Exoplanet Transits

Become a Planet Hunter

User Guide

V3.0

App version 3.0.0

Planet Hunting Tutorial

First time observing a distant planet orbiting around its sun? Read this page to master your Unistellar telescope and join our team of Planet Hunters.
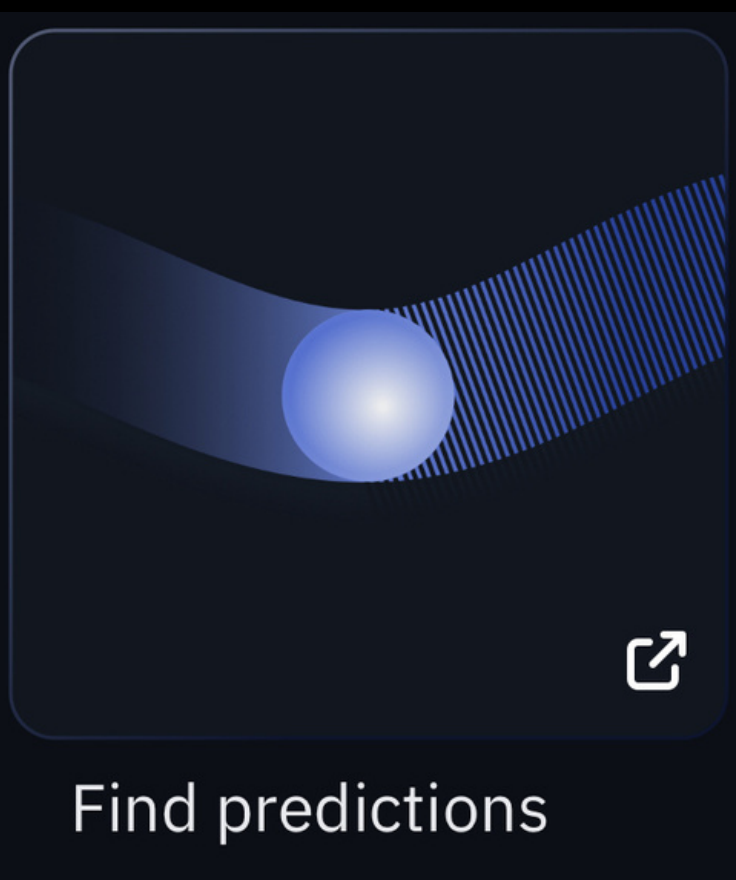
PRE-OBSERVATION

1 Select your mission

The transit of an exoplanet 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 <u>Unistellar Scientific Events Prediction Page!</u> This page will show you all of the exoplanet transits 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.

PRE-OBSERVATION

Read the Prediction

To use the Predictions page to observe exoplanets, first make sure that the "Exoplanet Transits" 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 transits to observe. The default is the current time (now).

PRE-OBSERVATION

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 transits by the target's location in the sky, the duration of the transit, and the visibility of the transit (aka, whether a full or partial transit is visible). 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. Each symbol has a meaning, and you can click on a symbol to see more observing details for that location:

☆ Blue stars & shading = you can observe the entire event.

△ Yellow triangles = you can observe the entire event but you may have tracking difficulty due to the altitude of the star.

◇ Orange diamonds = you may miss the start or end of the event.

PRE-OBSERVATION

Read the Prediction

You will need the recording parameters — Coordinates RA and Dec, the Exposure Time, Gain, Cadence 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.)
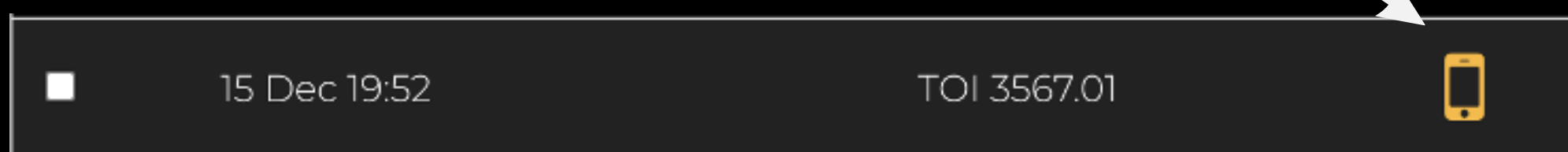
If you'd like to view the Recording parameters, they are listed below the map detailed on the previous page. You can also see other helpful information there about the transit mission, including how much of it will be visible to you (see "Category").
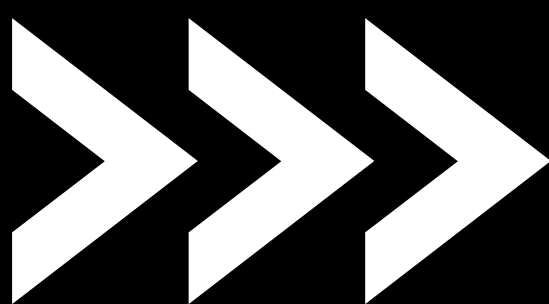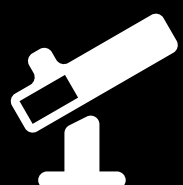
PRE-OBSERVATION

3 | Get ready

Now that you have selected a transit 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 need to search for transits visible to an entire region instead of your specific location, use the Exoplanet Transits 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.
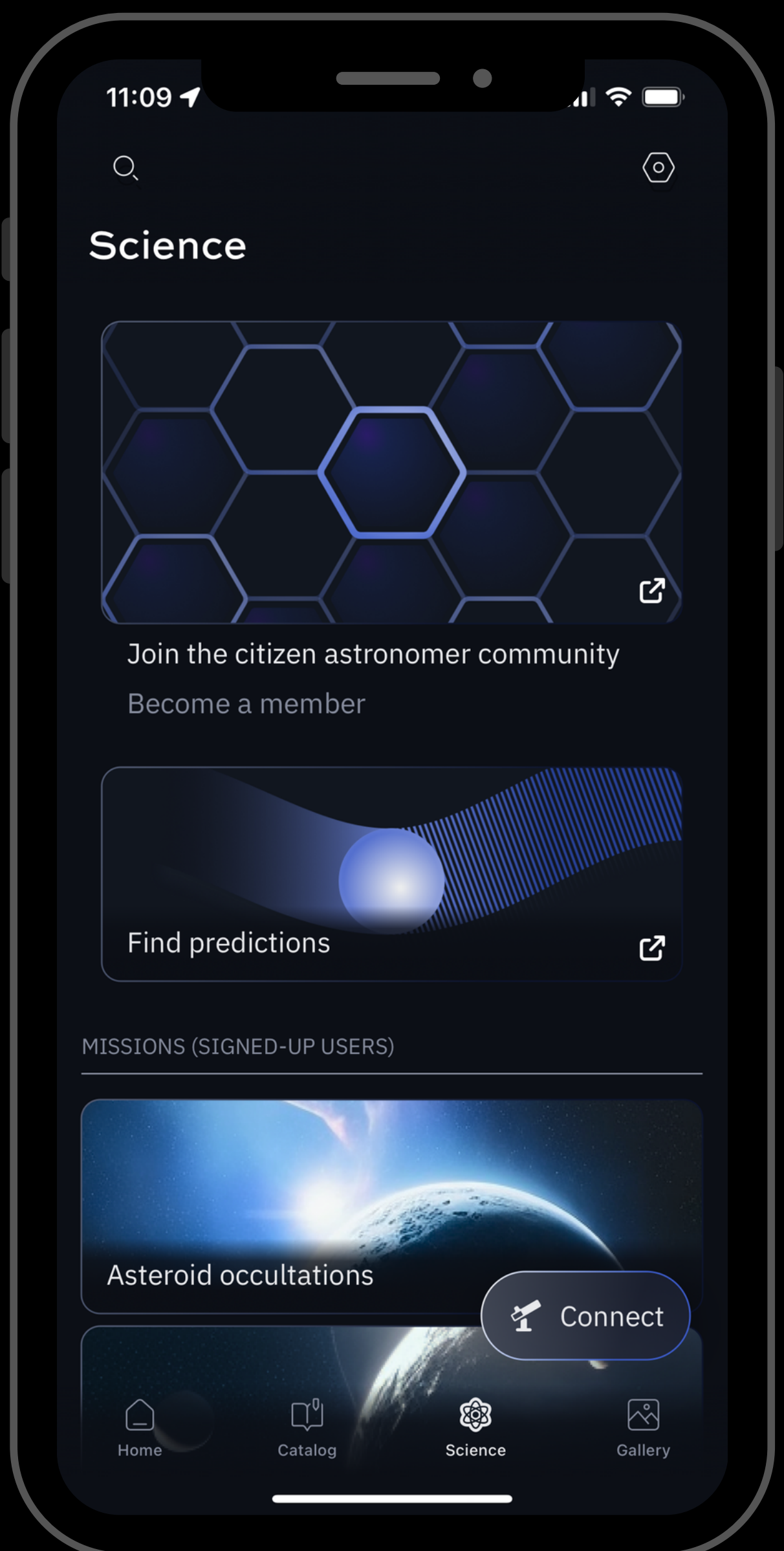
DURING OBSERVATION

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

(optional)

To make sure you get the best scientific data possible, it is helpful to manually take an initial set of "Dark Frames." You will also take these at the end of your observation during the the Sensor Calibration step (see page 16).

1. <u>Place the dust cap on your telescope</u>. You do not need to GoTo first. You can take these dark frames with your telescope in any position, as long as you have done a Field Detection.

2. Open your Unistellar App, click on the **Science** menu and select the Exoplanets icon. When you are prompted to point to your Target, click on Skip. On the next screen, enter the *Exposure time, Cadence* and *Gain* that you will use for the observation, as listed in the prediction. In the *Record Duration* box, enter 2 minutes. Then click on Save.

3. Follow the prompts to continue. You can refer to the following slides for more details.

4. If you are prompted to "Calibrate your Sensor" after this 2-minute observation, click Skip.

Now you are prepared to observe the transit!
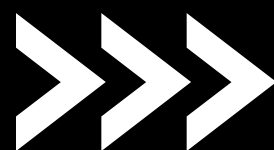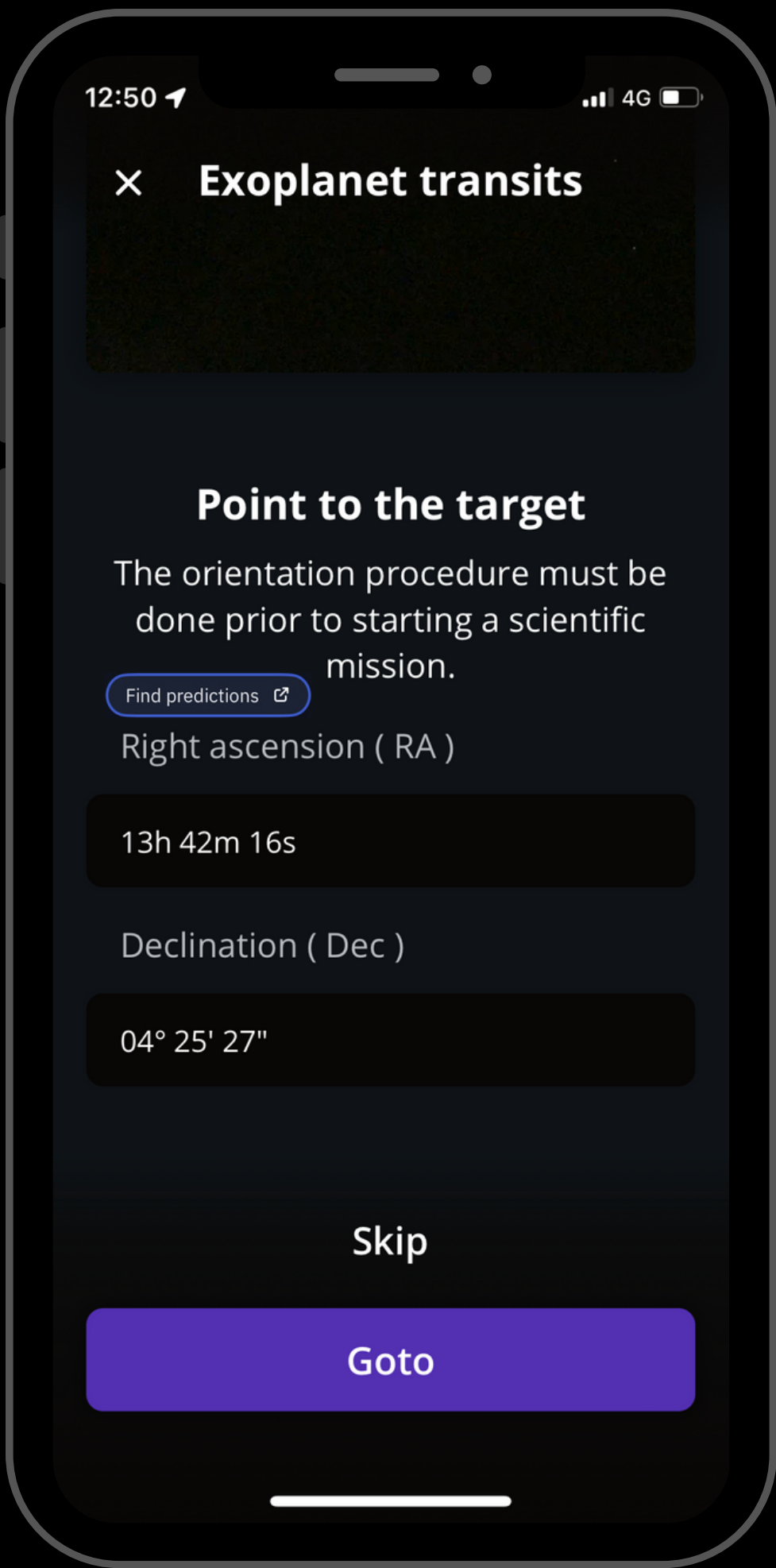
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DURING OBSERVATION

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 Exoplanets 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*, *Cadence* and *Gain* are correct, click on Save.

2. **Manual method:** Open your Unistellar App, click on the Science menu and select the Exoplanets tab. 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*, *Cadence* and *Gain* and click on Save.

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Pointing to your target*

*The **Exoplanet Transits Missions Page** is accessible through the "**Find Predictions**" button.

Entering observation details

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For the *Record duration*, you can enter the total duration to record the full event in one observation or you can enter a shorter duration of 1-2hr and record several short observations. The second scenario will improve the telescope's tracking of the target throughout the event.
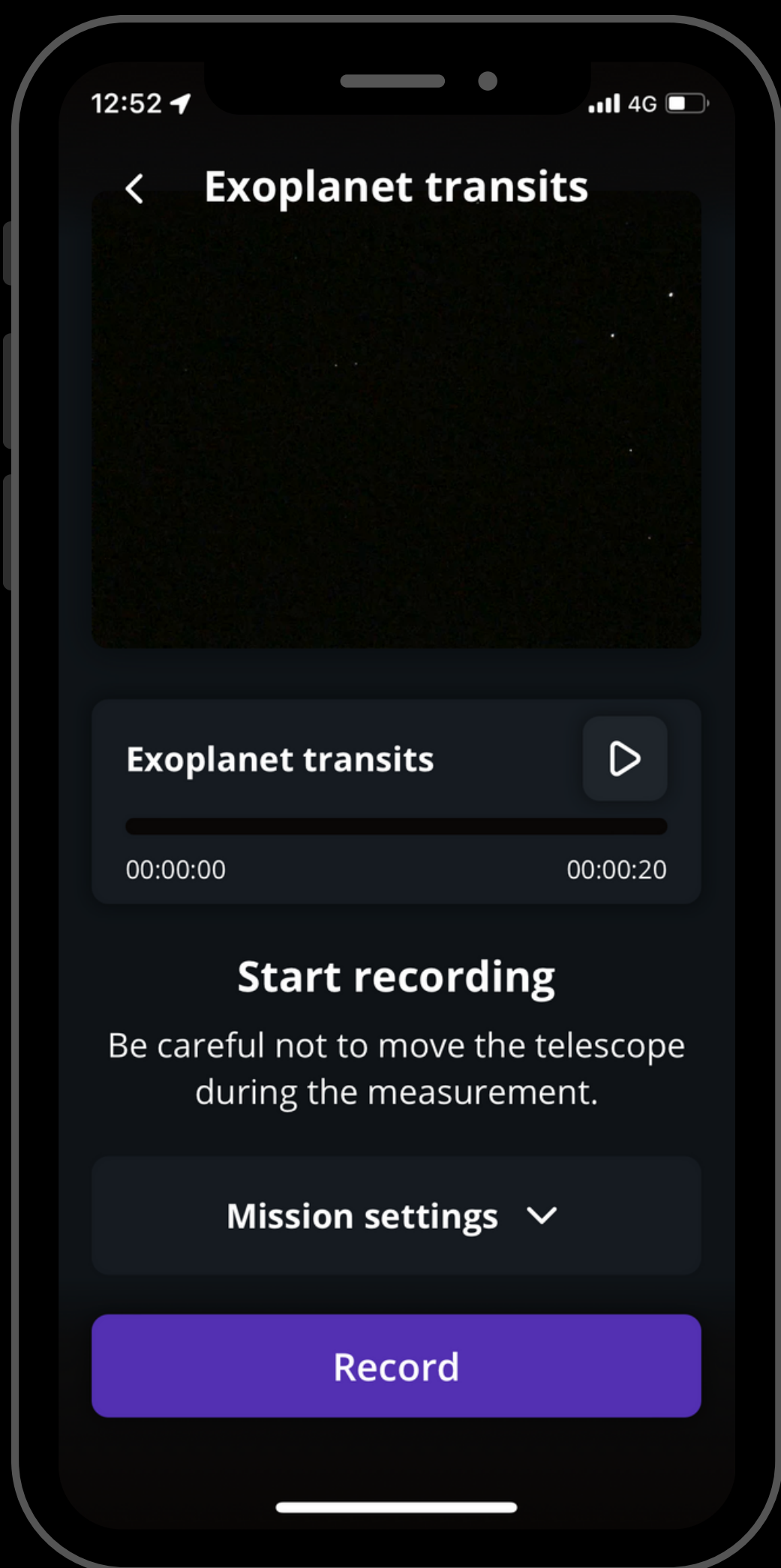

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DURING OBSERVATION

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 until the local "End Time" you have the best chance to catch the transit.
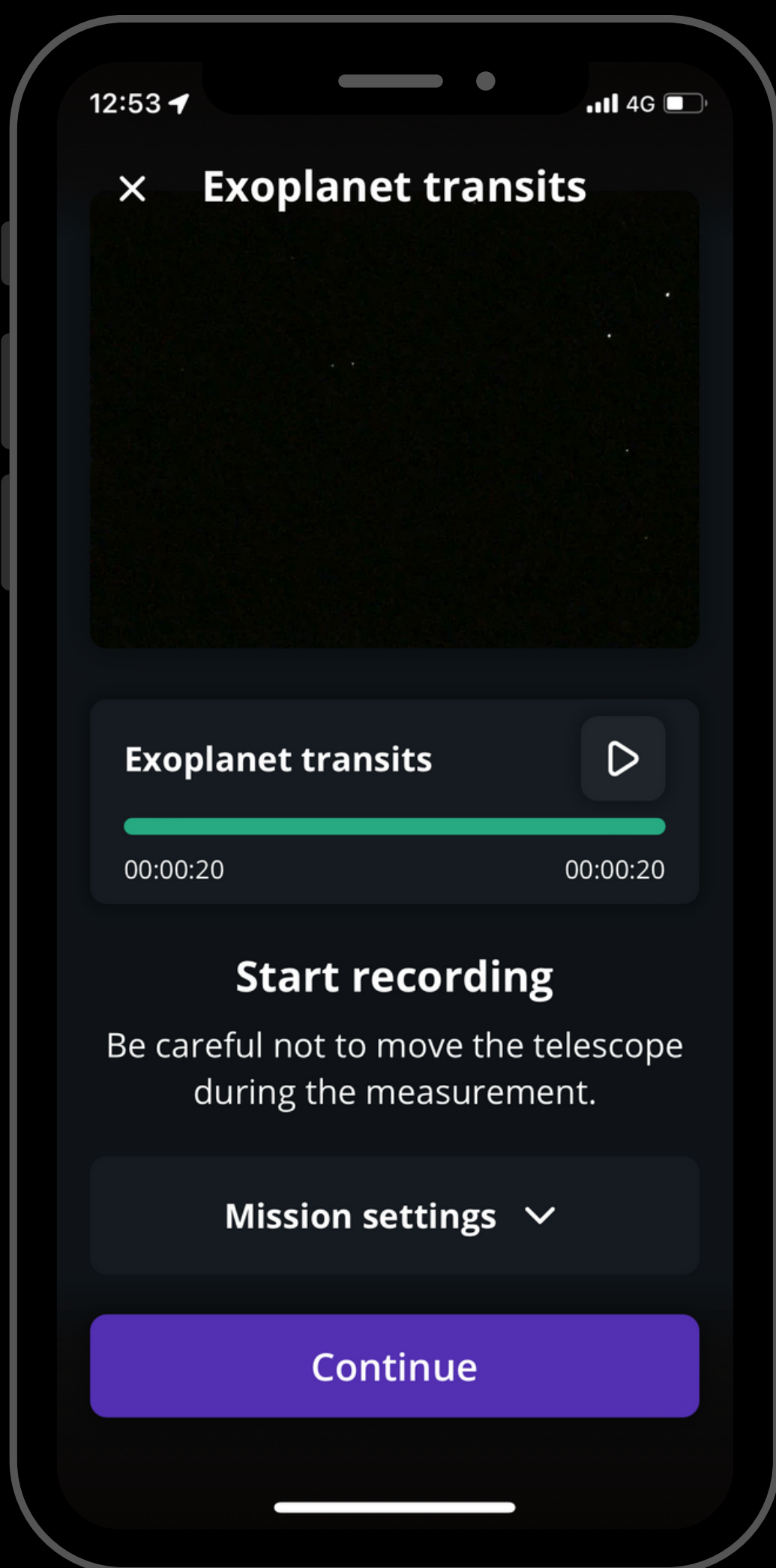
DURING OBSERVATION

Complete observation

During the observation, you can see the target star but the transiting exoplanet will not be visible on your phone screen.

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.
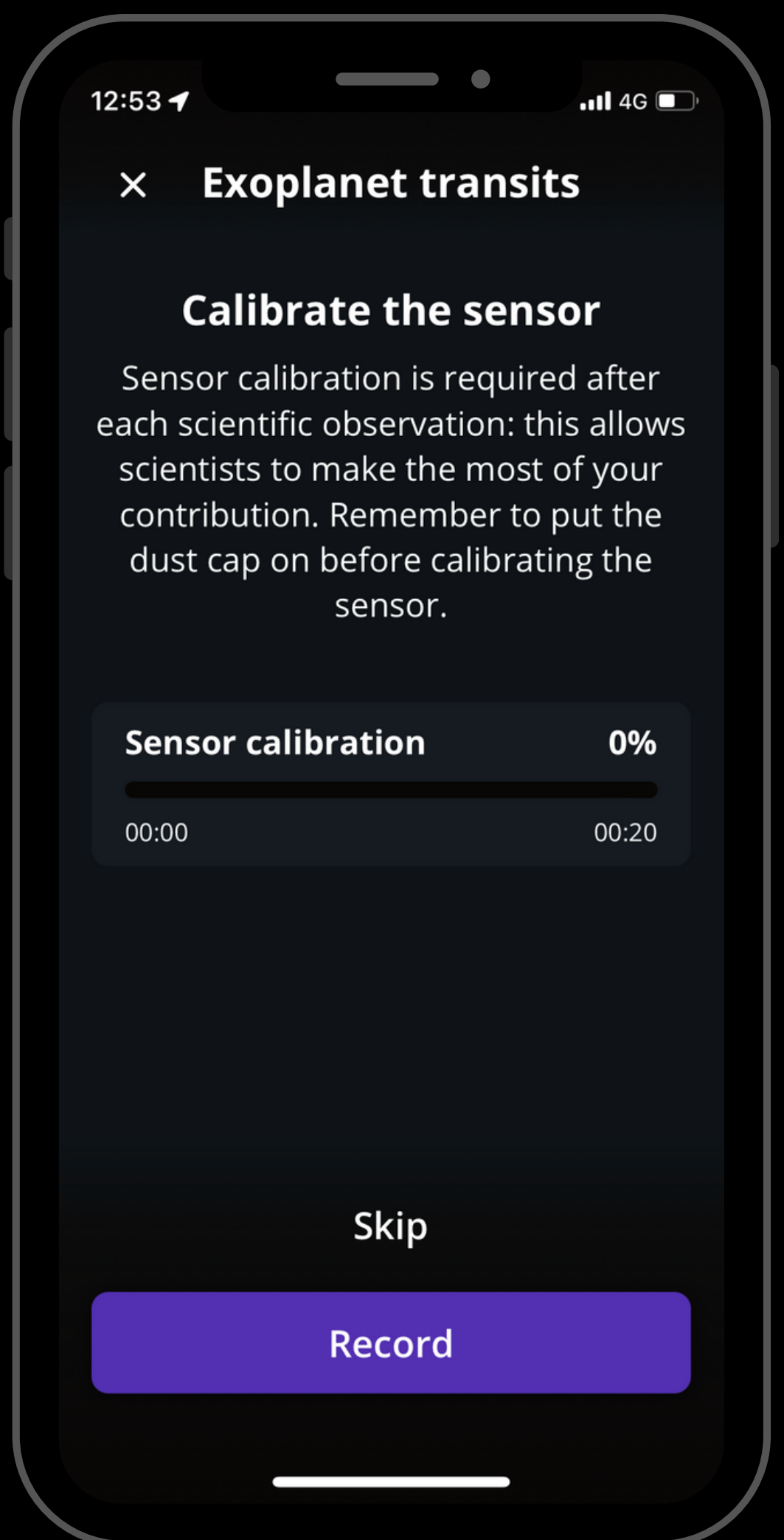
POST - OBSERVATION

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 transit. 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 Exoplanets 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

EXOPLANET TRANSITS

UNISTELLAR SETI INSTITUTE

YOU'RE DONE

We will send you the result of your scientific mission through our Slack communication platform, typically within a few days. Check the slack #transit-bot channel for your results!

Great Work, Citizen Astronomer!

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