



# **An update to applying for observing time in the CHEOPS Discretionary Programme**

## **Policies and Procedures CHEOPS-EST-SCI-TN-011**

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## 1 INTRODUCTION

This document informs potential users of CHEOPS of the policies and procedures relevant to, and to be followed for, the preparation and submission of proposals requesting observing

time through the Discretionary component of the CHEOPS Guest Observers Programme. This is the definitive document for Discretionary Programme, (DP) also known as the Director's Discretionary Time (DDT). Any information detailed in this document takes precedence over that presented in other documentation, in particular information detailed in CHEOPS-EST-SCI-TN-006, the first Policies and Procedures document for the Discretionary Programme issued in June 2020.

The Discretionary Programme is foreseen to run until the end of the nominal mission which is 24 September 2023.

Submission of observing proposals for CHEOPS is a two-step process. Phase I inputs are submitted through a dedicated proposal handling tool (PHT1) at ESA. A Phase I proposal is made up of a scientific justification and a technical justification and implementation, and includes proposer information as well as target details and outputs from tools used in proposal preparation. Phase II input is required for proposals that have been awarded observing time, and is submitted through a dedicated tool (PHT2) provided and hosted by the Science Operations Centre based at the University of Geneva and part of the CHEOPS Mission Consortium.

The document is organised as follows:

- section 2 provides a brief introduction to CHEOPS, with an overview of the different categories of observing time given in section 3;
  - constraints specific to the DP are given in section 4, as well as details of the reserved target list (RTL) and types of target that can be observed with CHEOPS;
  - an overview of the tools and documentation that are available to aid the observer in their proposal preparation are given in section 5, together with a detailed description of the content required for the different elements of the Phase I proposal;
  - detailed descriptions of the proposal submission procedure and the ESA proposal evaluation/selection procedures are given in sections 6 and 7 respectively;
  - section 8 provides a short description of the Phase II data entry required from PIs of proposals awarded CHEOPS observing time;
  - section 9 contains information on CHEOPS data products and proprietary periods;
  - section 10 provides a summary of how personal and intellectual data that is submitted in CHEOPS observing proposals will be used within the CHEOPS mission,
- with a list of key documents and the URLs for key webpages provided in the appendix.

Prospective proposers are advised to read all sections of this document very carefully. Attention is drawn to section 5.2 where the required contents of (and page limits for) individual elements of a proposal are detailed, and section 6 where the Phase I submission process is described.

Any updates will be posted on the webpage for the AO at:

<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/discretionary-programme>

which should be checked regularly, as should the frequently ask questions page for the Call:  
<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/faq-dp>

Attention is also drawn to the webpage detailing all successful proposals submitted to the CHEOPS Discretionary Programme

<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/dp-approved>

Access to the tool to be used for proposal submission – the Phase I Proposal Handling Tool (PHT1) - requires user credentials on the ESA Cosmos system, as will downloading the scheduling feasibility checker software which is needed to check the visibility of a given target with CHEOPS. Details on how to request credentials are provided in section 6.

Prospective proposers are reminded that the team supporting the Guest Observers is very small – in-line with the small-class mission status of CHEOPS – and whilst every effort will be made to respond quickly to questions raised in the framework of proposal submission and evaluation, it may still take a bit of time.

## 1.1 Acronyms

AO /AO-1/AO-2/AO-3	Announcement of Opportunity/first AO/second AO/third AO
BJD	Barycentric Julian Date
CHEOPS	CHaracterising ExOPlanet Satellite
CST	CHEOPS Science Team
(C)TAC	(CHEOPS) Time Allocation Committee
CMC	CHEOPS Mission Consortium
Co-I	co-Investigator
DP/DT	Discretionary Programme/Discretionary Time
ETC	Exposure Time Calculator
GO	Guest Observers
GTO	Guaranteed Time Observers /Guaranteed Time Observing
IOC(R)	In-Orbit Commissioning (Review)
ICRS	International Celestial Reference System
MOC	Mission Operations Centre
MJD	Modified Julian Date
M&C	Monitoring and Characterisation Programme
OR(s)	Observation Request(s)
PHT1	Phase I Proposal Handling Tool
PHT2	Phase II Proposal Handling Tool
PI	Principal Investigator
PS	Project Scientist
RTL	Reserved Target List
SOC	Science Operations Centre (University of Geneva)
UTC	Coordinated Universal Time

## 2 INTRODUCTION TO CHEOPS

The CHaracterising ExOPlanets Satellite (CHEOPS) is the first mission dedicated to the search for exoplanetary transits through high precision photometry of individual, bright stars already known to host planets. The mission is a partnership between Switzerland and ESA with important contributions from 10 other ESA member states that make up the swiss-led CHEOPS Mission Consortium (CMC).

CHEOPS was launched from ESA's spaceport in Kourou on 18 December 2019 as a co-passenger on a Soyuz rocket, with the early orbit phase culminating on 22 December 2019. In-orbit commissioning (IOC) started on 7 January 2020, and concluded with a successful IOC Review held on 25 March 2020. On this date responsibility for CHEOPS operations was handed over from ESA to CMC led by the University of Bern, Switzerland. This date also marked the start of the 3.5 year nominal mission lifetime, and the start of Year 1 of CHEOPS observing. Routine science operations began a few weeks after on 18 April 2020.

The CHEOPS payload consists of a single instrument - a space telescope with a primary mirror with an effective diameter of 30 cm, which feeds a single CCD focal plane detector covering 330 – 1100 nm with a field of view of 0.32 deg<sup>2</sup>. The payload design and operation has been optimised for ultra-high photometric stability and to achieve a photometric precision of, or better than, 20 parts per million (ppm) on the light curve of a  $V_{\text{mag}} = 9$  G dwarf star ( $T_{\text{eff}} = 5500$  K) in 6 hours, and 85 ppm or better on the light curve of a fainter  $V_{\text{mag}} = 12$  K dwarf star ( $T_{\text{eff}} = 4500$  K) in 3 hours. In both cases, these levels of precision are called for over periods of 48 hours and thus, together with high-cadence (from one image every c. 23 s to 1 image every 60 s) sampling, CHEOPS offers the capability to measure high-precision, high-cadence, broad-band light curves covering the visible-near infrared waveband.

Details on CHEOPS can be found in the CHEOPS mission paper (Benz et. al (2021), <https://doi.org/10.1007/s10686-020-09679-4>).

Two presentations have been prepared to introduce CHEOPS to potential observers. These provide an overview of the mission and its capabilities (at a glance, and in more detail), and are a recommended starting point for those new to the mission as well as those wishing to update their knowledge of the latest performances. These are available at:

<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/is-cheops-for-you/>

CHEOPS performances, including the photometric precision that can be achieved, can be found in two presentations noted above, as well as links in Table 2 of section 5 e.g.

<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/in-orbit-updates/>

A selection of recently published papers based on CHEOPS observations can be found on the CHEOPS-in-the-literature webpage at this link:

<https://www.cosmos.esa.int/web/cheops/cheops-in-the-literature/>

## 3 OBSERVING TIME ON CHEOPS

### 3.1 Division of time

An estimated 10% of the total time in a year is top-sliced for two activities: (a) spacecraft- and instrument-related activities, such as satellite/instrument software maintenance and patching, satellite safe mode and recovery, and anomaly investigation; and (b) a dedicated Monitoring and Characterisation (M&C) programme that has been designed by the CHEOPS Science Team (CST) to establish the scientific performance and characteristics of the payload, and to monitor their evolution over the course of the mission lifetime. An overview of the M&C programme can be found in the CHEOPS Observers Manual which is available from the Documentation section of the AO webpage, and also directly from:

<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/cheops-observers-manual/>

The time remaining in a year is referred to as nominal science observing time, or science time.

Note in the case that the top-sliced time used is either less than or more than 10% of a CHEOPS year, it will be either reassigned to or taken from the nominal science observing time according to the 80:20 Guaranteed Time Observing Programme:Guest Observers Programme split described below.

### 3.2 Guaranteed Time to the CHEOPS Science Team

The majority (80%) of the nominal science observing time on CHEOPS is dedicated to observations that are defined by the CST, and that are collectively referred to as Guaranteed Time Observing (GTO) and/or the Core Observing Programme. The GTO Programme covers six broad scientific themes in Exoplanet science:

- Finding transits of known exoplanets;
- Improving radii of known transiting exoplanets;
- Exploring systems in search for new exoplanets;
- Characterising exoplanet atmospheres;
- Uncovering new exoplanetary features;
- Stellar and planetary science relevant to the analysis and interpretation of exoplanet data.

A description of the GTO Programme can be found at the following link:

<https://www.cosmos.esa.int/web/cheops/the-cheops-guaranteed-time-observing-programme/>

### 3.3 Guest Observers Time

20% of the nominal science observing time is available, through the ESA-run GO Programme, to the general Science Community to conduct investigations of their choice. The Programme is administered by ESA, using tools and an Observers manual provided by the CMC. The GO Programme is split into two parts: annual Announcements of Opportunity (AOs) (or calls) for proposals to which a minimum of 15% of the science time per year on CHEOPS will be dedicated (a minimum of 75% of the GO time) and a second, so-called Discretionary Programme (DP), to which up to 5% of the science time per year will be

dedicated (up to 25% of the GO time), for which proposal submission possible throughout the year.

Details of the GO Programme can be found at:

<https://cosmos.esa.int/web/cheops-guest-observers-programme/>

## **4 CONSTRAINTS AND CONSIDERATIONS FOR THE DISCRETIONARY PROGRAMME**

When considering applying for observing time through the Discretionary Programme, prospective CHEOPS users should take into account the constraints and considerations that are detailed in this section. Any additional information that is requested to justify decisions taken during proposal preparation should be included in the proposal. Failure to do so may result in a proposal being rejected.

Proposals may be submitted at any time. To qualify for observing time in the Discretionary Programme, a proposal must meet all of the following criteria:

- Contain a single target of high scientific interest.
- Demonstrate that the target has:
  - been discovered (published) since the time of the close of the most recent call (15 March 2022),or
  - has become a target of high scientific interest, since the time of the close of the most recent call (15 March 2022)
- Contain a target that is observable by the end of the nominal CHEOPS mission which is 24 September 2022

The requirement that a target was either newly discovered since the last AO closed, or has been declared to be of high scientific interest since the AO closed, is waived for proposals led by PhD students (as part of their PhD work) or by early career researchers who are within 2 years of having been awarded their PhDs. In these two specific cases any target that is not on the reserved target list (RTL) can be proposed, subject to checks being made of the CHEOPS mission archive for existing duplicate observations.

Both time-critical and non-time critical observations may be requested.

Further constraints and details are given in the following subsections

### **4.1 Eligibility**

The Discretionary Programme open to the worldwide scientific community, regardless of nationality or institutional affiliation.

### **4.2 Observing period and available time**

Proposals for observations to be executed before the end of the nominal mission (24 September 2022) may be submitted. Up to 25 % of the observing time available to the Guest



Observers Programme may be allocated to the Discretionary Programme. This is equivalent to up to 5 % of CHEOPS science time.

### 4.3 Time requested

There is no upper limit to the amount of time that may be requested in a single proposal. It is noted, however, that the annual allocation for the Guest Observers Programme is just under 960 orbits (each of c. 99 minutes). Given their significant impact on the schedule, proposals calling for large numbers of orbits will be subject to increased levels of review and will require higher levels scientific justification than might be the case for shorter observations.

There is an absolute minimum of 1 orbit per single pointing or “visit” (see the Observers’ manual for a detailed description of what this is). In cases where high photometric precision is required, the minimum recommended duration of a visit is 5 orbits – e.g. for a transit observation this would translate to 3 orbits before and 2 orbits after the transit, plus the transit duration itself. More details on this can be found in a presentation on the following webpage:

<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/in-orbit-updates/>

An individual visit should be no longer than ~100 orbits, which is set by the 1-week duration of the observing schedule (activity plan) that is uplinked to the spacecraft. Under exceptional circumstances it may be possible for an observation with a longer duration (e.g. longer than 1 week) to be scheduled by splitting it into two, contiguous visits. Such long visits have a significant impact on the CHEOPS schedule, however, and will be considered in very rare cases only.

### 4.4 Sampling/cadence

The maximum image cadence is dependent on the exposure time and the stacking order required to meet the available downlink bandwidth. A higher temporal sampling may be achieved through the processing and analysis of imaggettes which are not stacked. Details on this are given in the CHEOPS Observers Manual.

### 4.5 Photometric performances and limiting target magnitudes

The projected photometric performances of CHEOPS are presented in the CHEOPS Observers Manual, and can be explored further using the Exposure Time Calculator (see Table 1 for details of the software).

Details of the most up-to-date performances are given in presentations available from this link:

<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/in-orbit-updates/>

There is no bright limit to the magnitude of an object that can be observed with CHEOPS.



The photometric performance for observations of stars fainter than  $G_{\text{mag}} \approx 11$  can vary a lot depending on stray light levels and background contamination, and users proposing targets at this magnitude or fainter can expect the photometric precision of the light curve products to vary, particularly in crowded fields. For such cases, a higher level of photometric detrending (not included in the data reduction pipeline) will be needed to extract the best possible performance from the data.

To get a feel from actual data for the precision that has been achieved, it is recommended to search for observations of faint targets in the mission archive (see link given in the appendix), as there are a number that have been made that are already public.

As faint-target observations may be carried out under conditions that could be detrimental to the scientific goal of the observations, proposals for objects that are much fainter  $G_{\text{mag}} \approx 11$  will be considered at the discretion of the ESA Project Scientist and TAC.

#### **4.6 Time criticality of observations**

Both time-critical and non-time critical observations may be requested. Proposals for non-time critical observations that can be flexibly scheduled, and either broken up or extended to fill gaps between time-critical observations can also be submitted. A short explanation of why flexible scheduling is appropriate, together with the proposed approach, should be included in the technical justification of the Phase I proposal.

#### **4.7 Uncertainties in ephemeris**

Target ephemerides are only required at the Phase II input stage (see section 8). Once input to this phase has been completed, update is foreseen in exceptional circumstances only. Where possible, in case of time-critical observations, proposers should therefore allow for uncertainties in ephemerides (e.g. mid-transit times and orbital periods) when considering their observing time requests in Phase I.

#### **4.8 Reserved targets/lines of sight**

The target line of sight to all targets that are either

- a. part of the ongoing GTO Programme,

or

- b. part of proposals that are from the GO Programme that have yet to be completed

is blocked and may not be included in observing proposals. These targets are placed onto the so-called Reserved Target List (RTL) which can be consulted at any time using the tool at:

<https://cheops.unige.ch/pht2/search-reserved-targets/>

#### **4.9 Observations of targets previously observed by CHEOPS**

Prospective proposers should contact [cheops-support@cosmos.esa.int](mailto:cheops-support@cosmos.esa.int) in cases where the target of interest is not reserved, but for which there are data in the CHEOPS archive mission (even if proprietary). A very brief summary of observations that have been made will be

provided to include the name of the target, the type of observation (transit, occultation, phase) and the number of visits.

Justification for the additional observations beyond those in the archive needs to be included in the observing proposal. Prospective observers are reminded of the overarching constraints on the choice of target for a Discretionary Programme which are detailed at the beginning of this section.

#### **4.10 Coordinated observations with other facilities**

Routine, coordinated observations with other facilities are not foreseen with CHEOPS. They may, however, be considered in exceptional cases and will be executed on a best-efforts basis.

#### **4.11 Solar system objects**

Solar system objects may be observed with CHEOPS, however there are important caveats:

- CHEOPS uses sidereal tracking only and thus cannot track Solar System objects. The resulting static coordinates (in RA and Dec) that are needed to prepare the detailed observation requests mean that such observations can become highly time-critical and limit significantly the period for which such observations can be executed.
- Observations of stellar occultations by e.g. trans-Neptunian objects, are possible, however require a very precise knowledge of the position of the occultation in the sky relative to the CHEOPS orbit. It is the responsibility of the proposer to determine this. Such programmes introduce significant complexities also on the SOC side, and will be done on a “best efforts” basis.

## **5 PHASE I PROPOSAL PREPARATION**

The content of a Phase 1 proposal has been designed to enable a thorough scientific and technical evaluation of the proposed observations to be made. A short summary of the tools and documents available to support proposal preparation is provided in section 5.1. This is followed by a detailed description of each section/component of a Phase 1 proposal in section 5.2.

All material must be written in English using a minimum font size of 10 pt, A4 portrait paper format and 1.5 line spacing. Where applicable, page limits for the individual components are noted in section 5.2. All documents need to be submitted as pdfs, where individual files must not exceed 50 MB. Note that non-compliance with instructions given in this section will result in rejection of the proposal on formal grounds.

Word templates for the scientific justification, and for the technical justification and implementation can be found on the webpage for the Discretionary Programme . The equivalent formats should be used when preparing proposals using any other software package.

## 5.1 Tools, aids and documentation to support proposal preparation

A number of tools and documents have been developed by the CMC to aid the CST with their preparations for observing with CHEOPS. These are made available to the Community to facilitate their preparation of proposals. A summary of these, together with details of overview presentations, is given in Table 2. Further details on the tools are given in the CHEOPS Observers Manual.

Tool/Aid/Documentation	Description
CHEOPS Observers Manual	<p>The manual provides the point of reference for all aspects of the mission. It includes a comprehensive overview of CHEOPS, a detailed description of the instrument and operations, and examples of simulated data. The latest issue of the manual is available from: <a href="https://cosmos.esa.int/web/cheops-guest-observers-programme/cheops-observers-manual/">https://cosmos.esa.int/web/cheops-guest-observers-programme/cheops-observers-manual/</a></p>
Reserved Target List Query Tool	<p>The tool provides the means to check whether a target is already on the reserved target list i.e. part of an existing GTO programme or GO programme. It can be found at: <a href="https://cheops.unige.ch/pht2/search-reserved-targets/">https://cheops.unige.ch/pht2/search-reserved-targets/</a></p> <p>SIMBAD is used to retrieve/resolve the coordinates of named targets. You are advised to check whether a target is on the reserved target list by using the target coordinates, not the target name, as not all targets (e.g. TESS objects of interest) are in SIMBAD.</p>
Scheduling Feasibility Checker	<p>The tool is used to check whether and when a target is visible to CHEOPS, and to help assess the impact that interruptions due to passage through the South Atlantic Anomaly and Earth Occultation have on target visibility and observing efficiency. It should be noted that the level of interruptions can differ from those that are actually achieved due to changes in orbital parameters, and so are indicative only.</p> <p>The tool requires the download and installation of a virtual machine platform, together with an image of the server/client interface. Instructions on how to install and use the tool are provided at: <a href="https://www.cosmos.esa.int/web/cheops-guest-observers-programme/scheduling-feasibility-checker/">https://www.cosmos.esa.int/web/cheops-guest-observers-programme/scheduling-feasibility-checker/</a></p>

	<p>For security reasons, the password needed to download the image is on a webpage which requires the user to be logged in to the Guest Observers Webpage and to be a member of the Guest Observers Group. Credentials can be requested following instructions on the AO webpage.</p> <p>Details of the period that each target is visible need to be included in the Technical Justification.</p>
<p>Exposure Time Calculator (ETC)</p>	<p>The tool is used to calculate the predicted photometric precision that can be achieved in a given integration time, and found at:  <a href="https://cheops.unige.ch/pht2/exposure-time-calculator/">https://cheops.unige.ch/pht2/exposure-time-calculator/</a></p> <p>The results of the ETC can be exported to pdf, and are required input to PHT1.</p>
<p>Phase II Proposal Handling Tool (PHT2)</p>	<p>The tool is used to generate and submit detailed observation requests, which are only required for <u>proposals that have been awarded time</u>. A short introduction to the Phase II proposal preparation and submission process is given in section 8, with detailed instructions provided in the CHEOPS Observers Manual and to PIs awarded CHEOPS observing time.</p>
<p>CHEOPS Data</p>	<p>The primary source of CHEOPS data is the CHEOPS mission archive.</p> <p>There is also a dedicated webpage at:  <a href="https://www.cosmos.esa.int/web/cheops-guest-observers-programme/cheops-data/">https://www.cosmos.esa.int/web/cheops-guest-observers-programme/cheops-data/</a></p> <p>which calls out a selection of CHEOPS data available. This includes simulated data from the end-to-end simulator of CHEOPS observations, CHEOPSim<sup>1</sup>, reference/calibration files that are used by the data reduction pipeline to calibrate/correct CHEOPS data as well as examples of observations done early in the mission.</p>
<p>CHEOPS visibility maps</p>	<p>Monthly and annual visibility plots showing the sky accessible with CHEOPS. These are available in the CHEOPS Observers Manual in graphic form, as well as in electronic form/ascii data files via a link in the “useful data” section on the Programme webpage.</p>

<sup>1</sup> See “Expected performances of the Characterising Exoplanet Satellite (CHEOPS) II. The CHEOPS simulator”, Futyan et al (2020) A&A 635, A23 for further details on CHEOPSim.

Overview of CHEOPS performances	Presentations are available from a dedicated webpage <a href="https://www.cosmos.esa.int/web/cheops-guest-observers-programme/in-orbit-updates/">https://www.cosmos.esa.int/web/cheops-guest-observers-programme/in-orbit-updates/</a>
Tips and recommendations from the CHEOPS Science Team on calculating the time required for CHEOPS observations; and how to structure visits	
Experiences of the CHEOPS Science Team in combining multi-epoch data	
Systematics in CHEOPS data, detailed by the CHEOPS Science Team	

**Table 1: Summary of the tools, documents and information provided by the Cheops Mission Consortium to support the Scientific Community with preparing their proposals.**

## 5.2 Components of a Phase I proposal

There are three components to a Phase I CHEOPS observing proposal: the scientific justification, and the technical justification and implementation which are detailed below, and inputs to the on-line proposal submission tool which are detailed in section 6.

### 5.2.1 Scientific justification

The justification shall include the following information, in distinct sections:

- Description of the proposed programme (maximum 2 pages), to include:
  - a. Title of the proposal\*
  - b. Name of PI and institute\*
  - c. Science goals: questions to be addressed by the observations proposed, to include a clear description of how CHEOPS observations will advance the state of knowledge in the area covered by the proposal.
  - d. Why CHEOPS: to include a clear description and justification for the functionality and performances of CHEOPS that will enable the science goals of the programme to be achieved.

An additional 1/2 page is allowed *solely* for tables and figures, if required.

- A concise description of the data reduction/analysis plan (maximum 1 page)

- A concise management plan (maximum 1/2 page), to include a short summary of:
  - a. Team background: List of co-Is (including Name, Institution, Country) together with a short description of the track records of the team.
  - b. Team roles: description of the tasks to successfully complete the science objectives, together with assignment of team roles and responsibilities.

The completed file needs to be uploaded into PHT1 in the form of a pdf no larger than 50 MB (strictly enforced). All items marked with an asterisk (\*) should match and duplicate inputs entered into the PHT1 itself.

Note that proposals exceeding the limits noted above will be rejected on formal grounds and will not be reviewed further.

### **5.2.2 Technical Justification and Implementation**

The technical justification and implementation is made up of three individual components described below. The three individual files need to be uploaded into the PHT1 tool in the form of pdfs, each with a size no larger than 50 MB (files larger than this will be rejected by the tool). All items marked with an asterisk (\*) should match and duplicate inputs requested by the PHT1.

#### **5.2.2.1 Technical Justification and Implementation Case (maximum 1 page excluding target details)**

To include:

- PI name (for identification) and title of proposal\*.
- Observing strategy: to include overall strategy, as well as criteria used for the target selection.
- The target name\*, coordinates (J2000, ICRS) in decimal degrees\*, GAIA G band magnitude\*, spectral type (where applicable), number of orbits per visit\*, number of visits per target\*, total observing time requested. 6 and 5 decimal places are required for RA and Dec coordinates respectively.
- Time request: Total time requested (in orbits), together with a full calculation justifying the need for the time requested. This should include an evaluation of precision needed to achieve the science objectives of the proposal, as well as a demonstration through use of the ETC that this can be met within the time requested. Time requests should allow for time lost due to interruptions (see ETC documentation), but not for slewing.
- Any special requirements/constraints and justifications for these: e.g. observing efficiency, critical phase ranges, the criticality of start and stop times of observation requests, the need for simultaneous observations with other observatories, visits longer than 100 orbits etc.

A short statement that the Scheduling Feasibility Checker has been used to check the feasibility of observing the target is required, together with dates on which/intervals for which the target can be observed with the required efficiency. Where many observing opportunities are available (e.g. observations of the transit of a very short period exoplanet), a selection will be sufficient, for example the earliest and latest availability dates



Scheduling details, together with target details, may be included in the form of a table on a second page.

### 5.2.2.2 Time Estimation

The on-line ETC calculator has the option to produce a pdf of the calculation, which includes both input parameters and output observing times for a target. This needs to be uploaded to PHT1. Tips and recommendations on how to plan observations and size the duration of individual visits have been provided by the CST in presentations referenced in Table 2 of section 5.1.

### 5.2.2.3 Target Duplication Checks

It is essential to check and confirm that a. the target is not already reserved and so on the RTL and b. has not already been observed:

- a. Check using the Reserved Target List Query Tool (see Table 2 in section 5). You are advised to check whether the target is on the reserved target list by using the target coordinates, not the target name. SIMBAD is used to retrieve/resolve the coordinates of named targets, however not all targets (e.g. TESS Objects of Interest) are in SIMBAD..
- b. Check the CHEOPS mission archive:  
[https://cheops.unige.ch/archive\\_browser](https://cheops.unige.ch/archive_browser)  
Note that the archive target query is sensitive to blanks/spaces. You are therefore advised to not only query the archive using target names, but also to try (in a separate query) target coordinates.

Screenshots should be taken to demonstrate that checks have been made and saved in pdf format. The two pdfs need to be concatenated into a single pdf and to be uploaded to PHT1 as part of the proposal.

Observers are reminded of the overarching constraints on the choice of target for a Discretionary Programme which are detailed at the beginning of section 4.

## 6 PROPOSAL SUBMISSION PROCEDURE

Phase I proposals must be submitted to ESA using the Phase I Proposal Handling Tool (PHT1) at: <https://cosmos.esa.int/web/cheops-guest-observers-programme/pht1-dp/>

This is the only way in which CHEOPS proposals can be submitted. The tool is self-explanatory, with concise on-line help available by hovering over the requested inputs.

The tool calls for a combination of on-line input and the upload of pdf files: the detailed content and format of the uploaded files must be in line with the guidelines provided in the previous section, which will be strictly enforced.

Access to PHT1 requires user credentials on the ESA Cosmos system, together with registration to the CHEOPS Guest Observers Programme group. Users can check at to see



whether they already have an ESA Cosmos account, also whether they are already members of the CHEOPS Guest Observers Programme group. Details of how to apply for credentials/to register are provided at the same URL in case not.

The following mandatory information needs to be entered for each Phase 1 proposal:

- Principal Investigator contact details;
- Equivalent details of an additional contact (this person will also be able to consult PHT2 inputs and have access to observational data taken for the proposal in the CHEOPS mission archive during the proprietary period);
- Career status of the proposal PI
- The names/institutes of co-Is;
- Title (maximum of 200 characters);
- Abstract (maximum of 1500 characters);
- Classification of proposal science (Exoplanet Science, Stellar Science, Other);
- Scientific justification (pdf file) – see section 5.2.1;
- Technical justification and implementation (pdf file) – see section 5.2.2.1;
- A single pdf with the output of the ETC tool for each target -- see section 5.2.2.2;
- A single pdf containing screenshots of checks of the reserved target list made for each target in the proposal target list – see section 5.2.2.3;
- Target name, RA (J2000, ICRS) and Dec (J2000, ICRS) in decimal format, GAIA magnitude, (tick-box) confirmation that the target is not on the RTL, whether an observation is time-critical or non-time-critical, the number of CHEOPS orbits requested per target visit and the total number of visits per target. The coordinates are required at the level of 6 and 5 decimal places for RA and Dec respectively.

The requested observing time needs to be provided in units of orbits and visits, and shall include time for interruptions due to passage through the South Atlantic Anomaly and Earth occultation - see section 4.3 for guidelines on the minimum duration of a visit. The time to slew to, to point and to acquire targets does not need to be included in the time request.

**Coordinates entered into PHT1 should be checked very carefully as they will be used “as is”, as the starting point for the detailed definition of observation requests in Phase 2. Updates will not be possible.**

Additional information - including orbital period, transit duration and mid-transit time – is requested for time-critical observations (relevant in particular to exoplanet observations) to facilitate the technical evaluation of proposals. However, this additional information is not mandatory (in which case the input "NA" can be provided).

*Note the total number of orbits and visits requested in a proposal will be calculated automatically based on the inputs provided for the individual target and will be included in the proposal template accordingly.*

An email will be sent to the PI to acknowledge proposal submission. This contains the number of your proposal.

Proposals cannot be updated once submitted (this is in contrast to proposals submitted for the annual AOs. that closes (see table in section 1). A new submission is required in case changes are required.

When submitting a proposal you will be asked to confirm that you have read and agree to the data privacy notice that governs the use by ESA of personal data in the Guest Observers Programme. This can also be found at this link:

<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/cheops-privacy-notice/>

The PI of a proposal is responsible for ensuring that they have the consent from team members to use the personal data of the team members in proposals.

## 7 PROPOSAL EVALUATION AND SELECTION

Phase I proposals will be evaluated by the CHEOPS Project Scientist in consultation with the Chair of the Time Allocation Committee<sup>2</sup> and the CHEOPS Mission Principal Investigator. Where possible, a rotating member of the TAC will be included in the consultation process.

The following points, in addition to those noted in section 4, will be considered as part of the review:

- Scientific excellence and timeliness of the proposal, overall feasibility and technical merit;
- Justification and correct determination of the observing time requested;
- Confirmation that the target meets the criteria details at the beginning of section 4.

It is expected that the turnaround time for proposal evaluation will be short, where possible within a few days. PIs will be informed of the results of the proposal evaluation process by e-mail. Successful proposals, including the title of the proposal (and target) and the time awarded, will be made available at <https://www.cosmos.esa.int/web/cheops-guest-observers-programme/dp-approved>

All targets will be added to the RTL.

Observers are reminded that whilst every attempt will be made to schedule observations of proposals that have been awarded time, for operational reasons there is no guarantee that this will be possible.

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<sup>2</sup> The CHEOPS Time Allocation Committee (CTAC) together with the CTAC chair are independent scientists appointed by ESA, in consultation with the CHEOPS PI. Their primary role is to evaluate proposals submitted to the annual calls for proposals for CHEOPS, and to make a recommendation to the ESA Director of Science for the award of CHEOPS observing time following the call.

## 8 PHASE II DATA ENTRY

PIs of accepted proposals will be required to follow Phase II of proposal preparation. The purpose of Phase II is to provide the detailed information required to schedule observations, in the form of observation requests (ORs). Target information (including coordinates) together with the time awarded for each target will be sent by ESA to the SOC, based on the inputs given to PHT1 and the time and priority levels awarded. This will be used to pre-populate the ORs and will not be changeable. Access to the tool will require user credentials, which will be provided by the SOC to the proposal PI and the additional contact.

PHT2 entry should be completed as soon as possible after notification of the award of telescope time has been received. Details of how to use PHT2 are provided in section 1.4 of the CHEOPS Observers Manual, Additional instructions on how to complete the inputs will be provided to PI.

Once submitted, the ORs will be added to those from all other Guest Observers Programmes and from the GTO Programme as input to the mission planning tool used to generate the weekly activity plans (observing schedules).

Observers are reminded that whilst every attempt will be made to schedule observations of proposals that have been awarded time, for operational reasons there is no guarantee that this will be possible.

## 9 DATA PRODUCTS AND PROPRIETARY PERIODS

CHEOPS has the following level data products:

- Level-0: Received at the SOC from the Mission Operations Centre. Includes science data, as well as housekeeping and auxiliary data. The data format is either telemetry packets (as downlinked from the spacecraft) or XML or plain ascii files as produced by the MOC;
- Level-0.5: Output of the preprocessing step at SOC. All data are time-tagged with UTC and MJD. Telemetry, science and housekeeping data are converted into FITS files at the level of visits and passes, and housekeeping data are converted into physical values;
- Level-1: Calibrated and corrected science images (full-array images as well as sub-array images) as produced by the Data Reduction Pipeline. Engineering meta-data are associated to the science data. Data are time tagged with UTC, MJD and BJD.
- Level-2: Photometric time series (light curves) and associated meta-data resulting from processing of the Level-1 images.

Further details can be found in the CHEOPS Observers Manual, with descriptions of the individual products (including metadata and contents) detailed in the Data Product Description Document (DPDD) which is available from the Discretionary Programme webpage.

All data products are ingested into the CHEOPS mission archive, together with an automatically generated report detailing the data processing that is produced by the data reduction pipeline. The CHEOPS mission archive can be found at: [https://cheops.unige.ch/archive\\_browser](https://cheops.unige.ch/archive_browser)

Details of selected examples of CHEOPS observations and data products can be found on the CHEOPS data page: <https://www.cosmos.esa.int/web/cheops-guest-observers-programme/cheops-data>

Data from the GTO Programme and all GO observations granted time through AOs will be subject to an initial period of 1 year. The proprietary period will be set at the level of observation requests: it will begin after the last visit of a given observation request has been made and declared complete following quality checks of the data at SOC. The proprietary period will not exceed a period of 1.5 years that starts from the time of successful completion of the first visit of the observation request.

The default proprietary period for observations made in the DP is as per that described above, however this may be reduced at the discretion of the Project Scientist. The proprietary period for observations that are obvious extensions of proposals already awarded observing time in the Guest Observers Programme may be substantially shorter than 1/1.5 years

Only the PI of the proposal associated with an observation, together with the additional contact detailed in the Phase I proposal, will be able to access proprietary data and associated reports.

## **10 USE OF DATA IN CHEOPS OBSERVING PROPOSALS**

### **10.1 Personal data**

Protection of Personal Data is of great importance for ESA, which strives to ensure a high level of protection as required by the ESA Framework on Personal Data Protection which applies in this field. ESA implements appropriate measures to preserve the rights of data subjects, to ensure the processing of personal data for specified and legitimate purposes, in a not excessive manner, as necessary for the purposes for which the personal data were collected or for which they are further processed, in conditions protecting confidentiality, integrity and safety of personal data and generally to implement the principles set forth in the PDP Framework.

Please consult the applicable Privacy Notice which is available at this link for further information:

<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/cheops-privacy-notice/>

## 10.2 Scientific/intellectual data

Both the proposal submission and evaluation process, and execution of operational activities have been devised to minimise the exchange of information between the GO Programme and the CHEOPS Mission Consortium. All parties in the Consortium and at ESA that do handle information relating to the GO programmes are subject to confidentiality agreements.

### USEFUL REFERENCES/WEBLINKS/RECENT CHEOPS PAPERS

- Webpage for the CHEOPS mission:  
<https://cosmos.esa.int/web/cheops/>
- Webpage for the CHEOPS Guest Observers Programme:  
<https://cosmos.esa.int/web/cheops-guest-observers-programme/>
- Register to the Guest Observers Programme:  
<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/register/>
- Introductory/overview presentations on CHEOPS:  
<https://cosmos.esa.int/web/cheops-guest-observers-programme/is-cheops-for-you-/>
- Updates in orbit - performances, tips from the CHEOPS Science Team working groups:  
<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/in-orbit-updates/>
- CHEOPS Observers Manual:  
<https://cosmos.esa.int/web/cheops-guest-observers-programme/cheops-observers-manual/>
- An overview of the current CHEOPS Guaranteed Time Observing Programme:  
<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/guaranteed-time-observing-programme/>
- Webpage for the CHEOPS Discretionary Programme:  
<https://cosmos.esa.int/web/cheops-guest-observers-programme/discretionary-programme/>
- Webpage listing approved DP proposals:  
<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/dp-approved/>
- Webpage for frequently asked questions (FAQ) for AO-3 in the Discretionary Programme:  
<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/faq-dp/>

- Webpage for the Phase I proposal handling tool (PHT1):  
<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/pht1-dp/>
- CHEOPS mission archive:  
[https://cheops.unige.ch/archive\\_browser/](https://cheops.unige.ch/archive_browser/)
- For details of CHEOPS in the literature, see:  
<https://www.cosmos.esa.int/web/cheops/cheops-in-the-literature/>
- Webpage for CHEOPS data:  
<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/cheops-data/>
- Webpages for AO-1, AO-2 and AO-3, the annual calls in the CHEOPS Guest Observers Programme:  
<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/ao-1/>  
<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/ao-2/>  
<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/ao-3/>
- Webpages listing approved proposals from the AOs:  
<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/ao-1-programmes/>  
<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/ao-2-programmes/>  
<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/ao-3-programmes/>
- Webpage with details of the CHEOPS Privacy Notice (handling of personal data):  
<https://www.cosmos.esa.int/web/cheops-guest-observers-programme/cheops-privacy-notice/>