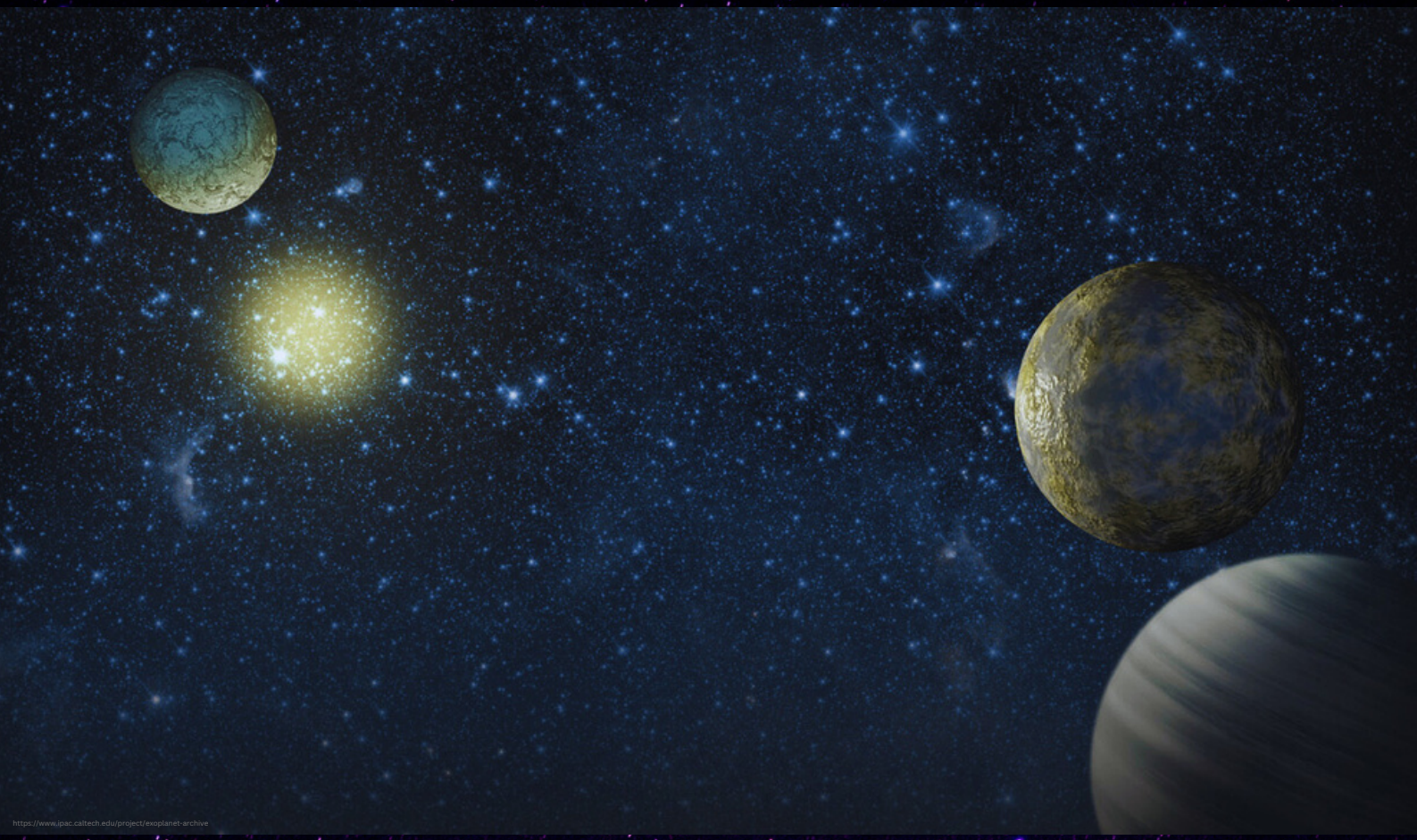
JAN. 2024 | VOL 1

THE HARRIOT

SEDS-VIT

EDITORS: ANAGHA V, SHAURYA

Think Infinite...



https://www.ipac.caltech.edu/project/exoplanet-archive

A Cosmic Treasure Hunt Beyond the Blues

BY AKSHANTH

Exoplanets are planets that orbit stars beyond our sun. For a long time, they remained undetected, but now advanced astronomical technologies and innovative methods have made it possible to find them. The search for exoplanets requires inventive and unconventional approaches, making the exploration a captivating journey.

Numerous trailblazing ideas have successfully detected exoplanets, showcasing the prowess of these innovative approaches. In this text, we will explore three methods of their detection, namely the transit method, the radial velocity method, and the gravitational microlensing method.

The transit method is an intriguing approach to exoplanet detection. Imagine standing in front of a bright light. When an object passes between you and the light, you notice a reduction in brightness. Similarly, observing star systems reveals fluctuations in brightness, corresponding to the sizes of exoplanets. This method allows scientists to decode the presence and dimensions of these distant worlds through the subtle variations in stellar light.

The Radial velocity method is a very intuitive approach. It is like a tug-of-war between a star and a planet. The gravitational effect of the planet on the star is much less compared to that of the star on the planet. This small gravitational force causes the star to wobble, fluctuating the circular rotational velocity of the star and compressing the light around it, causing the light to show the Doppler effect.

Gravitational microlensing is a concept stemming from Einstein's theory of space fabric and the bending of light around massive objects. This method is foundational in astronomy. To astronomers, this phenomenon looks like a constant fluctuation in a star's brightness, indicative of an object bending the star's light either towards or away from us due to lensing. These fluctuations offer valuable insights into the relative size and distance of planets. The unpredictability of this method requires astronomers to dedicate extended periods to observing vast sky portions. Analyzing recorded patterns aids in estimating the size of the involved star, and also occasionally captures rapid microlensing events induced by exoplanets, providing crucial data on the prevalence of these 'rogue' planets throughout the galaxy.

Kepler-452b: Earth's potential cousin

BY ANAGHA R

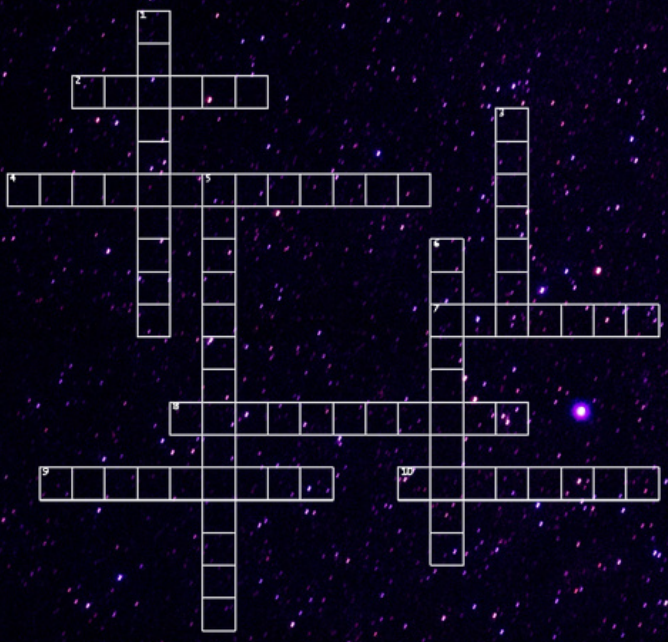
Picture this: A planet 60% larger than Earth, basking in the glow of a sun just like ours. 1400 light-years away, within the constellation Cygnus, lies Kepler-452b, the "Earth 2.0" in our galactic neighborhood. Kepler-452b was discovered in 2015 by NASA's Kepler Space Telescope. The gravity on it is about twice that of Earth. It is the only planet known to exist in its star system. What makes Kepler-452b truly intriguing is its potential for hosting life. Its sun-like parent star, Kepler-452, offers long-term stability, while theoretical models suggest the presence of continents and oceans, fostering diverse climate conditions. However, we don't know if Kepler-452b is rocky like Earth or gas-rich like Neptune. Its density and internal structure remain an enigma. The composition of its atmosphere is a complete unknown. It takes Kepler-452b 385 days to orbit its star, compared to Earth's 365 days.
Future telescopes like the James Webb Space Telescope and the Vera C. Rubin Observatory promise to unveil its secrets, shedding light on its potential to harbor life. This story is far from over. It poses a "what if?", as we embark on journey of discovery, reminding us that Earth might not be alone in the vast space.

Team Vyadh at IRC, Coimbatore, with their rover Dream_2.0 (28/01)

Team Ardra at ISDC, Coimbatore, with their drone MIRAD that won 1st place (29/01)

Crossword 001

BY HARSHIT, KAMESH, RHUTVIJ

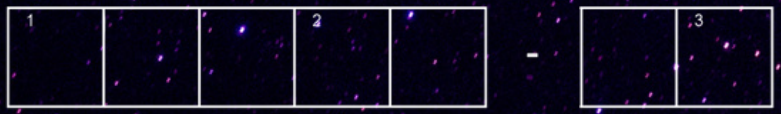


ACROSS
2. One day on this planet is seven years on Earth
4. The similarity between the radial velocity method of detecting exoplanets and measuring the velocity of precipitation (7,6)
7. The planet named after an artefact that contains the evils of the world
8. What if Jupiter is closer to the Sun? (3,8)
9. The wielder of the Darksaber rules this planet
10. An exoplanet orbiting within the habitable zone of the red dwarf star (7-1)

DOWN
1. Where it is not too hot, not too cold, just right for life to unfold the fairy tale with the three bears
3. The noble gas that blew up
5. Not Ethan Hunt's mission, but a celestial plot where planets go off-script and roam freely in space (5,9)
6. Earth (5-5)

Wordgram 001

BY NAVYA, SNEHA



HINTS (Use first letter of the answers to fill up the respective blanks)
1. The phenomenon that, if one entered, they can move in any direction in time but only one direction in space.
2. The constellation that contains the red dwarf Betelguese.
3. Cosmic snowballs of frozen gases, rocks and dust.

MASTER HINT
Nicknamed after the home planet of the chosen one in Star Wars

Biosignature that can only be produced by living organisms were found on K2-18 b, leading to rumours of possible biological life.

As of 10 January 2024, there are 5,569 confirmed exoplanets in 4,142 planetary systems, with 942 systems having more than one planet.

The first exoplanets were discovered in 1992, namely, Poltergeist and Phobetor.