

September 5, 2018 Session

This session focused on cosmology, particularly exoplanets in other locations in the universe. Hubble telescope focuses on spot in the universe and searches for exoplanets. Currently, 3649 confirmed exoplanets have been identified because they have been studied of 3 cycles or Earth years. The transit of exoplanets in front of other stars is detected by a dip in light signatures. By timing the amount of time that the light dips can indicate how fast it is moving. Additionally, depending on how much light dips, it can help determine the size of the planet. Dr. Rodriguez modeled the movement with a diagram that shows the transit light curves.

Kepler telescope has been searching for exoplanets orbiting other stars in other galaxies. At times, sun spots may appear to be a transit, but they move with a star and can skew data when locating exoplanets. This research is driven by the search for habitable zones where exoplanets can potentially support life based on their placement in a solar system. The temperature would be just right for all states of matter of water to exist. Exoplanet data is driven by Kepler's law of planetary motion, which helps to determine a planet's distance from their sun. Additionally, the interpretation of graphic data is a critical skill when researching and understanding transit graphs. The amount of light dips is on a fractional scale and are not large light variation changes when transits occur.

Kepler discovered that the distance cubed is equal to the square of the period is the orbital radius. To determine planet size, geometry calculations can help determine the size of a planet with the size information of the sun it orbits. Kepler's 3rd law can be used to determine stars the same size as the Sun. This math can be used in grades 7-12 and helps support math conversions of time and quantities. This analysis of NASA data helps to support CC math standards associated with radicals and integer exponents. The JPL website has many teaching resources with lessons that can be performed in the classroom, using authentic NASA data.

Kepler discovered 3 of the smallest exoplanets, which is very difficult to detect because of their small size. In 2010, the first habitable zone planet was discovered and two earth-sized planets were discovered. A multi-planet system has been identified, Trappist, with 3 planets in the habitable zone. Transit data has helped to track the planets' orbits around their star. Circumbinary systems have also been located, which have 2 stars in a system, Kepler 34 and 35. Exoplanets are identified in different ways: directly with a telescope, doppler method, and an eclipse.

Exoplanet exploration is important research because it addresses questions pertaining to astrobiology. The search for life beyond our solar system has brought about questions about alien life forms may develop and exist in other conditions. Europa, one of Jupiter's moons, has an outer ice crust and a liquid ocean underneath the ice. Scientists and engineers are working on ways to reach the planet and place a rover to search for life. Spectroscopy allows NASA to identify water by seeing the chemical signature of the water shooting out, displaying different colors.

Session concluded with examples of teacher resources that can be used in the classroom to support astronomy education. Resources are free for educators.

Looking for Life: www.jpl.nasa.gov/edu/teach/activity/looking-for-life/

Lesson/Activity ideas: Astrobound, Kepler math