



# Planetary Defense

Become a Planetary Guardian

User Guide

V3.0





App version 3.0.0

# Planet Guarding Tutorial

First time observing a Near-Earth Asteroid? Read this page to master your Unistellar telescope and join our team of Planetary Guardians.

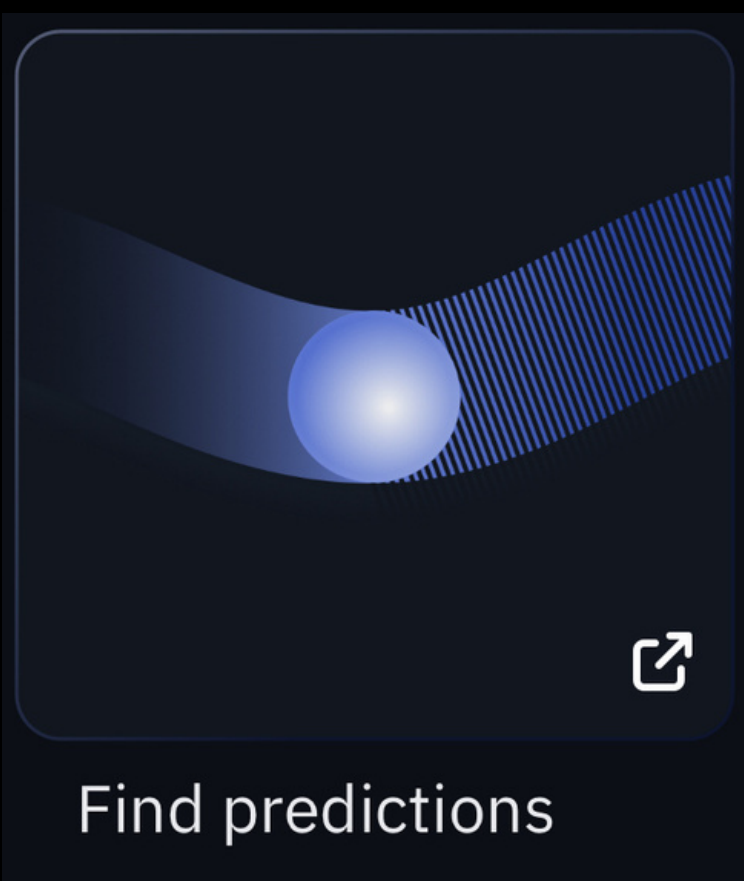


# PRE-OBSERVATION

1

Select your mission

The passage of a near-Earth asteroid (NEA) is a unique event to record, and to observe one you need to be in a specific area on Earth. First, you need to select a mission visible to your location. This is easy using the [Unistellar Scientific Events Prediction Page](#)! This page will show you all of the NEAs visible to your observing site within a given date range. It is also accessible through the Unistellar app **Home** or **Science** menu by clicking on the “**Find Predictions**” icon.



## Scientific Events Prediction

This page helps you find scientific events to observe from on your location within a chosen date range. The results include **deep links** to pre-format the Unistellar app for each observation .

### Parameters

Select the type(s) of event you want to include, then enter your location and a local date range. Click the “Generate” button below to get a list of the events available in your sky.

Type of events:

- Asteroid Occultations
- Exoplanet Transits
- Comets
- Planetary Defense

Location of the observation:

Enter the address from where you plan to observe

Or enter the coordinates directly in degrees (range -180 to 180 for longitude)



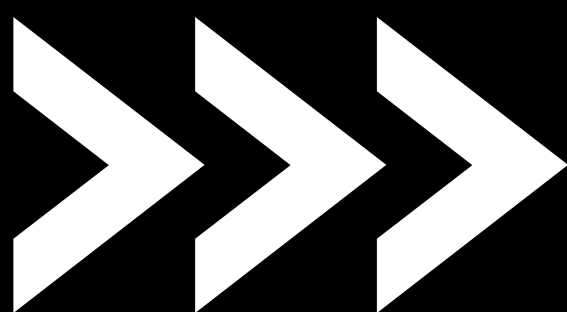
# PRE-OBSERVATION

1

Select your mission

Near-Earth asteroids are fast-moving targets to observe. Their coordinates in the sky depend on the location and date of the observation. If the near-Earth asteroid is in the Unistellar App Catalog, then you will have access to the coordinates from the app. The recording parameters (Duration, Exposure Time, and Gain) that you will need to do a science observation, as instructed later in this tutorial, are always given on the [Planetary Defense Missions Page](#).

However, if the NEA is not in the Unistellar App Catalog, you must use the Predictions & [Moving Target Ephemeris](#) pages, as described below, to compute its coordinates. The Predictions page is useful in either case to see if a target is visible at the date and time you wish to observe!



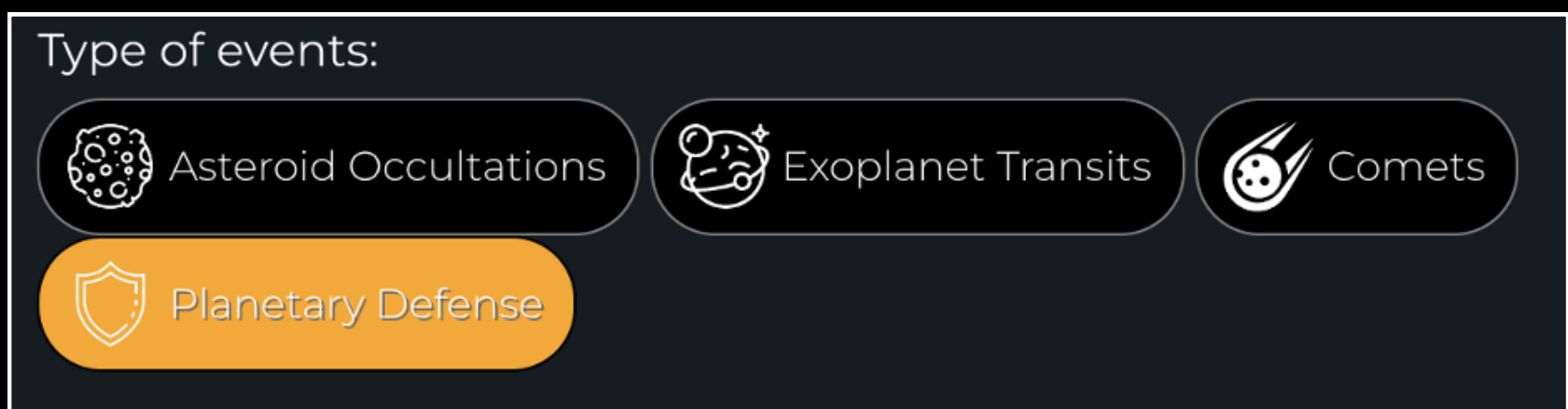


# PRE-OBSERVATION

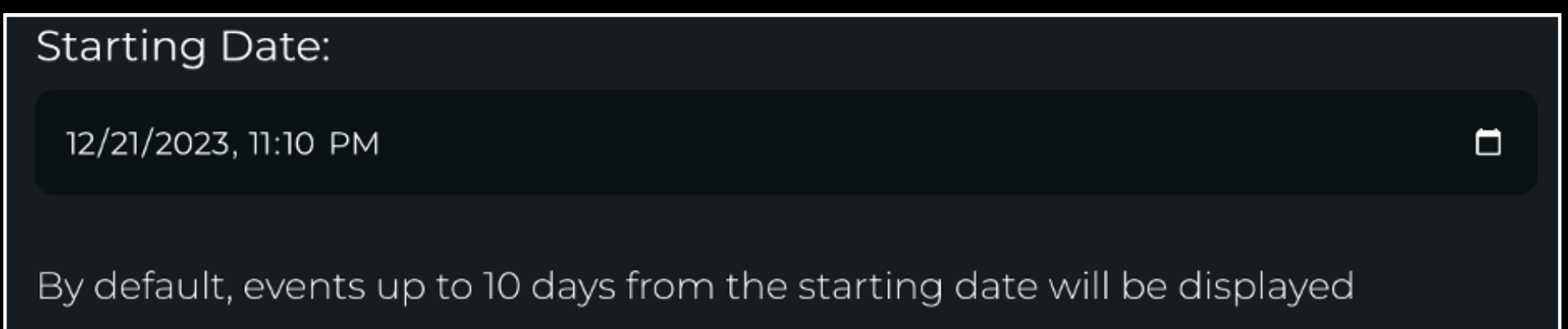
1

Select your mission

To use the Predictions page to observe asteroids, first make sure that the “Planetary Defense” button is highlighted in yellow. (You can select or deselect multiple types of events by clicking on each button.)



Then, in the “Location of the Observation” section, input the address or coordinates of the location on Earth from which you will be observing.



Lastly, in the box below “Starting Date” select the date on which you would like to search for asteroids to observe. Also include the time that you would like to observe - this is important because asteroids are moving targets. Ignore the message: “By default, events up to 10 days from the starting date will be displayed”.



# PRE- OBSERVATION

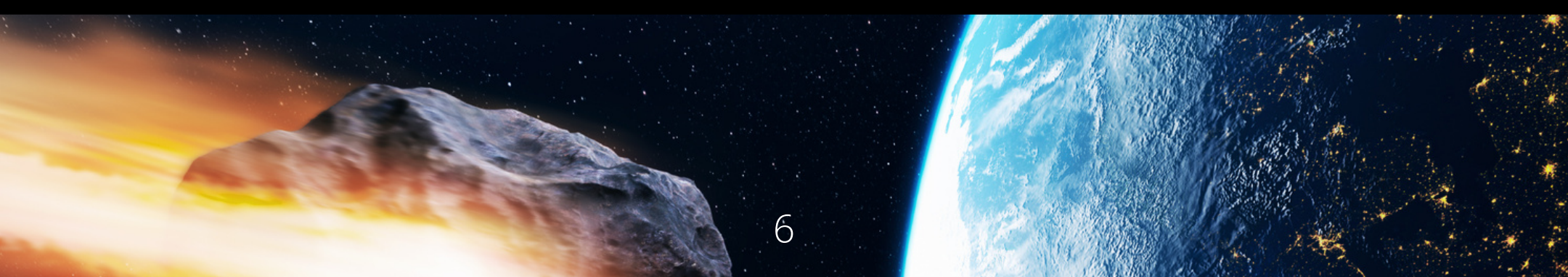
1

Select your mission

After inputting the information as instructed on Page 5, you are ready to search for missions by clicking the “**Generate**” button.

Note that you have the option on the Predictions page to filter asteroids by the target’s location in the sky. These filters are listed under “Advanced Parameters,” and must be selected before you click “Generate” to be implemented.


After you have clicked “Generate,” a table of all Planetary Defense targets visible during the provided date range will be displayed; however, they are not yet tailored to your specific observing location. Each row will include the target name and your input Starting Date. Note that it is possible that no targets are visible to you at the time you entered, in which case the Events table will be empty. That’s ok - feel free to check other dates and times for observable missions!





# PRE-OBSERVATION

## 2 Compute Coordinates

| Local Time <sup>?</sup> | Name  | Link  |
|-------------------------|-------|---|
| 21 Dec 23:10            | Leona |  |

Above is an example of a row in the Event table. The “Link” column contains a hyperlink to the [Unistellar Moving Target Ephemeris page](#). Clicking it will open that webpage in a new tab and automatically generate a list of times at which the target is observable from your specific location.

Each line in the Ephemeris Page’s list corresponds to the position of your target at a specific time between your Starting Date and 8 hours later, in increments of 20 minutes. If the target is visible from your location, you will be able to click on the smartphone icon, which contains a Deep Link that will open your Unistellar App and fill the Planetary Defense tab with the recording parameters. If your target is not visible, a crossed-out eye icon will appear instead. ([More information about Deep Links](#) are given below in “During Observation”.) You can click on each row of the list to expand it and see the target’s right ascension, declination, altitude, and azimuth coordinates.

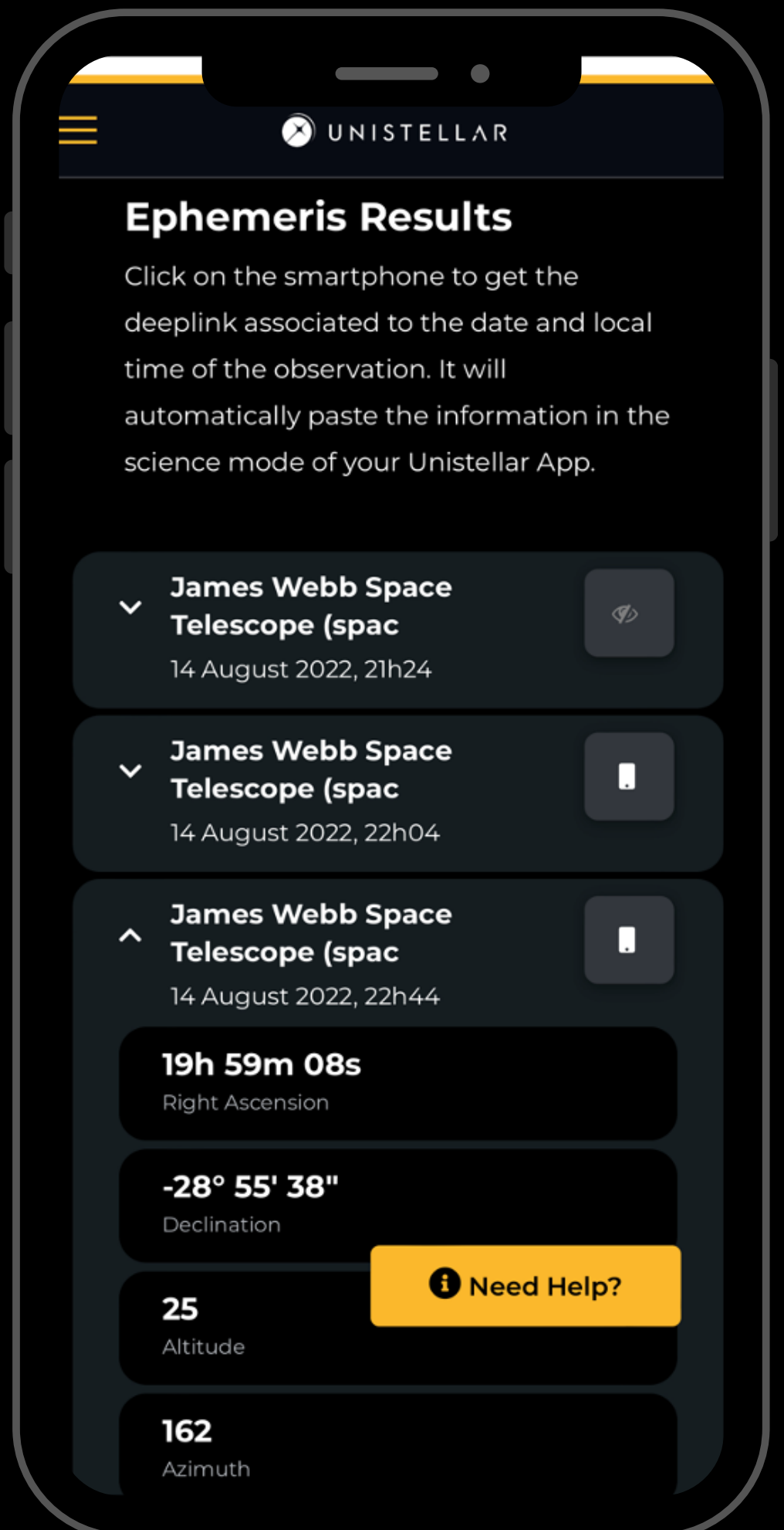




# PRE-OBSERVATION

## 2 Compute Coordinates

Note that each Deep Link is especially made for the asteroid's location at the time and location listed. If you want to observe at a different time or location, you simply need to change the information in the "Location of the observation" and "Date and local time" boxes at the top of the Ephemeris page and click "**Generate**" to obtain a usable link.



\*JWST is simply an example target





# PRE- OBSERVATION

3

Get ready

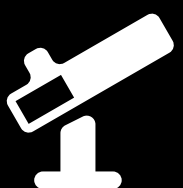
**Now that you have selected a mission to observe, you can get ready for your observation!\***

## Prepare your gear:

The day before your scientific mission, you need to charge your Unistellar telescope and empty its memory. If you need help emptying the memory of your telescope, please read these guidelines on "[how to upload my data](#)".

## Find your location:

To improve the quality of your data we recommend observing from a place with few street lights, not exposed to wind, and where you have good cellular service. You should also check the weather to avoid clouds and strong winds. The websites ClearOutside or Astrospheric are good tools for astronomers.



If you want to check out all the active planetary defense missions, check out the [Planetary Defense Missions Page](#). This page will also tell you which missions are in the Unistellar app, and which are not.

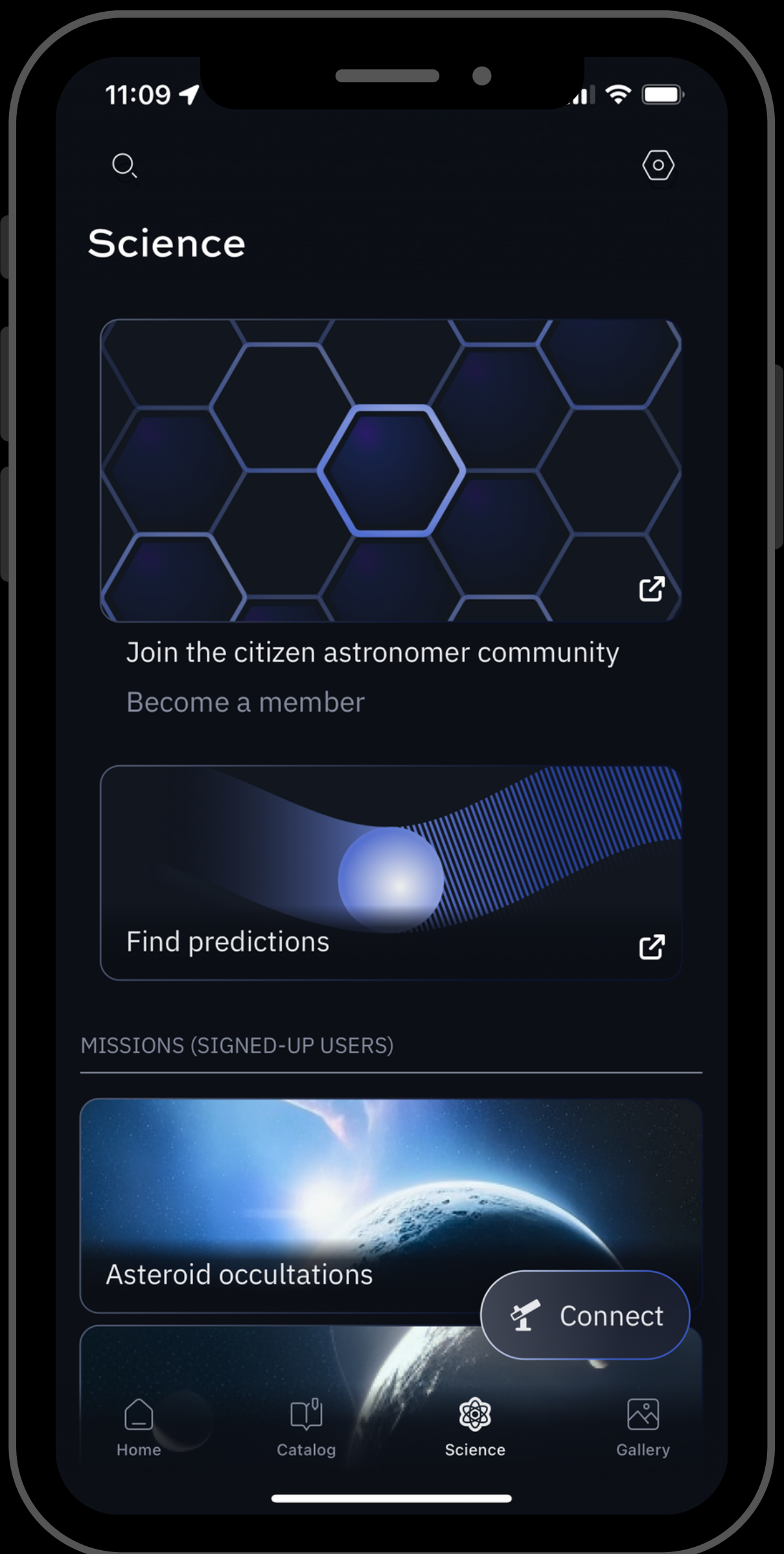


# PRE-OBSERVATION

4

Become a member

Join the community of Citizen Astronomers to receive alerts and be credited for your observation. To do so, in the Unistellar App V3.0, select the “**Become a member**” icon from the Home or Science menu. You will also receive an email invitation to join our Slack communication platform where thousands of Unistellar Citizen Astronomers and professional astronomers are connected.





# DURING OBSERVATION

1

30 minutes before

Set up your Unistellar telescope as you normally would before observing.

- Level the tripod
- Launch the Unistellar App (make sure that your smartphone was connected to 3G/4G/5G before opening)
- Turn your telescope On and connect it to your smart device
- Launch Autonomous Field Detection through the App
- Calibrate your telescope with the Collimation Screw and Focus Wheel. If you need help calibrating, please read these guidelines on ["how to collimate my mirror"](#) and ["how to use the bahtinov mask for focus"](#)



# DURING OBSERVATION

2

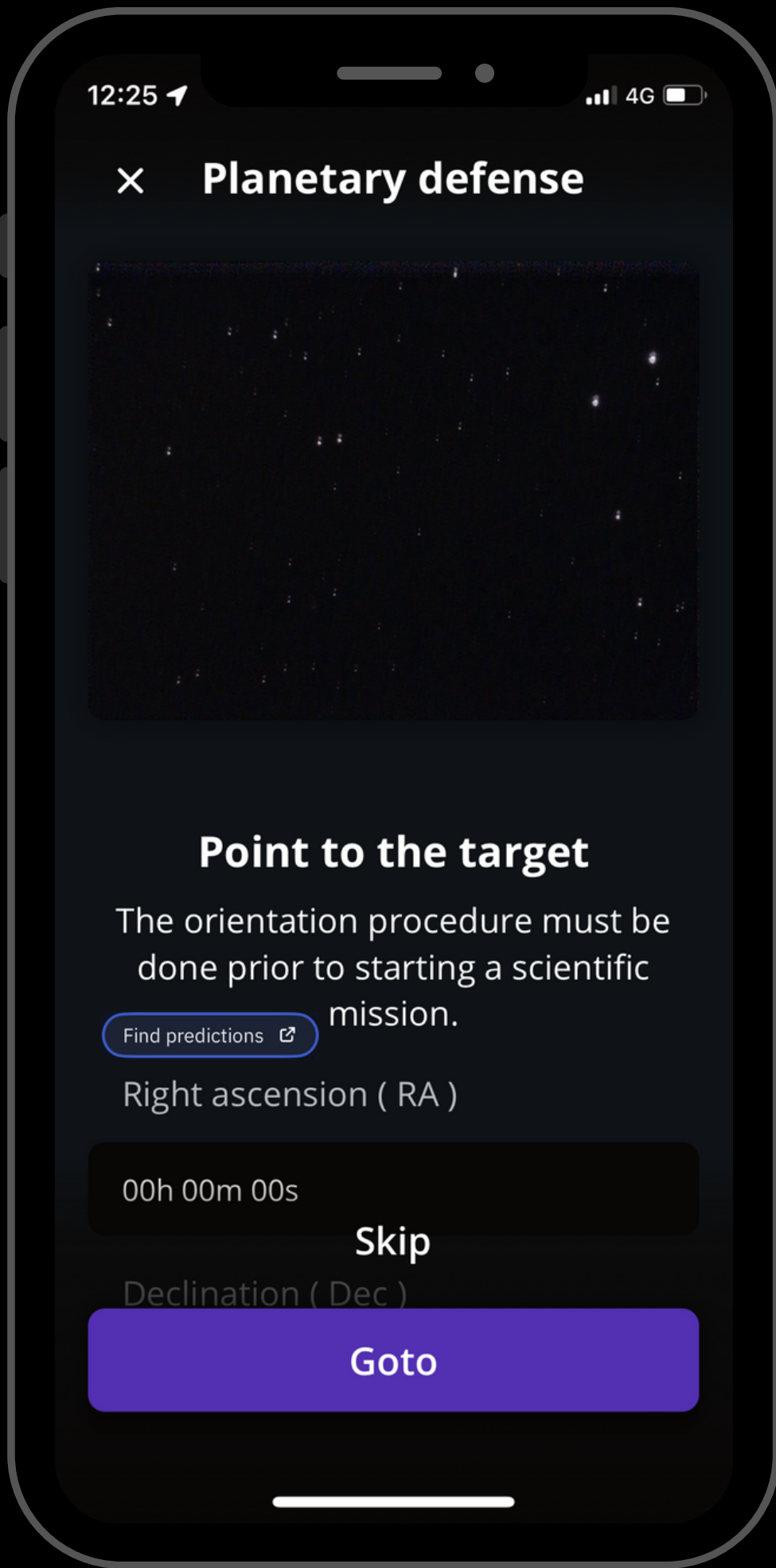
10 minutes before

It is time to point to your target! Two options:

*A. The asteroid is in the App Catalog:* Open your Unistellar App. In the Catalog, enter the name of your asteroid, select it and click on **Goto**. Once the Goto is done, click on the Science menu and select the Defense icon. Skip the step that prompts you to "Point to the Target". Enter the *Record duration*, *Exposure time*, and *Gain* - then click on **Save**.

*B. The asteroid is NOT in the App Catalog:* The quickest way to find your target is to use your smartphone to click on the [Deep Link](#) generated with our Predictions & Moving Target Ephemeris tools that you read about in the previous section. It will automatically open the Defense tab of your Unistellar App to enter the coordinates of the target and its recording parameters. If the *Right ascension* and *Declination* box are filled with the correct coordinates, click on **Goto** to point to your target. Once Goto is done, if the *Record duration*, *Exposure time*, and *Gain* are correct, you can click on **Save**.





← Pointing to your target\*

\*The Planetary Defense Missions Page is accessible through the “**Find Predictions**” button.

Entering observation details

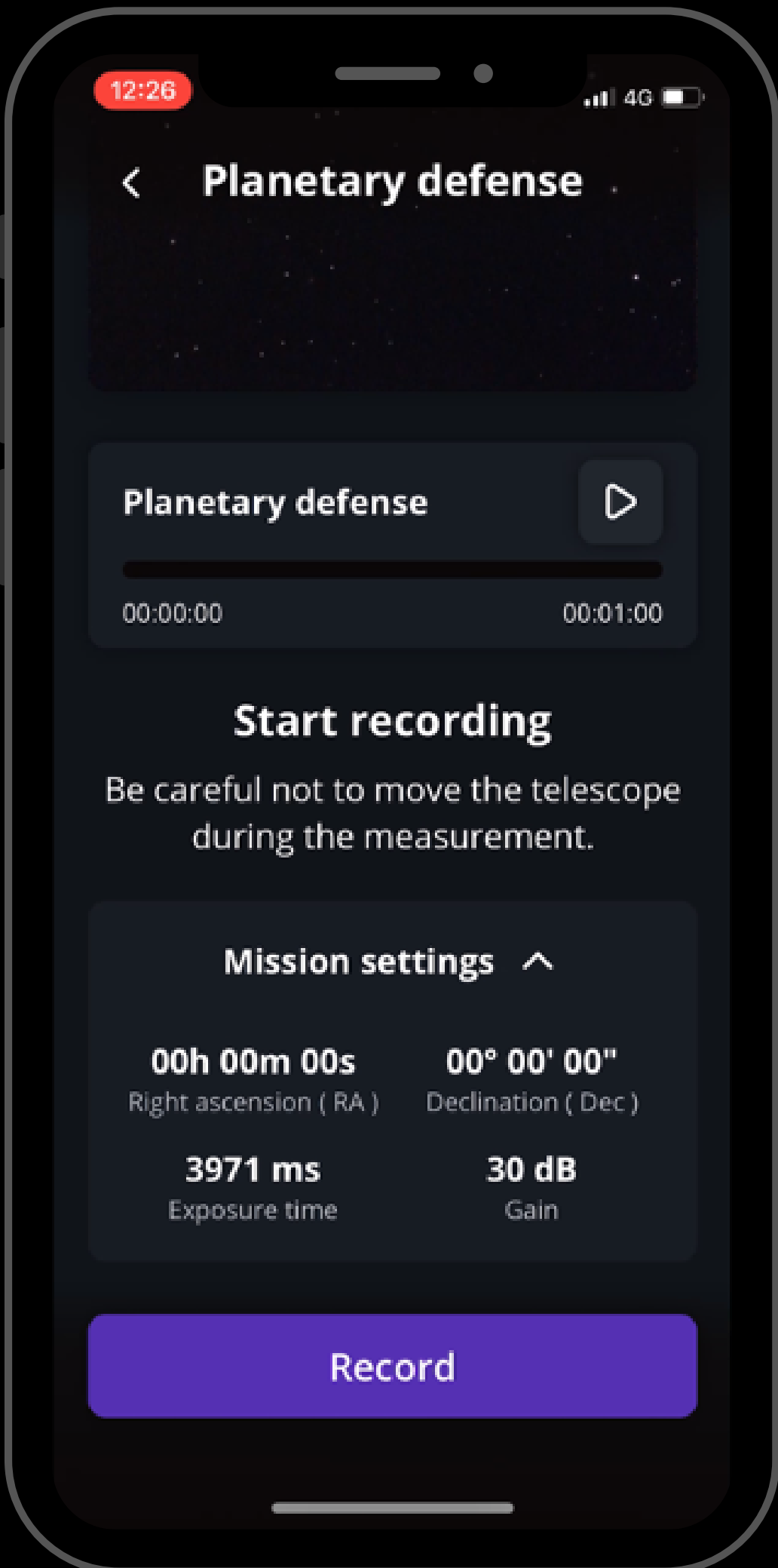




# DURING OBSERVATION

3

Launch observation



When you are ready, click on the **Record** button to start the observation.

Note that you can begin recording at any point of the night when the target is visible to you and will remain so for around two hours. We generally ask for three, back-to-back, 40 minute observations, as the target can move out of your telescope's field of view.



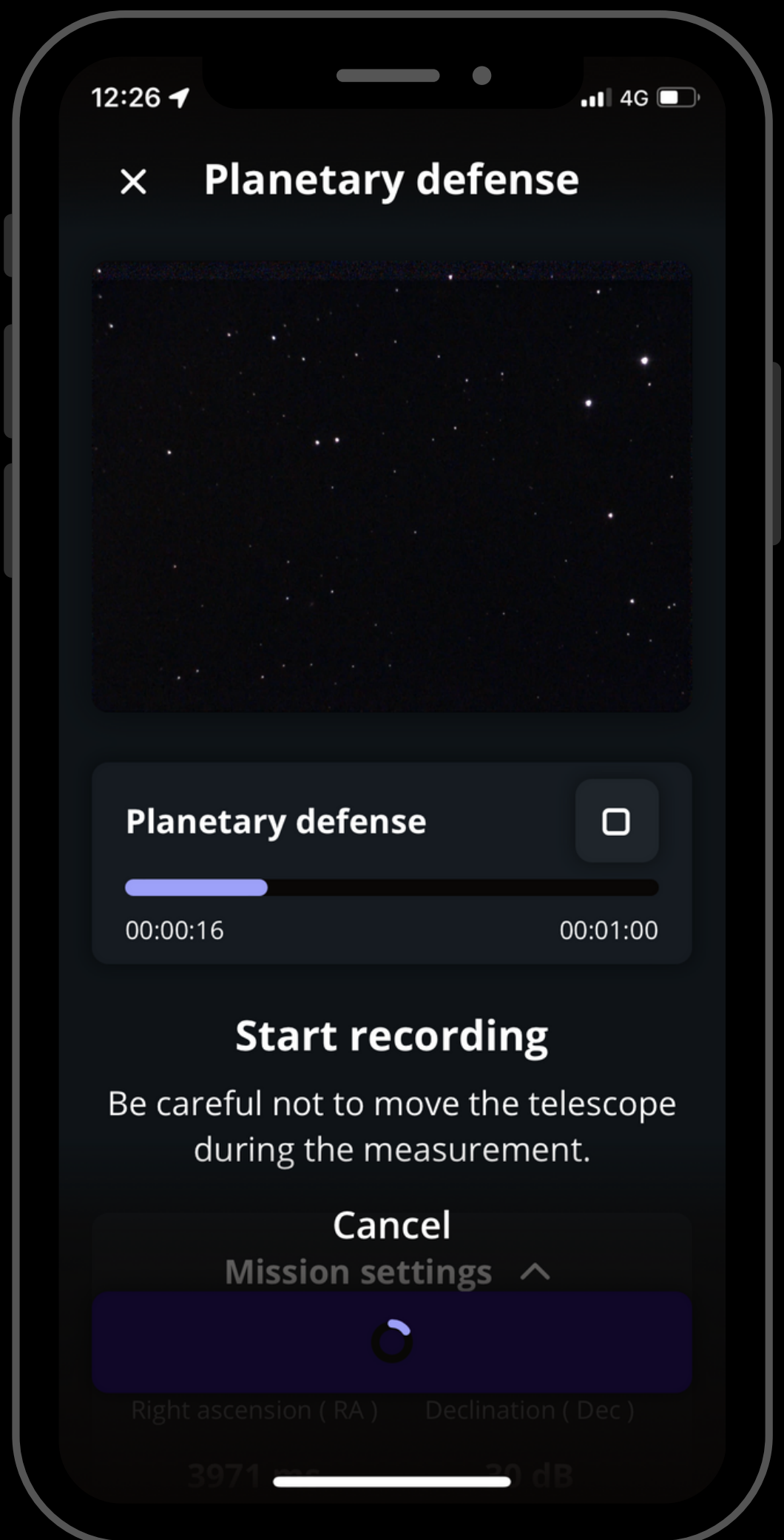
# DURING OBSERVATION

4

Complete observation

During the observation, you may see the NEA moving in the live view. If you see it move out of the live view, it is time to stop the current observation.

Once the recording is over, click on **Continue** to calibrate your sensor.





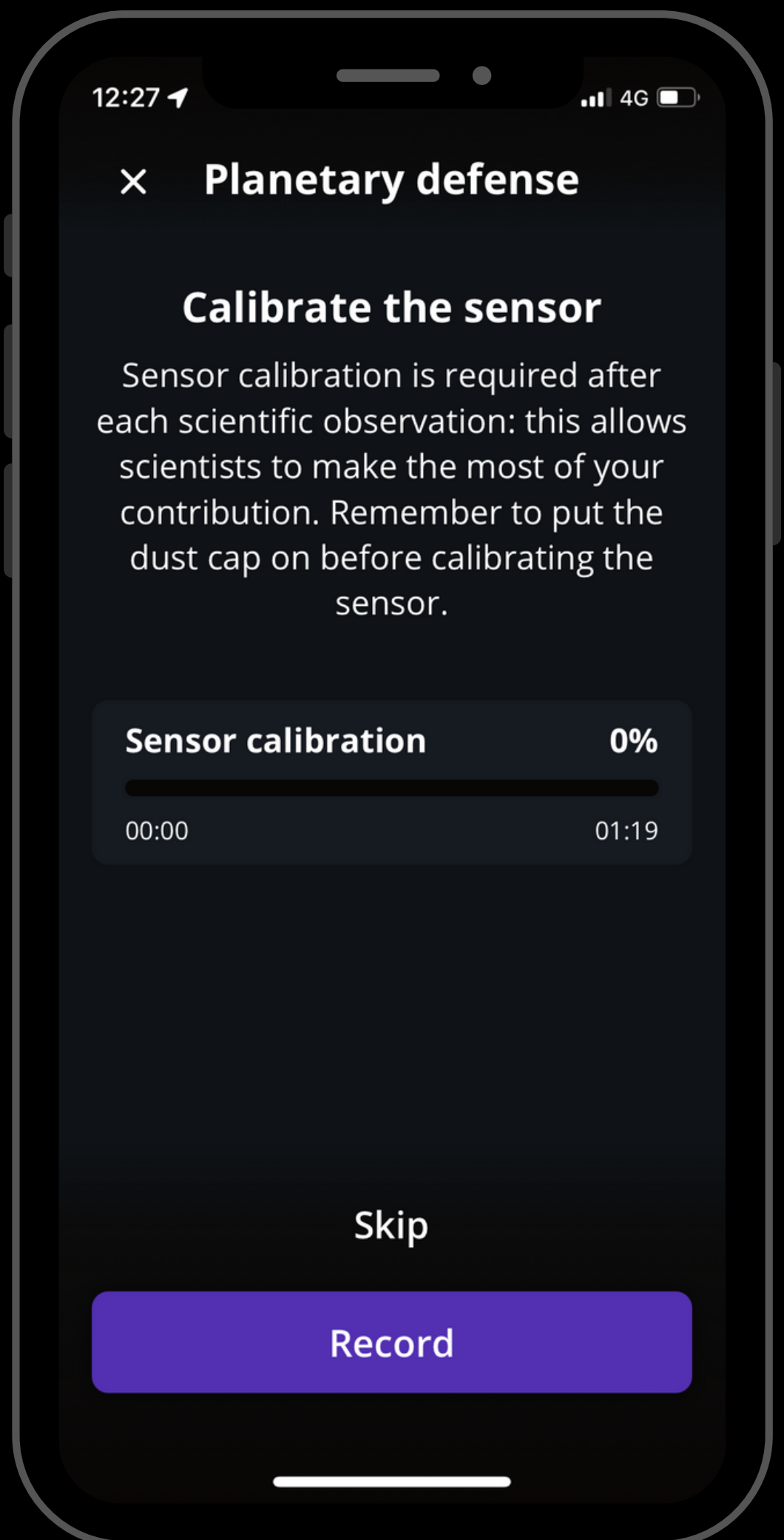
# DURING OBSERVATION

4

Complete observation

This calibration step gathers *Dark Frames* which will help us better analyze your observation. You must put the dust cap on your telescope before recording the calibration.

After this step, a final message appears: “Recording complete”. The mission is over.







# POST - OBSERVATION

1. **Share your data:** Once you are at home, please upload your data to our server. Our team of scientists will analyze your observation to check if you detected the near-Earth object. If you need help, please read these guidelines on [“how to upload my data”](#).

2. **Tell Unistellar you have participated:** To make sure your contribution is properly processed and you are credited for the result, always fill out this [Planetary Defense Observation Report](#). It asks for your name, the serial number of your telescope, and the name of the scientific mission you just accomplished.

CITIZEN SCIENCE

# PLANETARY DEFENSE



UNISTELLAR





# YOU'RE DONE

We will send you the result of your scientific mission through our Slack communication platform, typically within 24 hours. Check the slack #defense-bot channel to see your results!

Great Work,  
Citizen Astronomer!



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