Second Announcement of Opportunity for Observing Time in the CHEOPS Guest Observers Programme

Policies and Procedures
CHEOPS-EST-SCI-TN-007 i1.0

Prepared by Kate Isaak, CHEOPS Project Scientist

European Space Agency
Agence spatiale européenne

Table of Contents

1 PURPOSE

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. It is a follow-up mission, which will provide the unique capability of determining accurate radii for a subset of those planets for which the mass has already been estimated from ground-based spectroscopic surveys. It will also provide precise radii for new planets (Neptune-size and smaller) discovered by the next generation of ground- or space-based transits surveys. By unveiling transiting exoplanets with high potential for in-depth characterisation, CHEOPS will also provide prime targets

for future instruments suited to the spectroscopic characterisation of exoplanetary atmospheres.

80% of the science time on CHEOPS is dedicated to an observing programme defined by the CHEOPS Science Team (CST) and referred to as the Guaranteed Time Observing (GTO) Programme or Core Observing Programme. The remaining 20% is available to the astronomical community through a Guest Observers (GO) Programme run by ESA that is open to the science community as a whole. The GO Programme is broken into two parts: annual Announcements of Opportunity (AOs), or calls, for proposals to which 15% of the science time per year on CHEOPS will be dedicated and a second - so-called Discretionary Programme (DP) - to which 5% of the CHEOPS science time per year will be dedicated, with proposal submission possible at any time.

This document informs potential users of CHEOPS of the policies and procedures to be followed for, and relevant to, the two-step submission process for proposals requesting observing time through the second annual Announcement of Opportunity (AO-2).

The timeline for the Call is as follows:

Event	**Date**
Issue of AO-2	4 November 2020
Closing date for proposal submissions	1 December 2020 (midday GMT/UTC; 13:00 Central European Time)
CTAC meeting	Early February 2021
Announcement of the results of AO-2	By 19 February 2021
Phase II proposal submission opens (creation of observation requests)	25 February 2021
Submission deadline for Phase II input/ submission of observation requests	10 March 2021
Start of year 2 of CHEOPS, and observations from AO-2	26 March 2021

Table 1: Time line for the second CHEOPS Announcement of Opportunity (AO-2).

The document is organised as follows:

- section 2 provides a very brief introduction to CHEOPS, with an overview of the different categories of observing time and the reserved target list given in section 3;
- constraints specific to this Call are given in section 4;
- an overview of the tools and documentation that are available to aid the observer in their preparatory work are given in section 5, together with detailed description of the content required for the different elements of the Phase I proposal;
- detailed descriptions of the proposal submission process and 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 contains details of the persistence of proposals awarded observing time in AO-2;
- section 11 provides a summary of how personal and intellectual data that is submitted in CHEOPS observing proposals will be used within the CHEOPS mission.

A list of key documents, weblinks/webpages as well as recently submitted CHEOPS papers, is 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 individual elements of a proposal are detailed. Any updates will be posted on the webpage for the AO at:
https://www.cosmos.esa.int/web/cheops-guest-observers-programme/ao-2

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-ao-2

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

which prospective proposers are strongly recommended to check regularly during the call.

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 access to 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, it may still take a bit of time.

1.1 Acronyms

AO /AO-1/AO-2	Announcement of Opportunity/first AO/second 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

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 the CHEOPS Mission Consortium 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^2. 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_{mag} = 9 G dwarf star (T_{eff} = 5500 K) in 6 hours, and 85 ppm or better on the light curve of a fainter V_{mag} =12 K dwarf star (T_{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.

Photometric precisions of better than 15 ppm in 6 hours were measured in observations taken during IOC of HD 88111, a V_{mag}=9.18 (T_{eff}=5330 K) star, and 75 ppm in 3 hours in the case of observations of TYC 5502-1037-1, a V_{mag}=11.92 (T_{eff}=4750 K) star. In both cases the precision was maintained over periods of almost 48 hrs. These observations confirm that the photometric precision requirements of CHEOPS are met. Further details on photometric performances measured during IOC and beyond can be found on the CHEOPS data page at: https://www.cosmos.esa.int/web/cheops-guest-observers-programme/cheops-data

Further details on CHEOPS can be found in the CHEOPS mission paper ("The CHEOPS Mission", W. Benz et. al (2020) arXiv:2009:11633).

3 OBSERVING TIME

3.1 Top-sliced 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 CST to establish the scientific performance and characteristics of the payload, and to monitor their evolution over the course of the mission lifetime. The time remaining in the mission lifetime is referred to as nominal science observing 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 percentage split between the Guaranteed Time Observing Programme and the Guest Observers Programme noted in section 1.

An overview of the monitoring and characterisation 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://cosmos.esa.int/web/cheops-guest-observers-programme/cheops-observers-manual

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

Each theme is broken down into a number of individual, focused science programmes which, together with their associated target lists, will evolve over the course of the mission.

3.3 Guest Observers Time

20% of the nominal science observing time is available to the general science community, through the ESA-run GO Programme, to conduct investigations of their choice. The programme is administered by ESA, using tools and an Observers manual provided by the CHEOPS Mission Consortium (CMC). Proposals are solicited through a combination of AOs foreseen to come out annually, and the Discretionary Programme. This document is applicable to the second annual call, which comes out approximately 5 months before the start of the year 2 of CHEOPS observing. Future calls are currently foreseen on an annual basis, not earlier than 6 months before the start of the applicable cycle.

3.3.1 Discretionary /Time Programme (DP)

25% of the time allocated to the Guest Observers Programme (5% of the total CHEOPS science observing time) is foreseen to be allocated via the Discretionary Programme/Discretionary Time (DP). Details of the programme can be found at: https://cosmos.esa.int/web/cheops-guest-observers-programme/discretionary-programme

3.3.2 Oversubscription and allocation

The CHEOPS Observing Programme will, by definition, comprise a large number of time-critical observations. To facilitate the efficient scheduling of observations, a factor of approx. 0.32 more time than is physically available will be allocated to the GO programme. It is expected that the same over-subscription factor is applied to the GTO programme target list.

3.3.3 Time available in AO-2

It is foreseen that a total of ~1580 hrs/~948 orbits (duration c. 99 minutes) will be available to the Guest Observers Programme in Year 2. The total time allocated in AO-2 will differ from this number due to time that will be allocated through the DP, together with the oversubscription term described in section 0. It is therefore foreseen that the total time allocated will be around ~1830 hrs/~1100 orbits. The time will be split across three different priority levels – A/1 (highest priority), B/2 (medium priority) and C/3 (low priority), with the fraction of targets/observing time allocated to the different priorities set to maximise the chances of the observations of the highest priority targets being completed.

The persistence of observations awarded time in AO-2 is addressed in section 10.

3.4 The Reserved Target List

The target line of sight to all targets that are either

a. part of the GTO programme, or
b. part of observation requests from proposals that are from the GO programme that have yet to be started or remain to be completed, are blocked and may not be included in observing proposals.

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/

The RTL as of the time AO-2 opened is also available in a csv formatted file from the AO-2 webpage. It is important to recall that a target is no longer be reserved when all requested observations for the target have been completed, and thus that as time passes a small number of targets that appear in the csv file may no longer be reserved. The on-line tool should therefore always be checked, and provides the definitive status of a target/line-of-sight.

3.5 Update of the Reserved Target List during AO-2

The only way in which targets may be added to the RTL during the 4-week period that AO-2 is open is via submission of a proposal to the Discretionary Programme. This route is restricted to proposals containing a single target that is (a) observable by the date foreseen for the end of the AO cycle 2 (25 March 2022), and (b) that has either been discovered (published) or be declared to be of high scientific interest since 4 November 2020. Failure to meet these criteria will result in an automatic rejection of the proposal on formal grounds. Further details on the Discretionary Programme and the requirements that a proposal must meet may be found on the webpage for the programme:
https://www.cosmos.esa.int/web/cheops-guest-observers-programme/discretionary-programme

It is highly recommended that everyone preparing proposals for AO-2 checks the webpage listing proposals awarded time in the Discretionary Programme:
https://www.cosmos.esa.int/web/cheops-guest-observers-programme/dp-approved

where the title + target of all proposals awarded time will be published and clearly marked as such. This includes proposals awarded time during the period that the call is open. Once awarded time, such targets will be added to the Reserved Target List and will not be eligible for observing time in AO-2. Any component of a proposal submitted to AO-2 which includes such a reserved target will be rejected on formal grounds.

4 CONSTRAINTS ON PROPOSALS SUBMITTED TO AO-2

AO-2 is open to the worldwide scientific community.

The minimum duration of a single pointing (known as a “visit”, see the Observers’ manual for a detailed description of what this is) is 1 orbit ie. c. 99 minutes. There is no restriction on the maximum amount of time that may be requested in a single proposal, however 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. It may under exceptional circumstances be possible for a visit of a longer duration (eg. longer than 1 week) to be scheduled by splitting the visit into two, contiguous visits, however due to the impact on the CHEOPS schedule this will be considered in very rare cases only.

The timing accuracy and precision of CHEOPS has been verified during In-orbit commissioning and shown to deviate by less than 1 s from UTC. The maximum image cadence is dependent on the exposure time (see the CHEOPS Observers Manual for further details) and the stacking order required to meet the available downlink bandwidth. A higher temporal sampling may be achieved through the processing and analysis of imagettes which are not stacked. Further details on this are given in the CHEOPS observers manual.

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 2 for details of the software and associated documentation). For stars fainter than $G_{mag} \approx 11$, the photometric performance varies a lot depending on stray light and background contamination. Users proposing targets at this magnitude or fainter can expect the photometric precision of the light curve products to vary, in particular 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. 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 will be dealt with at the discretion of the TAC.

Both time-critical and non-time critical observations may be requested. Proposals for non-time critical observations that can be flexibly scheduled, broken up or extended to fill gaps between time-critical observations can also be submitted. Observations that could be suitable for such scheduling could include, for example, programmes to monitor stellar variability. A short justification for the need for flexible scheduling, together with a proposed approach, should be included in the technical justification.

It will only be possible to enter the transit parameters at the time of completion of Phase II input (see section 8), and so prospective proposers should allow for uncertainties in ephemerides (eg. mid-transit times) when considering their observing time requests in Phase I.

Please contact cheops-support@cosmos.esa.int in cases where the target of interest is not reserved, but for which there are existing observations in the CHEOPS archive mission (even if proprietary). A brief summary of the observations that have been completed will be provided by ESA (eg. at the level of "transit observations, 10 visits; occultations, 1 visit; phase curve; 1 visit) so that the proposer can decide whether they believe additional observing time is required. The justification for the additional observations beyond those in the archive will need to be addressed in the observing proposal, and may be rejected by the Time Allocation Committee.

Routine simultaneous observations with other observatories are not foreseen for CHEOPS. They may, however, be considered in exceptional cases provided they do not disrupt significantly operations. It should be noted that even if such a proposal were to be accepted by the TAC, CHEOPS observations would be executed on a best-efforts basis and thus cannot be guaranteed.

Proposals to observe Solar System objects may be submitted, however proposers must take note of the following 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 eg. 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. This can introduce significant complexities both in the planning of the observations and in their scheduling, and as a result such programmes have a relatively low chance of being either feasible or being completed.

5 PHASE I PROPOSAL PREPARATION

In Phase I, observers are required to provide inputs that enable both a scientific and technical evaluation of the proposed observations to be made. All material submitted must be written in English. A minimum font size of 10 pt must be used, with an A4 portrait paper format and 1.5 line spacing. Page limits for the individual sections are given below. All documents need to be submitted to the proposal handling tool (PHT1) in the form of pdfs, where individual files may not exceed 50 MB. Note that non-compliance with instructions noted in this section and associated subsections will result in rejection of the proposal on formal grounds. Templates for the scientific justification and the technical justification and implementation can be found on the webpage for the call and should be used to prepare proposal inputs.

More detailed information on the proposed observations will be requested from the PIs of proposals awarded time through the Phase II tool (PHT2) (see section 8).

5.1 Tools and aids for proposal preparation

A number of tools and documentation 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 is given in Table 2. Further details on each are given in the CHEOPS Observers Manual.

Tool/Aid	Description
CHEOPS Observers Manual	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 manual is available as a pdf file from both the webpage for the AO and also from:

	https://cosmos.esa.int/cheops-guest-observers-programme/cheops-observers-manual
Reserved Target List Query Tool	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: https://cheops.unige.ch/pht2/search-reserved-targets/ 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 (eg. TESS objects of interest) are in SIMBAD. A check should also be made of the CHEOPS mission archive to ensure that observations of the proposed target have not already been made. Screen capture shall be used as evidence that a check has been made, and needs to be converted to a pdf and to be included in the proposal submission.
Reserved Target List	An csv formatted file containing the content of the Reserved Target List (target name, RA, Dec) as of 4 November 2020 is available from the webpage of the AO.
Scheduling Feasibility Checker	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. 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: https://www.cosmos.esa.int/web/cheops-guest-observers-programme/scheduling-feasibility-checker The page detailing the password needed to download the image requires the user to be logged in to the Guest Observers Webpage and to be a member of the Guest Observers Group.

	Details of the periods of target visibility need to be included in the Technical Justification.
Exposure Time Calculator (ETC)	The tool is used to calculate the predicted photometric precision that can be achieved in a given integration time, and can be found at: https://cheops.unige.ch/pht2/exposure-time-calculator/ The results of the ETC can be exported to pdf, and are required input to PHT1.
Phase II Proposal Handling Tool (PHT2)	PHT2 is used to generate and submit detailed observation requests, which is only required for proposals that have been awarded time. Details on the Phase II proposal preparation and submission process can be found in the CHEOPS Observers Manual.
CHEOPS Data	A dedicated webpage at: https://www.cosmos.esa.int/web/cheops-guest-observers-programme/cheops-data provides users with details of a selection of CHEOPS data that is available. These include: 1. Simulated data from the end-to-end simulator of CHEOPS observations, CHEOPSim[1] 2. Reference/calibration files that are used by the data reduction pipeline to calibrate/correct CHEOPS data 3. Observations made during In-orbit Commissioning which illustrate CHEOPS photometric performances 4. A reference transit observation 5. Observations of ultra-bright targets taken during M&C (significantly brighter than typical target stars) to illustrate CHEOPS capabilities
CHEOPS visibility maps	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

[1] 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.

	in the "useful data" section on the discretionary programme webpage.
Overview of CHEOPS performances determined during IOC	A short presentation, prepared by the CHEOPS Mission Consortium, summarising the key performances of CHEOPS – photometric precision, point spread function and noise performance overview – measured during IOC can be found on the CHEOPS data page.
Overview of CHEOPS photometric performances	A short presentation, prepared by the CHEOPS Mission Consortium photometric precision, providing an overview of the photometric performances being achieved with CHEOPS.

Table 2: Summary of the tools, documents and information provided by the CMC to support the Scientific Community with preparing their proposals.

5.2 Required 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 in the subsections below, and inputs to the on-line proposal submission tool (detailed in section 6).

5.2.1 Scientific justification (max 4 pages)

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 maximum 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 requested by 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 pdf, 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 names*, 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 demonstrating the need for the time requested. This should include an evaluation of sensitivity 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 (justified): e.g. observing efficiency, the criticality of start and stop times of observation requests, any need for observations to run over more than one CHEOPS year, 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 each proposed target is also required. Dates on which/intervals for which the target can be observed with the required efficiency should be given - where numerous (eg. observations of the transit of a very short period exoplanet), a selection will be sufficient.

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

5.2.2.2 Time Estimate

The on-line ETC calculator has the option to produce a pdf of the webpage, which includes both input parameters and output observing times for a single target. This needs to be uploaded to PHTI. To review/add to depending what is provided.

5.2.2.3 Target Duplication Checks

The proposer is required to check and confirm that the target is not already reserved and so on the RTL or has not already been observed:

- The former check is done by using the Reserved Target List Query Tool (see Table 2 in section 5). 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 (eg. TESS objects of interest) are in SIMBAD. A csv file is also available from the webpage of the AO which contains the names and coordinates of all reserved targets.
- The latter is done by checking the CHEOPS mission archive at: https://cheops.unige.ch/archive_browser
- Note that the archive target query is case-sensitive, as well as being sensitive to blank/spaces. You are therefore advised to not only query the archive using target names, but also to try (in a separate query) target coordinates.

A pdf of the screen shots of the checks needs to be uploaded as part of the proposal.

The full list as of the time that AO-2 opened is also available in csv format from the AO-2 webpage.

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-ao-2
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 https://www.cosmos.esa.int/web/cheops-guest-observers-programme/register 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);
- 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. A minimum of one orbit per visit is required, with a maximum of 100 orbits (see section 4). The time to slew to, to point and to acquire targets does not need to be included in the time request.

Bulk upload of targets is possible via a csv file, an example of which can be downloaded from the webpage for the AO. Care should be taken when editing this file, as some file editors can introduce hidden characters which may prevent the successful ingestion of the file.

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 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 targets 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 can be updated at any time up to the time that AO-2 closes (see table in Section 1). This can be done by clicking on the "Update" button in the proposal submission tool. Whatever is in PHT1 at the time of closing will be considered as final input.

7 PROPOSAL EVALUATION AND SELECTION

Phase I proposals submitted via PHT1 by close of the call will be evaluated by the CHEOPS TAC. The TAC and TAC Chair are scientists from the European exoplanet community, appointed by ESA in consultation with the CHEOPS PI. Additional scientists may be called upon in case of need. The CHEOPS Project Scientist will be the secretary to the TAC.

The technical feasibility for each proposal will be reviewed by the CHEOPS PS using inputs provided in the submitted technical justification and output from the Exposure Time Calculator tools. The following points will be considered as part of the review:

- Overall feasibility and technical merit;
- Appropriate determination (and justification) of the observing time requested, per target and per proposal;
- Any target duplication with other proposals submitted to AO-1;
- Confirmation that no targets in a given proposal are on the Reserved Target List.

A short summary of the assessment will be provided to TAC members, according to a standard format, before the TAC meeting.

The TAC members will individually evaluate proposals and rank them according to:

- Scientific excellence and relevance of the proposed observations;
- The uniqueness and applicability of CHEOPS to achieve the proposed scientific objectives of the proposal;
- Technical feasibility and robustness of the proposed observations and data analysis.

The management plan will also be taken into consideration in the overall evaluation.

The TAC is foreseen to meet in early February. During the meeting, evaluations of proposals by individual TAC members will be discussed, and the recommendation on which proposals are to be awarded time will be consolidated. Targets in proposals that are recommended for award of time will be given a priority of 1, 2 or 3 which will be used by the science planning tool to prioritise the scheduling of observations.

A technical check will be made by the SOC of all proposals recommended for execution, and any found to be unfeasible will be rejected. It should be noted that establishing the technical feasibility of a proposal is the responsibility of the PI of the proposal, and it is not foreseen that many (if any) proposals will be rejected at this stage.

The ESA Director of Science will receive the recommendations of the CHEOPS TAC and will take the final decision on the award of observing time.

PIs of all proposals – including those not awarded time – will be informed of the results of the proposal evaluation process by e-mail. A list of all successful proposals, including the

title, abstract (potentially shortened), and the time awarded for each proposal will be made available on the ESA CHEOPS mission webpages. It is possible that the name of the targets will also be made public via the same channel.

All targets from successful GO proposals will be added to the Reserved Target List.

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.

8 PHASE II DATA ENTRY

PIs of accepted proposals will be required to follow Phase II of the 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 shortly before the tool is made available

PHT2 will open by latest 25 February 2021. All inputs must be finalised and submitted by 10 March 2021. Details of how to use PHT2 are provided in section 1.4 of the CHEOPS Observers Manual.

Once submitted, the ORs will be reviewed by the SOC and then 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 RIGHTS

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.

A detailed description of the CHEOPS data products (including meta data and contents) can be found in the Data Product Description Document (DPDD) which is available from the webpage for the AO.

All data products are ingested into the CHEOPS mission archive, together with an automatically generated report detailing the steps of and results from data processing that is produced by the data reduction pipeline. The CHEOPS mission archive can be found at: https://cheops.unige.ch/archive_browser

Details of 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 all GTO programmes and GO observations granted time through AOs will be subject to an initial proprietary 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. During the proprietary period only the PI of the proposal associated with the observation request, together with the additional contact detailed in the Phase I proposal, will be able to access the data and associated reports.

10 PERSISTENCE OF TARGETS AWARDED TIME IN AO-2

Targets for which observing time is awarded in AO-2 will remain on the reserved target list until the end of the AO cycle or until the associated observations have been completed, whichever comes first. All priority 1 observations will automatically roll over into the subsequent cycle, as will any observation requests for which some but not all visits have been executed.

Note that PIs of all priority 2 and 3 proposals from AO-1 that have not started at the time of the opening of AO-2 are invited to resubmit their proposals (updated or otherwise) for re-evaluation by the TAC if they wish their proposals to be considered for AO-2.

11 HOW DATA SUBMITTED IN CHEOPS OBSERVING PROPOSALS WILL BE USED?

11.1 Personal data

All submitted proposals (which include names, any email addresses and institutions of all co-Is) will be kept in databases at ESA and on the computer of the CHEOPS Project Scientist and on the computers of persons working at ESA authorised by the CHEOPS Project Scientist. Proposals will also be distributed to the Chair and members of the CHEOPS Time Allocation Committee as part of the proposal evaluation process.

For operational purposes, the name of the PI, their email address, institute and ESA Cosmos ID, together with those of the co-I (designated in the Phase I Proposal Handling Tool to be able to edit observing requests and access the archive), will be kept at ESA and will also be kept by the CHEOPS Science Operations Centre based at Geneva Observatory, in the University of Geneva. The name and email address of the PI will be included in files that are used by the SOC in the mission planning system to schedule CHEOPS observations. Files used by the mission planning system may also be shared with the company that developed the planning system solely for test and development purposes. The PI's name will be included in the FITs header of all CHEOPS data files which will be publicly available through the CHEOPS mission archive at Geneva Observatory after the proprietary period has expired. The PI's email address will be used by SOC to inform them that observations have been scheduled, and that data taken has been successfully processed and is in the CHEOPS mission archive. The PI's email address will be used by ESA/the CHEOPS Project Scientist to keep the PI up-to-date on CHEOPS and to interact with them on their programme.

11.2 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
- Webpage for the CHEOPS Discretionary Programme: https://cosmos.esa.int/web/cheops-guest-observers-programme/discretionary-programme

- Webpage for CHEOPS data: https://www.cosmos.esa.int/web/cheops-guest-observers-programme/cheops-data
- Webpage for the Phase I proposal handling tool (PHT1): https://www.cosmos.esa.int/web/cheops-guest-observers-programme/pht2-ao2
- Webpage for AO-1, the first annual call in the CHEOPS Guest Observers Programme: https://www.cosmos.esa.int/web/cheops-guest-observers-programme/ao-1
- Webpage listing approved proposals from AO-1: https://www.cosmos.esa.int/web/cheops-guest-observers-programme/ao-1-programmes
- Webpage listing approved DP proposals: https://www.cosmos.esa.int/web/cheops-guest-observers-programme/dp-approved
- 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 frequently asked questions (FAQ) for AO-2 in the Guest Observers Programme: https://www.cosmos.esa.int/web/cheops-guest-observers-programme/faq-ao-2

- For details of CHEOPS in the literature, see: https://www.cosmos.esa.int/web/cheops/cheops-in-the-literature