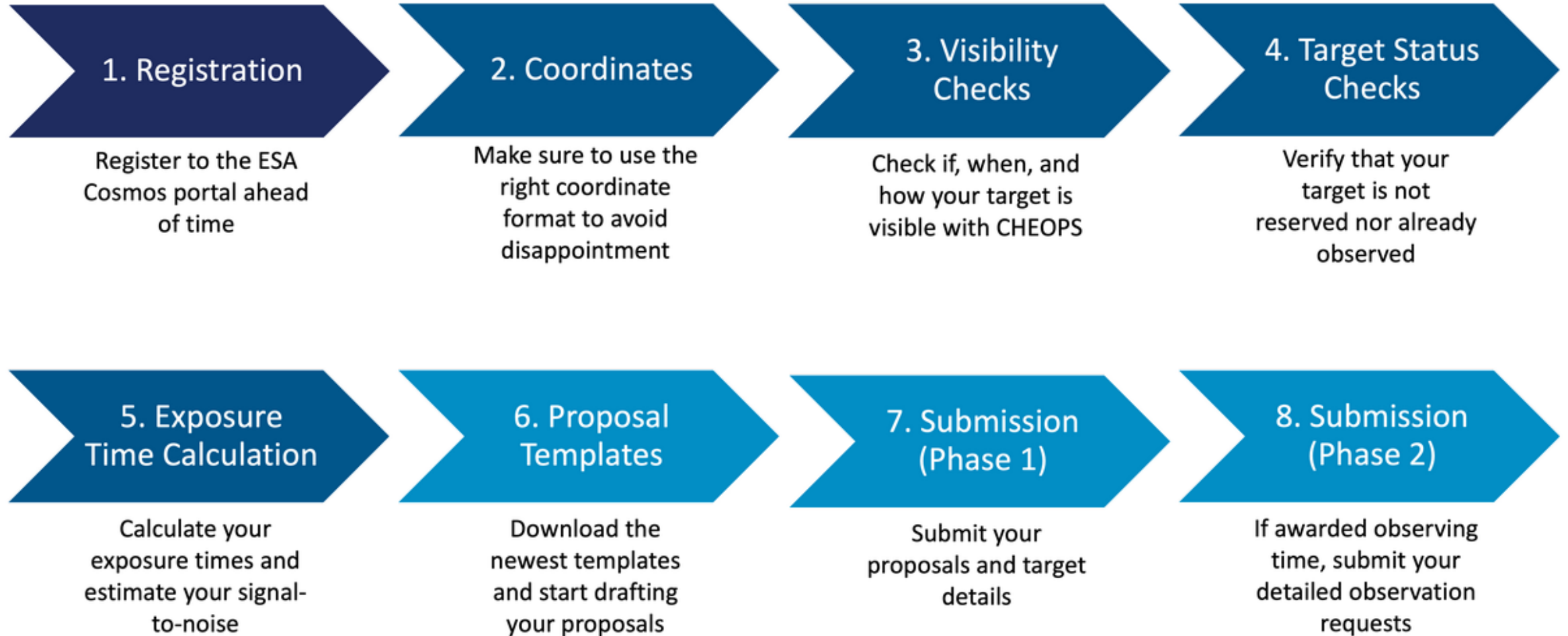


CHEOPS Guest Observers AO-6 Proposal Tutorial

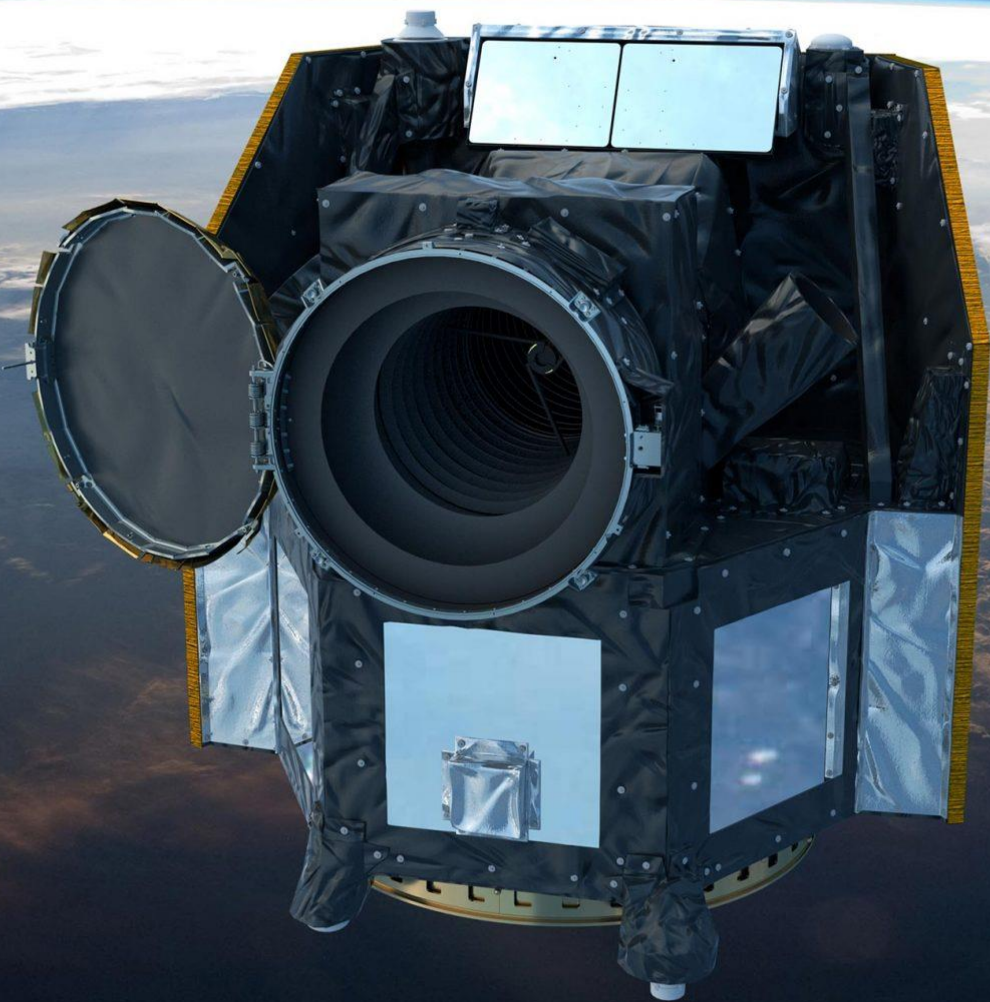
Bruno Merín

Last update: 02/04/2025

7 steps to submit a CHEOPS proposal to its GO AO-6



Why observing your targets with CHEOPS ?



More targets: only 50 GTO reserved targets, with all the rest being open to the entire community

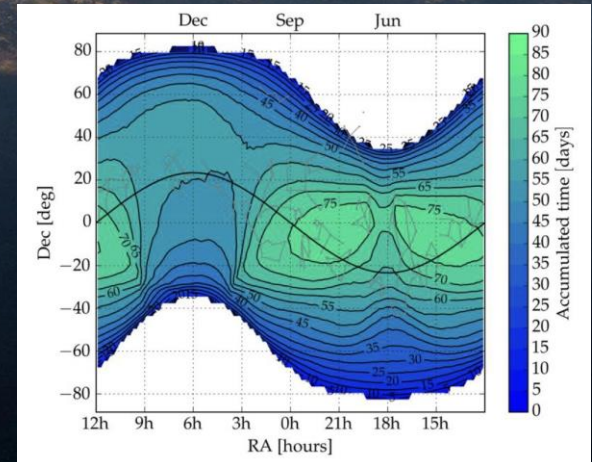
- **More time:** 30% science observing time dedicated to the GO Programme

- **Double anonymous** peer-review of proposals

- Zero-installation, **cloud-based** target visibility checker

Space-based ultra-high-precision photometry :

- 20 ppm in 6 hrs ($6 \leq V \leq 9$); 85 ppm in 3 hrs ($9 \leq V \leq 12$)
- >50% of the sky observable



Target visibility map



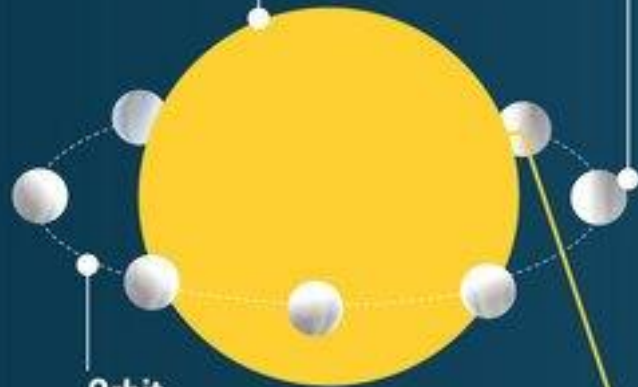
Cool science with CHEOPS



CHEOPS SHOWS SCORCHING EXOPLANET ACTS LIKE A MIRROR

Data from ESA's exoplanet mission **Cheops** has led to the surprising revelation that an ultra-hot exoplanet that orbits its host star in less than a day is covered by **reflective clouds of metal**, making it the **shiniest exoplanet ever found**.

LTT 9779
Sun-like host star



Orbit
~ 19 hours

Cheops detected a small reduction in light coming from the system when the planet moved behind the star

LTT 9779b
Mirror-like exoplanet

A unique ultra-hot Neptune-type planet which likely began its life as a bigger gas giant, but lost mass over time

Silicate (glass)
cloud layer
Titanate
cloud layer



Cloud-filled atmosphere
reflects 80% of incident light

Mass
1.7 × Neptune



Radius
1.2 × Neptune



Dayside temperature
~ 2000 °C



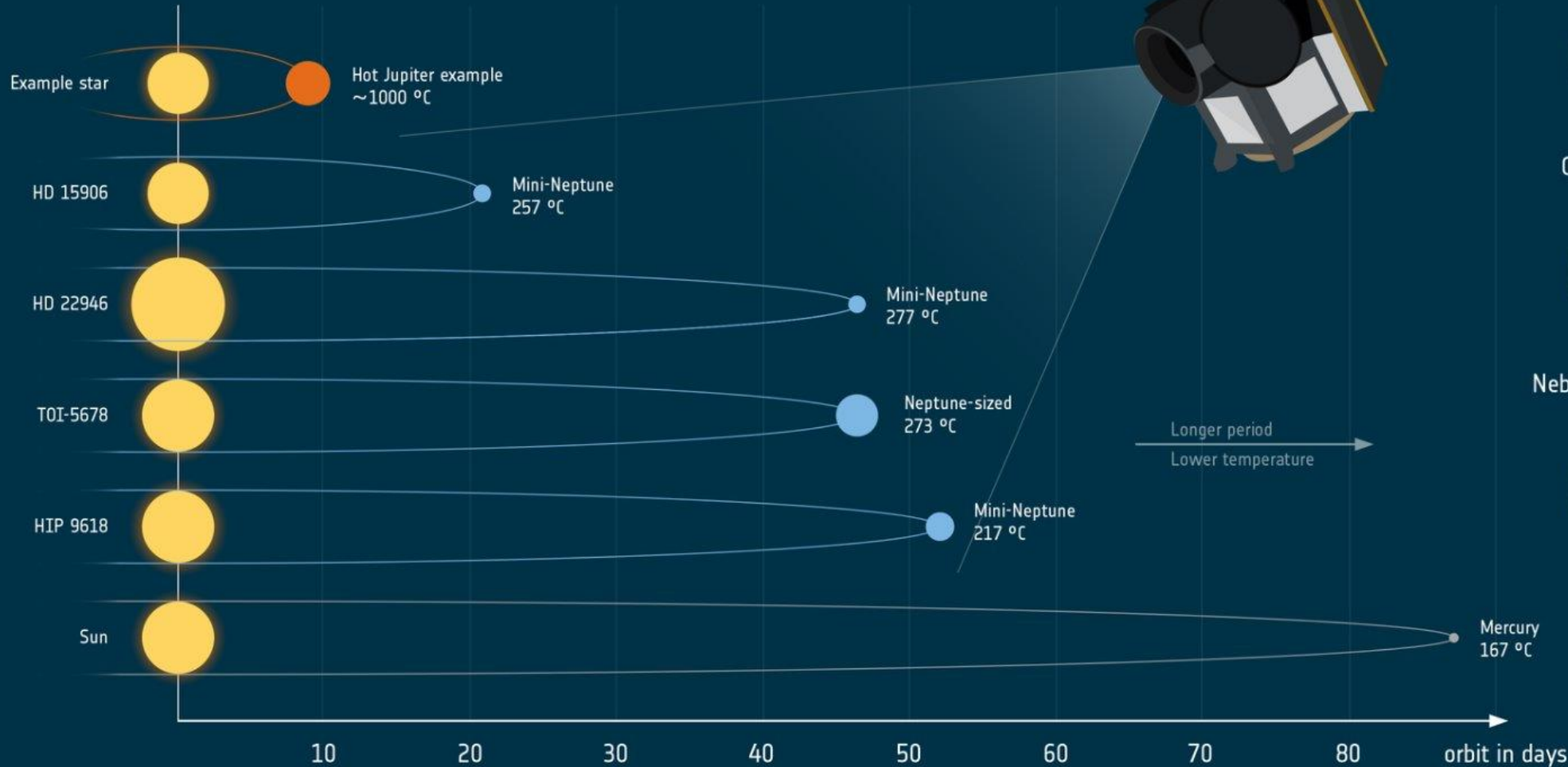
#CHEOPS



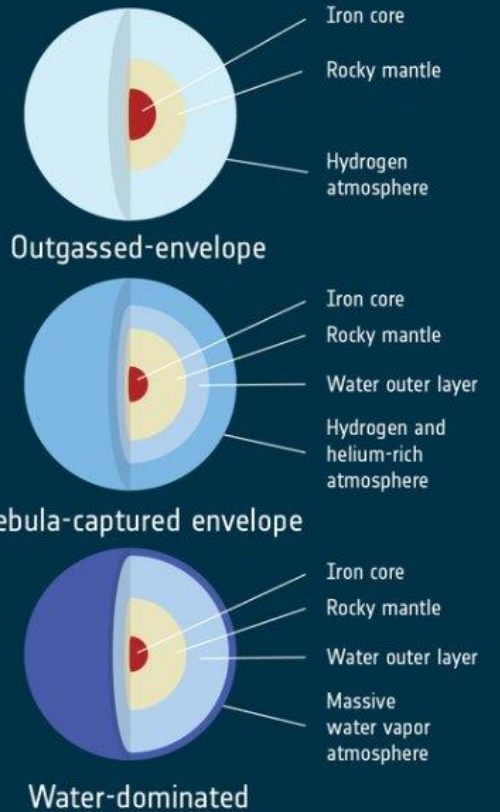
CHEOPS EXPLORES MYSTERIOUS WARM MINI-NEPTUNES



ESA's Cheops confirmed the existence of four warm exoplanets with sizes between Earth and Neptune, orbiting their stars closer than Mercury our Sun. These so-called mini-Neptunes are unlike any planet in our Solar System and provide a 'missing link' that is not yet understood. Mini-Neptunes are among the most common types of planets known, and astronomers are starting to find more and more orbiting bright stars.



Internal structure possibilities of mini-Neptunes



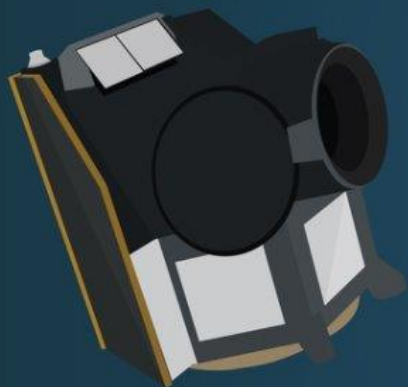
#CHEOPS

Garai et al. 2023, Osborn et al. 2023, Tuson et al. 2023 and Ulmer-Moll et al. 2023
Stars and planets not to scale

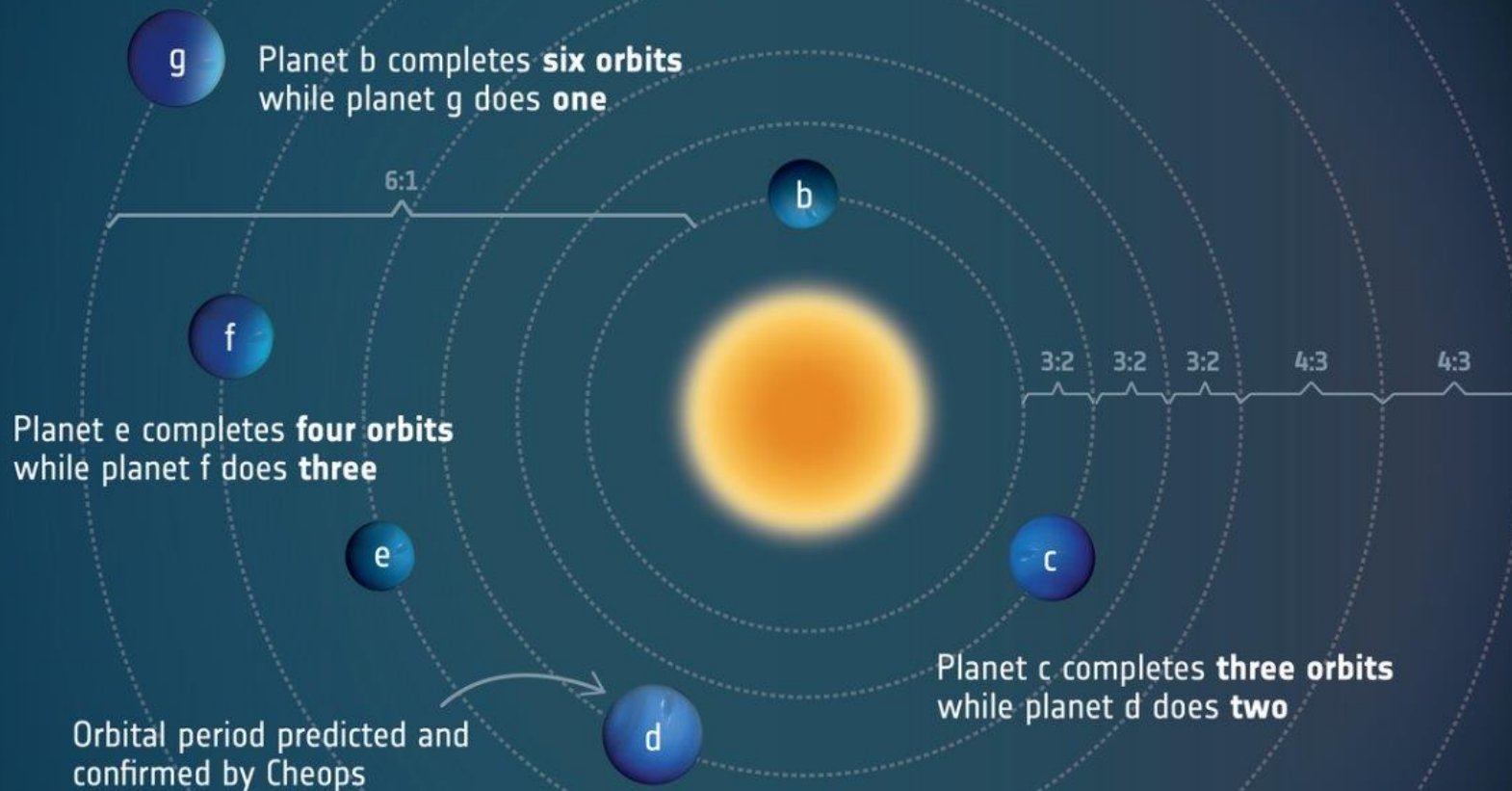


ESA'S CHEOPS HELPS UNLOCK RARE SIX-PLANET SYSTEM

An uncommon family of **six exoplanets** has been unlocked with the help of **ESA's Cheops mission**.



The six planets orbit their **central star HD 110067** in a harmonic rhythm with planets aligning every few orbits.



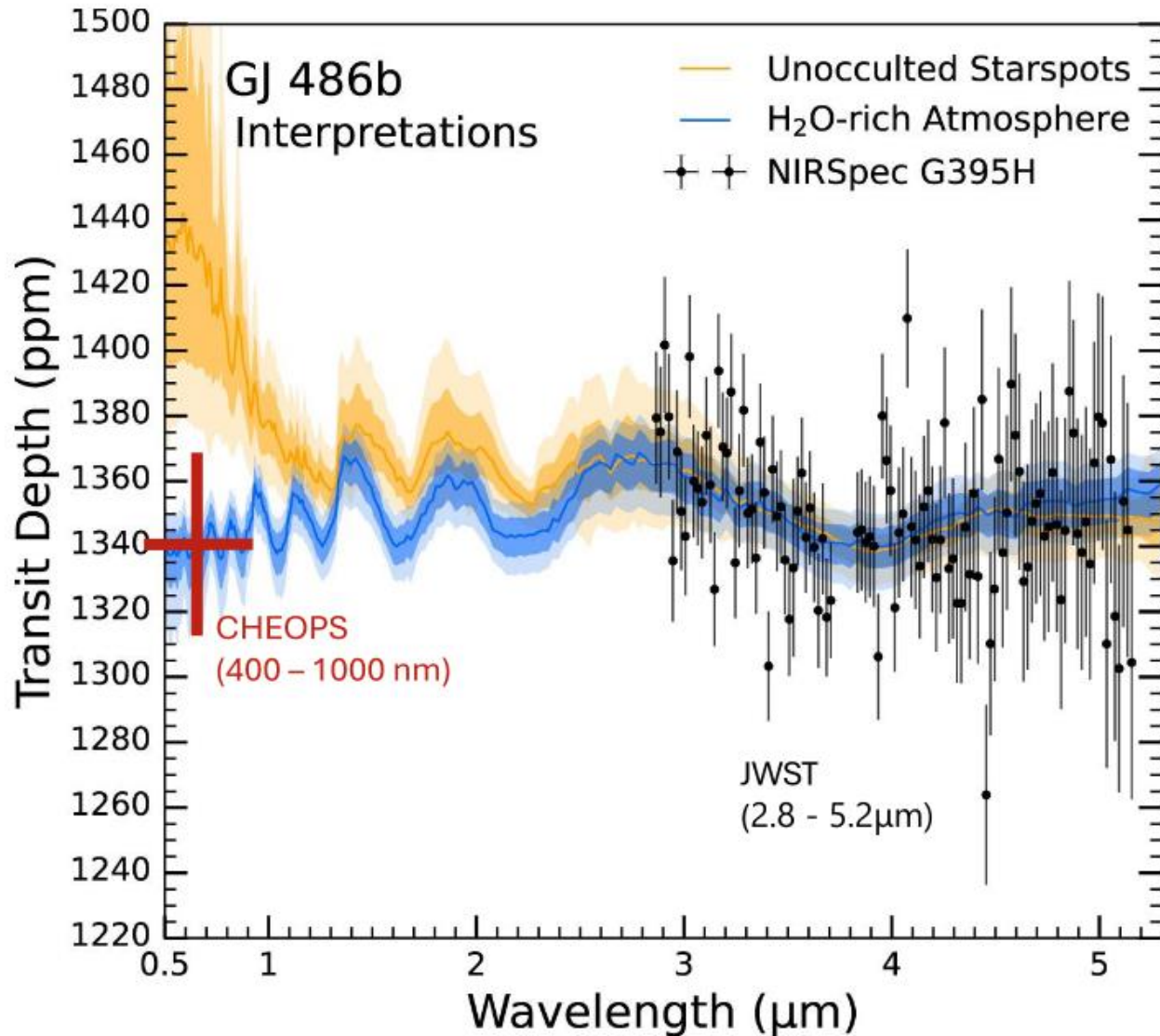
All planets are smaller than Neptune and have large atmospheres

*Star and planets not to scale



Novelties in CHEOPS Cycle 6

- Large programmes are encouraged if teams can demonstrate that they will have the resources to produce a large and coherent dataset for further analysis by the scientific community.
- Simultaneous observations with JWST or other facilities could be requested, potentially enhancing the scientific impact of observations from both observatories (even if schedulability cannot be guaranteed in all cases). See next slide.

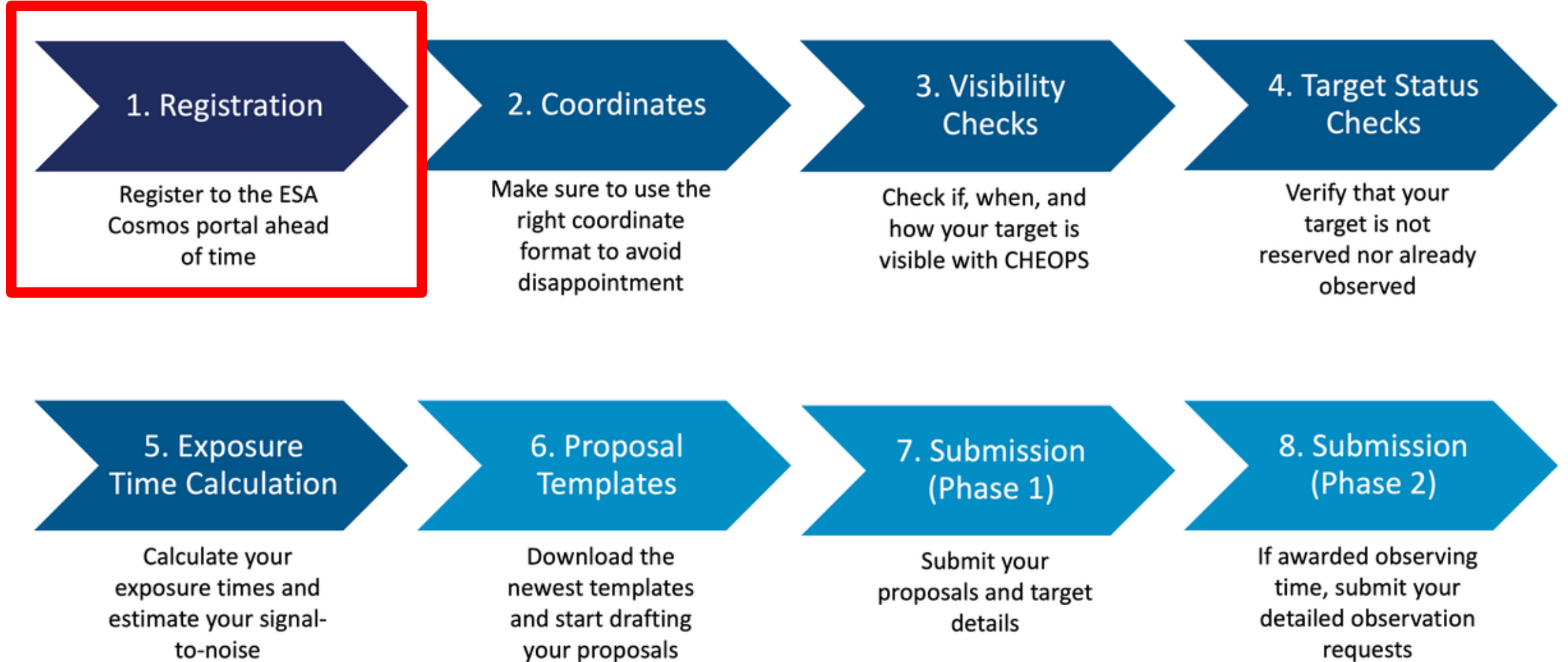


Simultaneous observations:

- Example of super-Earth GJ 486b studied with JWST
- High-profile science (NASA media release, worldwide coverage)
- Simultaneous CHEOPS observations could have broken this degeneracy and given the full picture
- CHEOPS will help HST and JWST to reach full potential

Moran et al. 2023, ApJL, Volume 948, Issue 1, doi: [10.3847/2041-8213/accb9c](https://doi.org/10.3847/2041-8213/accb9c)
<https://www.nasa.gov/universe/webb-finds-water-vapor-but-from-a-rocky-planet-or-its-star/> 2

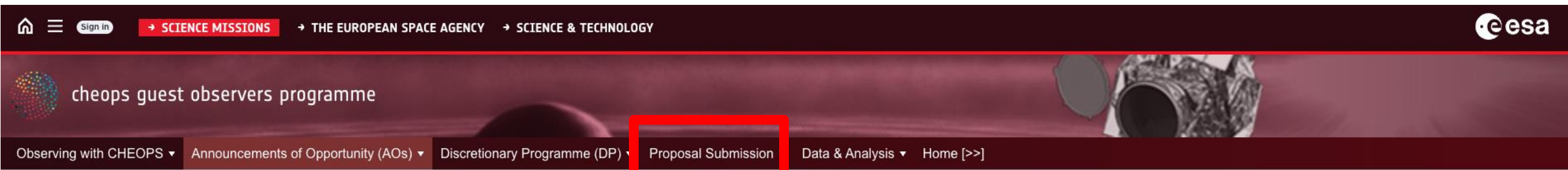
7 steps to submit a CHEOPS proposal to its GO AO-6



1. Registration



1. Go to <https://www.cosmos.esa.int/web/cheops-guest-observers-programme/ao-6>
2. Then click on "Proposal submission"



6TH ANNOUNCEMENT OF OPPORTUNITY (AO-6)

FOR PARTICIPATION IN THE CHEOPS GUEST OBSERVERS (GO) PROGRAMME


This 6th Announcement of Opportunity (AO-6) marks your science opportunities in CHEOPS' first extended mission. AO-6 opens on 18 March 2025 and closes on 8 May 2025, soliciting proposals for observations to be carried out as part of the CHEOPS Guest Observers (GO) Programme, with the observation window spanning from 1 October 2025 to 30 September 2026 (inclusive). CHEOPS offers its GO users space-based ultra-high precision photometry for the observation of exoplanet transits, eclipses, occultations, phase-curves, and more. Science cases may range to exomoons, ring structures, stellar activity, trans-Neptunian objects, and beyond. The timely overlap of several space- and ground-based missions can provide opportunities for synergies with NASA/ESA/CSA JWST, NASA/ESA HST, NASA TESS, ESO ground-based facilities, and more.



1. Registration

3. Then click on "Registration"

Navigation bar with links: [SCIENCE MISSIONS](#), [EUROPEAN SPACE AGENCY](#), [SCIENCE & TECHNOLOGY](#), [SIGN IN](#)

Header banner: cheops guest observers programme 

Menu: [Observing with CHEOPS](#), [Announcements of Opportunity \(AOs\)](#), [Discretionary Programme \(DP\)](#), [Proposal Submission](#), [Data & Analysis](#), [Home \[>>\]](#)

REGISTRATION FOR THE CHEOPS GUEST OBSERVERS PROGRAMME

To submit proposals for Announcement of Opportunities (AOs) and to the Discretionary Programme (DP), users must register to the CHEOPS Guest Observers (GO) Programme. Please follow the instructions below.

Welcome to the CHEOPS Guest Observers Programme

If you want to register, please follow the instructions below:


- If you already have an account, please click on [The self-registration process](#)
- If you are starting a new registration process, please click on [New Registration](#)
- If you believe you have forgotten your password, please click on [Please ensure you have a valid email address](#)

New Registration - Search by Email Address

Please enter an existing email address, or a new email address before starting the self-registration process. As a first action, the system will check if the email address already exists. Remember to confirm you are not a robot before clicking on Search.


Email Address

Re-enter email address

I'm not a robot 

reCAPTCHA
[Privacy](#) - [Terms](#)

[Search by Name](#)

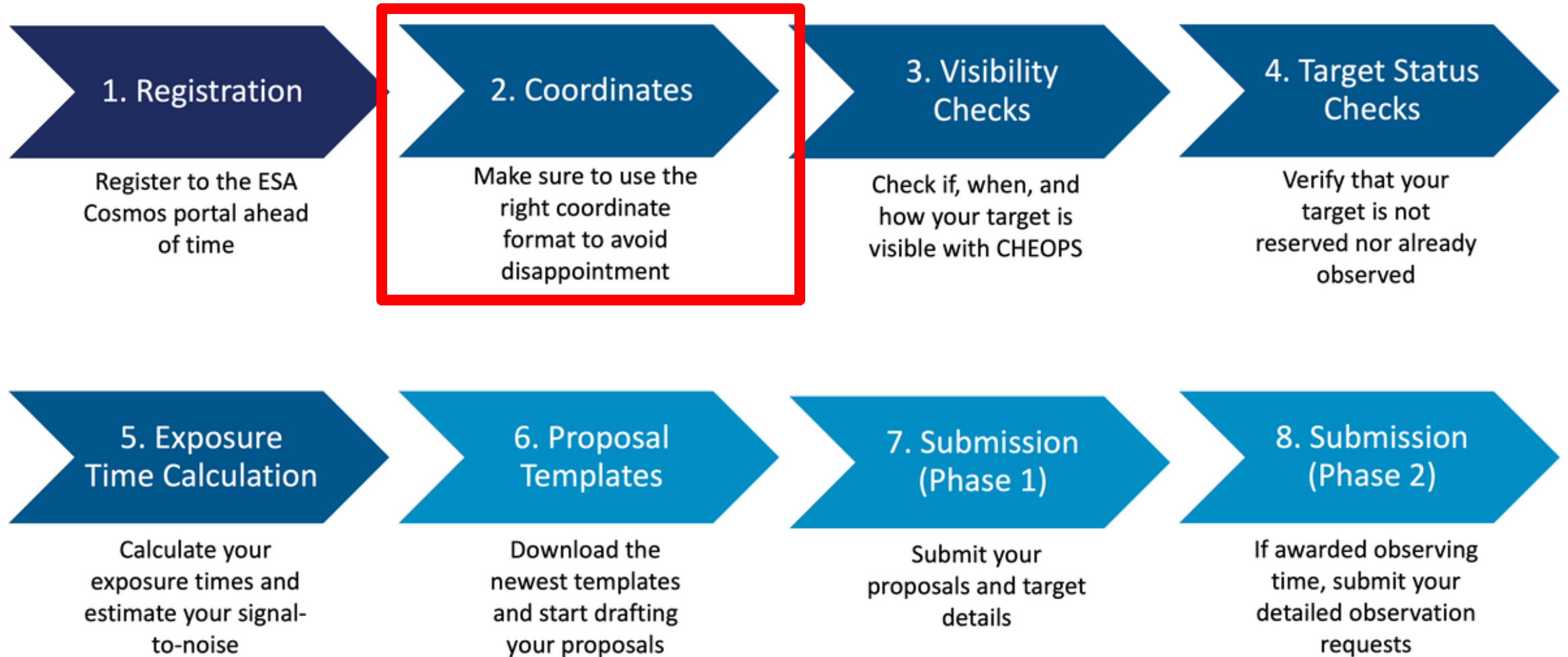


1. Registration

4. Follow the instructions
5. This will create a so-called “cosmos” account that you will need to submit your proposals, and to submit your Observation Requests (ORs) once you have your proposal approved.

(this account also gives you access to other ESA Science user services like other archives, ESASky, helpdesks or to ESA Datalabs)

7 steps to submit a CHEOPS proposal to its GO AO-6



2. Coordinates check

1. CHEOPS consistently uses "ICRS, epoch J2000" SIMBAD (neither Gaia nor ExoFOP coordinates)
2. Go to <https://cheops.unige.ch/pht2/search-reserved-targets/> and resolve your target

Target and Programme Information

Search Targets

Search radius : 10 arc seconds

Target name:

Right ascension: ✓

Declination: ✓

CHEOPS Extended Mission

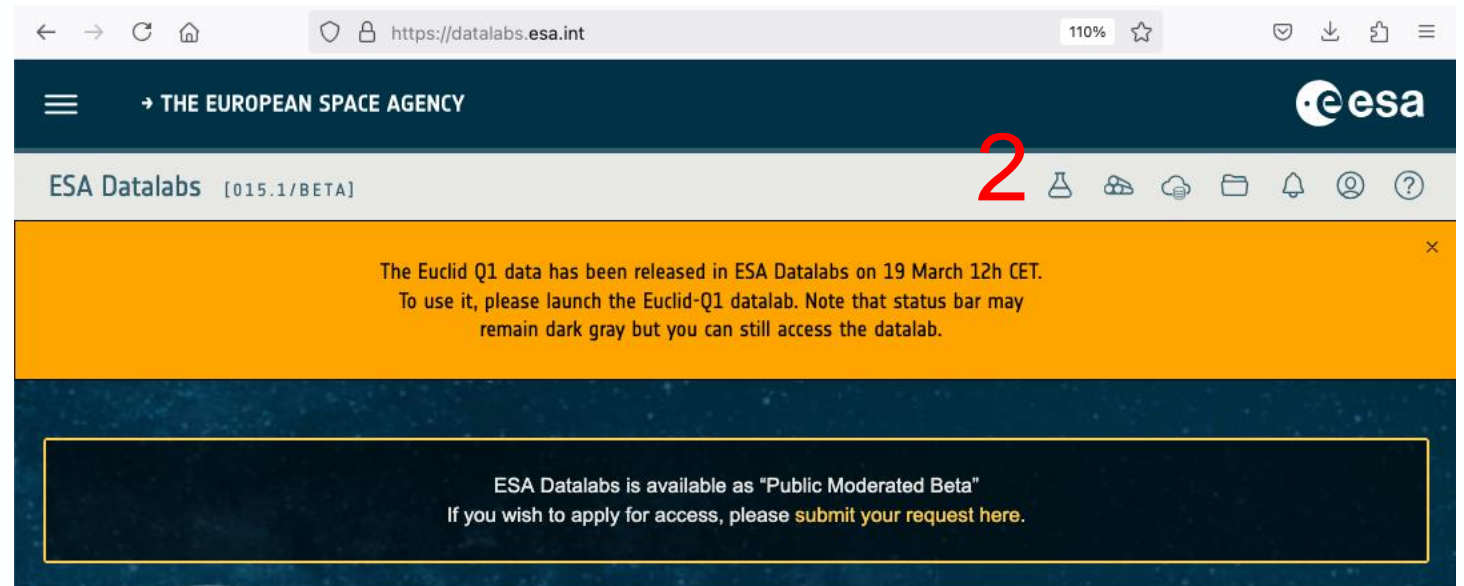
GO proposals for this target are not possible.
This target (i.e., line of sight) is reserved by active GTO programmes (PR140080).

7 steps to submit a CHEOPS proposal to its GO AO-6



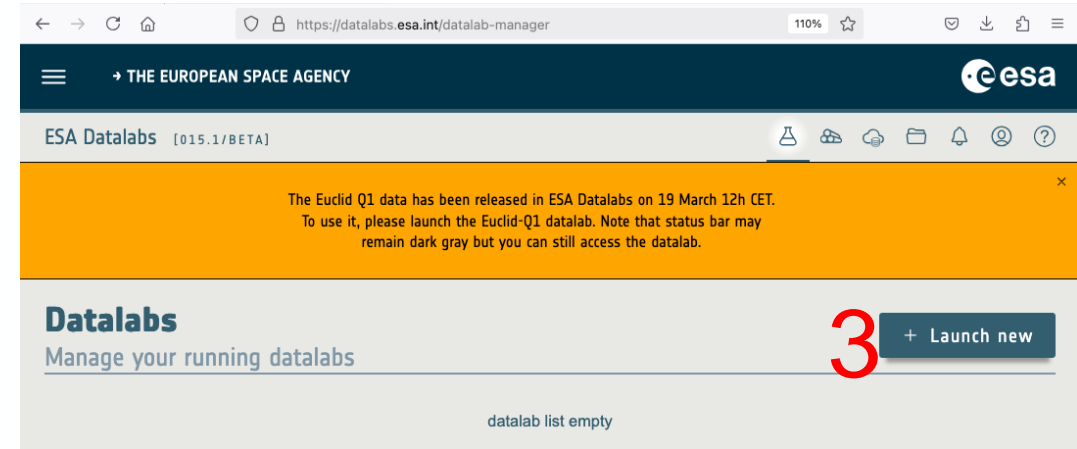
3. Visibility checks

1. Go <http://datalabs.esa.int> and login with your cosmos account (you need to register first)
2. Click on flask icon

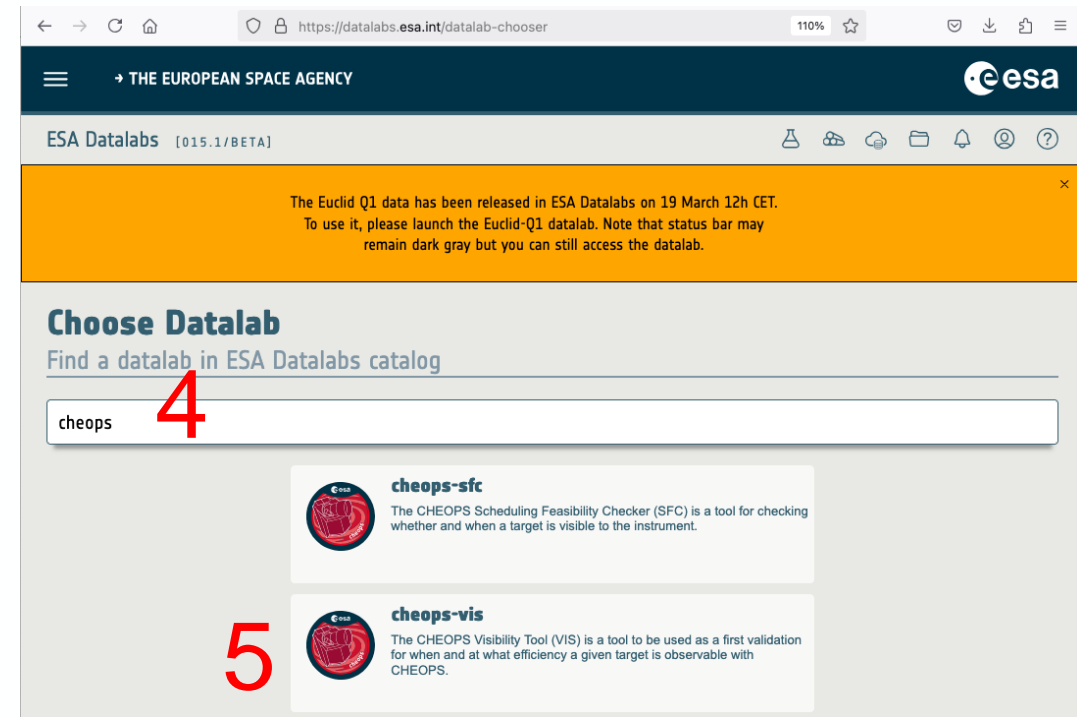


3. Visibility checks

3. Click on "Launch new"



4. Type "cheops" in search field
This shows both CHEOPS applications in Datalabs



5. Click on "cheops-vis" card

3. Visibility checks

6. Click on “Launch it!”

The screenshot shows a web browser window with the URL `https://datalabs.esa.int/datalab-launch-wizard/f47864f6-128b-49df-b94b-b8`. The page header includes the ESA logo and the text "THE EUROPEAN SPACE AGENCY". Below the header, there is a notification banner: "The Euclid Q1 data has been released in ESA Datalabs on 19 March 12h CET. To use it, please launch the Euclid-Q1 datalab. Note that status bar may remain dark gray but you can still access the datalab." The main content area is titled "cheops-vis" and "Datalab launch options". It features a text input field for "Name (optional)", a checked checkbox for "select datalab as soon as its interface is available", and a "Description" section stating: "The CHEOPS Visibility Tool (VIS) is a tool to be used as a first validation for when and at what efficiency a given target is observable with CHEOPS." At the bottom, there are two buttons: "+ Launch it!" and "× Cancel". A large red number "6" is overlaid on the "Launch it!" button.

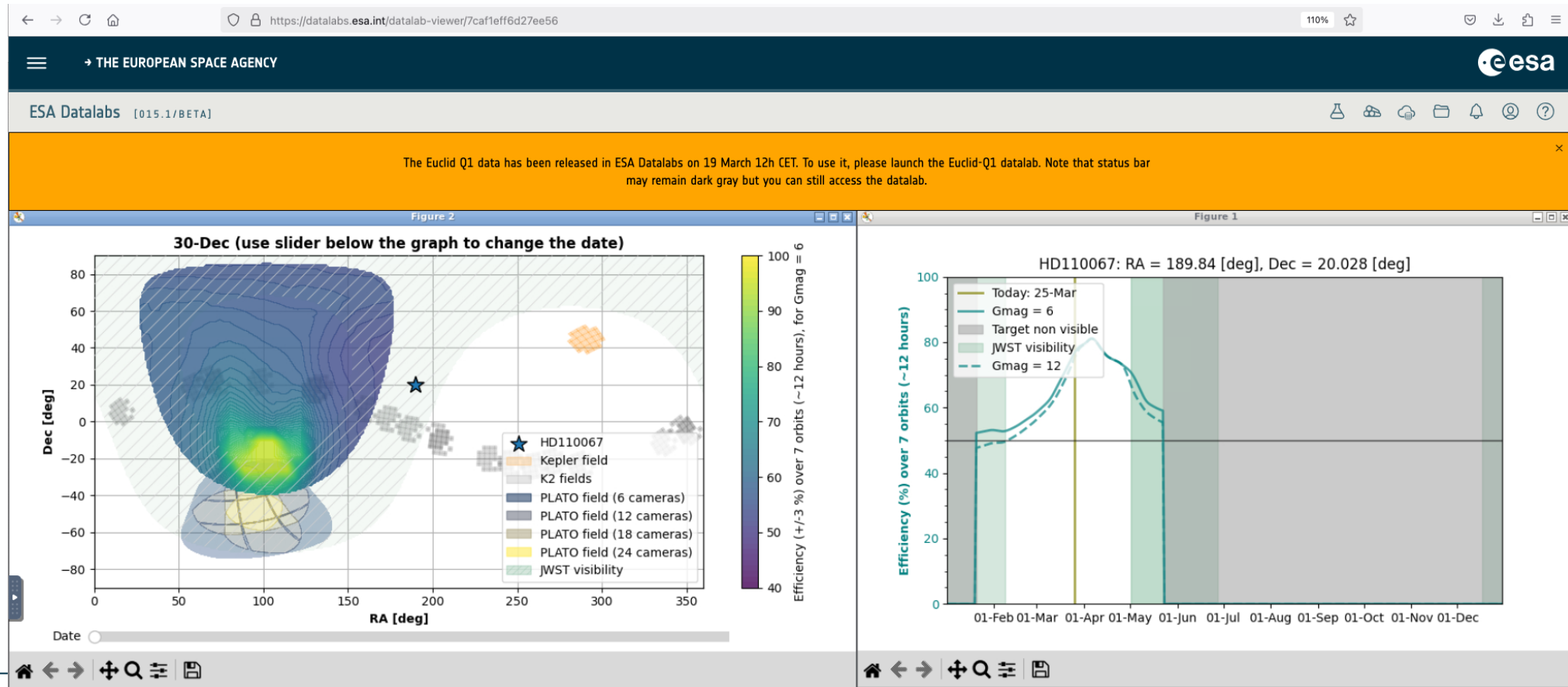
3. Visibility checks

7. Once the application starts, press “enter” to get the console prompt

```
https://datalabs.esa.int/datalab-viewer/0db28d09cbc09abb 110% ☆
THE EUROPEAN SPACE AGENCY
ESA Datalabs [015.1/BETA]
The Euclid Q1 data has been released in ESA Datalabs on 19 March 12h CET. To use it, please launch the Euclid-Q1 datalab. Note that status bar may remain dark gray but you can still access the datalab.
sh
e from Sesame. If the target is not found please add the --RA and --Dec arguments.
Multi-target mode: In multiple target mode, the only mandatory argument is --targets_file, which should be the name of your CSV file containing one row per target, and located in my_workspace/cheops_vis/. The file must have a column for target_name. Refer to the example file for the correct format: 'my_workspace/cheops_vis/targets_example_file.csv'.
Example use:
Basic: CHEOPS_VIS --target_name "51 Peg"
Advanced: CHEOPS_VIS --target_name TOI1234 --RA 20.45 --Dec 0.31 --obs 25-Sep --mode f --SEA 113 --orb_plane --angle_max_roll 15 --hide_slider --hide_plots
Arguments:
target_name: Target ID that will be queried to Sesame if no --RA or --Dec is provided. This ID will also appear on the plots.
RA: Target Right Ascension [0:360] (degrees)
Dec: Target Declination [-90:90] (degrees)
obs: The planned observation day, displayed on the plot in the format 'DD-Mmm' (e.g., '25-Jan').
mode: Use 'b' for bright or 'f' for faint mode. The output efficiencies are derived from a star with Gmag = 6 (bright) or Gmag = 12 (faint)
targets_file: Name of the CSV file containing your targets. This file must be put in my_workspace/cheops_vis/. The columns should be 'target_name,RA(deg),DEC(deg),obs(dd-Mon)' (the last three can be empty), with one row per target. Refer to the example file 'targets_example_file.csv' in my_workspace/cheops_vis/
SEA: Sun Exclusion Angle [110:120] (degrees). CHEOPS can only observe targets within a cone of radius (180-SEA) from the antisun position. Current value is 117 (as of February 2025).
orb_plane: If provided, this argument will show the location on the sky of the orbital plane.
ANGLE_MAX_ROLL: If provided, it shows the intersection between the visibility cone and a zone of X degrees away from the orbital plane, where the maximum roll rate is enforced. If no value is given, the current value in CHEOPS inflight software will be used.
hide_slider: If present, hides the interactive visibility plot.
hide_plots: If present, hides individual efficiency plots (one per target, limited to 10 targets).
Press Enter if you already know how to use the Visibility tool, or '!' to see the rest of the instructions.
```

3. Visibility checks

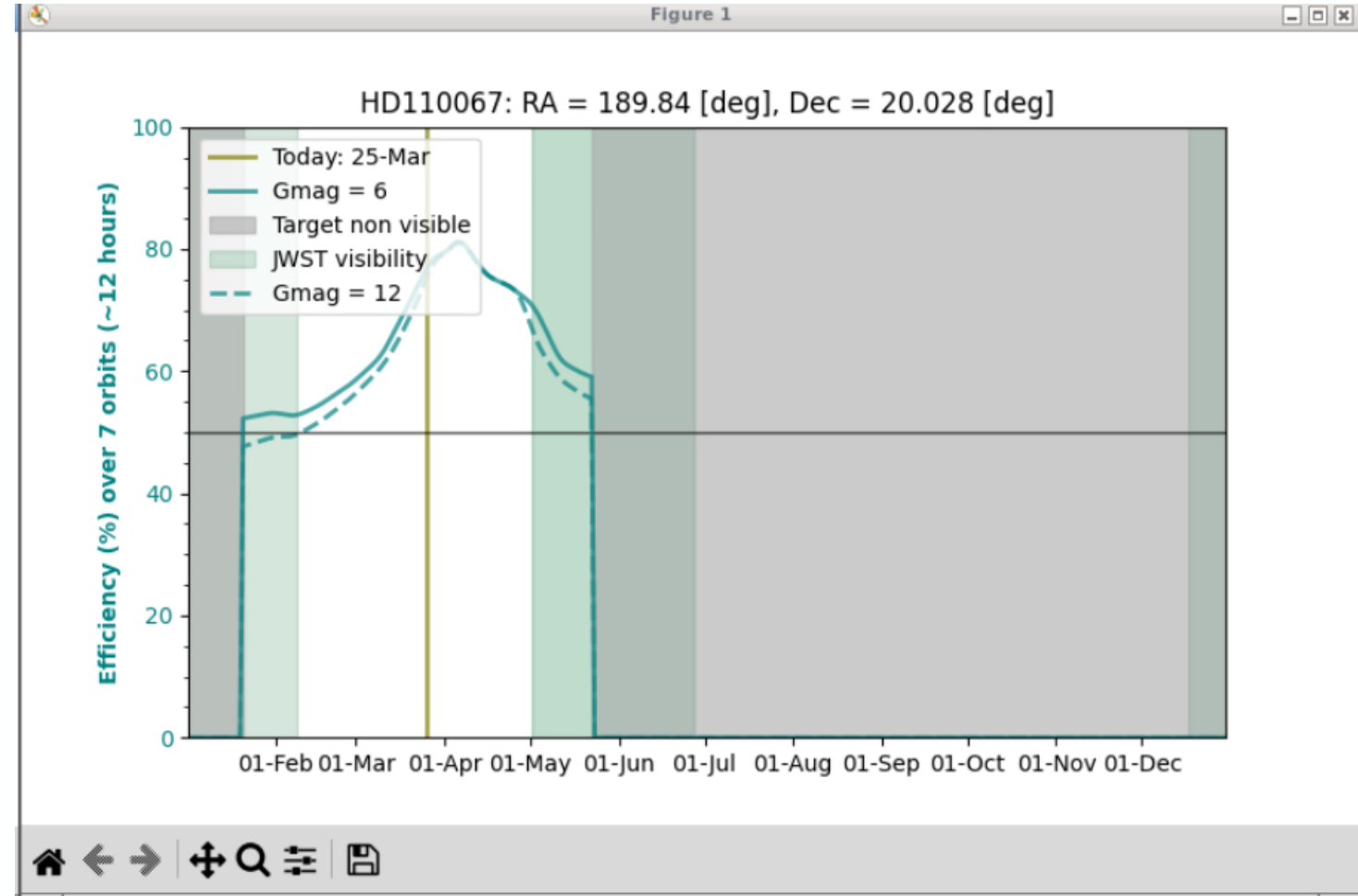
8. At the prompt type "CHEOPS_VIS --target_name" and the name of your target (or other options)



3. Visibility checks

8. Figure shows efficiency as a function of time

You can also use the **cheops_sfc** tool in Datalabs to calculate possible visits for a given transit.



7 steps to submit a CHEOPS proposal to its GO AO-6



4. Target status checks

1. Go to <https://cheops.unige.ch/pht2/search-reserved-targets/> and check your target versus the Reserved Target List

Target and Programme Information

Search Targets

Search radius : 10 arc seconds

Target name

HD 110067

Resolve with Simbad

Right ascension

189.8395986915799

Declination

20.02778777129

Clear

CHEOPS Extended Mission

List of reserved targets

List of programmes

GO proposals for this target are not possible.

This target (i.e., line of sight) is reserved by active GTO programmes (**PR140080**).

GO proposals for this target are not possible.

This target (i.e., line of sight) is reserved by active GTO programmes (**PR140080**).

4. Target status checks

2. Go to https://cheops-archive.astro.unige.ch/archive_browser/ and check your target has not been observed yet

The screenshot displays the CHEOPS Archive Browser interface. At the top, the logo for CHEOPS (Characterising Exoplanet Satellite) is visible alongside the text 'ARCHIVE BROWSER' and an image of the satellite. Below the header, there are navigation links for 'Data Query' and 'Help'. The main content area is divided into several sections:

- Target & Observation Based Query:** This section contains three buttons: 'Target & Observation Based Query', 'Reference Data Query', and 'LO Data Query'. Below these, the 'Target Name' field is highlighted with a red box, containing the text 'HD 110067' and a 'Resolve' button.
- Target Based Query:** This section contains several input fields for target parameters: 'Target RA (deg)' (189.8395986915799), 'Target Dec (deg)' (20.02778777129), 'Radius (deg)' (0.01), 'Target Magnitude Min (mag)', 'Target Magnitude Max (mag)', 'Target Effective Temp Min (K)', and 'Target Effective Temp Max (K)'. Below these are dropdown menus for 'Visits Proprietary Status' (set to 'All Data') and 'Version' (set to 'Latest').
- Observation Request Based Query:** This section contains a 'Submit Query' button (highlighted with a red box) and a 'Reset' button.

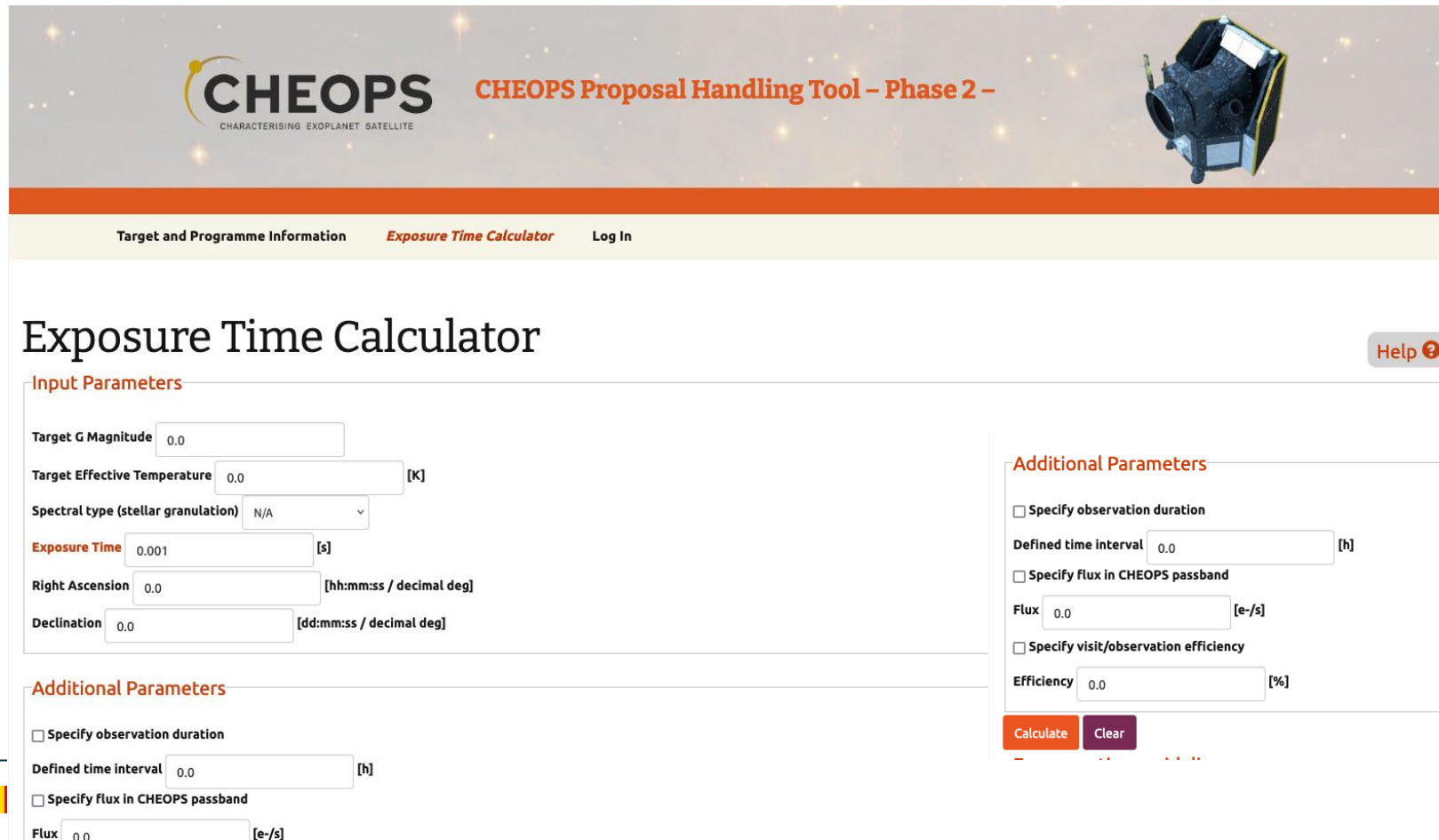
On the right side of the page, there is a login form with fields for 'Username' and 'Password', and a 'Login →' button.

7 steps to submit a CHEOPS proposal to its GO AO-6



5. Exposure time calculation

1. Go to <https://cheops.unige.ch/pht2/exposure-time-calculator/> and calculate exposure times



The screenshot shows the 'CHEOPS Proposal Handling Tool - Phase 2 - Exposure Time Calculator' web interface. The page has a header with the CHEOPS logo and a navigation bar with 'Target and Programme Information', 'Exposure Time Calculator', and 'Log In'. The main content area is titled 'Exposure Time Calculator' and includes a 'Help' button. The interface is divided into two main sections: 'Input Parameters' and 'Additional Parameters'. The 'Input Parameters' section contains fields for 'Target G Magnitude' (0.0), 'Target Effective Temperature' (0.0 [K]), 'Spectral type (stellar granulation)' (N/A), 'Exposure Time' (0.001 [s]), 'Right Ascension' (0.0 [hh:mm:ss / decimal deg]), and 'Declination' (0.0 [dd:mm:ss / decimal deg]). The 'Additional Parameters' section includes checkboxes for 'Specify observation duration', 'Specify flux in CHEOPS passband', and 'Specify visit/observation efficiency', along with input fields for 'Defined time interval' (0.0 [h]), 'Flux' (0.0 [e-/s]), and 'Efficiency' (0.0 [%]). At the bottom of the form are 'Calculate' and 'Clear' buttons. The footer of the page features flags for Germany, Austria, and Belgium on the left, and flags for Hungary, Russia, and Canada on the right, followed by the text '→ THE EUROPEAN SPACE AGENCY'.

5. Exposure time calculation

2. Download the PDF export of the best-fitting exposure times for your science goal

CHEOPS Exposure Time Calculator

Comment

Input Parameters

G Magnitude : 8.18
 Effective Temperature : 5240.00
 Spectral type (stellar granulation) : K0V
 Exposure Time : 20.00 [s]
 Right Ascension : 189.84 [deg]
 Declination : 20.03 [deg]

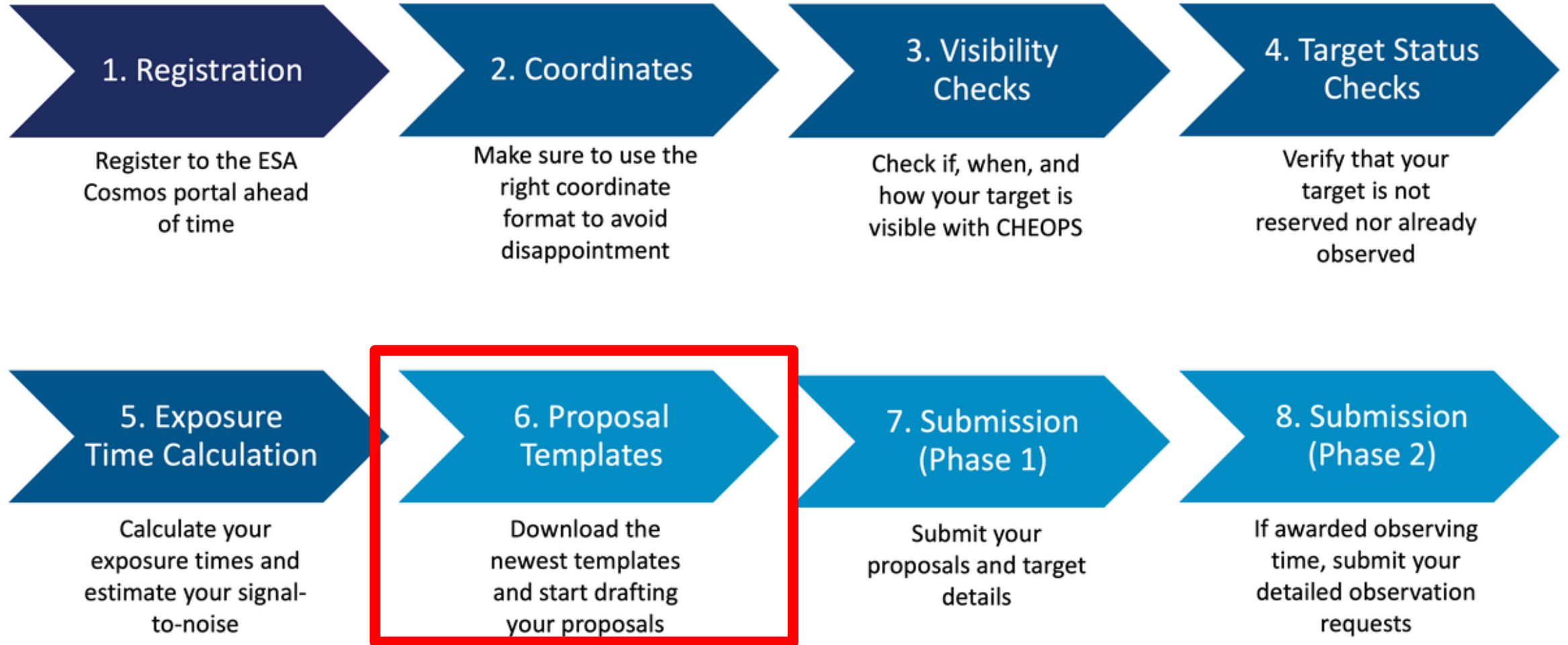
Additional Parameters

Specify observation duration : YES
 Defined time interval : 3.00 [h]
 Specify flux in CHEOPS passband : NO
 Specify visit/observation efficiency : NO

Calculation Results

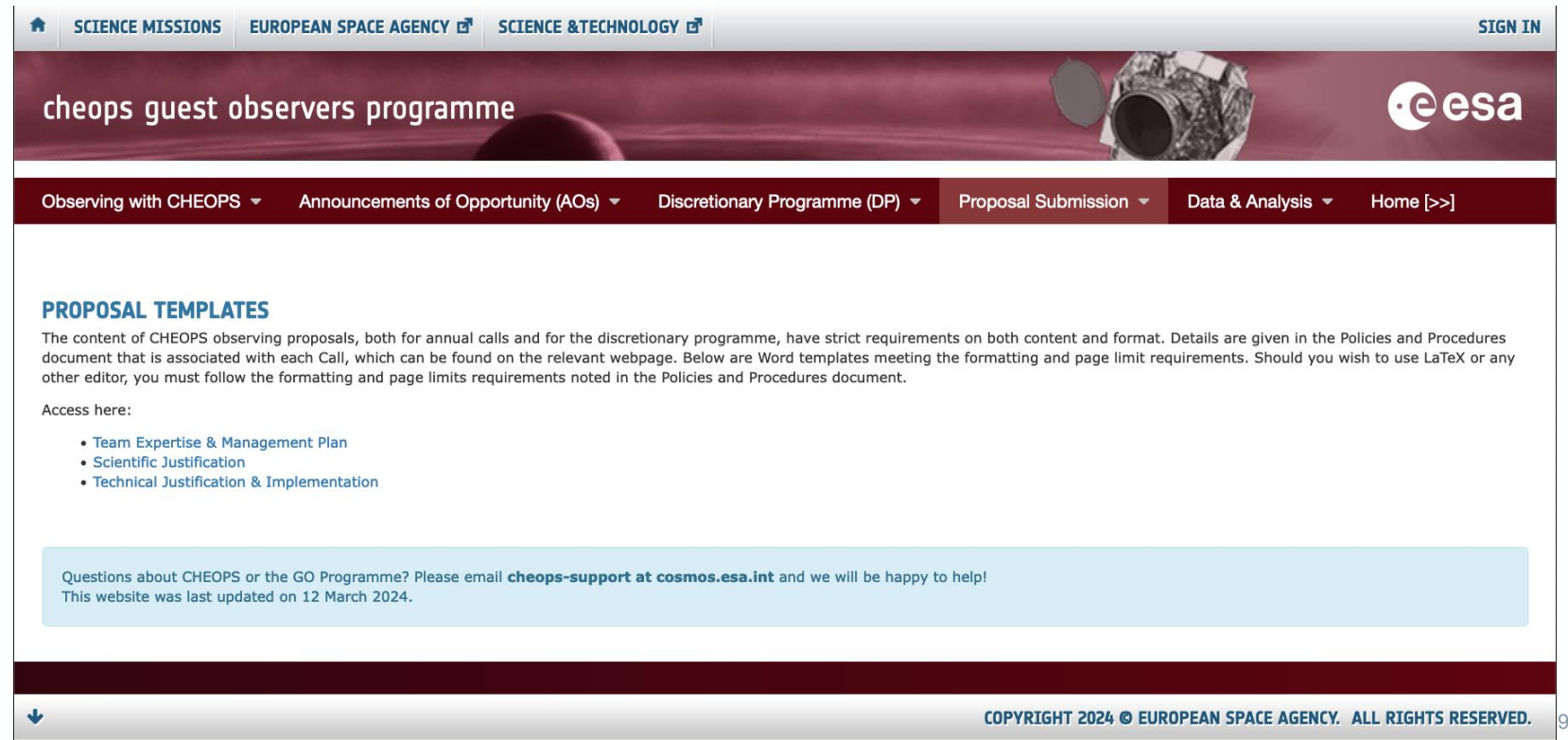
	User input	1 min	10 min	30 min	1 h	3 h	6 h
Saturation level at PSF peak [% FWC] :	82.18						
Assuming 100% efficiency							
Stellar granulation noise :	6.44	8.60	7.83	7.62	7.38	6.44	5.03 [ppm]
Photon noise :	9.69	130.00	41.11	23.73	16.78	9.69	6.85 [ppm]
Total noise including stellar granulation :	16.06	191.94	71.95	41.36	25.61	16.06	12.03 [ppm]
Total noise without stellar granulation :	14.71	191.75	71.52	40.65	24.52	14.71	10.93 [ppm]
Assuming computed maximum efficiency : 83.30							
Stellar granulation noise :	6.44		7.83	7.62	7.38	6.44	5.03 [ppm]
Photon noise :	10.63		45.96	26.18	18.45	10.63	7.51 [ppm]
Total noise including stellar granulation :	17.22		77.88	46.83	27.81	17.22	12.80 [ppm]
Total noise without stellar granulation :	15.97		77.49	46.20	26.81	15.97	11.77 [ppm]
Assuming computed median efficiency : 61.60							
Stellar granulation noise :	6.44		7.83	7.62	7.38	6.44	5.03 [ppm]
Photon noise :	12.36		53.07	30.36	21.47	12.36	8.73 [ppm]
Total noise including stellar granulation :	19.43		87.54	55.21	35.09	19.43	14.30 [ppm]
Total noise without stellar granulation :	18.33		87.18	54.68	34.31	18.33	13.38 [ppm]

7 steps to submit a CHEOPS proposal to its GO AO-6



6. Proposal templates

1. Go to <https://www.cosmos.esa.int/web/cheops-guest-observers-programme/proposal-templates> and download the three proposal templates

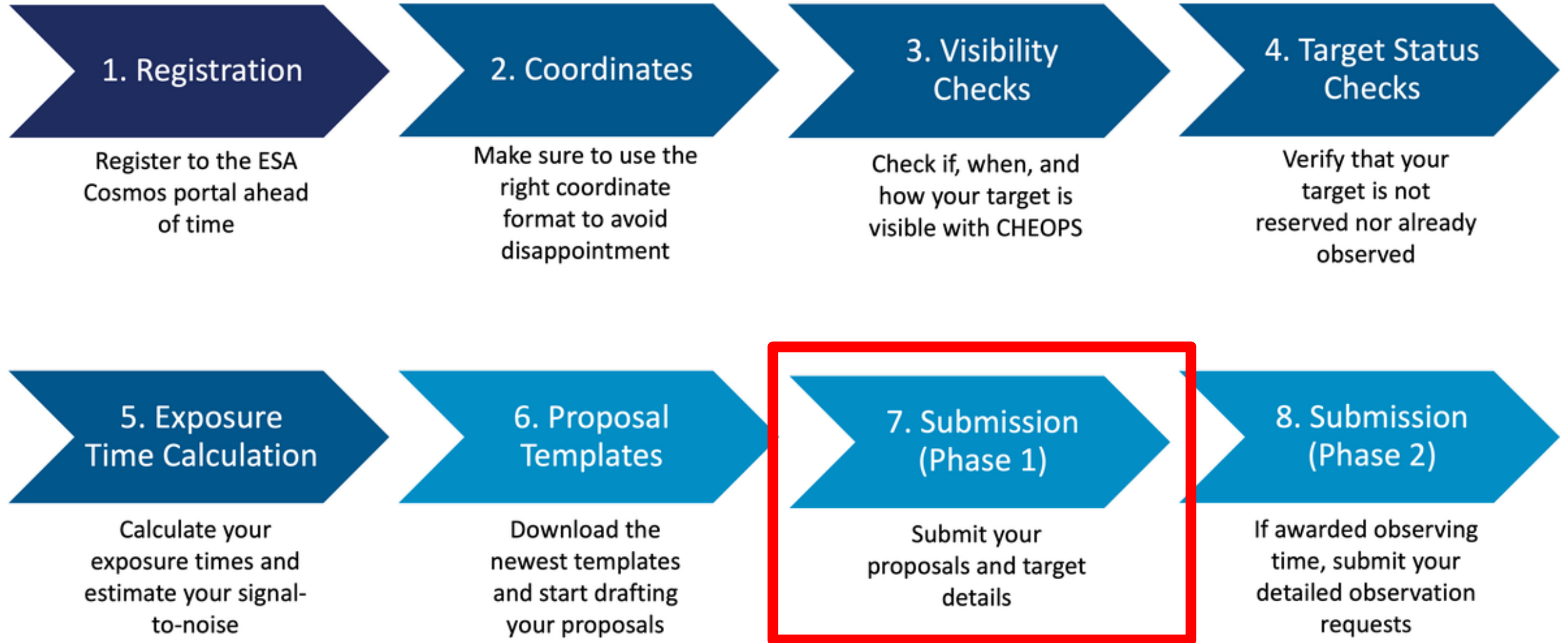


The screenshot shows the website for the CHEOPS Guest Observers Programme. The header includes navigation links for 'SCIENCE MISSIONS', 'EUROPEAN SPACE AGENCY', and 'SCIENCE & TECHNOLOGY', along with a 'SIGN IN' button. The main navigation bar contains 'Observing with CHEOPS', 'Announcements of Opportunity (AOs)', 'Discretionary Programme (DP)', 'Proposal Submission', 'Data & Analysis', and 'Home [>>]'. The 'PROPOSAL TEMPLATES' section is highlighted, with a sub-header and introductory text. Below the text is a list of three templates: 'Team Expertise & Management Plan', 'Scientific Justification', and 'Technical Justification & Implementation'. A light blue box at the bottom of the section contains contact information and a date: 'Questions about CHEOPS or the GO Programme? Please email [cheops-support at cosmos.esa.int](mailto:cheops-support@cosmos.esa.int) and we will be happy to help! This website was last updated on 12 March 2024.'

6. Proposal templates

1. Fill in the *Team expertise and management Plan* template (list team members, their expertise and describe how do you plan to reduce and analyse the data). This document is not anonymised.
2. Fill in the *Scientific Justification* template (**IMPORTANT: respect the dual anonymous conditions!** E.g. make it impossible to guess who you are to reviewers)
3. Fill in the *Technical Justification & Implementation* template with the details from your visibility and exposure time calculations. (**IMPORTANT: respect the dual anonymous conditions!** E.g. make it impossible to guess who you are to reviewers)

7 steps to submit a CHEOPS proposal to its GO AO-6



6. Submission (Phase 1)

1. Go to <https://www.cosmos.esa.int/web/cheops-guest-observers-programme/pht1> and click on “Submission Phase 1”
2. Then click on “Sign in” to log-in into the Proposal Handling Tool 1 (PHT1)



6. Submission (Phase 1)

3. Login with your "cosmos" account (from the registration, step 1)

EUROPEAN SPACE AGENCY | SCIENCE & TECHNOLOGY

cosmos central authentication service

ENTER USERNAME & PASSWORD

Username:*

Password:*

LOGIN

[Forgot your password?](#)
[Forgot your username?](#)
[Privacy Policy](#)

ABOUT CAS

CAS is a single sign-on service that provides access to several secure ESA websites and services.

SINGLE SIGN-OUT

When you end your CAS single sign-on session by logging out of CAS, CAS attempts to log you out of all the services that you visited during your session. While this works well under normal circumstances, there are a number of fundamental limitations with this feature. For that reason it is strongly recommended that you close your browser after logging out of CAS, particularly in cases where additional security is merited, such as a shared computer.

For security reasons, please log out and exit your web browser when you are done accessing services that require authentication!

6. Submission (Phase 1)

4. Click on CHEOPS AO-6

5. Click on the + sign to create a proposal

You currently have no proposals submitted, click here to start [+](#)

Ongoing calls

List of campaigns

Sort by
Oldest first

Here is a list of the active campaigns offered by the SCI Proposal Handling System.



CHEOPS DP

12/03/2024 - 31/12/2029

The Discretionary Programme (DP) runs throughout the year and may have up to 25% of the total science observing time of the Guest Observer (GO) Programme, with the remaining at least 75% dedicated to the annual Announcements of Opportunity (AOs). DP proposals have to be submitted at the latest 4 weeks before the date of the first possible observation.

[Open](#)



CHEOPS AO-6

18/03/2025 - 08/05/2025

This 6th Announcement of Opportunity (AO-6) marks the third year of opportunities in CHEOPS' first extended mission. AO-6 opens on 18 March 2024, 12:00 (noon) CET, and will close on 8 May 2025, 12:00 (noon) CEST. It will solicit proposals for observations to be carried out as part of the CHEOPS Guest Observers (GO) Programme, with the observation window spanning from 1 October 2025 to 30 September 2026.

[Open](#)

6. Submission (Phase 1)

- 6. Fill in the PI details in page 1
- 7. Upload the PDF with the *Team Expertise and Management Plan* file

6. Submission (Phase 1)



8. Fill in the details on the contact's name and other collaborators

Proposals Handling System

Proposal submission

Completed: 1 Additional contact Remaining: 3

1 2 3 4 5

Additional Contact Name Additional Contact Affiliation

Country Cosmos ID

Select an option [input field]

Additional Contact Email

Collaborator 1 + -

Name Affiliation

[input field] [input field]

Log out Back Next



6. Submission (Phase 1)

9. Enter the proposal details (title, science category, abstract and upload justifications)

Proposals Handling System

BMM Bruno Merin Martin

- Ongoing calls
- My projects

Log out

Proposal submission

Completed: 2 1 2 **3** 4 5 Remaining: 2

Title • Max. 200 characters

Science Category •

Abstract • Max. 1500 characters

Max size is 10 MB

Max size is 10 MB

Max size is 10 MB

Max size is 10 MB

6. Submission (Phase 1)

10. Enter info on the target(s), including time-critical info if needed and observation parameters

Proposals Handling System

BMM Bruno Merin Martin

- Ongoing calls
- My projects

Completed: 3 Targets Remaining: 1

1 2 3 4 5

Target 1 + -

Target name • Time criticality •

RA (J2000, ICRS) deg • RA (J2000, ICRS) sexag Dec (J2000, ICRS) deg • Dec (J2000, ICRS) sexag GAIA magnitude •

No: orbits/visit • No: visits/target • Reserved Target •
 YES NO

Orbital Period (in days) Transit duration (in hrs) Mid-transit Time (BJD_TT, in days)

Time awarded Target priority

Log out Back Next

6. Submission (Phase 1)

11. Click on the boxes related to Data privacy and then click "Finish" to submit

Proposals Handling System

BMM Bruno Merin Martin

Ongoing calls

My projects

Log out

Proposal submission

Completed: 4

User consent

1 2 3 4 5

By ticking these boxes, you confirm that, for yourself and team members that you are acting on behalf of, you:

have read, consent, and agree to the CHEOPS Guest Observers Programme [Data Privacy Policy](#).

consent to the publishing of surnames and institutions on ESA web portals for awarded observing time.

Back

Finish

Questions and answers

Extra material

Visibility checks (without Datalabs account)

1. Go to

https://gitlab.unige.ch/cheops/CHEOPS_visibility_tool and download the visibility checker python package (it requires python installed and scipy later than 1.9)

2. After installation, run command:

1. For a single target, run (RA/Dec are optional, see definitions of command line arguments below)

```
$ python3 mk_CHEOPS_eff_maps.py --target_name TARGET_NAME --RA RA --Dec DEC --obs OBS --mode mode
```

2. For multiple targets, use the targets_file argument (definition below), run

```
$ python3 mk_CHEOPS_eff_maps.py --targets_file PATH_TO_YOUR_TARGETS_FILE --mode mode
```

Visibility checks (without Datalabs account)

1. The package will show the visibility map and efficiency values for one year (Remember: AO-6 runs from 1 Oct 2025 to 30 Sept 2026)

