



# ESO Call for Proposals — P112

Proposal Deadline: 28 March 2023, 12:00 noon CEST



# Call for Proposals

## ESO Period 112

**Proposal Deadline: 28 March 2023,  
12:00 noon Central European Summer Time**

**Issued 28 February 2023**

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 submit your enquiries through the [ESO Helpdesk](#).

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).

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## Part I

# Phase 1 Instructions

## 1 ESO Proposals Invited

The **European Southern Observatory (ESO)** invites proposals for observations at ESO telescopes during Period 112 (**1 October 2023 – 31 March 2024**). 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)  
[\*\*NIRPS\*\*](#) (Near Infra Red Planet Searcher)  
[\*\*ULTRACAM\*\*](#) (High speed, three channel CCD camera)

### Paranal

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[\*\*CRIRES\*\*](#) (Cryogenic high-resolution IR Échelle Spectrograph)  
[\*\*ESPRESSO\*\*](#) (Échelle SPectrograph for Rocky Exoplanets and Stable Spectroscopic Observations)  
[\*\*ERIS\*\*](#) (Enhanced Resolution Imager and Spectrograph)  
[\*\*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)  
[\*\*PIONIER\*\*](#) (Precision Integrated-Optics Near-infrared Imaging ExpeRiment)  
[\*\*SPHERE\*\*](#) (Spectro-Polarimetric High-contrast Exoplanet REsearch)  
[\*\*UVES\*\*](#) (UV–Visual Échelle Spectrograph)  
[\*\*VISIR\*\*](#) (VLT Imager and Spectrometer for mid-InfraRed)  
[\*\*X-SHOOTER\*\*](#) (UV–Visual–NIR medium resolution échelle spectrograph)

**IMPORTANT:** Since Period 110, ESO has been employing Distributed Peer Review (DPR) for approximately half of the submitted proposals (see Sect. 1.1). ESO proposals must be submitted using the web-based tool [p1](#). In addition, as previously [announced](#), ESO requests all science users to provide more detailed and updated information in their User Portal profile. Users failing to do this will not be able to submit a proposal as PI and/or as CoI. Furthermore, restrictions imposed by the global COVID-19 pandemic may result in changes to the content and conditions provided in this Call that cannot be foreseen at the time of writing. In particular, runs scheduled in Visitor Mode during Period 112 may need to be executed in Designated Visitor Mode if travel restrictions are in place.

Further information can be found via the [Phase 1](#) webpage. Details on the instruments and ESO facilities offered in Period 112 can be found on the La Silla Paranal Observatory [Call for Proposals](#) webpage. The main characteristics of all Period 112 instruments offered at La Silla and Paranal 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:

**28 March 2023,  
12:00 noon Central European Summer Time.**

Please note that it is the responsibility of the Principal Investigator (PI) to resolve any problems related to the submission of their proposal well before the deadline. ESO cannot provide support beyond 11:00 CEST on the day of the deadline. No submissions or amendments to submitted proposals can be accepted after 12:00 CEST.

In each submitted proposal, one single person, namely the PI, is the primary responsible. Submitting a proposal implies that the PI and their 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. PI and all co-Is must be registered in the ESO User Portal and will all receive an email notification when they are added to (or removed from) the proposal.

Any questions about policies or the practical aspects of proposal preparation, including technical requirements of the planned observations, should be sent to ESO via the [ESO Helpdesk](#).

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 110 and 111)

### 1.1.1 General

- **Distributed Peer Review:** Since Period 110, ESO is employing Distributed Peer Review (DPR) for approximately half of the submitted proposals. In this paradigm, first introduced by [Merrifield & Saari \(2009\)](#), all PIs of proposals qualifying for DPR accept to review a number of proposals ( $N$ ) submitted by their peers during the same cycle. Correspondingly, they accept that their proposals are reviewed by  $N$  peers who submitted proposals in the same cycle. More details and background information on DPR at ESO can be found in [Patat et al. \(2019\)](#), users should familiarise themselves with the [DPR rules and guidelines](#).

For Period 111 there are no changes to the DPR process introduced in Period 110. The  $N = 10$ , and the criteria describing the proposals which qualify for DPR are as follows:

1. All proposals requesting a total time (including overheads) of less than **16 hours** are assigned to DPR. This time threshold is set to have an approximate 50/50 distribution between DPR and panels, and it is based on the time request statistics compiled in recent cycles.
2. Exceptions to this general rule are proposals including at least one ToO run, proposals for Calibration Programmes and DDT proposals.
3. All other proposals submitted for the regular cycle will be reviewed in the classical way by the OPC and the panels.



Since Period 110, the review channel (DPR vs. panels) is assigned at the time of proposal submission, based on the above rules. The PI (or delegated PI; dPI) is informed about the assigned review process and prompted to formally accept the conditions at the time of submission. At this stage the PI/dPI can delegate the reviewer’s role to one of the co-Is listed in the proposal. The delegation can also occur when the list of co-Is is specified.

By submitting a proposal qualifying for DPR, the PI/dPI commits to follow the DPR rules (see [DPR rules and guidelines](#)).

- **New scientific keywords:** Since Period 110, a new set of scientific keywords replaces the OPC categories. While preparing their proposals in p1, users must select at least two keywords, and at most five keywords (ten keywords for Large Programmes), except that proposals for Calibration Programmes do not require any keywords. The keywords must be selected in decreasing order of relevance (*i.e.*, the first selected keyword is the most relevant). We emphasise that the scientific keywords are important for assignment of the proposals to the reviewers.
- **Proposal anonymisation:** Period 108 marked the full deployment of the Dual-Anonymous Peer Review (DAPR) in the evaluation of proposals for observations at ESO telescopes. Applicants must formulate the scientific rationales of their proposals following the anonymisation rules and examples described [in this link](#), which also gives a detailed description of the DAPR paradigm. While Period 106 was used as a dry run, both to make the community aware of the upcoming implementation of DAPR and to test its practical, procedural and policy aspects, since Period 108 proposal anonymisation is mandatory. Failure to abide by the DAPR rules may lead to the disqualification of the proposal.

The fields **Background and Expertise** and **Data Product Delivery Plan** (in the case of Large Programmes) are the only fields of the proposal in which information on the proposing team can be disclosed. These fields – as well as the fields **Investigators**, **Previous Usage** and **Applicants’ Publications** – will not be included in the material distributed to the referees during the proposal review phase, and will only be accessible to them after the ranking phase is completed.

- **Large Programmes (LP):** [Large Programme](#) proposals are only accepted in even Periods, *i.e.*, Periods with proposal submission deadline in March or April.

Large Programmes can be requested to start either in the semester of the Call or in the subsequent semester (the following odd Period), but the programme can extend at most over four consecutive semesters from the semester of the Call (*e.g.*, currently up to Period 115).

ESO strives to execute Large Programmes over shorter periods of time (aiming at two semesters by default), while maintaining the ceiling of 30% of the observing time allocated to Large Programmes set by ESO Council in 2004. Thus, 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 aim at increasing the scientific impact of ESO’s telescopes.

See Sect. 4.4 for restrictions on instruments and modes for Large and Monitoring Programmes.

- **Facility changes:** Changes in any of the technical capabilities of the full ESO instrument suite in Period 112 can be found via the [Recent Changes in Instrumentation](#) webpage. Before writing a proposal for a given instrument, users are urged to check the instrument’s news webpage covering details not contained in this Call (*e.g.*, for X-SHOOTER: <https://www.eso.org/sci/facilities/paranal/instruments/xshooter/news.html>).
- **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. 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.

- **Guaranteed Time Observations (GTO):** GTO will be carried out in Period 112 with **GRAVITY** and **MATISSE** (UTs and ATs), **NAOMI** (ATs) on any VLTI instrument, as well as with **CRIRES**, **ESPRESSO**, **ERIS**, **ULTRACAM**, and **NIRPS**. Please see Sect. 4.5 for information on the number of nights allocated to GTO programmes in Period 112. For details about the protected targets, please see: <https://www.eso.org/sci/observing/teles-alloc/gto/112.html>.

### 1.1.2 Paranal

- **Joint VLT/I-ALMA proposals** - For the first time, in P112, ESO is introducing a joint channel for scientific programmes requiring both VLT/I and ALMA observations. See 4.11 for more information.
- **Rapid Response Mode (RRM) activation policy:** The RRM policy changed starting in Period 105: on-going observations on any VLT instrument can be interrupted by an RRM triggered on that specific UT, even if the trigger requires a change of focus, unless the relevant programme is specifically protected against an RRM trigger (in case of strictly time-critical programmes). The change is fully operational on all UTs since Period 109. Users are encouraged to read Sect. 4.8.2, which describes in more detail this new aspect of the RRM policy.
- **Joint VLT/I-XMM proposals:** It will not be possible to apply for VLT-XMM time in Period 112; proposals under this scheme will be invited again in Period 113.
- **Distribution of UT instruments:** For Period 112 the distribution of offered instruments on the UT foci is shown in Table 1. ESPRESSO can be operated from any of the four UTs in 1-UT mode and employs the four UTs simultaneously in 4-UT mode.

	Nasmyth A	Cassegrain	Nasmyth B
UT1	Visitor Instrument (Sect. 3)	<a href="#">FORS2</a>	<a href="#">KMOS</a>
UT2	<a href="#">FLAMES</a>	<a href="#">VISIR</a>	<a href="#">UVES</a>
UT3	<a href="#">SPHERE</a>	<a href="#">X-SHOOTER</a>	<a href="#">CRIRES</a>
UT4 - AOF	<a href="#">HAWK-I</a>	<a href="#">ERIS</a>	<a href="#">MUSE</a>
ICCF	<a href="#">ESPRESSO</a>		
VLTI	<a href="#">GRAVITY</a> <a href="#">MATISSE</a> <a href="#">PIONIER</a>		

Table 1: Distribution of offered UT instruments in Period 112.

- **Remarks on UT instruments:**
  - The UT1 Nasmyth A focus is available for a **Visitor Instrument** during Period 112.
  - Several additional new modes and functionalities will be offered for [ERIS](#) in Period 112. The bright magnitude limit for NGS has been removed, and the faint magnitude limit for LGS tip-tilt stars has been relaxed from RP=17 to RP=18. Seeing-enhancer mode is offered for targets without suitable tip-tilt stars. Non-sidereal and differential tracking modes are also offered. For NIX, the three sparse aperture masks are now offered, as well as detector windowing with four preset subarrays sizes.
  - [KMOS](#): The Calibration Plan has been updated concerning telluric star observations with respect to Periods 110 and 111. Starting in Period 112, the observatory will only provide one telluric obtained in twilight at average airmass. Please check the [KMOS News webpage](#) and the KMOS User Manual for Period 112 for further details.
  - At [ESPRESSO](#), the Laser Frequency Comb (LFC) is now fully operational and proposals requesting it for wavelength calibration will be accepted. User will still need to clearly

indicate the need for the LFC for their science. The instrument status is regularly updated in the [ESPRESSO news](#) webpage.

- With the availability of superior VLT capabilities, the IFU mode of [X-SHOOTER](#) has been decommissioned and is not available anymore since Period 111.

- **Remarks on Survey Telescopes:**

- [OMEGACAM](#) at the VST is no longer offered.
- [VIRCAM](#) is no longer offered.
- [4MOST](#) surveys have already been selected and there is no plan for a specific call for 4MOST observations in the next years.

- **Remarks on VLTI operations:**

- **Support for VLTI proposals:** For VLTI users needing assistance to prepare their VLTI proposals, the community-supported [VLTI Expertise Centres](#) – distributed throughout Europe – can offer in-depth support. They also offer support for observation preparation, advanced data reduction and analysis.
- Users are encouraged to submit proposals whose targets are observable from early October till November (**around RA=0h**) as this range is usually undersubscribed.
- From Period 112, ESO introduces the **extended configuration A0–B5–J2–J6**, offering the longest baselines on the VLTI platform. It is offered for single-field operations with all instruments. Due to the redundancy with the Astrometric configuration, the current large configuration A0–G1–J2–J3 will no longer be offered. The current Astrometric configuration is renamed "Large".
- **Relocation configurations:** For operational reasons, observations may take place on relocation configurations during a transition between two standard configurations. A criterion of at least 50% baseline length overlap will be used. This scheme will be primarily used for imaging runs. The overlap in baseline length between standard and relocation configurations is detailed in the [VLTI Configurations Overview](#) webpage.

- **Remarks on VLTI instruments:**

- **[GRAVITY \(astrometric measurements\)](#):** ESO invites proposals with the goal of performing astrometric measurements, a capability which is still under development (see, *e.g.*, the following articles: [Gravity collaboration, 2017, A&A 602, A94](#) and [The Messenger 170, 10](#)). Proposers who need help with the preparation of GRAVITY astrometric observations are invited to contact the [ESO Helpdesk](#) well in advance of the deadline.
- **[GRAVITY dual-field wide mode](#):** Since Period 110 a new dual-field wide observing mode is offered for the UTs and the small and large (previous astrometric) configurations of the ATs. This mode allows fringe tracking from a target that is up to 30 arcsec away from the science target by using the VLTI Star Separators to separate the beams. The magnitude limits of the fringe tracker and acquisition camera and the expected sensitivity for the science camera in this mode can be found on the [GRAVITY webpages](#) and are based on a preliminary characterisation of the mode. Due to the need of good atmospheric conditions (turbulence category 30% and better), observations are strongly encouraged to be carried out in service mode to ensure that the conditions are met. Note that the dual-field wide mode only provides relative measures (differential visibilities and phases), no absolute visibilities, due to atmospheric effects when separation increases. Calibrations of the interferometric transfer function are thus not needed and not offered for this mode.
- For [MATISSE](#) targets for which photometry may be too noisy, direct measurement of the **correlated fluxes** is possible for objects with lower fluxes than for visibility measurements. See the [MATISSE news page](#) for details. Absolute calibration of correlated fluxes requires special calibrators, as not only their sizes need to be known, but also their SED. Please contact the [VLTI Expertise Centre at Leiden Observatory](#) for help with selecting appropriate calibrators and data reduction.

- As from Period 112, [MATISSE](#) is offered for **narrow off-axis** mode for exo-planet and similar observations (with GRAVITY as fringe tracker), meaning while GRAVITY tracks fringes on a source, MATISSE can point to a nearby offset position. See the [MATISSE news page](#) for details.
- The cooling pump of the [PIONIER](#) detector is currently not performing, which affects the performance of the instrument. ESO, in collaboration with the PIONIER consortium, is looking into possible solutions. A direct consequence of the instrument status is that no Large nor Monitoring Programs are offered for Period 112.

### 1.1.3 La Silla

- **Distribution of La Silla instruments:**

In Period 112 the distribution of offered instruments on the La Silla foci will be:

- **3.6-m:**
  - \* Cassegrain: [HARPS](#)
  - \* Cassegrain: [NIRPS](#)
- **NTT:**
  - \* Nasmyth B: [EFOSC2](#)
  - \* Nasmyth B: [ULTRACAM](#)
- [NIRPS](#) was successfully commissioned during Period 110 and is starting its operation in Period 111. NIRPS is a near-infrared (974nm-1919nm), high-resolution (up to  $R = 90\,000$ ), cross-dispersed (72 orders) fibre-fed spectrograph optimised for stability and designed for the detection and characterisation of exoplanets around late-type stars. It can be used simultaneously with HARPS to collect spectra from 380nm to 1919nm (with a gap from 689nm to 974nm) in a single acquisition. Its ultimate goal is to reach a long-term stability of  $\leq 1\text{m/s}$ , but for the first period of operation a more conservative value of 2-3 m/s is adopted. A Laser Frequency Comb for wavelength calibrations is expected to improve further the stability from Period 112 onwards.
- [HARPS](#) can be operated simultaneously with [NIRPS](#) starting from period 111.
- **HARPS/NIRPS time-sharing:** Users who wish to participate to the HARPS/NIRPS time-sharing coordination for exoplanets search programs requiring nominal sampling and standard instrumental configuration shall contact François Bouchy ([francois.bouchy@unige.ch](mailto:francois.bouchy@unige.ch)), at least two weeks prior to submitting their proposal. Proposals approved to participate to the HARPS/NIRPS time-sharing must add **3.6m time-share tag** from the Tags section of the [P1](#).
- **Simultaneous usage of HARPS and NIRPS:** Users requesting to use both NIRPS and HARPS should select NIRPS instrument in [P1](#) and declare the intention of using both instruments in the **Special Remarks** field of the proposal. For already approved HARPS Normal and Large Programmes users wanting to use NIRPS, please contact Observing Programmes Office for approval using the ESO's ticketing system <https://support.eso.org/>. Users should be aware that slightly larger overheads are expected when switching from HARPS alone to HARPS+NIRPS mode.
- The Cassegrain Visitor focus of the 3.6-m telescope is not offered during Period 112 due to the operation of [NIRPS](#) and [HARPS](#). The possibility of offering this visitor focus will be re-evaluated in the future.
- The Visitor focus of the NTT continues to be available during Period 112, see Sect. 3.
- The installation and commissioning of [SoXS](#) will start in Period 112. As a consequence, [SOFI](#) will be decommissioned and is not offered in P112. [EFOSC2](#) is offered in P112, it is expected to be decommissioned during Period 112. The decommissioning date will be announced on the LPO News web-page <http://www.eso.org/sci/facilities/lpo/news.html>.

- The [EFOSC2](#) MOS mode has been decommissioned and is no longer offered.
- **ULTRACAM:** This PI instrument is offered to the ESO community for up to 5% of the observing time at the NTT in Period 112. 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 112 GTO target protection](#) webpages.

## 1.2 Important reminders

### 1.2.1 General

- **ESO User Portal:** Proposals are submitted via the [p1](#) proposal preparation tool. It requires users to log in with their ESO [User Portal](#) credentials. Further, all CoIs are required to have an updated ESO User Portal account with specified science expertise keywords. PIs will add CoIs to their proposals by submitting the CoI's email address. Therefore, both PIs and CoIs are required to keep their affiliations and e-mail addresses up-to-date in the ESO User Portal.
- **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 support:** Since Period 105, and in order to improve the chances of proposal success, ESO encourages users to team up with, or seek advice from, members of the community who have submitted successful proposals in the past. As an additional option, users may also want to consider collaborating with ESO scientists with expertise on the scientific subject of their proposal. PIs interested in the latter option should send an email to [science\\_p1support@eso.org](mailto:science_p1support@eso.org) with a title and abstract of their proposal, at least three weeks before the proposal submission deadline. This information will be seen by interested ESO scientists and treated as confidential.
- **Observing conditions:** The definitions of the observing conditions for Phase 1 and Phase 2 can be found on the [Observing Conditions](#) webpage. Mistakes in, *e.g.*, the lunar illumination requirement cannot be corrected after the deadline.
- **Any-weather proposals:** ESO strongly encourages programmes that can effectively exploit the worst observing conditions on the VLT. More specifically, ESO invites proposals that request turbulence category 85% or 100%, thin/thick clouds and have no moon constraints.
- **Justification of requested time and observing constraints:** Users must provide in the Time Justification field of the proposal all details necessary to reproduce their ETC calculations to justify the time and observing constraints requested. Failing to do so may result in the Observatory concluding that the programme is not feasible. Further justification of the observing constraints can be provided in the Lunar Phase and Constraints Justification field.
- **Policy on requests for changing or adding targets:** Teams asking for observations that envision the need for additional or a change of targets, or for adapting their observing strategy after the start of the Period (following, *e.g.*, Gaia data releases), must declare it with a note in the Special Remarks field of the proposal. 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 rationale and **Time Justification** field. The request will undergo a scientific review by the OPC. 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 or instrument setup changes 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.

- **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 112](#)).
- **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 into the ESO Archive. Exceptions to this rule must be authorised by the Director General, and must be requested before the proposal is submitted.

### 1.2.2 Paranal

- **VLTI imaging:** In Period 112, ESO will continue a scheme to optimise operations for aperture synthesis (imaging) with the VLTI. This scheme only applies to Service Mode observations with the ATs. The reader is referred to the Period 112 [VLTI manual](#) for imaging requirements: observing mode, minimum requested time and minimum time range. It is highly recommended to request imaging in SM. Imaging proposals requesting VM are expected to present a strong justification.

Since Period 108, ESO has introduced imaging slots (ISLs) in the VLTI-AT telescope schedule, in order to further improve the efficiency of VLTI imaging observations. ISLs are periods of about two weeks of uninterrupted service mode, with flexibility on the exact dates to change the AT configurations. The ISLs are specifically set aside and centred around new moon in February, May, August and November of every year. PIs of GTO programmes, Large Programmes and programmes requiring Visitor Mode are requested to adhere to this restriction for their planning. ISLs are primarily intended to support imaging observations, but they are not restricted to this type of VLTI observations. ISLs are regular SM time, and OBs are executed according to their priority. Likewise, imaging observations are not restricted to ISLs, but can be completed in SM time outside of the ISLs.

- **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 offered by this mode. Visitor mode runs are encouraged for those users who have never visited Paranal, even if the observations are straightforward. Users should make use of the **Mode Justification** field of the proposal to justify their preferred mode or why an alternative mode should also be considered. Please note that if a certain instrument mode is offered exclusively in either Service Mode or Visitor Mode then this overrides these scheduling considerations.

- **Service Mode Observation Blocks (OBs):** Service Mode 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 instrument 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** is offered for specific instrument modes on FORS2, UVES, X-SHOOTER, SPHERE, HAWK-I and MUSE in Period 112. 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. 4.8.2 for details on the renewed RRM policies related to focus changes.
- **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](#).

### 1.2.3 La Silla

- **Support during observing runs :** A streamlined operation is in effect in La Silla. La Silla instruments are offered in Visitor Mode (VM) and Designated Visitor Mode (DVM) only. The latter is offered with restrictions; please see next item and 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. Please check the online instructions for [visiting astronomers](#) for more details.

- There is a **minimum length of three contiguous nights for runs** to be executed with La Silla telescopes. Runs with a duration of less than three nights may only be scheduled in DVM, 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. There is no minimum duration for runs of Calibration Programmes.

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 and it is the default mode for runs with a total duration of less than three contiguous nights (see also Sect. 5.1.2). Runs requesting observations that take up less than one night may be rejected on operational grounds. Due to the reduced operations at La Silla, OBs scheduled in DVM must be submitted using the [p2ls](#) web interface 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. Further details can be found [here](#).
- **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 ESO through the [ESO Helpdesk](#) to check the feasibility of such observations for your programme.

### 1.3 Changes foreseen in the upcoming Periods

- [MOONS](#) – the Multi-Object Optical and Near-infrared Spectrograph – is expected to be installed at the UT1 Nasmyth A focus during the first or second quarter of 2024.
- The VLT [Visitor Focus](#) at UT1 will remain available during Period 112. However, activities related to the installation of MOONS may impose time restrictions. Interested users should contact [paranal@eso.org](mailto:paranal@eso.org).
- [FORS1](#), the upgraded FORS instrument, is expected to be installed and see first commissioning in Period 114. FORS2 will thus be decommissioned in Period 114, and the first commissioning of FORS1 without the MXU is planned to occur in Period 114. FORS1 will be retrofitted with the Multi-object spectroscopy with exchangeable masks (MXU), and further commissioning will be undertaken in Period 115. Therefore, the MXU mode will not be available for several months between Periods 114 and 115.

## 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 or turbulence parameter, 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 summarised 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 demo version of the web-based tool [p2](#) for La Silla and 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. Instrument specific performance and observing conditions, in particular for VLTI and Adaptive Optics instruments, are described in the respective User Manuals and only briefly summarised on the Observing Conditions webpage.

The following sections give some additional information and references that should be useful to proposers. Proposers are also encouraged to consult tutorials and p1-related videos from the LPO Users Workshop available at <https://eso.org/sci/meetings/2021/Users-Workshop1.html>.

## 2.1 Support for VLTI programmes

For VLTI users needing assistance to prepare their VLTI proposals, the community-supported [VLTI Expertise Centres](#) – distributed throughout Europe – can offer in-depth support. They also offer support for observation preparation, advanced data reduction and analysis.

## 2.2 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:

<https://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 and MATISSE are included in the dedicated GRAVITY and MATISSE ETCs. 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.

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

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

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

<https://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 scheduled observations, proposers are requested to specify the version number of the ETC they used in the **Time Justification** field 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 112. Please note that while the sky background values used in the ETCs generally reflect actual conditions on Paranal, the 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 properly 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.

## 2.3 The p1 proposal submission tool

All Phase 1 proposals must be prepared and submitted using the new, web-based proposal submission tool, [p1](#). The L<sup>A</sup>T<sub>E</sub>X ESOFORM has been retired. Further details can be found in Sect. 1.1 and in [The ESO Messenger \(2019, v. 176, p. 41\)](#), or online in the [p1 introduction](#) webpage. Users are encouraged to get familiarised with the new system using the [p1demo](#).

### 2.3.1 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 “Organisations, People and Strategies in Astronomy 2” (OPSA 2, ed. Heck, p. 231)]. Observing/scheduling constraints that are not indicated or that are inaccurately specified are unlikely to be taken into account by the scheduler. **Retrofitting scheduling constraints after the release of the schedule is not possible.**
- **Proposal resubmissions:** If the proposal is a re-submission of an old proposal then the **OPC comments must be addressed** in this new submission.
- **VLTI observation type:** For each observing run, one or more observation types that best describe the proposed observations **must be specified**:
  - snapshot: standalone concatenations without further links to other observations in terms of time links or filling the uv plane; these concatenations are CAL/SCI, CAL/SCI/CAL or CAL/SCI/CAL/SCI/CAL, depending on what each instrument offers;
  - time series: time series of concatenations that are repeated once or more often over the period; <sup>1</sup>
  - imaging: a set of concatenations with different baseline configurations to fill the uv plane for the purpose of image reconstruction; in this case, special care is taken at execution to uniformly fill the uv plane; it is highly recommended to request imaging in SM; imaging in VM should have a strong science case justification;
  - astrometry: GRAVITY dual-feed observations with the purpose of extracting astrometric information.
- **Naming convention for AT configurations:** AT configurations are requested by generic names ("Small", "Medium", "Large" and "Extended") rather than explicit configurations. The standard configurations should be used for Phase 1 and Phase 2 preparation and are detailed for a given period in the [VLTI Configurations Overview](#) webpage.

For operational reasons, observations may occasionally take place on relocation configurations during a transition between two standard configurations. A criterion of at least 50% baseline length overlap will be used. This scheme will be primarily used for imaging runs. The overlap in baseline length between standard and relocation configurations is detailed on the aforementioned webpage.

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<sup>1</sup>As a guideline, due to the need to cycle through different AT configurations, possible cadences are either a few days in a row, or not more than 2-3 times per period per AT configuration.

- **Precipitable water vapour (PWV) constraints:** PWV constraints must be specified for all instruments when adding or editing runs in [p1](#).
- **NIRPS/HARPS time-sharing:** Proposers must add `3.6m time-share tag` from the Tags section of the [p1](#) proposal preparation tool if they are participating in the NIRPS/HARPS time-sharing. Follow to [1.1.3](#) to ensure compliance with the NIRPS/HARPS time-sharing policy.
- **VLT/I-ALMA proposals:** Proposers must add `Joint VLT/I-ALMA tag` from the Tags section of the [p1](#) proposal preparation tool if they are applying for VLT/I-ALMA time under the ESO-ALMA agreement (see Sect. [4.11](#)).

## 2.4 Proposal Submission

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

**28 March 2023,  
12:00 noon Central European Summer Time.**

Proposal submission is done via the new web-base tool p1 at:

<https://www.eso.org/p1>.

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 preparation and submission of the proposal early, as ESO cannot provide support for proposal submissions after 11:00 CET 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 plan ahead. Over the past Periods, congestion of the proposal submission system has repeatedly occurred in the last few hours before the 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, the PI of the proposal will receive a confirmation e-mail. If you are not sure if your proposal has been successfully submitted, contact ESO through the [ESO Helpdesk](#).

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

Finally, note that by submitting a proposal qualifying for DPR, the PI/dPI commits to follow the DPR rules (see [DPR rules and guidelines](#)).

## 3 Visitor Instruments

In Period 112, visitor instruments can be mounted at the VLT and NTT 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.

ESO also offers two foci in the VLTI laboratory to house interferometric instruments.

At the VLT, the Nasmyth A focus of UT1 is available during Period 112. Proposers should keep in mind that the start of preparatory work for the arrival of MOONS limits the availability of the visitor focus during Period 112 and beyond.

The requirements for visitor instruments are substantially reduced compared to the requirements for a 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](#)
- For the NTT: [Visitor Focus](#)

## Part II

# Proposal Types, Policies, and Procedures

## 4 Proposal Types

For Period 112 the programme types offered are:

- Normal Programmes (including the joint VLT/I-ALMA)
- Monitoring Programmes
- Large Programmes
- Guaranteed Time Observations
- Calibration Programmes
- Director’s Discretionary Time

Target of Opportunity observations are requested strictly as ToO runs pertaining to any programme type (except Monitoring Programmes). See Sect. 4.8 below for details.

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

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, whereas 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. 2.3.1.

**Please note:** All proposers (Service and Visitor Mode) must include time for all overheads (telescope + instrument) in their proposals (see the [Overheads](#) webpage). For both La Silla and Paranal instruments, the [p2 demo](#) web interface can be used to prepare mock observations and estimate the total execution time including overheads.

### 4.1 Normal Programmes

Most of the observing time on ESO telescopes will be allocated to **Normal Programmes** in Period 112. Normal Programmes are limited to a time request of less than 100 hours and available instruments are listed in Table 2. Proposers must upload a PDF file containing the scientific rationale of the proposal. Templates and further instructions to produce this file are available at the [p1 help](#) webpages. 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, although 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 three nights, except for runs using Visitor Instruments or for combinations of contiguous EFOSC2 (totalling at least three 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 2: Available Instruments for Normal Programmes

Telescope/Combined Focus	Instrument
UT1	FORS2, KMOS, VISITOR <sup>1</sup>
UT2	FLAMES, VISIR, UVES
UT3	CRILES, SPHERE, X-SHOOTER
UT4	HAWK-I, ERIS <sup>3</sup> , MUSE
ICCF	ESPRESSO <sup>2</sup>
VLTI	GRAVITY, MATISSE, PIONIER, VISITOR
NTT	EFOSC2, ULTRACAM, VISITOR
3.6	HARPS, NIRPS

<sup>1</sup> The Nasmyth A focus is available for a Visitor Instrument. See Sect. 3.

<sup>2</sup> ESPRESSO in 1-UT mode can be operated from any of the 4 UTs. The 4-UT mode is only offered in Visitor Mode and observations are 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 112), with a minimum duration for each individual observing slot of one half-night.

<sup>3</sup> Some modes of ERIS will be offered only contingent on further successful commissioning.

## 4.2 Monitoring Programmes

Monitoring Programme (MP) proposals enable users to request a limited amount of time to monitor targets over more than one Period. Proposers should select the corresponding programme type when creating their proposal in [p1](#). Monitoring Programmes are subject to the same instrument restrictions as Large Programmes (see [4.4](#)) and are only accepted on some instruments (see [Table 3](#)).

An ESO MP 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 eight hours in even Periods and ten 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 consecutive Periods.
- MP proposals will be evaluated in the same way as Normal Programmes but must be amongst the highest-ranked programmes in order to be scheduled.
- All ToO run types can be submitted as part of Monitoring Programmes (see Sect. [4.8](#)).

## 4.3 Large Programmes

Large Programme (LP) proposals in Period 112 are accepted on the instruments listed in [Table 3](#). However, please note that several restrictions apply (see Sect. [4.4](#)).

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 following:

- 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.

Table 3: Available Instruments for Large and Monitoring Programmes

Telescope/Combined Focus	Instrument
UT1	FORS2, KMOS
UT2	FLAMES, VISIR, UVES
UT3	CRIRES <sup>1</sup> , SPHERE, X-SHOOTER
UT4	HAWK-I, MUSE, ERIS <sup>1</sup>
ICCF	ESPRESSO <sup>1</sup>
VLTI	GRAVITY, MATISSE <sup>1</sup>
NTT	EFOSC2 <sup>1</sup>
3.6	HARPS <sup>1</sup> , NIRPS <sup>1</sup>

<sup>1</sup> Restrictions apply (see Sect. 4.4).

- A programme that has the potential to lead to a major advance or breakthrough in the field of study has strong scientific justification and legacy value, 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.
- All ToO run types can be submitted as part of Large Programmes (see Sect. 4.8).

Proposers must upload a PDF file containing the scientific rationale of the proposal. Templates and further instructions to produce this file are available at the [p1 help](#) webpages. Proposers may use a total of three pages (not including figures or tables) for the two sections of the scientific rationale:

- A) Scientific Rationale
- B) Immediate Objective

An additional two pages of attachments (figures or tables) are permitted. Note that sections C and D of the scientific rationale for Large Programme proposals produced with ESOFORM up to Period 104 (respectively, **Telescope Justification** and **Observing Mode Justification**) are now input fields in the new Phase 1 proposal submission tool [p1](#). 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 three contiguous nights.

Proposers should be aware that the PIs of successful proposals for (GTO) Large Programmes are required to provide all data products (processed images and spectra, **processed integral fields spectrograph data cubes, catalogues**) for ingestion and publication into the ESO archive. More information on the science data products is available here:

<https://www.eso.org/sci/observing/phase3/p3sdpstd.pdf>. Proposals that waive proprietary rights are encouraged. PIs of Large Programmes are asked to take particular care when completing the field Data Product Delivery Plan of the proposal in which they must provide detailed information on the data quality assessment and data reduction. **In case of instruments supported by the availability of ESO Data Streams** (see the following link: [https://www.eso.org/sci/observing/phase3/data\\_streams.html](https://www.eso.org/sci/observing/phase3/data_streams.html)) the proposers should detail the additional steps applied to the data products for their large programme, in addition to the calibration/reduction levels applied to the ESO processed science data. They are also required to include the planning for the 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. In the case of **instruments supported by ESO Data Streams**, the proposers must provide the timeline for ingestion and publication of their higher-level reduced products in the ESO science archive. Large Programme proposals must include a precise timeline for the publication of data products in order to comply with ESO's policies. Such publication is intended in the ESO archive: any availability of data products from other project-specific web pages, or refereed publications e.g. CDS, is not compliant to the ESO science policies. Publication of data products in the ESO science archive ensures the storage, dissemination and usage of the large programme data conjointly with the entire ESO archive science content. Furthermore, the minting of the doi associated with any data collections enables higher traceability of the science data products, citation and usage.

Guidelines for the submission of these data products, including a description of the required metadata and formats, can be found on the Phase 3 webpages; proposers are invited to contact ESO via the [ESO Helpdesk](#) for further information. The Phase 3 webpages can be found at: <https://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. They may also be asked to outline the progress and/or outcome of the programme at ESO Large Programmes and Surveys workshops, similar to those of [October 13-15, 2008](#) or [October 05-09, 2015](#).

#### 4.4 Restrictions to Large and Monitoring Programmes

During Period 112, the following restrictions apply for either Large Programmes or Monitoring Programmes (see Table 3). The rationale behind these restrictions is the following:

- **CRIRES:** LPs and MPs are only offered for spectroscopic modes, not polarimetric or spectro-astrometric modes.
- **ERIS:** The instrument can be requested for LPs and MPs in the modes offered for Period 112.
- **ESPRESSO:** ESPRESSO LPs and MPs are only offered in 1-UT mode.
- **MATISSE:** The instrument is offered for LPs and MPs except with the new HIGH+ setting or the new GRA4MAT mode, which requires further characterisation.
- **PIONIER** is not offered for LPs and MPs as the long term performance cannot be guaranteed until the cooling pump issue is resolved.
- **EFOSC2:** The instrument will be decommissioned once **SoXS** is ready for science operations, which is expected to take place by the end of Period 112. Therefore, **EFOSC2** is not offered for MPs given the operational constraints at La Silla.
- **HARPS:** and **NIRPS:** are only offered for LPs but not for MPs, given the operational constraints at La Silla.

#### 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 112, GTO teams can request time up to four Periods, if compatible with the corresponding GTO contract. These are called Large GTO programmes. 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 112, the GTO teams should submit their proposals 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. GTO policies are summarised in the ESO Council document [Cou-1847](#).

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 VLT baselines or instruments). Some GTO programmes require ToO runs<sup>2</sup> (see Sect. 4.8.1). 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 P112 (nights) <sup>(2)</sup>
CRIRES-consortium	UT3	CRIRES+	108	113	62.0	20.7	10.4
ERIS-consortium	UT4	ERIS	111	120	195.0	174.0	19.3
ESPRESSO <sup>(3)</sup>	UT	ESPRESSO	102	112	293.0	10.2	10.2
GRAVITY-consortium-UT <sup>(4)</sup>	VLT-UT	GRAVITY	99	112	73.8	2.5	2.5
GRAVITY-consortium-AT	VLT-AT	GRAVITY	97	112	157.0	47.0	47.0
GRAVITY+ <sup>(4)</sup>	VLT-UT	GRAVITY+	112	121	69.3	69.3	6.9
MATISSE-consortium-UT <sup>(4)</sup>	VLT-UT	MATISSE	103	112	37.5	8.3	8.3
MATISSE-consortium-AT	VLT-AT	MATISSE	103	112	173.0	62.0	62.0
NAOMI-consortium	VLT-AT	ALL-VLTI	105	112	28.0	8.4	8.4
NIRPS-consortium	3.6m	NIRPS/HARPS	111	120	725.0	652.1	72.5
VISA-MPG	VLT	GRAVITY	79	112	69.0	17.3	17.3

(1) At the start of ESO Period 112. Corrected for the losses in P105.

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

(3) Nights with 1 UT.

(4) Nights with all 4 UTs.

**NOTE:** The total entitlement may include approved compensations for technical losses. For P112 the accounting is indicative. Possible losses in P110 and P111 are not accounted for.

## 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 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 specialised 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 the 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 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 <https://www.eso.org/sci/observing/phase3.html>. The raw calibration data, as well as the ad-

<sup>2</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.

vanced 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.

Proposers should clearly state in the scientific rationale 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. 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 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.

Approved DDT proposals are carried out in Service Mode on Paranal 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 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 [p1](#) proposal submission tool.

DDT proposals are reviewed by a DDT committee, which issues recommendations to the Director General, or their delegate. Urgent requests must be clearly identified in the **Special Remarks** field of the proposal.

## 4.8 Target of Opportunity

Normally, up to 5% of the available observing time may be used for **Target of Opportunity** (ToO) runs. 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, triggered by the PI. Runs aimed at studying such events through triggers are, in the ESO proposal terminology, ToO runs.

They should be for generic targets and/or times. However, if accepted by the OPC the run will not be executed until the PI (or their 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 such programmes may require a mixture of ToO runs and other run types, proposers are requested to specify the type of run in the [p1](#) proposal submission tool.

#### 4.8.1 ToO runs

**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. 4.8.2 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 their 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 the 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 run will need to indicate the number of targets per run and the requested number of triggers per target. 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.

ToO runs are **not** carried over to the following Periods, even if pertaining to Large Programmes. However, ToO observations triggered near the end of a Period will typically be completed even if this implies executing further observations into the upcoming Period.

**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 a specific time constraints, if the observations must take place more than one week after the 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.

ESO's policy regarding compensation in case of interrupted observations and other possible issues related to ToO observations can be found on the [ToO policy](#) webpage.

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

During Period 112, ESO offers the VLT Rapid Response Mode (RRM) system for the following instruments: FORS2 on UT1, UVES on UT2, SPHERE and X-SHOOTER 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**. 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.
- **RRM runs must be exclusively used for triggering the RRM system.** Therefore they must be specified as runs separate from hard or soft ToOs.
- As with any ToO observation, proposers will need to indicate 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 112 are subject to the following conditions:

- An RRM trigger cannot interrupt an already on-going RRM observation.
- RRM triggers will be accepted during Service Mode and Visitor Mode runs. They have overriding priority over other observations, unless the latter are strictly time-critical. This is assessed by ESO before the start of the Period and at the approval of DDT Programmes during the Period, based on information provided in the proposal. The list of RRM-protected runs is available at <https://www.eso.org/sci/observing/teles-alloc/rmm-protected-runs.html>.
- The new RRM change-of-focus policy has been extended to all the relevant instruments since Period 109. The old RRM scheme required that the requested instrument must be in use at the moment of the RRM trigger, as the system would automatically reject triggers that require a change of focus. Within the new scheme, if the trigger requires a change of focus, the telescope is expected to point at the location of the target within about 12 minutes following the trigger, due to the additional overhead, instead of about six minutes if the trigger is for an instrument that is already observing. This new capability implies that any programme may be interrupted by an RRM trigger, except strictly time-critical observations which are protected.

The following instrument-specific restrictions apply:

- FORS2 can only be used in broad-band imaging, long slit spectroscopic, imaging polarimetric and spectro-polarimetric modes;
- UVES can only be used with standard wavelength settings;
- during Period 112, 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 User 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.

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 contact ESO through the [ESO Helpdesk](#) 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 webpage](#).

## 4.9 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).

## 4.10 Non-Member State Proposals

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

## 4.11 VLT/I-ALMA proposals

With the aim to take full advantage of the complementarity of ESO/optical-NIR and ALMA/sub-millimetre observing facilities, starting in P112, ESO is inviting users to submit joint proposals for VLT/I and ALMA. Further details on how to apply for the joint VLT/I-ALMA time and the ALMA technical specifications required can be found here:

<https://www.eso.org/sci/observing/phase1/JointVLT-ALMA.html>. It is the proposers' responsibility to provide a full and comprehensive scientific and technical justification for the requested observing time at both facilities. Both the ESO and ALMA observatories 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 jeopardise the entire proposed science programme. Users should submit their proposal by selecting the Normal programme type and adding **Joint VLT/I-ALMA tag** from the Tags section of the **p1** proposal preparation tool.

Joint proposals requiring ALMA time will comply with the ALMA Users' Policies and Call for Proposals guidelines (<https://almascience.eso.org/proposing/learn-more>). ESO may allocate up to 50h of ALMA time per yearly Cycle on each of the ALMA Arrays (i.e. 12-m, 7m, and TP). Joint Proposal submitted to ESO cannot request ALMA time for VLBI or phased array observing

modes. ALMA Large Programs are not allowed when Joint Proposals are submitted to a partner observatory, and therefore the amount of ALMA time requested must be less than that of the ALMA Large Program threshold (see the ALMA Proposer’s Guide for a definition of a Large Program). Joint Proposals will be allowed to request array configurations offered between the time the project will enter the ALMA queue (i.e. upon project preparation subsequent to proposal approval as indicated below) until the end of the ongoing ALMA Cycle, as well as those offered in the upcoming ALMA Cycle.

During the preparation of the proposal, PIs will use the ALMA Observing Tool to input the technical details and perform a first automatic validation. Projects requiring observing capabilities offered by ALMA in the upcoming Cycle may not be yet supported by the version of the Observing Tool available on the ALMA science portal. In those cases, the PI will make use of other tools provided by ALMA (<https://almascience.eso.org/tools>) and provide a detailed explanation of the assumptions made and how the observing time was estimated. PIs are responsible for summarising the technical justification for the requested ALMA observations; this will be used for initial technical assessment. As indicated in ALMA Proposer’s Guide, an incomplete Technical Justification may lead to the rejection of the proposal on technical grounds.

ALMA projects will be evaluated based on the technical feasibility of the requested observations, and the scheduling feasibility considering the requested array configuration and time constraints. Upon acceptance of a Joint Proposal by ESO, PIs will be requested to submit the project with the ALMA Observing Tool. The JAO will then proceed to prepare the Scheduling Blocks in preparation for observations and to perform a final detailed technical assessment. In addition to any significant technical issue found during this process, projects that, during the preparation of the Scheduling Blocks, result in a larger observing time than requested in the proposal ALMA Technical Justification are subject to rejection on technical grounds at the discretion of the JAO. Once the Scheduling Blocks have been prepared, projects will immediately enter the ALMA observing queue, unless requesting observing capabilities only offered in the upcoming Cycle. In that case, the project will enter the queue at the corresponding Cycle start date. As such, since Joint Proposals is a mode offered for ALMA Cycle 10, proposals accepted during ALMA Cycle 9 will only enter the queue at the Cycle 10 start, on October 1st 2023. As a consequence, a joint proposal will only be able to request array configurations offered for ALMA Cycle 10. Projects will remain in the ALMA queue up to a total period of two years.

## 5 Observing Modes

In Period112, VLT and VLTI instruments will be offered in three modes: *Visitor Mode* (VM), *Designated Visitor Mode* (DVM) 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. More recently, the article “*Should I stay, or should I go? Service and Visitor Mode at ESO’s Paranal Observatory*”, in the [September 2018](#) issue, discusses the advantages of each mode. 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). La Silla and Paranal observers must use the Phase 2 preparation tool [p2](#) for the creation of OBs. 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. For ESO telescopes, one night in Visitor Mode is defined to be eight hours in even Periods and ten hours in odd Periods.

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 the [p2](#) web interface for OB preparation. 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 Change Request tab in p2. 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.

Although it is very rare, the Observatory may interrupt Visitor Mode observations 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 nights. 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. 4.8.2). Policies regarding compensation in case of interrupted observations and other possible issues related to ToO observations can be found on the [ToO policy](#) webpage.

### 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.

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. The web-based tool 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, users can request additional science targets, instrument setup changes and backup targets. However, such requests must be submitted at least four 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, the Designated Visitor Mode is generally restricted to runs requesting less than three contiguous nights. Nevertheless, runs requesting observations that take up less than one night may be rejected on operational grounds. OBs scheduled in DVM must be submitted using the [p2](#) web interface for OB preparation by the Phase 2 deadline, following instructions given at the time of the webletters release. Observations will be executed by a telescope operator and contact with the PI is therefore very limited.

## 5.2 Service Mode

Over half of the total time available for observations on Paranal will be carried out in Service Mode (SM). 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 familiarise themselves with the Phase 2 Service Mode [guidelines](#). Once the OBs are completed, they will be reviewed by ESO to ensure full optimisation and compliance, and ultimately be accepted.

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.

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) observations, 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 (*e.g.*, 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 authorised 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. 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 long 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.
  - **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 long or complex, timing links that are very restrictive, and time-series for observations requiring excellent observing conditions, are unlikely to be successfully completed. 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 minimise the risk that the observations become 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 when 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. Since Period 103, at the time of occurrence of the predicted event, the PI of the programme (or one of their 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. See the Phase 2 [ToO Procedures](#) webpage for further details.

- **VLTI Imaging Programmes:** PIs of VLTI imaging programmes can request to repeat all observations of a time-critical imaging campaign if it was not finished within the requested time, under the following conditions: (i) the run is A-ranked; (ii) the time interval during which the image needs to be completed (Imaging Time) is specified in the proposal; (iii) the Imaging Time is not shorter than one month, and (iv) the guarantee concerns not more than the ESO-recommended number of uv points for imaging (currently 15 concatenations per target). Possible additional points are taken on a best-effort basis, and expire outside the Imaging Time interval.

## 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 summarise those policies relevant for ESO proposers for Period 112. For details on individual policies we refer proposers to the [ESO Optical/Infrared Telescopes Science Operations Policies](#) 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 credentials. 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.

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

For non-member state proposals (Sect. 4.10) 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>3</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. 4.9): “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, the ESO Director General grants observing time based on the OPC ranking and the availability of telescope time.

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<sup>3</sup>Proposals from astronomers based in Australia will be considered as proposals from astronomers based in ESO Member States.

## 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 through the [ESO Helpdesk](#) 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, VISIR) must approach ESO via the [ESO Helpdesk](#) 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.

## 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 p2 (for Paranal and La Silla users).

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 via the Waiver option of the Change Request tab in p2 (clear instructions are available at <https://www.eso.org/sci/observing/phase2/SMGuidelines/WaiverChanges.html>) at least one week before the Phase 2 deadline (also see Sect. 6.5).

Approved new targets and instrument setups will not be protected against target duplication from other programmes.

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 authorisation has been obtained are not allowed at the telescope.

Observations requiring the use of the Four Laser Guide Star Facility (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 112, 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 113. 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 Programmes 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 optimise 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 authorised by ESO (see Sect. 6.4). Only relaxing observing constraints is allowed at Phase 2. 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 or this will not occur automatically. Please be sure to indicate the pre-imaging character of the run by using the corresponding run type in [p1](#). 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

For both Visitor Mode and Service Mode observations, the [ESO Science Archive Facility](#) is the sole access point to data obtained with ESO telescopes. All data obtained with ESO facilities are ESO property, but ESO grants a 12-month proprietary period for science and acquisition data to the PI of the programme, which applies to each data file individually. The proprietary period starts as soon as the data are made available to the PI or respective delegates via the archive, *i.e.*, as soon as the data are ingested, which typically happens a few hours after the observation.

The information contained in the headers of all data files is immediately public. At the end of the proprietary period, the raw data and the abstracts of proposals are made public. In addition, for a selection of instruments (see the [ESO Data Streams](#) webpage), also the reduced data are made public. Exceptions to this ESO [Data Access Policy](#), such as an extension of the proprietary

period, may be granted in exceptional cases. The corresponding requests have to be justified in detail and submitted to the Director General for approval. Justifications based only on lack of time and/or resources to complete the data analysis will not be considered. Requesting a shorter proprietary period than the nominal 12 months is possible using the Proprietary Time pull-down menu when adding or editing observing runs in p1. Raw data from Public Surveys, Calibration Programmes and calibration data are not subject to a proprietary period and become publicly available as soon as they are ingested into the ESO Archive.

## 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 112.72DG."*

## 6.9 Press Releases and other communication products

Should you consider that your results are relevant for the wider public or journalists, please consider sending your paper to the Department of Communication ([press@eso.org](mailto:press@eso.org)), preferably no later than when the paper is submitted for publication. Further information can be found [here](#).

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

4LGSF	4 Laser Guide Stars Facility
4MOST	4-metre Multi-Object Spectroscopic Telescope
AOF	Adaptive Optics Facility
APEX	Atacama Pathfinder EXperiment
AT	Auxiliary Telescope for the VLT Interferometer
CIAO	GRAVITY Coudé Infrared Adaptive Optics system for the VLT Interferometer
CoI	Co-Investigator
CRIRES	CRyogenic high-resolution IR Échelle Spectrometer
DDT	Director's Discretionary Time (proposal)
EFOSC2	ESO Faint Object Spectrograph and Camera 2
ERIS	Enhanced Resolution Imager and Spectrograph
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
FORS2	FOcal Reducer/low dispersion Spectrograph 2
GALACSI	Ground Atmospheric Layer Adaptive Corrector for Spectroscopic Imaging
GRA4MAT	GRAVITY fringe tracker used for MATISSE
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
IFU	Integral Field Unit
IR	Infrared
IRDIS	InfraRed Dual-Band Imager and Spectrograph
ISAAC	Infrared Spectrometer And Array Camera
ISL	VLTI imaging slot
KMOS	K-band Multi-Object Spectrograph
LGS	Laser Guide Star
LPO	La Silla Paranal Observatory
LST	Local Sidereal Time
MACAO	Multi-Applications Curvature Adaptive Optics
MATISSE	Multi AperTure mid-Infrared SpectroScopic Experiment
MOONS	Multi-Object Optical and Near-infrared Spectrograph for the VLT
MUSE	Multi-Unit Spectroscopic Explorer
MXU	Multi-object spectroscopy with exchangeable masks
NAOMI	New Adaptive Optics Module for Interferometry
NFM	Narrow Field Mode (a mode of MUSE)
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
p1	web-based phase 1 proposal preparation tool
p2	web-based phase 2 proposal preparation 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
SM	Service Mode
SOFI	Son of ISAAC
SOXS	Son of X-Shooter
SPHERE	Spectro-Polarimetric High-contrast Exoplanet REsearch
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
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
WFM	Wide Field Mode (a mode of MUSE)
X-SHOOTER	UV-Visual-NIR medium resolution échelle spectrograph
ZIMPOL	Zurich IMaging POLarimeter