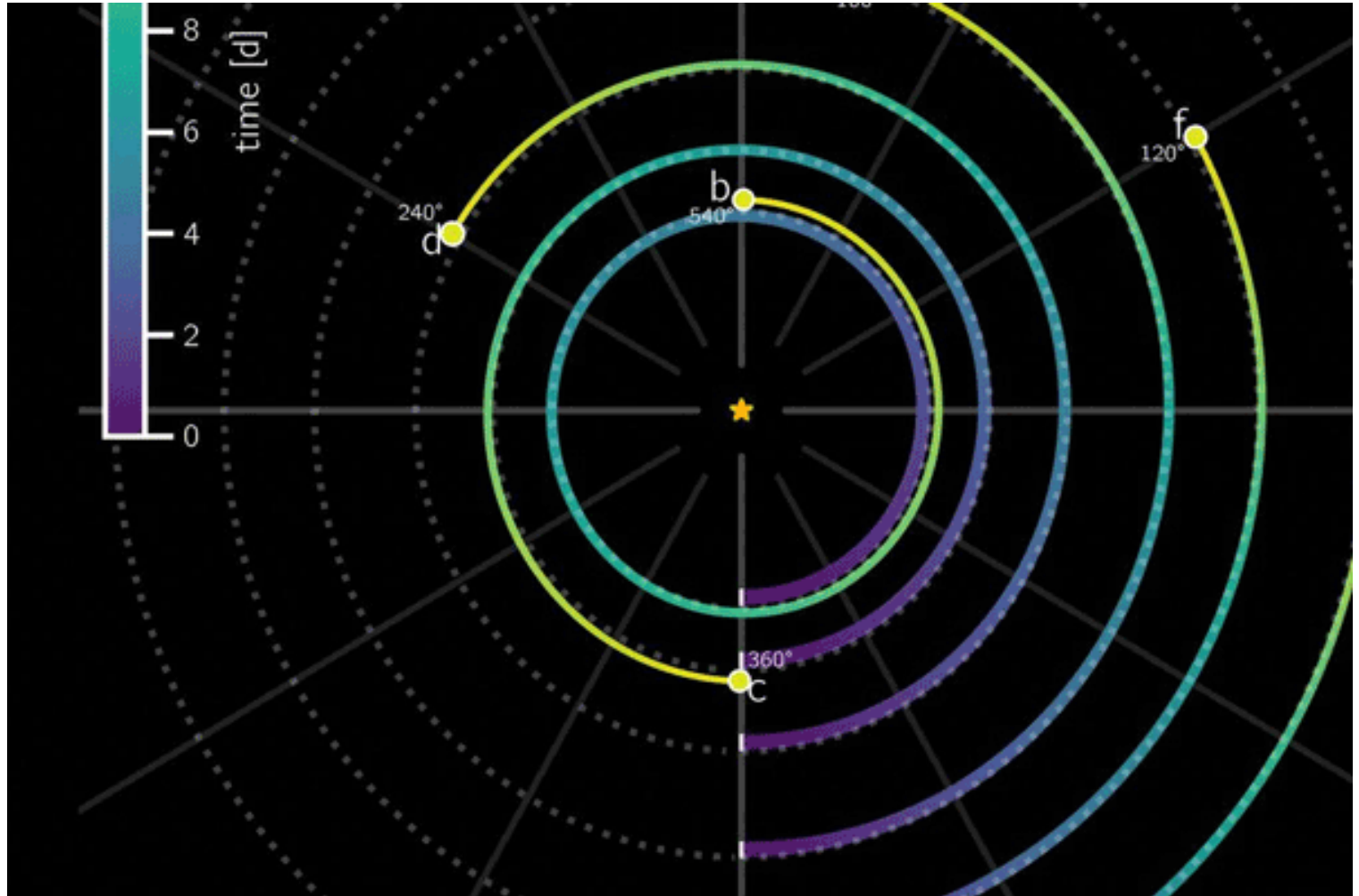


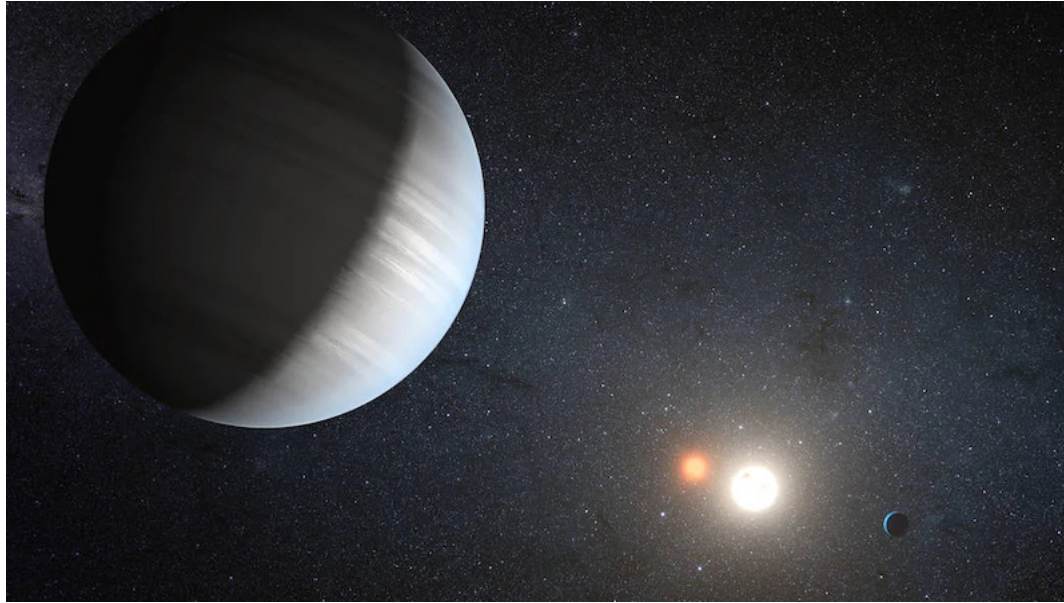
Discovery of Six Sub-Neptunes

By IAS Toppers | 2023-12-04 15:10:00



Discovery of Six Sub-Neptunes

Astronomers have recently identified **Six sub-Neptune planets** orbiting in a rare synchronised dance around a **distant star** named **HD110067**.

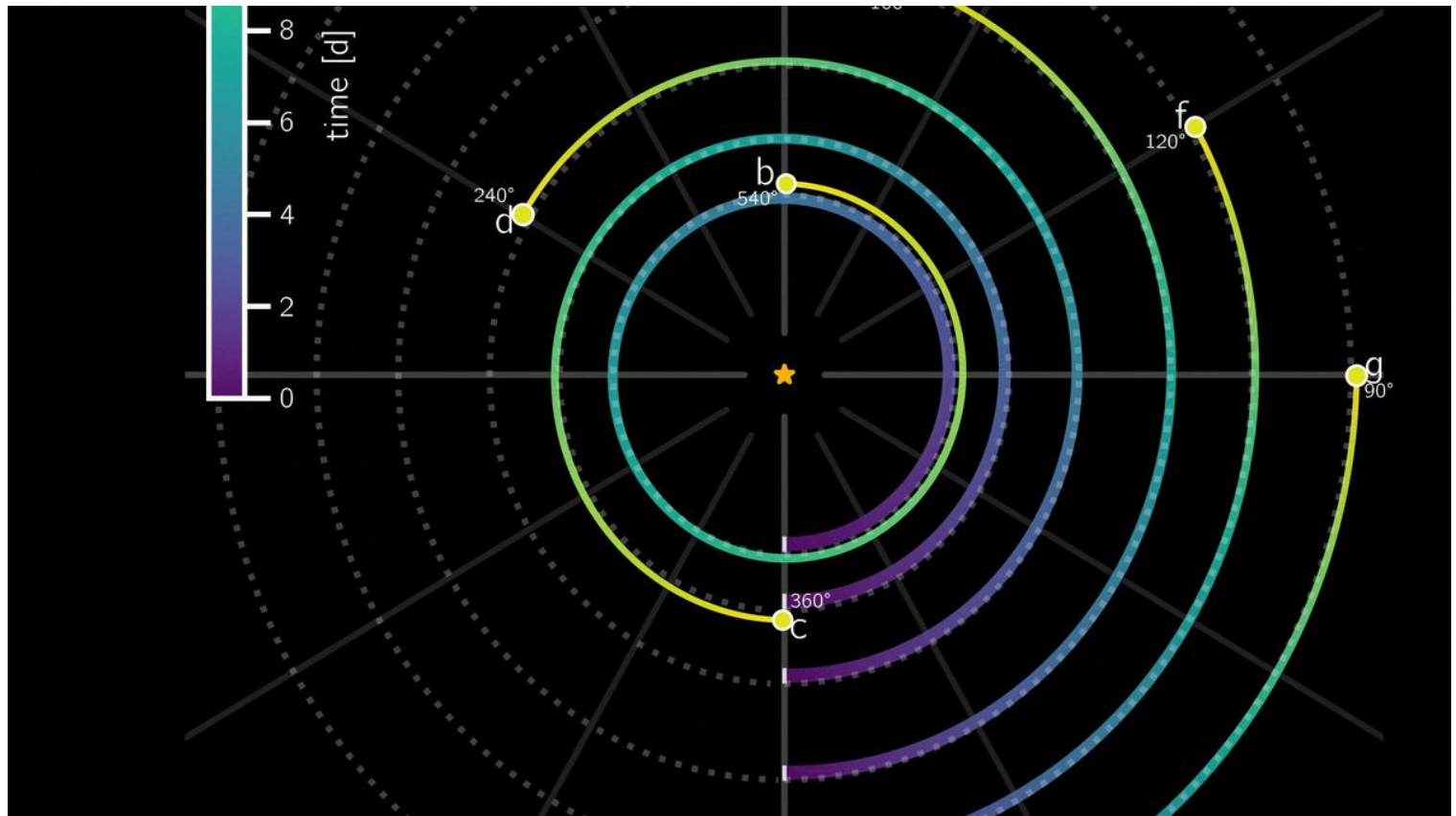


[Ref - EarthSky]

Discovery of Six Sub-Neptunes:

- **Sub-Neptunes** are a type of **exo-planets**.
 - **Exo-planets** are any planet beyond our solar system.
 - They are made up of **elements** similar to those of the planets in our solar system, but the **mixes of elements** may differ.
- **Star HD110067** is about **20% smaller** in mass than the sun and located approximately **100 light-years away** in the constellation **Coma Berenices**.
 - **Coma Berenices** is an ancient asterism (group of stars) in the **northern sky**, which has been defined as one of the 88 **modern constellations**.
- It was discovered through observations of **minute dips in the star's brightness** as the planets transited in front of it.
- A **rare condition** was observed in the 6 sub-Neptunes, indicating a **stable synchronization** of their orbits since their formation **about 4 billion years ago**.
- **No chaotic events** like giant impact events have perturbed their orbits.
- None of these planets are in the **nominal habitable zone** for terrestrial planets.
 - A **habitable zone** is the region around a star where conditions might be right for **liquid water** and potentially **life**, they **possess atmospheres** that could modify their surface temperatures.
- This research raises a question of the **existence of life** on other planets.
- The **James Webb Space Telescope (JWST)** can play an important role in our understanding of these planets.

About Sub-Neptunes:



[Ref - TH]

- **Sub-Neptunes** are generally **any planet** that has a **smaller radius than Neptune**, although some could still be **more massive**.
- Their **size ranges** size from **1.9 to 2.9 times Earth's diameter**.
- This includes both **mini-Neptunes** and **super-Earths**.
- They possess **substantial atmospheres**, challenging the understanding of planetary systems.
- These are **not Earth-like planets**, prompting speculation on their composition - rock with thick atmospheres of **hydrogen and helium gas**, or **rock and ice with warm, water-rich atmospheres**.

About Super-Earth and Mini-Neptune:

Super-Earths:

- Super-Earths are **larger than Earth** but **smaller than Neptune**.
- They're generally (but not always) **between 1.2 and 2 Earth-radii**.
- They are defined primarily by their **mass**, however, **not their size**.
- Their **composition** can vary **according to their density**.
- **Low-density** super-Earths could have **atmospheres of hydrogen and helium** while **higher-density** ones could be **composed largely of water** or have **very dense cores with thick atmospheres**.
- **Super-Earths with oceans** may be **habitable** and conducive to the **evolution of life**.

Mini-Neptunes:

- Mini-Neptunes are generally thought of as having **thick hydrogen–helium atmospheres**.
- There may be variations regarding **composition**, including **deep layers of ice, rock, or liquid oceans**.
- There may be another class of planet in the super-Earth to mini-Neptune size range: **Hycean planets**.
 - They are up to **2.6 times the diameter of Earth**, **temperatures up to 200 degrees Celsius**, and thick hydrogen atmospheres.