and time-series for observations requiring excellent observing conditions, are unlikely to be successfully completed. Therefore, all such proposals are reviewed for technical feasibility and may be rejected if judged to be too complex. Proposers for programmes requiring timing links are strongly encouraged to consider how they may simplify their timing sequences as much as possible, as this will minimize the risk that the observations are deemed unfeasible. They should also read the [Time-critical OB execution policy](#) webpage.

If a given OB cannot be executed within its intended observability window, it will be removed from the observing queue and will not be attempted again. If it was part of a time-linked series, then the time-series observation will continue with the next OB if appropriate. ESO will not restart a sequence of linked observations if the pre-specified timing constraints cannot be fulfilled. More details on how the p2 tool can be used to time-link, group or concatenate various OBs, are described on the [Phase 2 preparation](#) webpages.

- **ToO programme execution:** Successful proposers of ToO runs will have to prepare OBs for their observations well ahead of the beginning of an observing Period (see Sect. 5.2). Most ToO OBs will have to be “dummy” OBs with default values for target coordinates, integration times etc. Starting in Period 103, at the time of occurrence of the predicted event, the PI of the programme (or one of his/her delegates) will be required to copy one of the template OBs and provide the missing information. The service observer will update and execute the specified OBs. The Phase 2 [ToO Procedures](#) webpage will be fully updated prior to Period 103.

## 6 Policy Summary

Several policies regarding all aspects of the use of ESO telescopes have been refined over the years by the ESO Council, as advised by the Observing Programmes Committee (OPC), and by the Science and Technology Committee (STC). Here we summarize those policies relevant for ESO proposers for Period 103. For details on individual policies we refer proposers to the [VLT/VLTI Science Operations Policy](#) document.

### 6.1 Who may submit, time allocation policies

ESO proposals may be submitted by any group or individual. One single person, the **Principal Investigator** or PI, must be assigned to be responsible for the programme. The PI will also act as

the official contact between ESO and the proposers for all later correspondence (Phase 2 information, data distribution, etc.). By submitting a proposal, the PI takes full responsibility for its contents, in particular with regard to the names of CoIs and the agreement to follow the ESO policies and regulations, including the conditions specified in the present Call for Proposals. Following the introduction of the ESO User Portal, PIs identify themselves uniquely in Phase 1 proposals by their User Portal username. Note that each individual is allowed to have only one account in the User Portal database; multiple accounts must not be created. Failure to comply with this restriction may lead to the rejection by ESO of the corresponding proposals.

All valid proposals received by ESO prior to the submission deadline will be reviewed by the OPC, who will rank them according to the scientific merit and the importance of its contribution to the advancement of scientific knowledge. Furthermore, proposals should provide evidence that the proposing individual or team have the expertise and sufficient resources to carry out the analysis.

Proposals should be self-contained. The evaluation will be based solely on their contents.

For non-member state proposals (Sect. 4.9) the additional criteria listed below will be taken into account.

- The required telescope/instrumentation is not available at any other observatory accessible to the applicants.
- If an ESO member state proposal and a non-member state proposal are rated equally, preference will be given to the ESO member state proposal.<sup>2</sup>

The following policy, extracted from the agreement between ESO and its host state Chile, governs the allocation of time to **Host State Proposals** (Sect. 4.8): “Chilean scientists who present meritorious projects shall have the right to obtain up to 10% of the observing time of ESO telescopes”. For VLT projects at least one half of this 10% shall be dedicated to projects of Chilean astronomers in cooperation with astronomers of ESO member countries.

Following the recommendations of the OPC and a technical feasibility check, the ESO Director General grants observing time based on the OPC ranking and the availability of telescope time.

## 6.2 Requesting use of non-standard observing configurations

Proposers should pay particular attention to the fact that, as indicated in the instrument manuals, use of certain non-standard instrumental modes or configurations requires prior approval by ESO. This approval must be obtained before submitting the Phase 1 proposal. Corresponding requests, including a brief justification, must be submitted by e-mail to [usd-help@eso.org](mailto:usd-help@eso.org) at least two weeks before the proposal submission deadline. Failure to follow this rule may lead to the rejection of the proposal by ESO for technical reasons.

Users who wish to request a new (own) filter to be installed, particularly in the cryogenic instruments (*e.g.*, HAWK-I, VIRCAM) must approach ESO via [usd-help@eso.org](mailto:usd-help@eso.org) at least 3 months before submitting a proposal requesting that filter. Failure to follow these guidelines may lead to the rejection of the proposal by ESO for technical reasons.

## 6.3 Policy regarding offered/available observing configurations

Users will be promptly informed if it becomes impossible to support some currently offered instrument mode, and may be asked to switch from Service Mode to Visitor Mode or vice versa. In general, runs requiring non-standard configurations will only be accepted in Visitor Mode.

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<sup>2</sup>Proposals from astronomers based in Australia will be considered as proposals from astronomers based in ESO Member States.

## 6.4 Observing programme execution

Observations in both Visitor and Service Mode must be executed as described in the Phase 1 proposal, including the instrument modes and specified targets. Departures from Phase 1 specifications and targets will not generally be allowed, unless a sound scientific justification exists, and provided that the change involves neither a significant increase in the pressure factor on oversubscribed regions of the sky nor a scientific conflict with another, already approved, observation. The request for changes of targets and instrument setup(s), along with the corresponding scientific justification, must be submitted via the web-based form available at

<http://www.eso.org/sci/observing/phase2/ProgChange/>.

For any other departure from Phase 1 specifications a justification must be provided in writing to [paranal@eso.org](mailto:paranal@eso.org) at least one month before the beginning of the observations for runs scheduled in Visitor Mode. For Service Mode runs, these requests and associated justifications must be submitted to [usd-help@eso.org](mailto:usd-help@eso.org) or to [p2pp-waiver@eso.org](mailto:p2pp-waiver@eso.org) (clear instructions are available at <http://www.eso.org/sci/observing/phase2/SMGuidelines/WaiverChanges.html>) at least one week before the Phase 2 deadline (also see Sect. 6.5).

ESO reserves the right to reject the changes if they are insufficiently justified, conflicting with any other approved programmes, or imply significant changes in the overall distribution of scheduled targets in the sky. Observations of targets for which no authorization has been obtained are not allowed at the telescope.

Observations requiring the use of the Laser Guide Star Facility (LGSF or 4LGSF) are subject to the policies described in the [VLT Laser Guide Star Facility Policies](#).

### 6.4.1 Service Mode run execution

The runs to be conducted in Service Mode will be subdivided into the following classes for operational reasons:

- **Class A:** All possible efforts will be made to execute all OBs corresponding to the runs in the requested observing Period. Approximately the first half (according to the OPC ranking) of the total amount of Service Mode time scheduled on each telescope falls in this class.
- **Class B:** These runs will be executed in the requested observing Period on a best-effort basis. Approximately the second half (according to the OPC ranking) of the total amount of Service Mode time scheduled on each telescope falls in this class.
- **Class C:** Filler runs. OBs will only be executed if the observing conditions do not permit observations for runs within classes A and B. The “any-weather” proposals mentioned in Sect. 1.2 would fall under this category.

For Class A runs that are not completed by the end of Period 103, ESO will decide whether they can be declared “substantially complete” or have to be carried over to the next Period, provided that this is technically feasible. The PIs of all Class A runs will be informed about their eligibility for carryover one month before the proposal submission deadline for Period 104. In general, a Class A run will not be carried over for more than one additional natural visibility Period. Class B and C runs will not be carried over. Monitoring Programme and ToO runs are by definition Class A regarding priority in execution but they will not be carried over to the following Periods regardless of their completion status. As Monitoring Programmes span multiple Periods for the purposes of monitoring individual targets/fields this removes the necessity for the creation of carryover runs.

Proposers are particularly encouraged to consider their observing strategy and how they can simplify any time constraints as much as possible to increase the chances of their observations being scheduled. Guidelines on the handling of time-critical OBs are available at the [Time-critical OB execution policy page](#).

## 6.5 Phase 2 Service Mode policy: constraints and targets are binding

In order to optimize the use of ESO telescopes in Service Mode for a given Period, it is necessary to maintain a proper mix of runs requiring a variety of observing conditions, and with targets spread over the entire range of RAs. For this reason, proposers are requested in their Phase 1 proposal to specify not only the targets with accurate coordinates, but also the required observing conditions (lunar phase, seeing, sky transparency). **Due to their essential role in determining the long-term scheduling of Service Mode time, the constraints specified at Phase 1 are binding.** Successful proposers will not be allowed to change the instrument setups, target lists and/or times per target that were requested at Phase 1 in their Phase 2 submissions, unless explicitly authorized by ESO (see Sect. 6.4). The relaxation of observing constraints is allowed at Phase 2 only. See Sect. 6.4 for more details on how to request waivers for Service Mode runs.

## 6.6 Pre-imaging runs

A separate run must be specified for a VLT programme requiring pre-imaging. If this is not specified in the proposal, the time needed for the execution of the pre-imaging will be deducted from the total allocation of the project. Pre-imaging runs are always scheduled in priority class A, but must be specified as pre-imaging runs as this will not occur automatically. Please be sure to indicate the pre-imaging character of the run by using the corresponding `\INSconfig` macro in the L<sup>A</sup>T<sub>E</sub>X ESOFORM template. Note that pre-imaging OBs are not allowed to be in concatenation containers. The execution time for the pre-imaging run has to be calculated for single OBs.

## 6.7 Data rights, archiving, data distribution

All data obtained with ESO facilities are ESO property. ESO grants a 12-month proprietary period for science and acquisition data to the PI of the programme. This period applies to each data file individually. The proprietary period starts as soon as the data is made available to the PI or respective delegates via the [ESO Science Archive Facility](#), *i.e.*, as soon as the data are ingested. Should you wish to specify a shorter period than the nominal 12 months in Period 103, please do so using the `\ProprietaryTime` macro in the L<sup>A</sup>T<sub>E</sub>X ESOFORM template. Raw data of Public Surveys and calibration data are not subject to a proprietary period and become publicly available as soon as they are ingested in the ESO Archive.

For both Visitor Mode and Service Mode observations, the ESO Science Archive Facility is the sole access point to data obtained with ESO telescopes: <http://archive.eso.org>. PIs of Service and Visitor Mode programmes and their data delegates have access to their proprietary raw data as soon as the data have been ingested in the ESO Archive, which typically happens a few hours after the observation. Access to the data is provided after the PI or delegate supplies their ESO User Portal credentials. The [CalSelector](#) archive service for VLT instruments combines the science files with any ancillary files that are needed to process the data, (*e.g.*, acquisition images, calibrations, etc.).

## 6.8 Publication of ESO telescope results

Publications based on observations collected at ESO telescopes must state this in a footnote to the article's title or in the acknowledgments, as outlined on the [ESO publications policy](#) webpage. The observing run ID(s) must be clearly identified by their ESO reference number(s) as shown in the following example:

*“Based on observations collected at the European Southern Observatory under ESO programme 103.C-1234(A).”*

## 6.9 Press Releases

Should you consider that your results are worthy of a press release to the general public, please contact the ESO Outreach Department ([information@eso.org](mailto:information@eso.org)) as soon as possible, preferably no

later than when the paper is submitted for publication. ESO reserves the right to use for press releases any data obtained with ESO telescopes as part of programmes with allocated ESO time.



## Part III

## Appendix

## A Acronyms

AMBER	Astronomical Multi-BEam combineR
AOF	Adaptive Optics Facility
APEX	Atacama Pathfinder EXperiment
ARTEMIS	ARchitectures de bolomètres pour des TÉlescopes à grand champ de vue dans le domaine sub-Millimétrique au Sol
AT	Auxiliary Telescope for the VLT Interferometer
CHAMP+	Carbon Heterodyne Array of the MPIfR
CIAO	GRAVITY Coudé Infrared Adaptive Optics system for the VLT Interferometer
CoI	Co-Investigator
CONICA	High-Resolution Near Infrared CAmera
CRIRES	CRyogenic high-resolution IR Échelle Spectrometer
DDT	Director's Discretionary Time (proposal)
DSM	Deformable Secondary Mirror
EFOSC2	ESO Faint Object Spectrograph and Camera 2
EE	Encircled Energy
ESO	European Southern Observatory
ESPRESSO	Échelle SPectrograph for Rocky Exoplanets and Stable Spectroscopic Observations
ETC	Exposure Time Calculator
FLAMES	Fibre Large Array Multi Element Spectrograph
FLASH	First-Light Apex Sub-millimeter Heterodyne
FORS2	FOcal Reducer/low dispersion Spectrograph 2
GALACSI	Ground Atmospheric Layer Adaptive Corrector for Spectroscopic Imaging
GLAO	Ground Layer Adaptive Optics
GRAAL	GRound layer Adaptive optics Assisted by Lasers
GRAVITY	Second generation VLTI instrument in the K band
GTO	Guaranteed Time Observations
HARPS	High Accuracy Radial velocity Planet Searcher
HAWK-I	High Acuity Wide field K-band Imager
ICCF	Incoherent Combined Coudé Focus
IF	Intermediate Frequency
IFS	Integral Field Spectrograph
IR	Infrared
IRDIS	InfraRed Dual-Band Imager and Spectrograph
ISAAC	Infrared Spectrometer And Array Camera
KMOS	K-band Multi-Object Spectrograph
LABOCA	LArge BOlometer CAmera
LGS	Laser Guide Star
LGSF	Laser Guide Star Facility
LRS	Low-Resolution Spectroscopy
LSS	Long Slit Spectroscopy
LST	Local Sidereal Time
LTAO	Laser Tomographic Adaptive Optics
MACAO	Multi-Applications Curvature Adaptive Optics
MATISSE	Multi AperTure mid-Infrared SpectroScopic Experiment
MOS	Multi-Object Spectroscopy
MPIfR	Max-Planck-Institut für Radioastronomie
MRS	Medium-Resolution Spectroscopy
MUSE	Multi-Unit Spectroscopic Explorer

NACO	NAOS-CONICA
NAOMI	New Adaptive Optics Module for Interferometry
NAOS	Nasmyth Adaptive Optics System
NEAR	New Earths in the $\alpha$ Cen Region
nFLASH	new First Light APEX Submillimetre Heterodyne instrument
NGS	Natural Guide Star
NIRPS	Near Infra-Red Planet Searcher
OB	Observation Block
OMEGACAM	Wide Field Imager for the VST at Paranal
OPC	Observing Programmes Committee
OPO	Observing Programmes Office
p2	web-based phase 2 proposal preparation tool
P2PP	Phase 2 Proposal Preparation (software tool)
PI	Principal Investigator
PIONIER	Precision Integrated-Optics Near-infrared Imaging ExpeRiment
POEM	Paranal Observatory Eavesdropping Mode
PWV	Precipitable Water Vapour
RA	Right Ascension
RRM	Rapid Response Mode
SABOCA	Submillimetre APEX BOLometer CAMera
SAM	Sample Aperture Mask
SEPIA	Swedish-ESO PI receiver for APEX
SHFI	Swedish Heterodyne Facility Instrument
SINFONI	Spectrograph for INtegral Field Observations in the Near Infrared
SM	Service Mode
SPHERE	Spectro-Polarimetric High-contrast Exoplanet REsearch
SPIFFI	Spectrometer for Infrared Faint Field Imaging
STS	Star Separator System
ToO	Target of Opportunity
ULTRACAM	High speed camera
USD	User Support Department
UT1	Unit Telescope 1 (Antu)
UT2	Unit Telescope 2 (Kueyen)
UT3	Unit Telescope 3 (Melipal)
UT4	Unit Telescope 4 (Yepun)
UV	Ultra Violet
UVES	UV-Visual Échelle Spectrograph
VIMOS	VIisible MultiObject Spectrograph
VIRCAM	VISTA InfraRed CAMera
VISIR	VLT Imager and Spectrometer for mid-InfraRed
VISTA	Visible and Infrared Survey Telescope for Astronomy
VLT	Very Large Telescope
VLTI	Very Large Telescope Interferometer
VM	Visitor Mode
VST	VLT Survey Telescope
XFFTS	eXpanded Fast Fourier Transform Spectrometer
X-SHOOTER	UV-Visual-NIR medium resolution échelle spectrograph
ZIMPOL	Zurich IMaging POLarimeter