



## India in Exo-planetary Research

### What is the issue?

\n\n

\n

- In a feat that is critical for India and science, Ahmadabad based lab discovered a planet orbiting a star 600 light years away.

\n

- This is a 1<sup>st</sup> for Indian scientists and is a vindication of India's space potency.

\n

\n\n

### What the metrics of Exo-planet studies?

\n\n

\n

- **Why** - Exo-planets are those celestial bodies that orbit stars outside our solar system in clearly defined elliptical paths.

\n

- We need to understand how planets form around stars, to understand our solar system better, for which study of exo-planets are key.

\n

- Habitability of exo-planets is a keenly studied area, which is mainly based on its distance from its star (the planet should be neither too hot nor too cold).

\n

- Indian scientists have been trying to track exo-planets since 2012, but it was only recently that PRL, Ahmadabad became the 1<sup>st</sup> to achieve the feat.

\n

- **What** - The 1<sup>st</sup> thing is to understand about exo-planets are their characteristics and fundamental parameters - mass, radius, and atmosphere.

\n

- With mass and radius, it is easy to get the density, which will help in making a rough estimate of the planet's composition.

\n

\n\n

\n

- **The challenge** - Detecting an exo-planet is very difficult as it is a dull object that will invariably be roaming around the bright spot of its star.

\n

- Direct imaging of exo-planets is almost impossible, although new techniques are being evolved by NASA and others.

\n

- There are only 5-6 spectrographs around the world that can measure the mass of exo-planets at high precision (radial velocity less than 2 m/s).

\n

- India counts itself as one of the few countries that has the instruments to discover and analyse such difficult worlds.

\n

\n\n

### **Then, how are exo-planets studied?**

\n\n

\n

- **How** - The presence of a planet will make its star wobble, which can be measured using a precise spectrograph.

\n

- This spectrographic reading will help in measuring the mass of the planet.

\n

- When the planet passes between its star and Earth, the intensity of light from that star (which reaches the earth) gets minutely dim.

\n

- This dip in star's flux is measured, and this is subsequently employed to estimate the radius of the planet.

\n

\n\n

### **What are the observed results of the newly detected exo-planet?**

\n\n

\n

- A suspected planet (now been coded as "K2-236b"), was under the observation of the Ahmadabad based lab over 1½ years.

\n

- In Jan 2018, scientists conclusively stated that their object of observation was a planet, which was then confirmed by "Mount Abu Space Observatory".

\n

- The planet is said to be composed of 70% iron, ice or silicates and 30% is gas, with about 27 Earth-masses and 6 Earth-radii.

\n

- In terms of mass and radius, the planet is akin to Neptune, and it is just one-seventh of the distance away from its star as compared to 'Sun-Earth distance'.

\n

- One year on that planet is about 19.5 Earth-days and surface temperatures average to about 600°C, which thereby makes it uninhabitable.

\n

\n\n

### **How does the future of exo-planetary studies in India look?**

\n\n

\n

- Indian space scientists have set out with the ultimate aim of detecting planets of close-to-Earth mass (2 to 10 Earth masses).

\n

- A new 2.5-m telescope at "Mount Abu Observatory" with a bigger spectrograph is likely to be installed by 2020, and it will be called "PARAS-2".

\n

- PARAS-2 is slated to have the capacity to even measure smaller exo-planets that are just about 2 or 4 times Earth's mass.

\n

- It is also hoped that ISRO will launch some space missions relating to exo-planet studies.

\n

\n\n

\n\n

**Source: Indian Express**

\n



**IAS PARLIAMENT**  
*Information is Empowering*  
A Shankar IAS Academy Initiative