

# NOVA EXOPLANET LAB

## Educator Guide

### GAME OVERVIEW

**NOVA Labs is a free digital platform that engages teens and lifelong learners in games and interactives that foster authentic scientific exploration.**

In the NOVA Exoplanet Lab, players take on the role of NOVAnauts, scientists for the NOVA Space Center's Galactic Resettlement team. They've received distress calls from aliens in desperate need of new homes, and to help, will have to master the same techniques scientists use to find and characterize exoplanets – world's orbiting faraway stars.

**There are four steps a NOVAnaut must complete to help their alien friends:**

**STEP 1:** After learning about the different methods used to find exoplanets, players use the **transit method** to identify stars that seem to have planets orbiting them. This method allows them to calculate each planet's volume, based on how much of the star's light it blocks from reaching our telescopes when crossing in front.

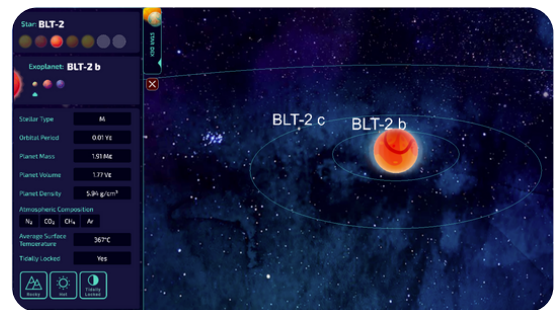
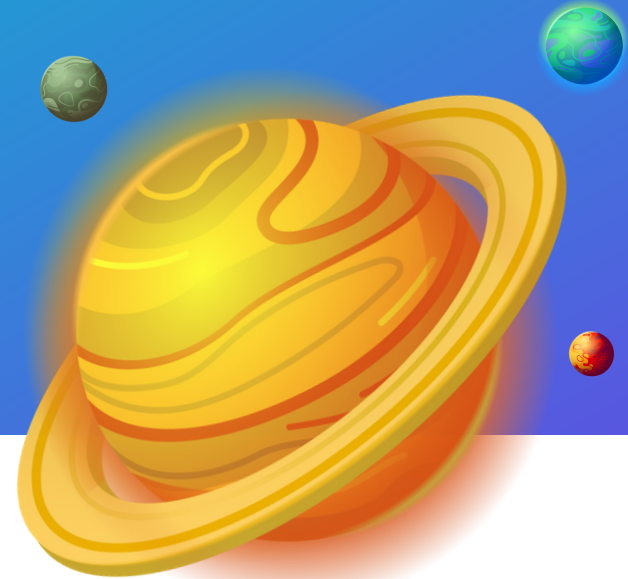
**STEP 2:** Next, players use the **radial velocity method** to measure how much the planets are tugging gravitationally on their stars, causing them to wobble. This gives an estimation of their mass, which, combined with the volume derived from the transit method, allows the player to calculate each planet's density.

**STEP 3:** The third step is to identify the **atmospheric composition** of each planet they've discovered by analyzing the unique absorption spectrum of the star's light after passing through it. Knowing what molecules are present can tell us how many heat-absorbing greenhouse gases are present – another clue to the planet's temperature – and whether there are any biosignature gases which might indicate whether life is already there.

**STEP 4:** The final step is to put all this information together by placing **habitability tags**, or **Habi-tags**, on each planet that summarize its likely conditions. Now they're ready to make a decision about where to send their alien, who will report back on how they fare once they arrive at their new home.

Throughout the mission, all relevant data will be logged in the player's **Star-Dex**. If they're looking to get an up-close view of a particular exoplanet, players can open the **Star-View** to toggle between all of the newly discovered exoplanets orbiting the selected star. Players can view the information in their Star-Dex or open Star-View at any point during the game.

The Exoplanet Lab is part of the NSF-funded **WHIMC project (What-If Hypothetical Implementations in Minecraft)**, based at the University of Illinois at Urbana-Champaign. WHIMC uses Minecraft as a creative sandbox where kids can explore alternative versions of Earth allowing researchers to study how "What If?" hypothetical scenarios might trigger engagement and learning in STEM.



**For lesson plans and additional resources for classroom use of the Exoplanet Lab, visit the Exoplanet Lab Collection on PBS LearningMedia:**

**[pbslearningmedia.org/collection/exoplanet-lab](https://pbslearningmedia.org/collection/exoplanet-lab)**

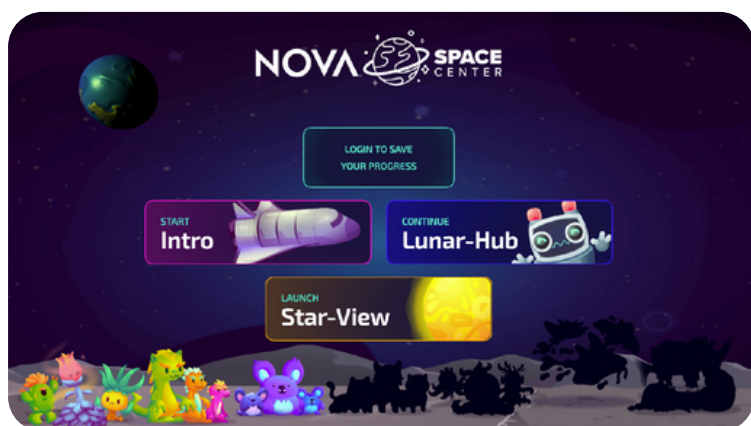
# GAME SUPPORT GUIDE

The **NOVA Exoplanet Lab** is an immersive, 3D experience that encourages students to master the same techniques scientists use to find and characterize exoplanets.



## For the best Exoplanet Lab experience:

- **Close all open tabs or apps** on your desktop, laptop, or Chromebook. The Lab is also playable on smartphones and tablets.
- **Ensure your web browser is current.** We recommend using Google Chrome and Mozilla Firefox-- Internet Explorer is not supported.
- While you can play as a guest, it's recommended for students to **create their own NOVA Labs account** using either Google, Facebook, or PBS log in to save their progress. Students can create a free PBS log in with an email address and password.
- Players can enable "**Teacher Mode**" by hitting Ctrl+Alt+shift+T to skip past videos and audio or select a specific mission and task.



## Exoplanet Lab Home Page

- **LOG IN:** Log in to a NOVA Labs account using Google, Facebook, or PBS log in to save your progress.
- **INTRO:** Start the NOVA Exoplanet Lab from the very beginning.
- **LUNAR-HUB:** If you are logged in and want to continue a previous session, pick up right where you left off in the Lunar Hub.
- **STAR-VIEW:** Jump into Star-View to see entire star systems and get an up close look at newly discovered exoplanets

## Lunar-Hub

- Click and drag to get a 180 degree view of the **NOVA Lunar Outpost**
- Click on highlighted or pulsing items to advance to the next portion of the Lab.
- After completing each station, players will be directed to launch **Star-View** to visualize the data they just collected.



## Icon Library



### LOG IN

In the top right hand corner of the screen, the person icon will direct students to log in using a Google, Facebook, or PBS account. They can create a PBS account with their email address and a password. Students can also track their progress through the Lab here.



### REPLAY

This icon seen in various places throughout the Lab allows you to replay videos or dialogue from the beginning.



### NEXT / SKIP

This icon seen in various places throughout the Lab allows you to advance to the next scene/ activity or skip video / dialogue to advance through the game.



### TRAINING MANUAL

In the bottom right hand corner of the screen, the book icon opens the player's training manual. Here, players will find a glossary, a guide to habi-tags, and all of the videos played throughout the Lab.



### PLAYBACK STRENGTH

Select the strength of your Internet connection: high, medium, or low. This will determine how fast pages and videos load when navigating and playing the Exoplanet Lab



### AUDIO

In the bottom left corner of the screen, click the speaker to turn the audio on or off.



### HINT SYSTEM

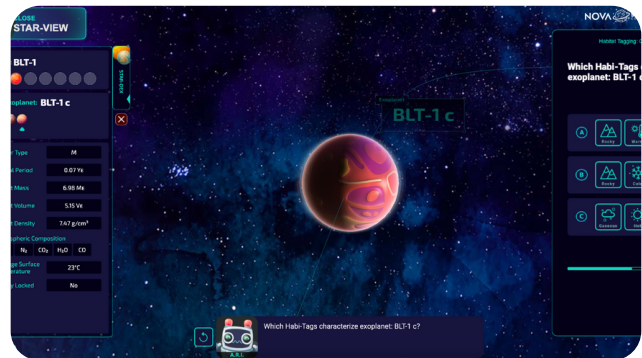
In the bottom right hand corner, ARI's icon will give you a hint for what to do next. Hints will appear on the screen in the closed captioning window in a red box with white text.

## STAR-DEX



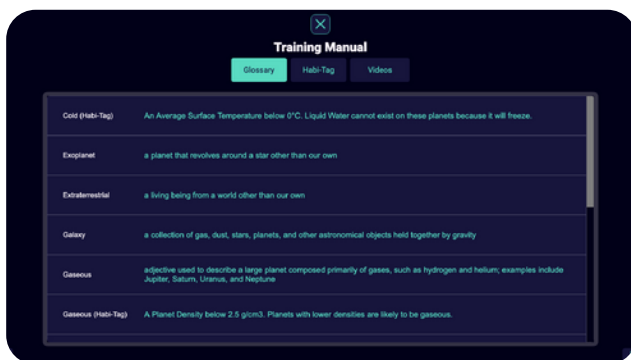
- Click on the **Star-Dex** on the upper left corner of the screen to open and close the panel at any time.
- Each time the player detects a new star, identifies an exoplanet, or collects a new piece of data about an exoplanet, it is added to the **Star-Dex**.
- Players will use the data in their **Star-Dex** to determine if an exoplanet will make a suitable home for the alien.

## STAR-VIEW



- Click on the **Star-View** icon in the upper left corner of the screen to launch
- Click and drag for a full 360 degree view of the selected star system.
- Players can toggle between all of the stars and exoplanets they've discovered so far.
- In **Star-View**, players will assign each planet habitability tags, or habi-tags, that summarize its likely condition.

## Training Manual



- Click on the book icon in the lower right corner of the screen to open the Training Manual.
- Open the training manual at any time during the Lab to view a glossary of terms, video library, and habi-tag definitions.

Follow @thenovalabs on [Facebook](#) and [Twitter](#) for updates and check out our collection of free educational resources on PBS LearningMedia

[pbslearningmedia.org/collection/exoplanetlab](https://pbslearningmedia.org/collection/exoplanetlab)

