



# Asteroid Occultations

Become a Shadow Hunter

User Guide  
V3.0





# Shadow Hunting Tutorial

First time observing an occultation of a star by an asteroid? Read this presentation to master your Unistellar telescope and join our team of shadow hunters.

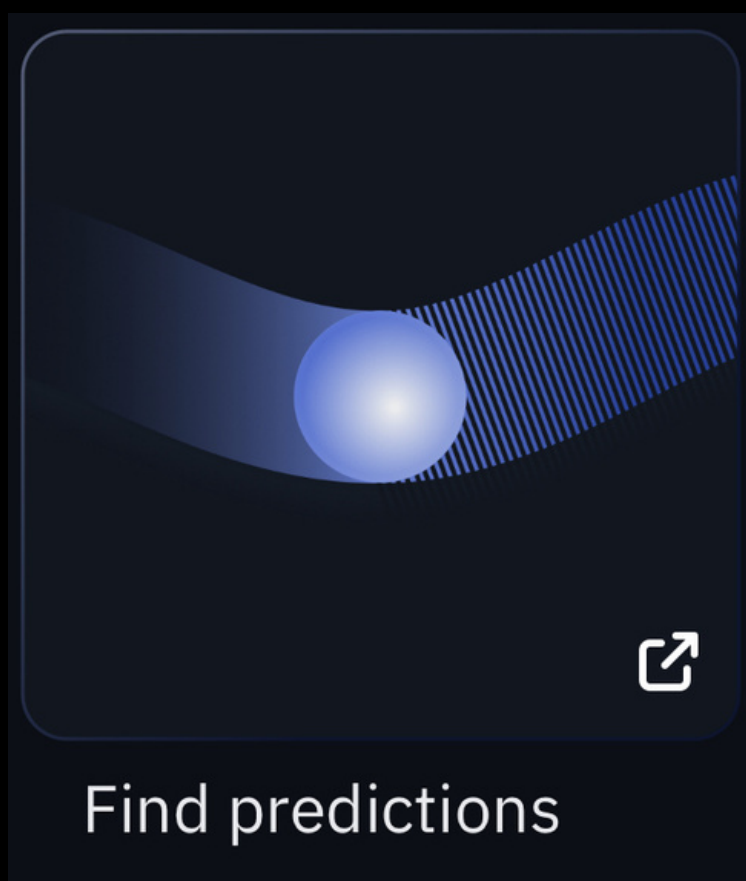


# PRE-OBSERVATION

1

Select your mission

An asteroid occultation is a unique event to record, and to observe one you need to be in a specific arealocation 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 occultations 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


2


## Read the Prediction


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

Type of events:

 Asteroid Occultations

 Exoplanet Transits

 Comets

 Planetary Defense

Input the address or coordinates of the location on Earth from which you will be observing.

Location of the observation:

Enter the address from where you plan to observe

Search an Address...

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

Longitude

Latitude

Lastly, in the box below “Starting Date” select the date and time after which you would like to start searching for occultations to observe. The default is the current time (now).





# PRE-OBSERVATION

2

## Read the Prediction

After inputting the information as instructed on Page 4, you are ready to search for missions by clicking the “Generate” button.

Note that you have the option on the Predictions page to filter occultations 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 Events visible to your location will be displayed. Each row will include the target name and the start time of the event (in your time zone) under “Local Time”. For detailed information, simply click on a row you are interested in!

*PS: You can even select events and export them to your calendar!*

EXPORT SELECTION TO ICS (CALENDAR)

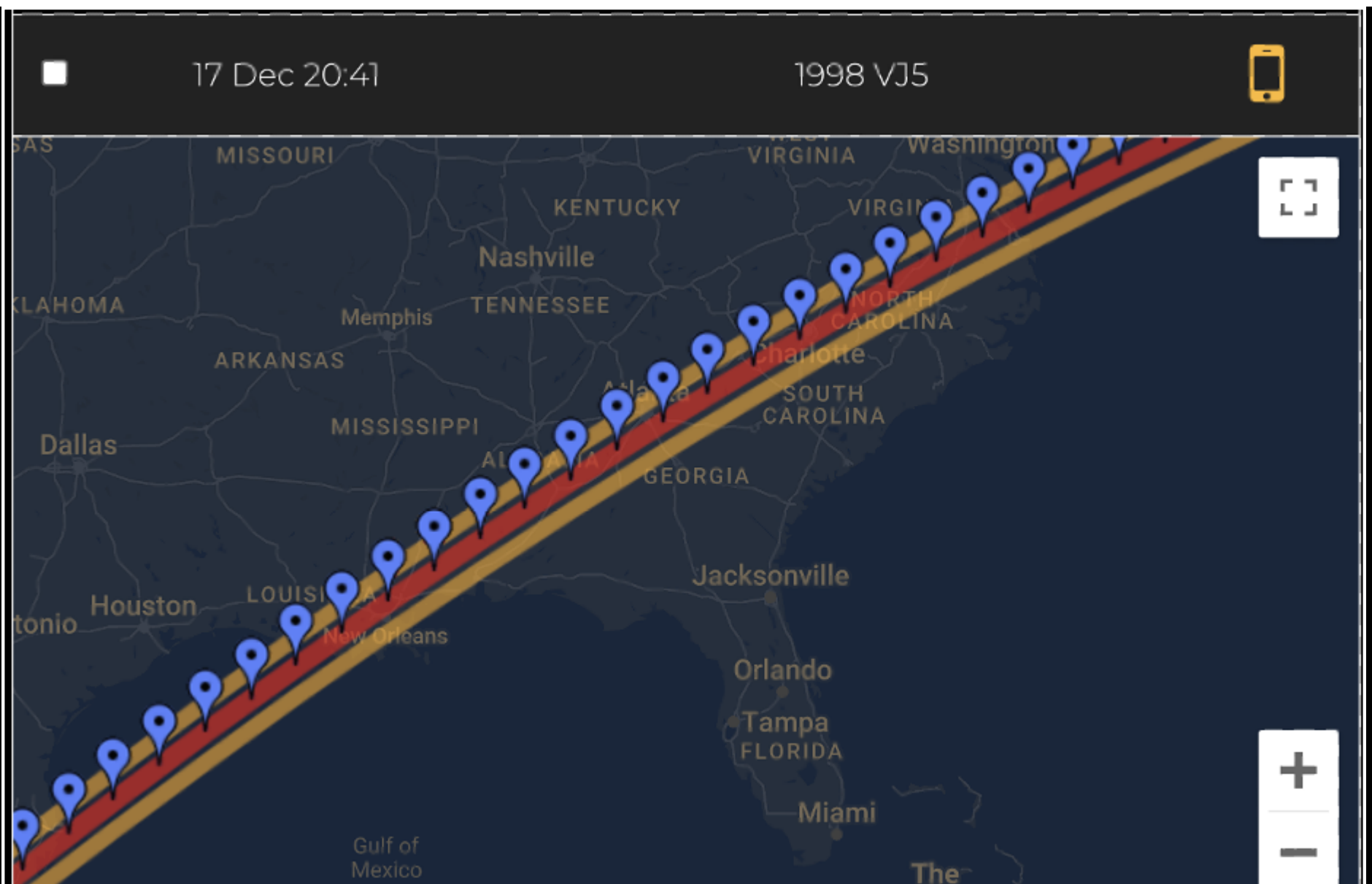




# PRE-OBSERVATION

2

Read the Prediction



Above is an example of a prediction visibility map similar to what you would see after clicking on a row in the table of Events. Click the + or - symbol to zoom in and out on the map.

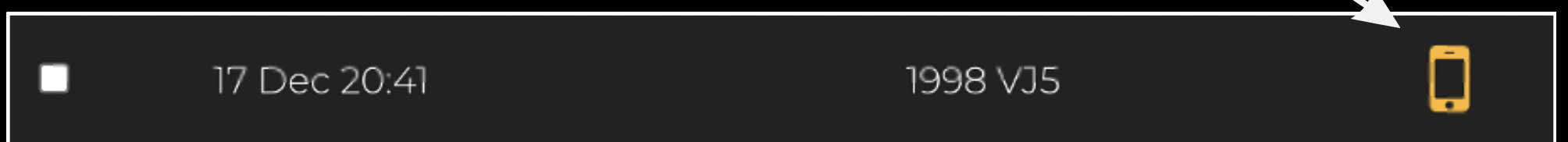
The expected path of the asteroid's shadow is marked by the orange lines! The closer you are to centrality, marked by the red line, the better chance you have of detecting the occultation. Note that asteroid occultations start at very slightly different times based on an observer's location, which you will see if you click on any of the blue location icons.



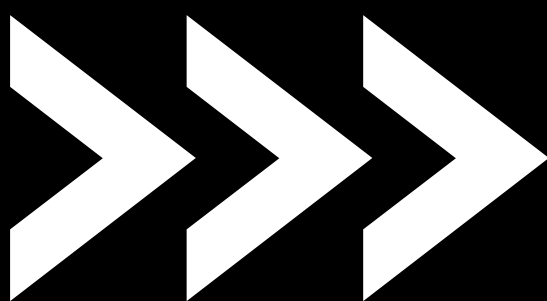
# PRE-OBSERVATION

## 2 Read the Prediction

You will need the recording parameters — Coordinates RA and Dec, the Exposure Time, Gain, and Duration — to start your observation. *All this information is saved in a Deep Link, which you can click on to fill the recording parameters automatically into the app. It is the last icon of the row, illustrated by a smartphone icon.* ([More information about Deep Links](#) are given below in the the “During Observation” section.)



If you’d like to view the Recording parameters, they are listed below the map detailed on the previous page. You can also see other helpful information there about the occultation mission.





# PRE-OBSERVATION

3

Get ready

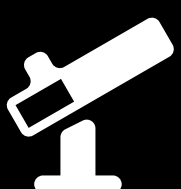
**Now that you have selected an occultation to observe, you can get ready for your observation!\***

## 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 need to search for occultations visible to an entire region instead of your specific location, use the [Asteroid Occultations Missions Page](#).



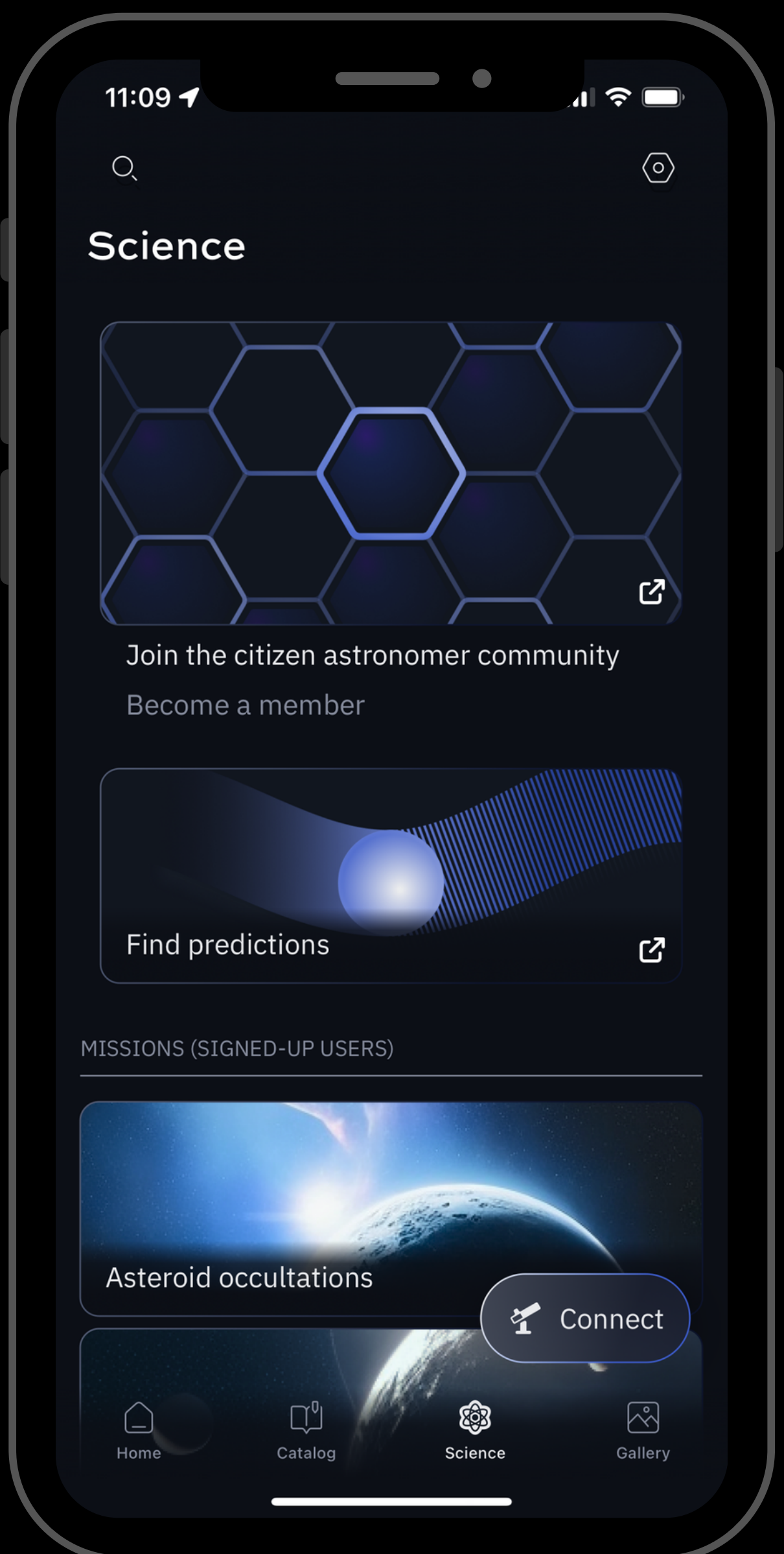


# PRE-OBSERVATION

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

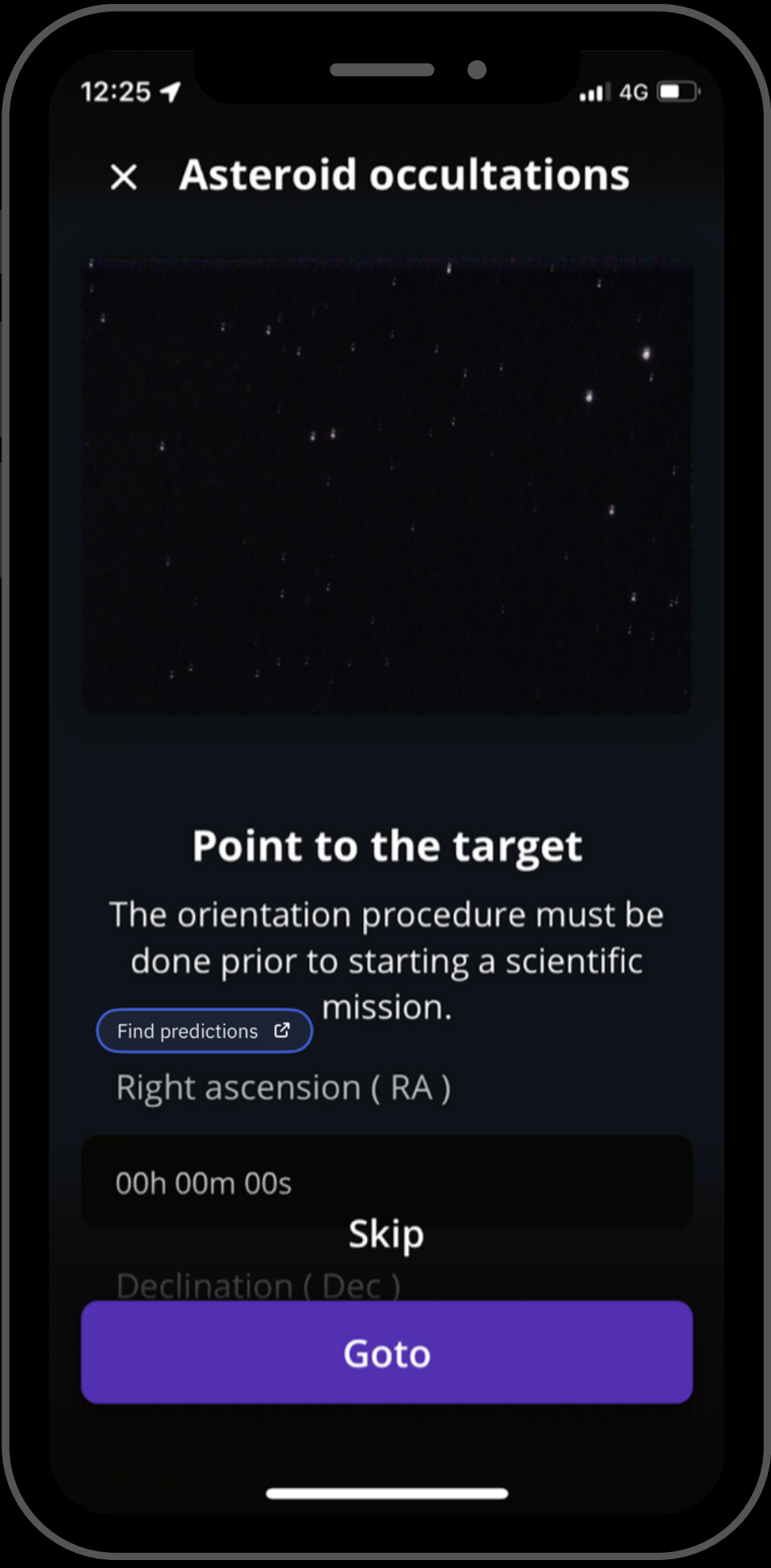
2

10 minutes before

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

1. **Deep Link method:** The quickest way to find your target is to use your smartphone to click on the Deep Link associated with your event. Refer back to page 7 to see how to access this. It will automatically open the Occultations tab of your Unistellar App and fill up the coordinates of the target and its recording parameters. If the *Right Ascension* box 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, click on **Save**.
2. **Manual method:** Open your Unistellar App, click on the Science menu and select the Occultations icon. Enter the *Right Ascension* and *Declination* and click on **Goto** to point to your target. Once Goto is done, enter the *Record duration*, *Exposure time*, and *Gain* and click on **Save**.





Pointing  
to your  
target\*

\*The [Asteroid Occultations Missions Page](#) is accessible through the “**Find Predictions**” button.

Entering  
observation  
details



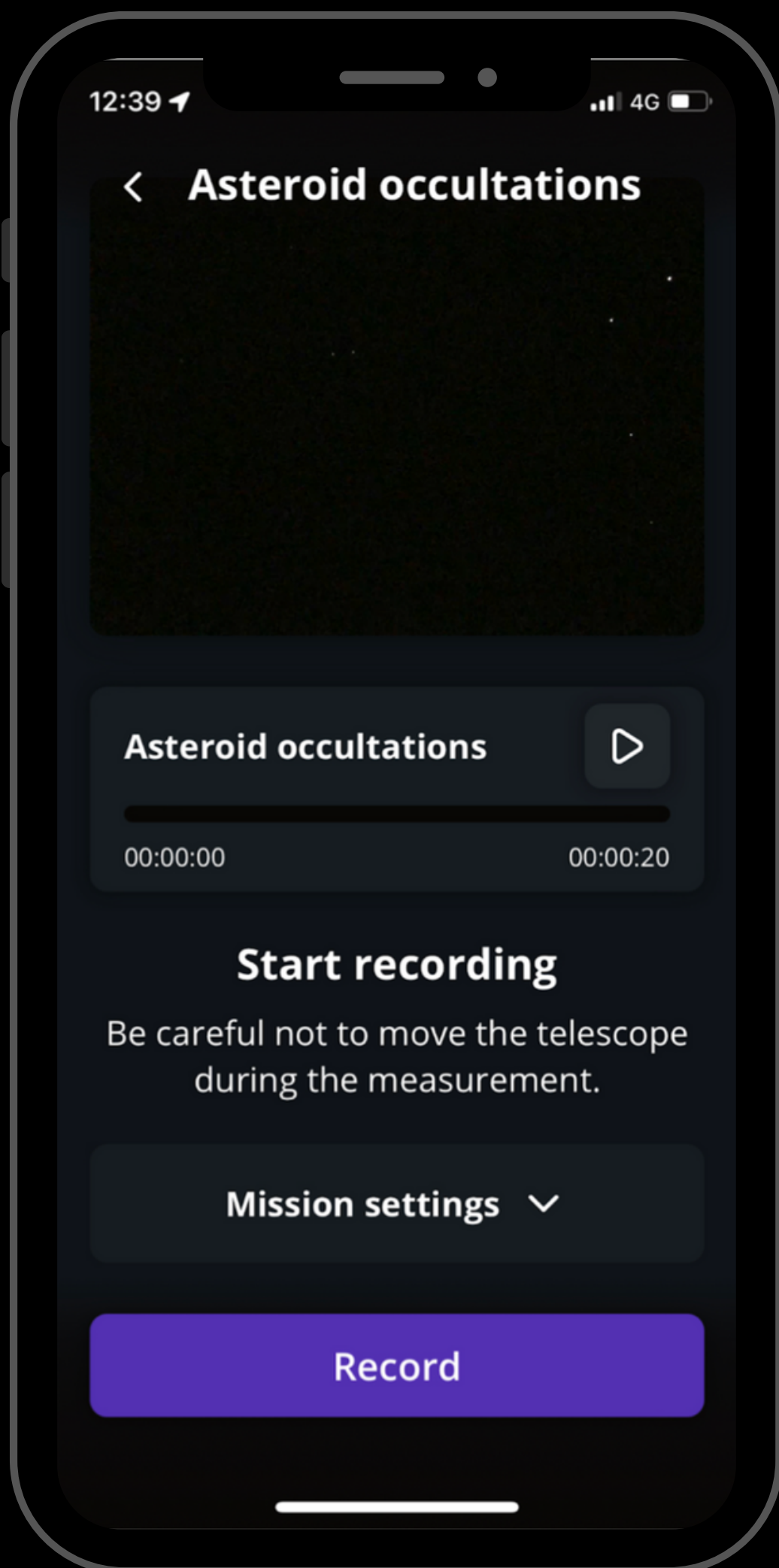




# DURING OBSERVATION

3

Launch observation



At the start time, click on the **Record** button to start the observation.

Note that the "Local Time" listed on the [Scientific Events Prediction Page](#) is the start time when you should press **Record**. If you begin to record at this time and observe for the entire duration, you have the best chance to catch the occultation.



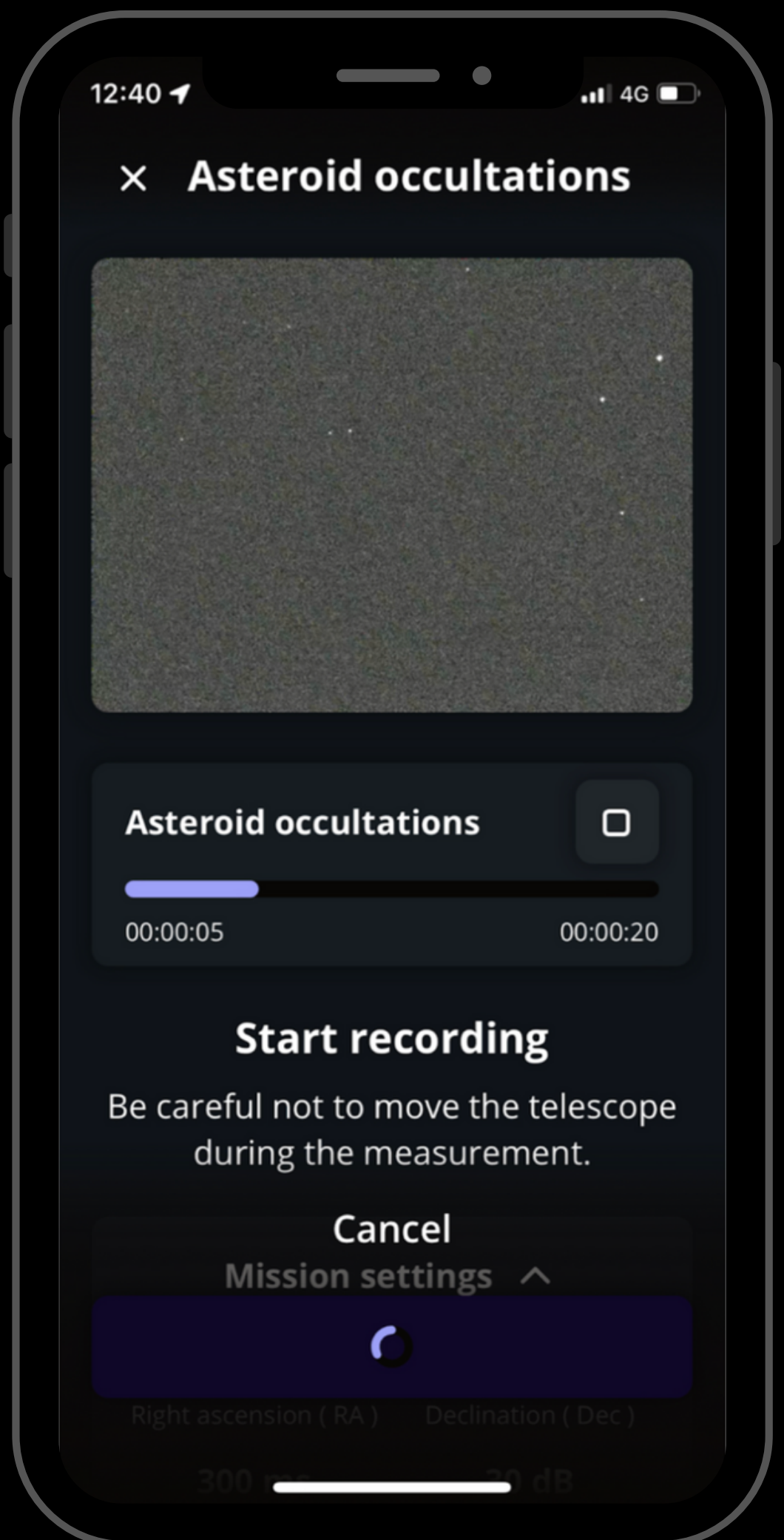
# DURING OBSERVATION

4

Complete observation

During the observation, keep an eye on your star – you may see it briefly disappear in the live view due to the passing asteroid.

Once the observation is over, a final message appears:  
“Recording complete”.







# 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 occultation. 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 [Occultation 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

## ASTEROID OCCULTATIONS



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# 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 #occultation-bot channel for your results!

## Great Work, Citizen Astronomer!



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