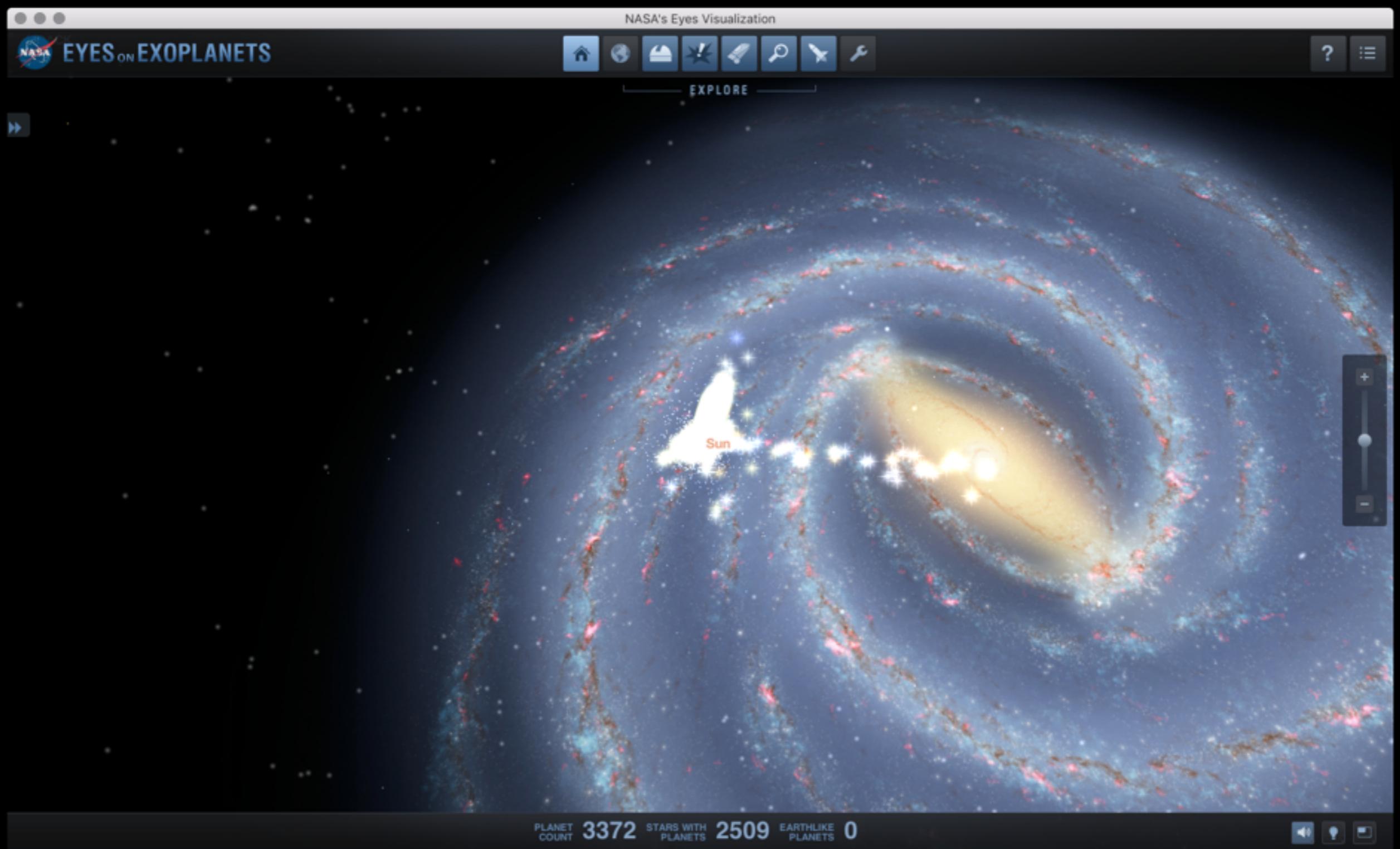
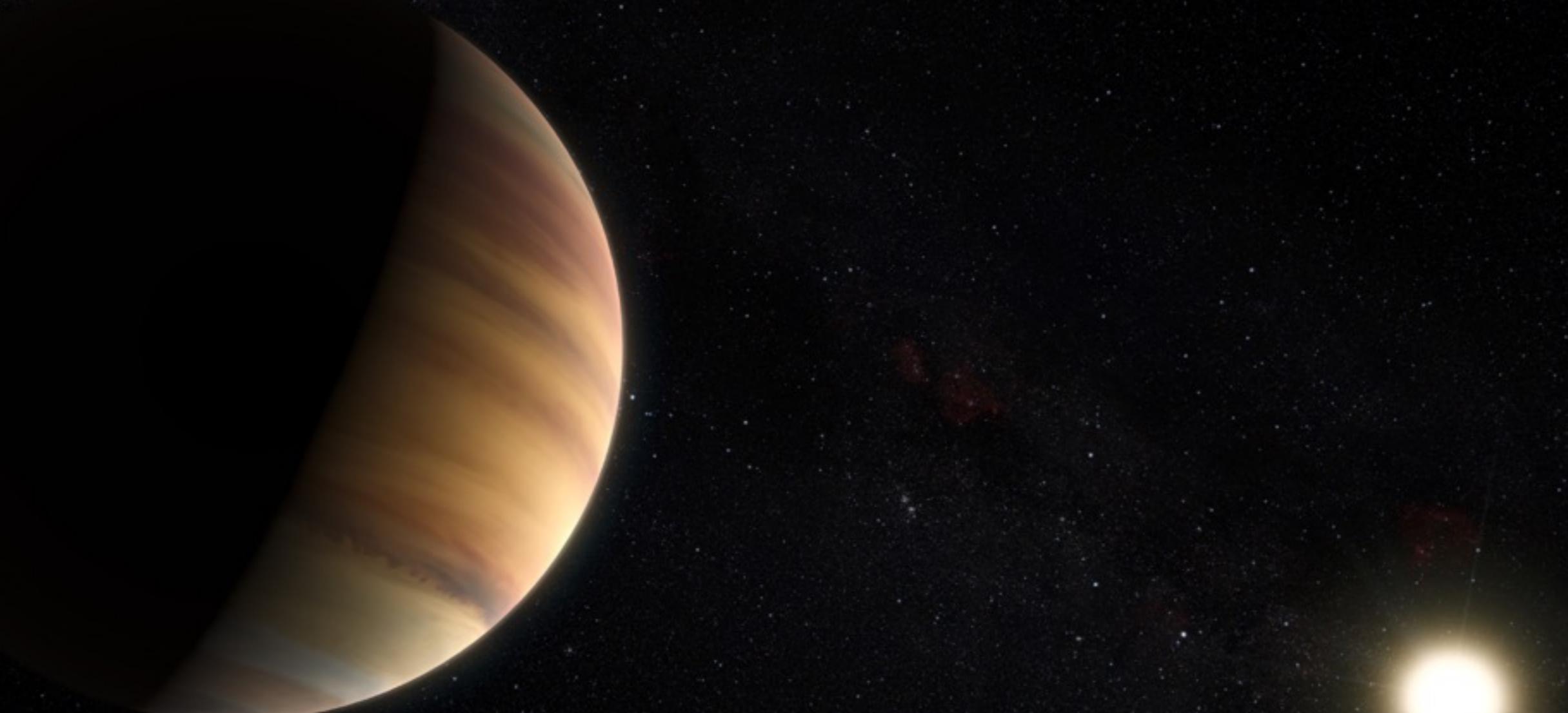
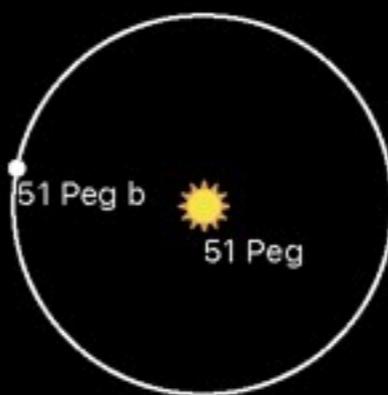


EXOPLANET SAFARI



51 Peg b

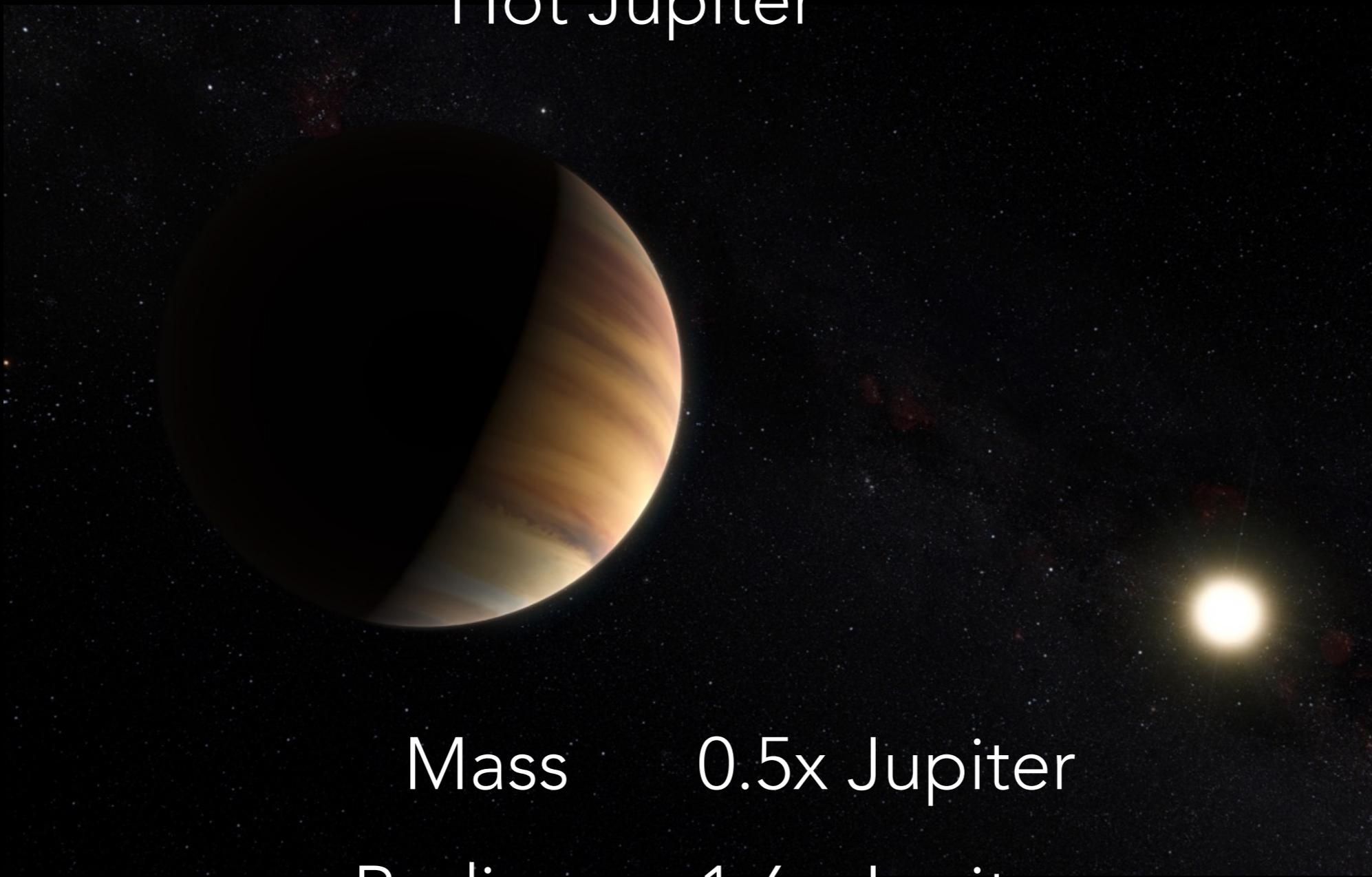




51 Peg b

51 Peg

Hot Jupiter



Mass 0.5x Jupiter

Radius 1.6x Jupiter

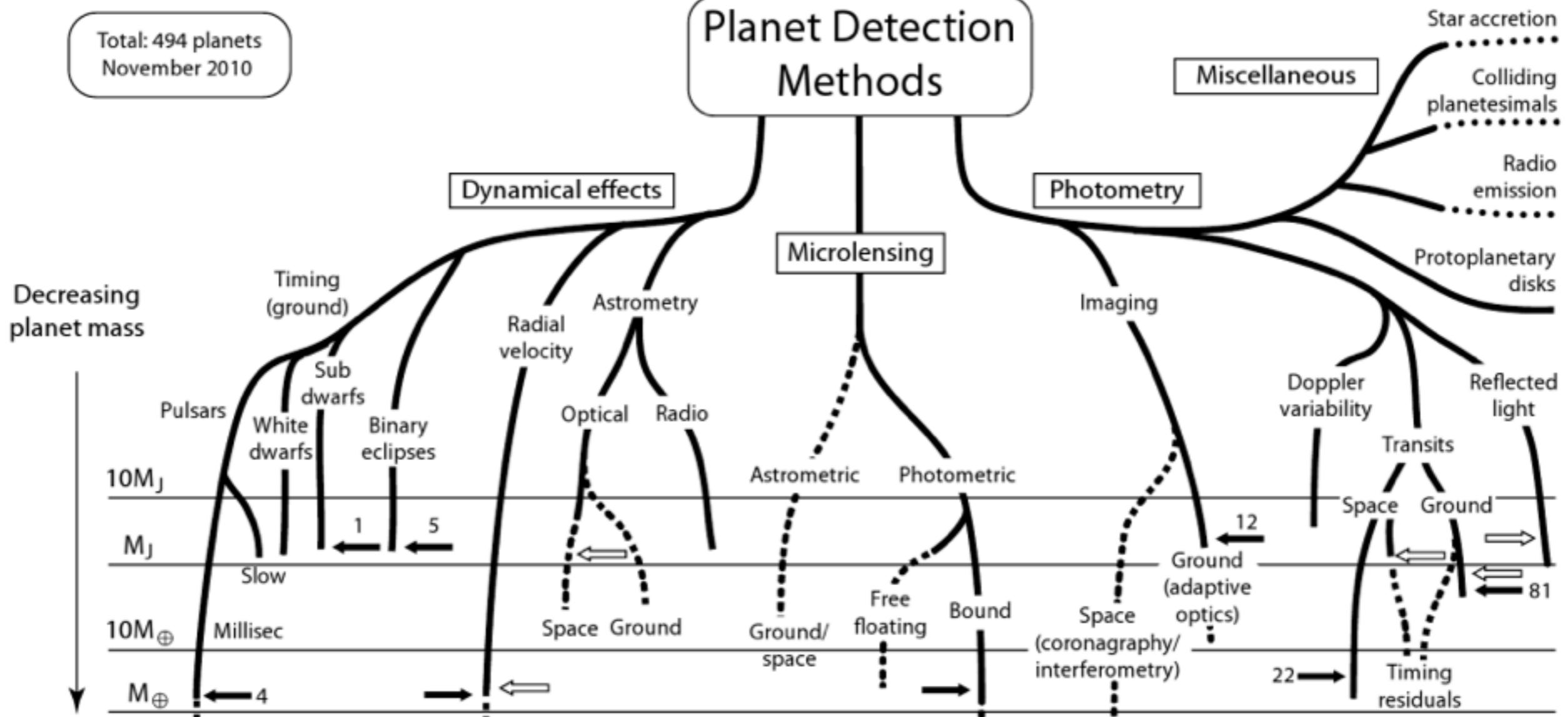
Orbit 4.23 days

Temp 990°C

Total: 494 planets
November 2010

Planet Detection Methods

Decreasing planet mass



Discovered: 10 planets

358 planets

11 planets

12 planets

103 planets

Detected: 10 planets
(6 systems,
3 multiple)

461 planets
(390 systems,
45 multiple)

11 planets
(10 systems,
1 multiple)

12 planets
(10 systems,
1 multiple)

108 planets
(7 systems,
1 multiple transit)

— existing capability

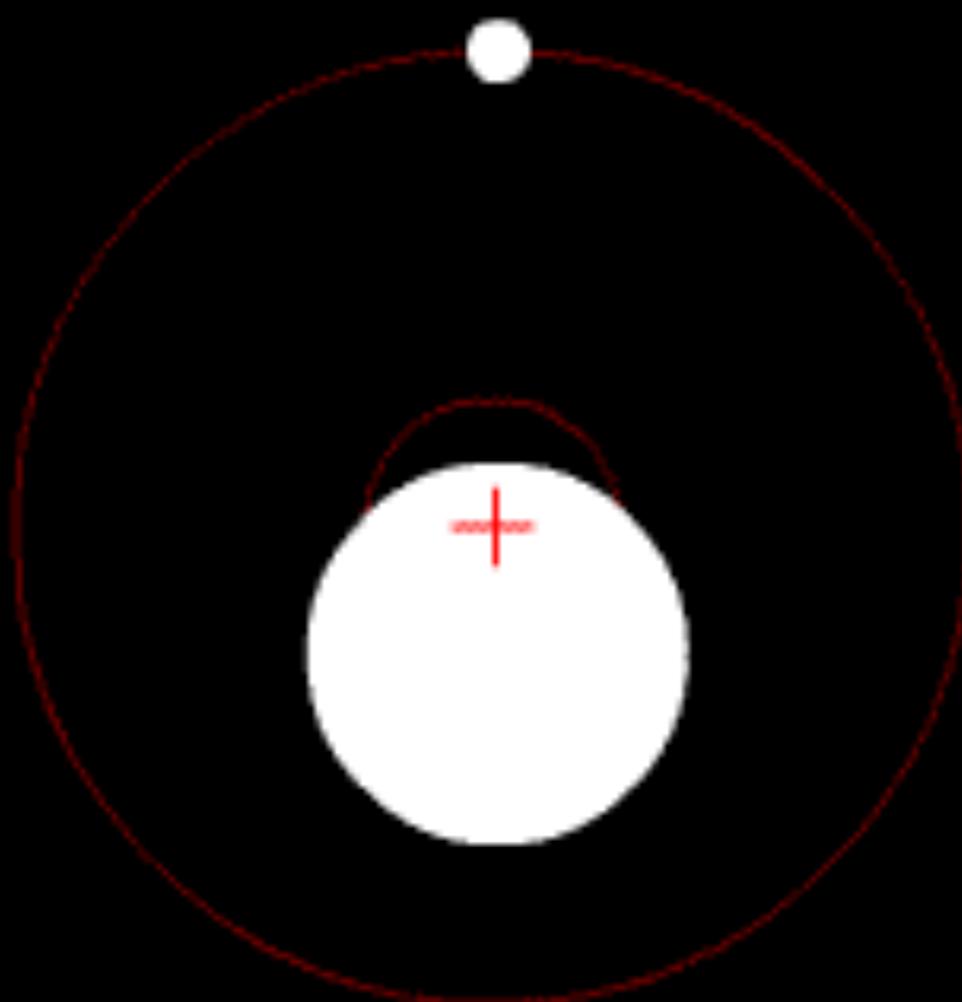
····· projected (10–20 yr)

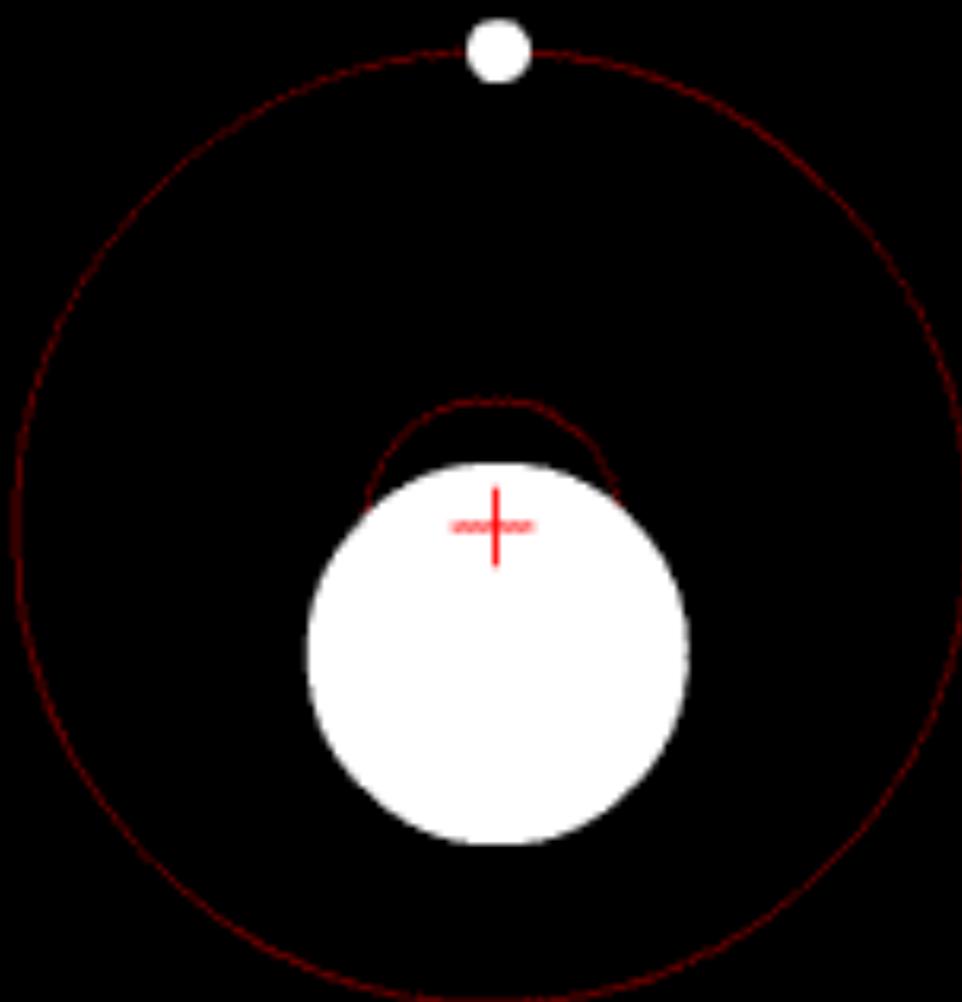
n = planets known

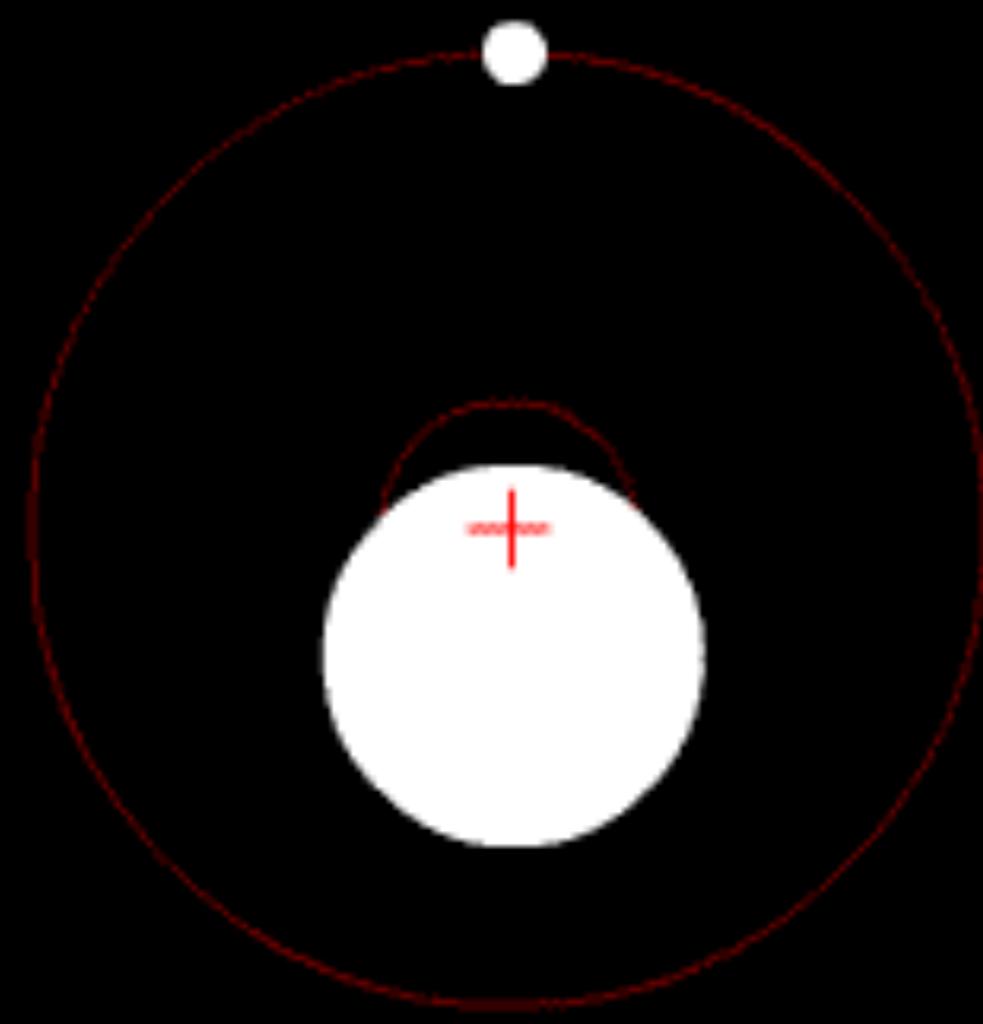
→ discoveries

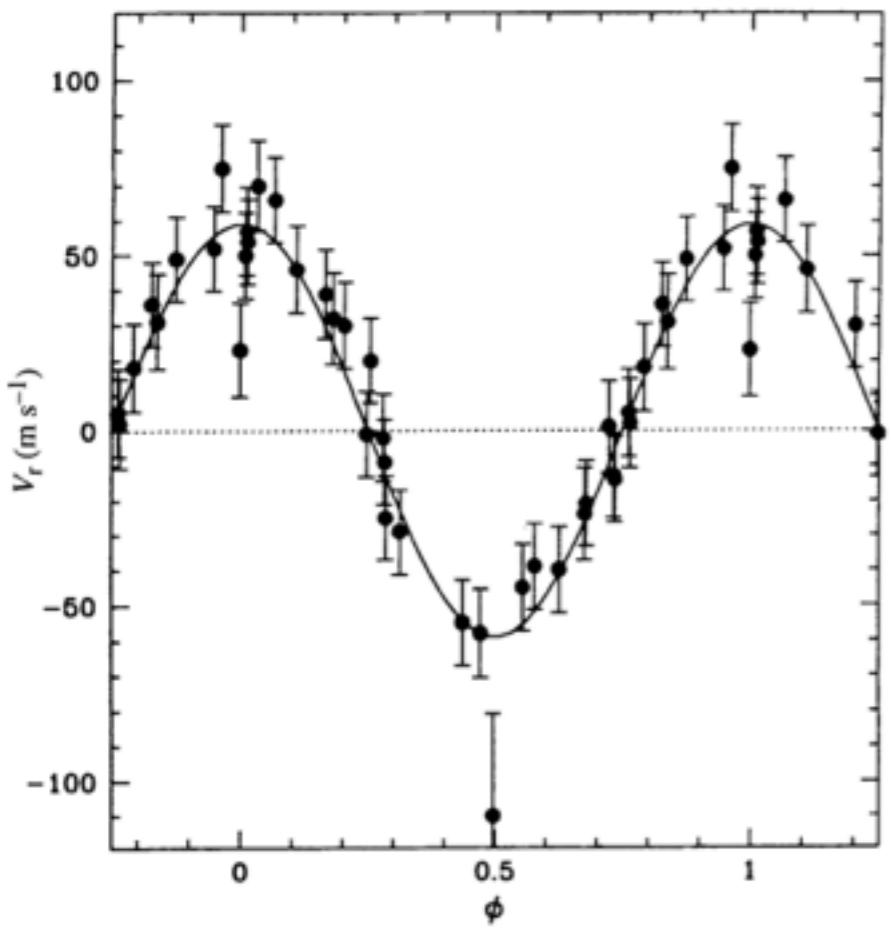
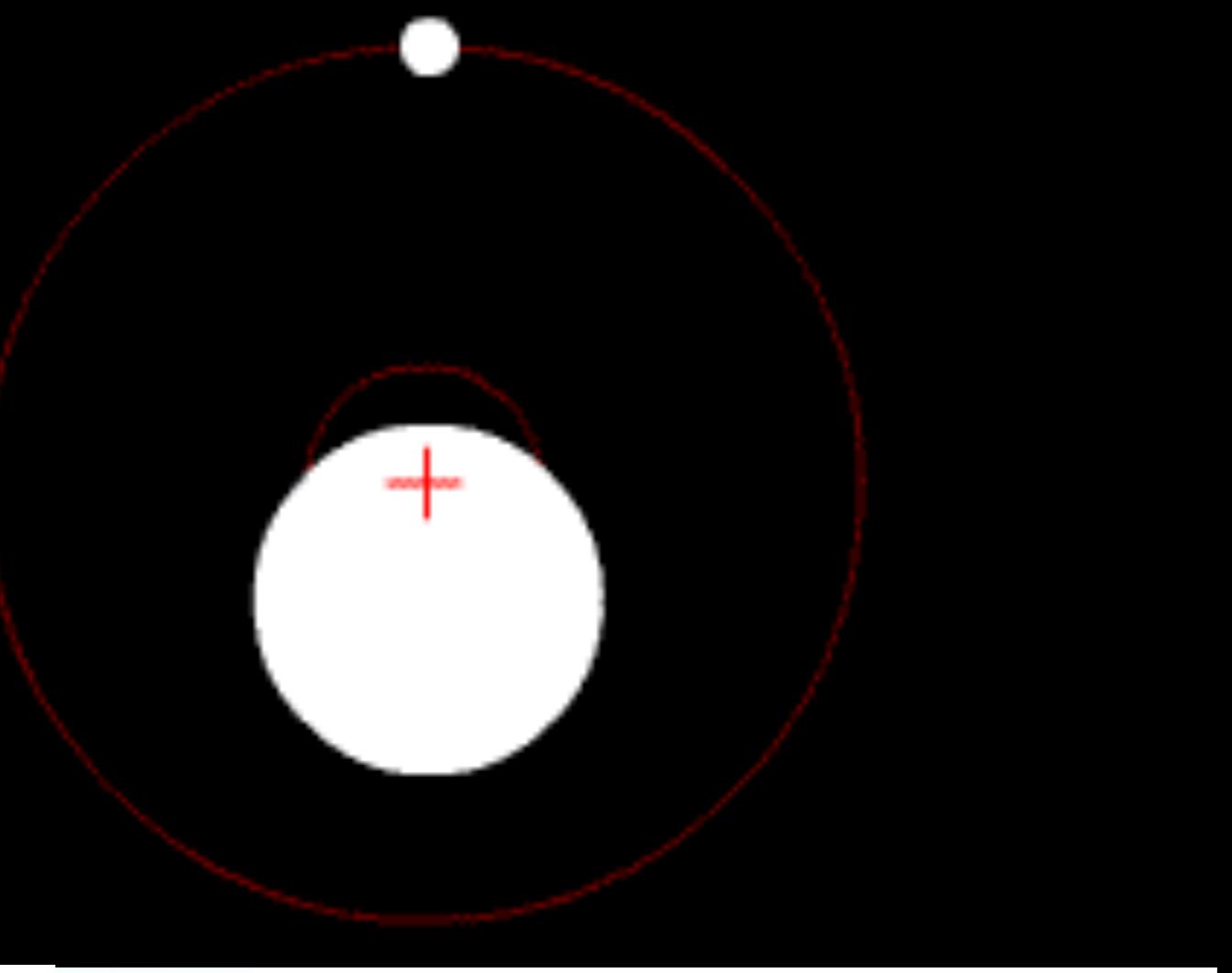
→ follow-up detections

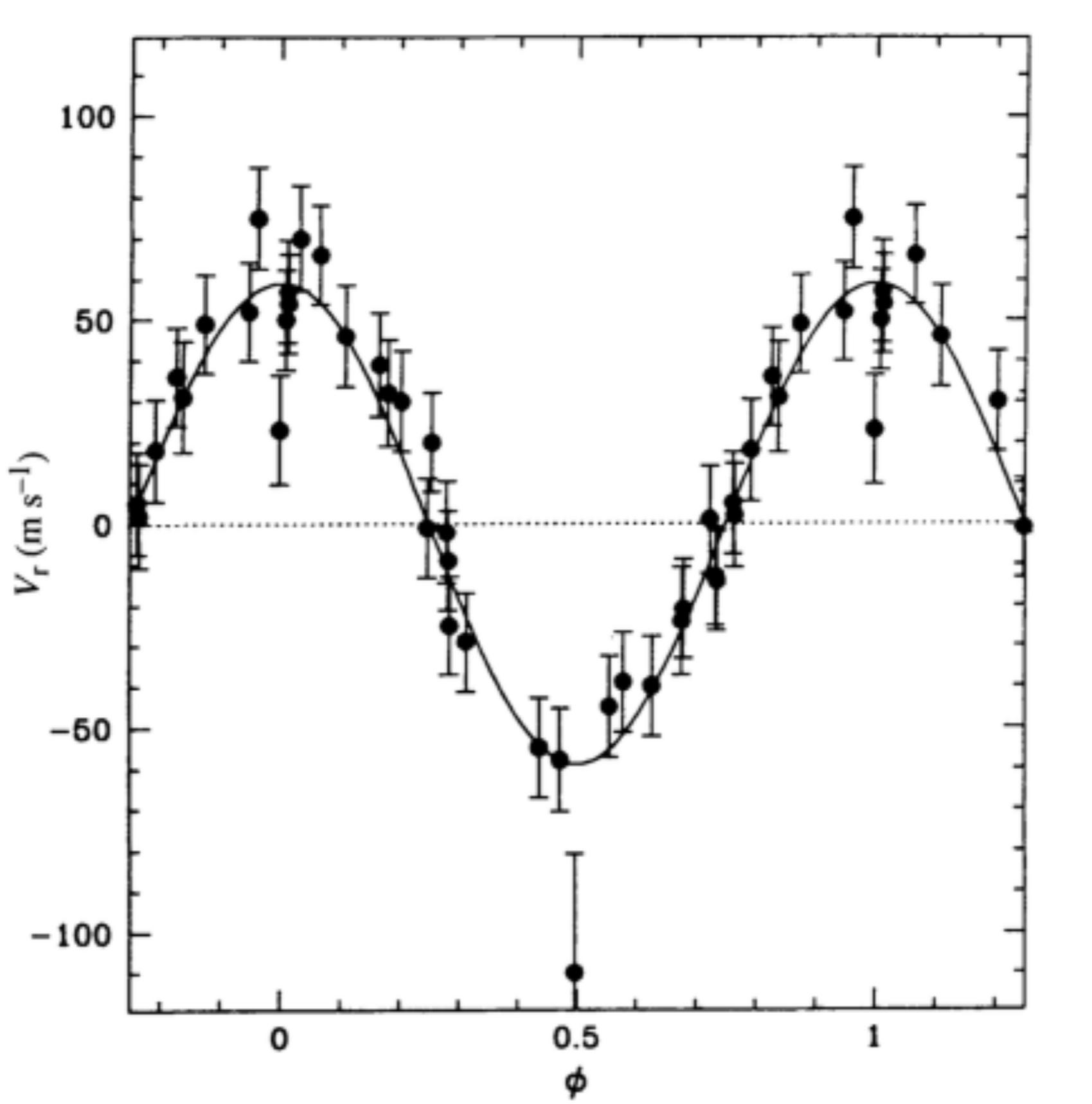


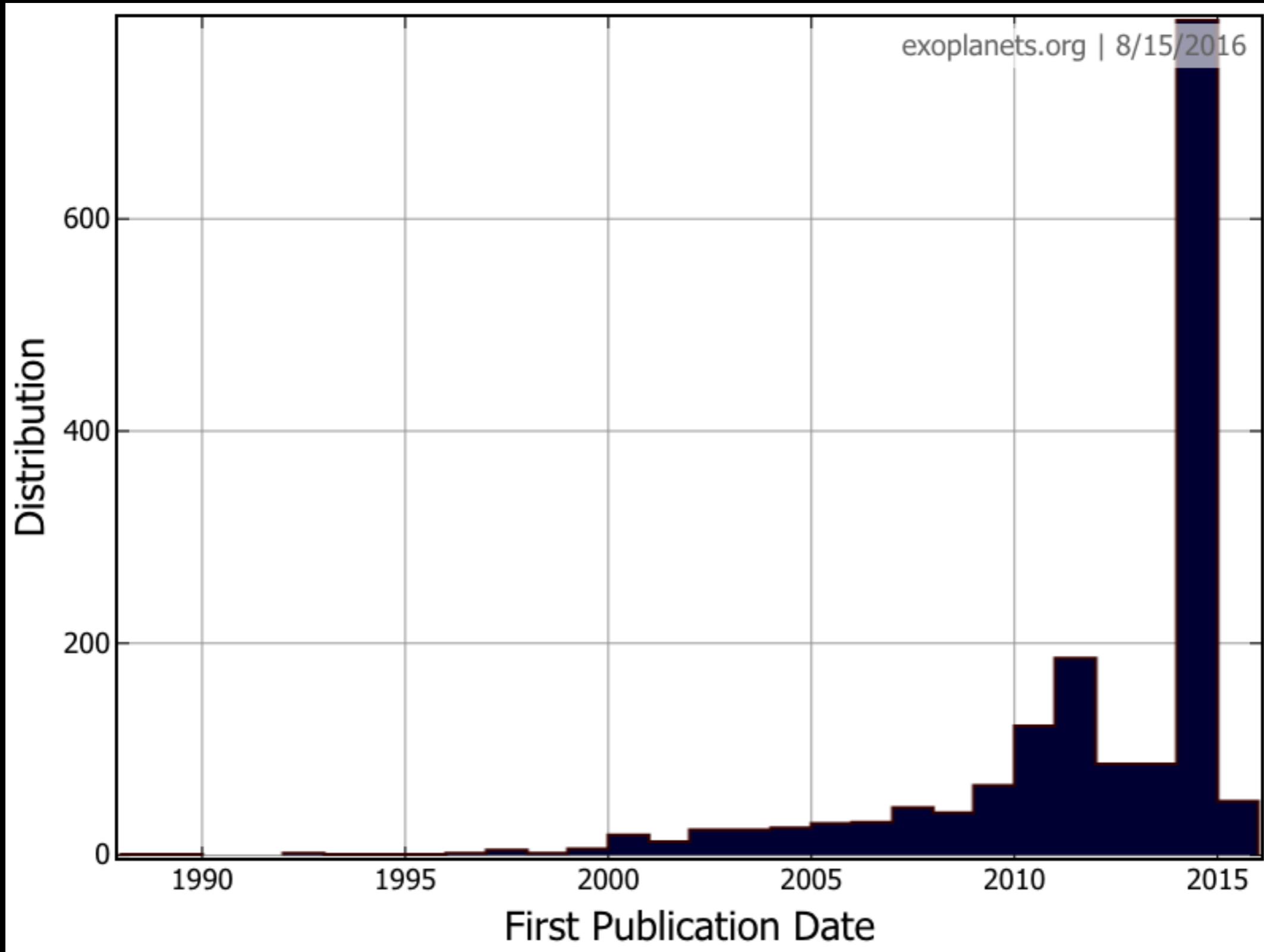




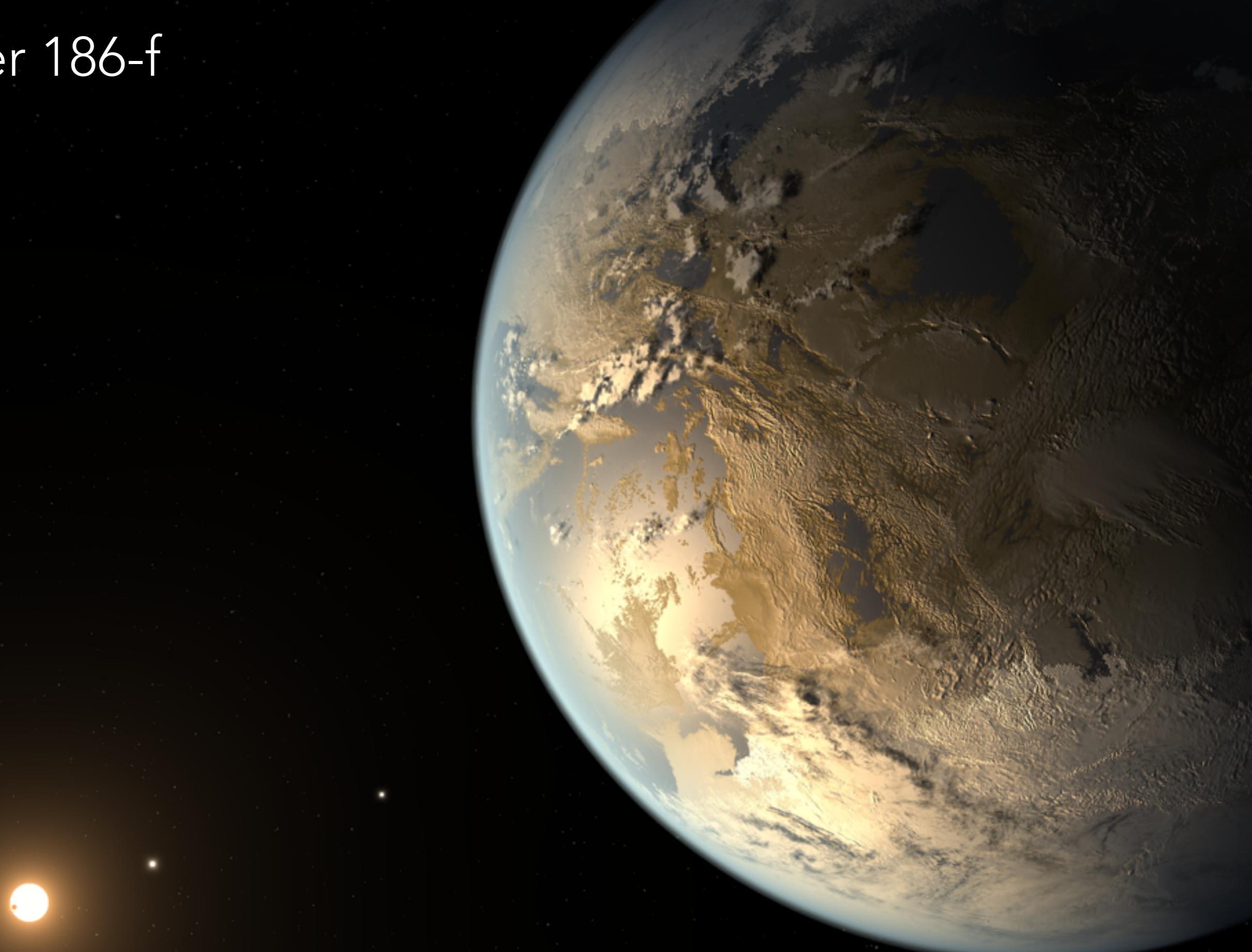


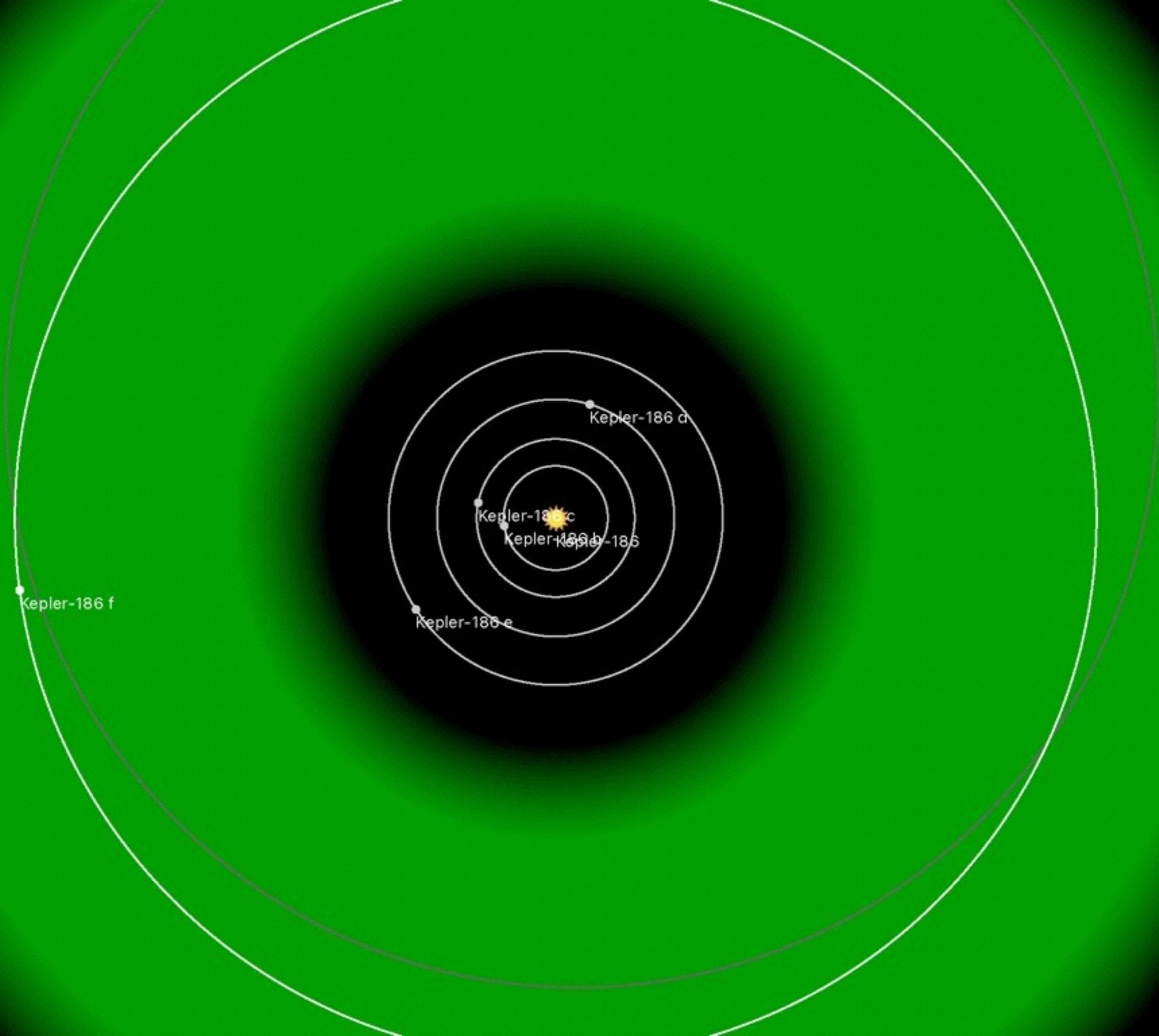


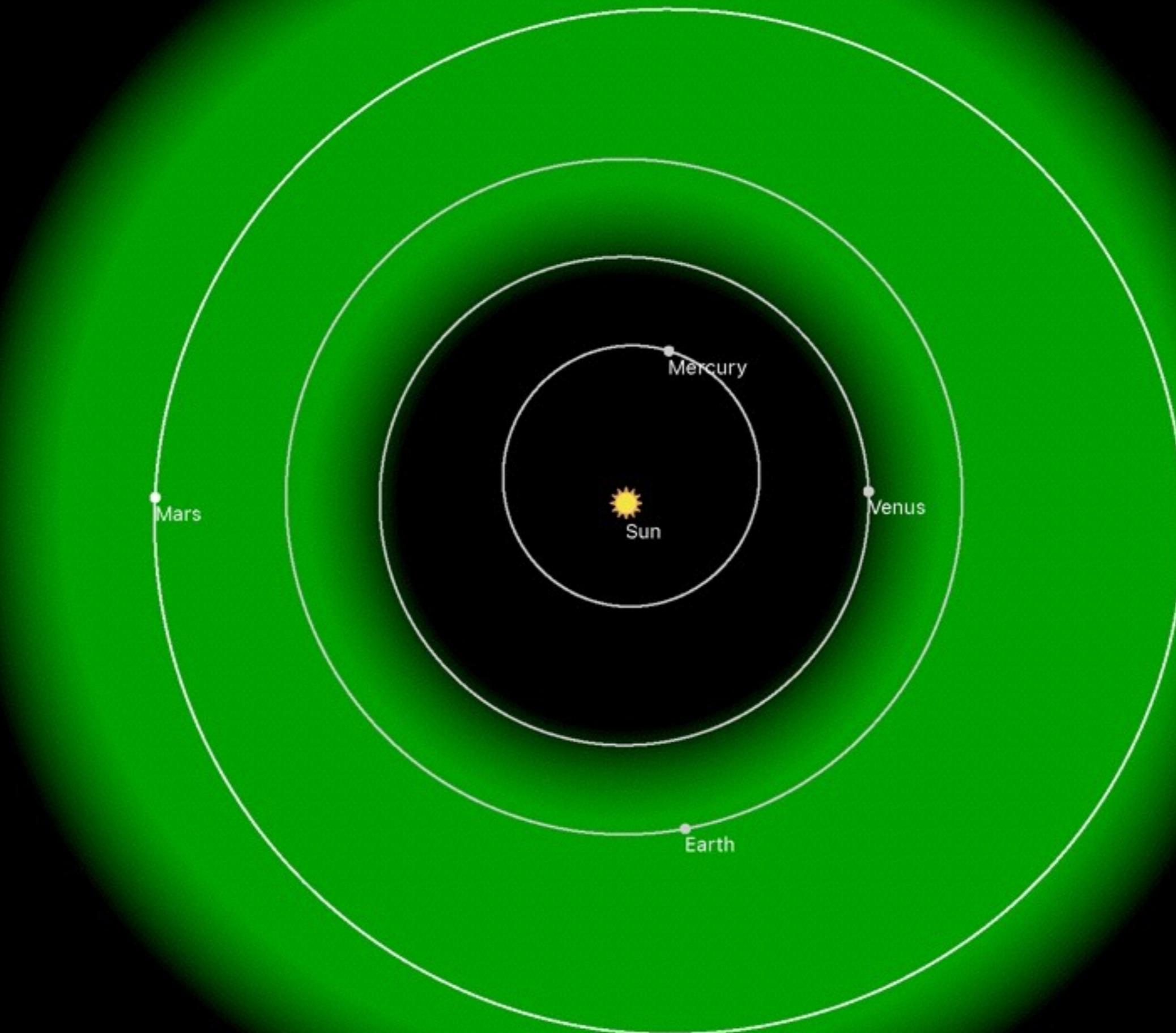


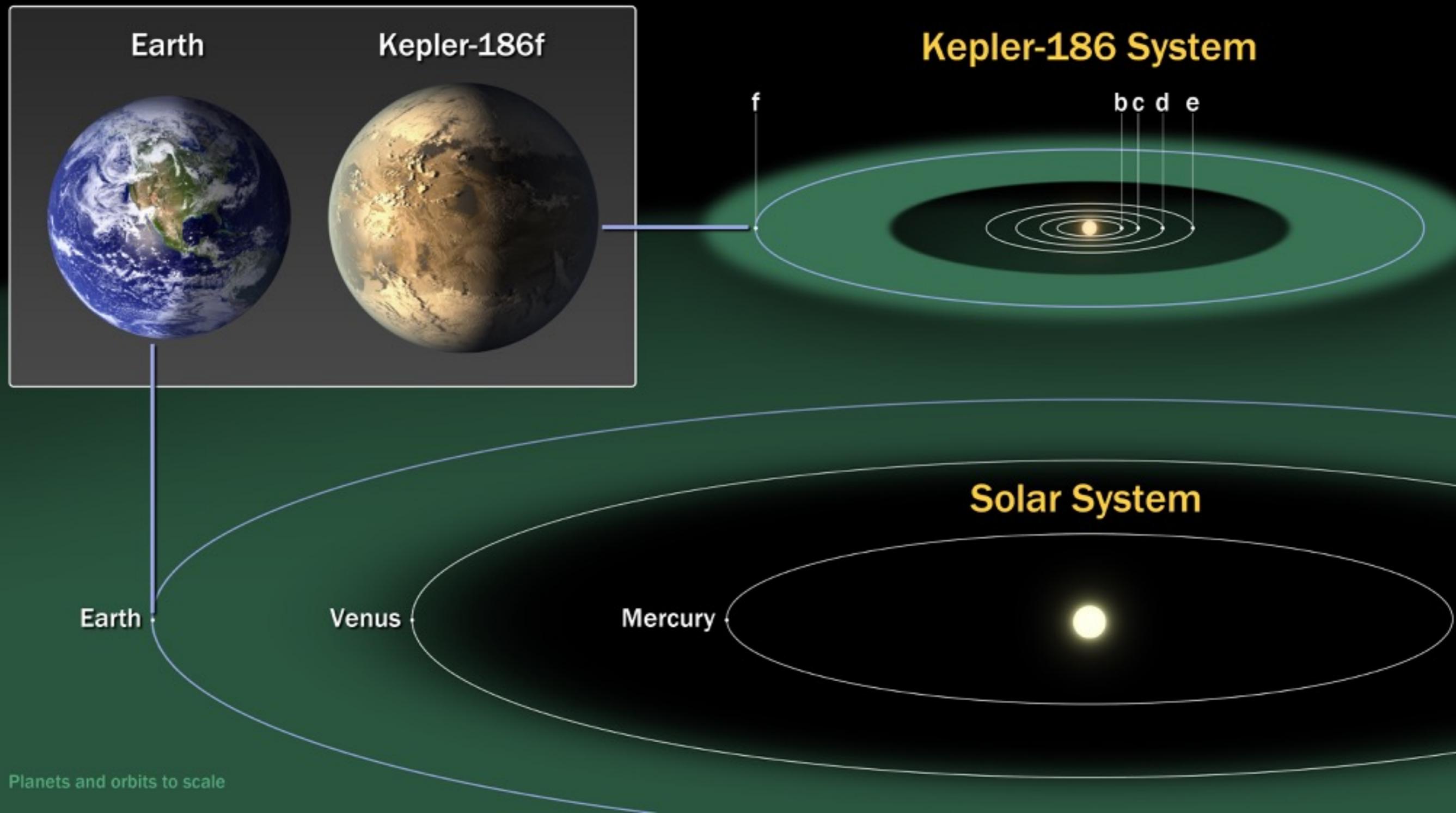


Kepler 186-f



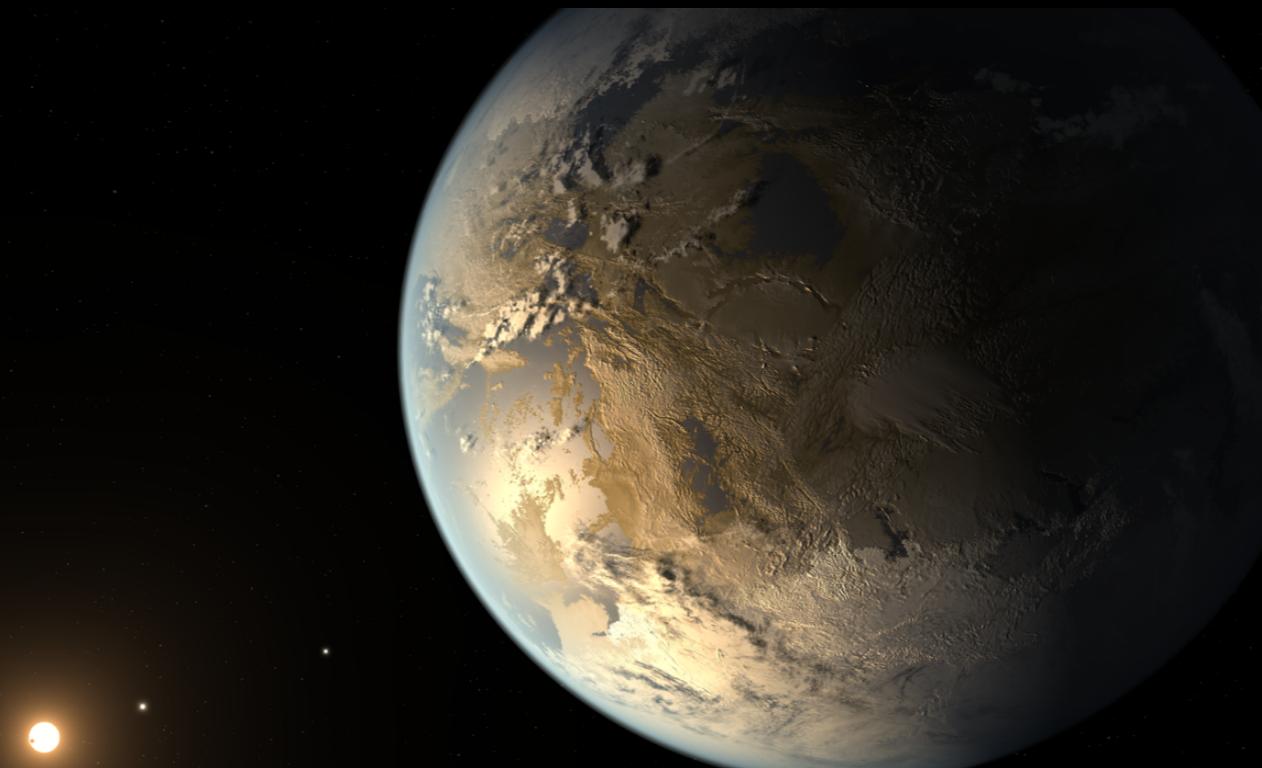








Earth 2.0



Mass

Unknown

Radius

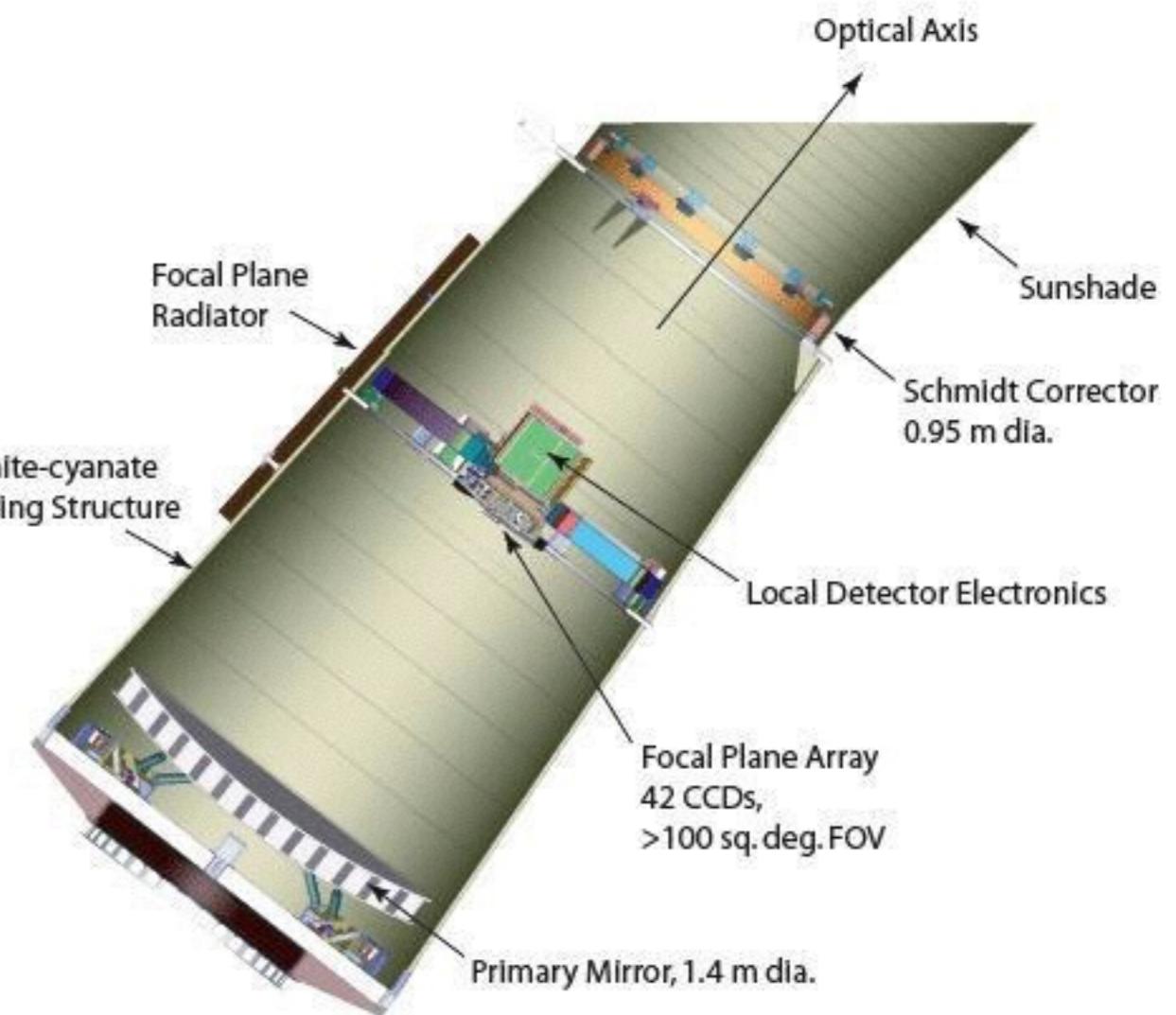
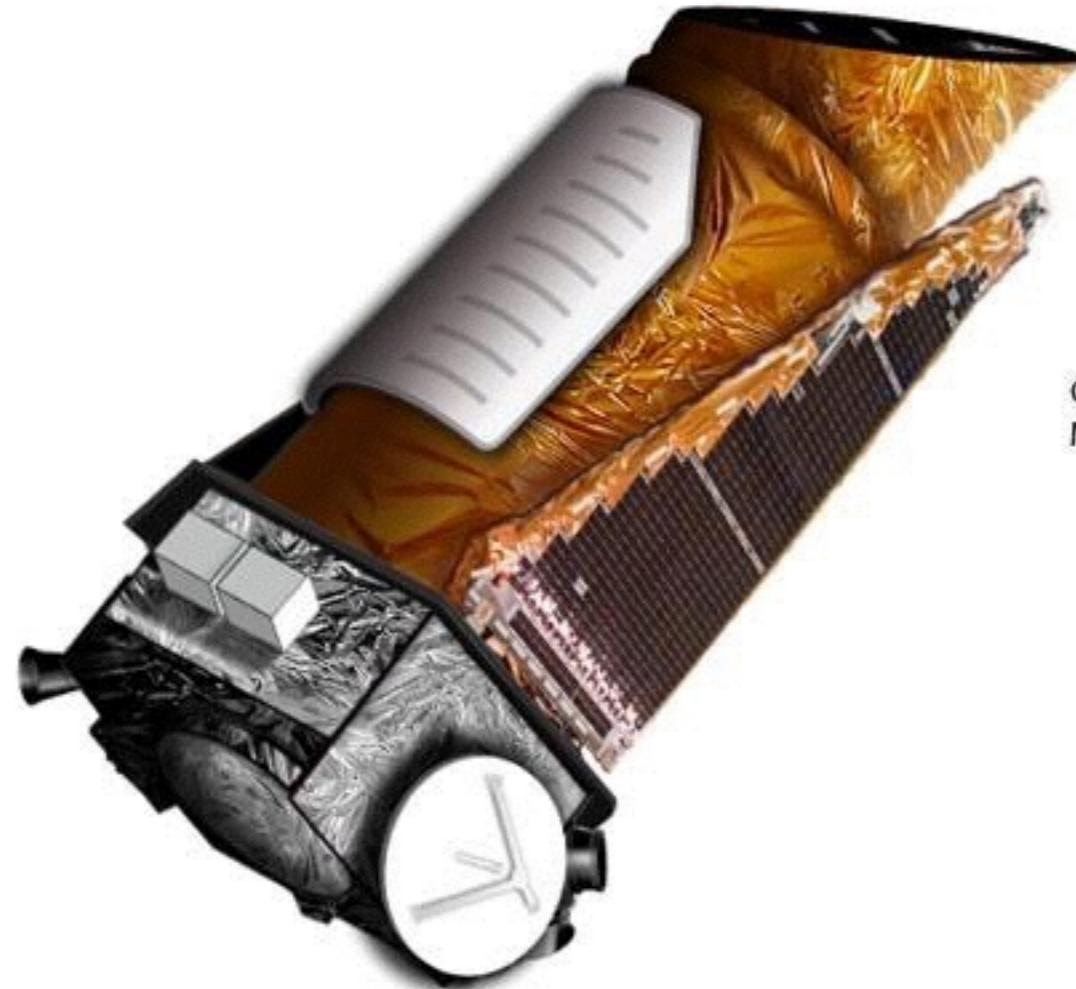
1.08x Earth

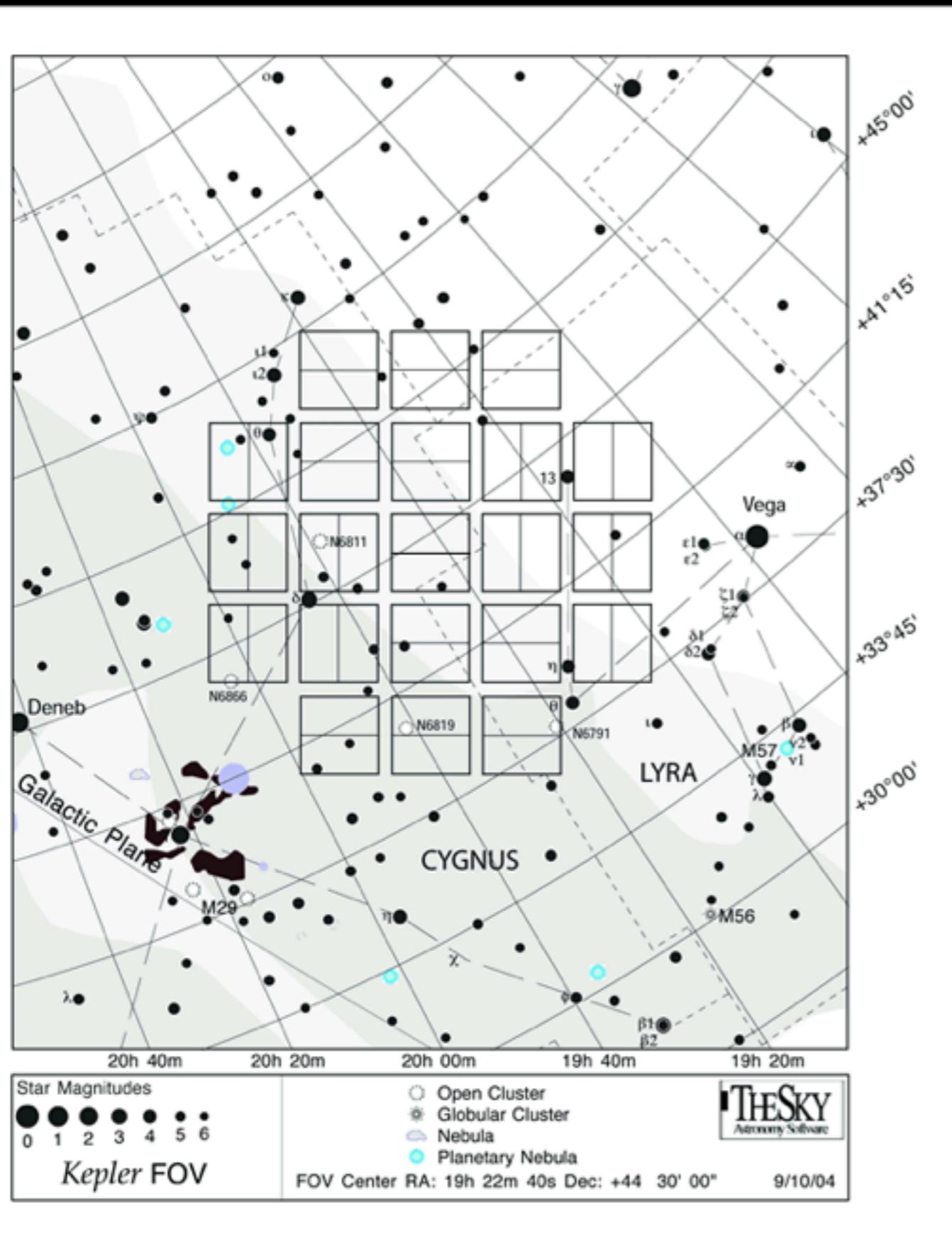
Orbit

112 ± 24 days

Temp

Mars-Earth

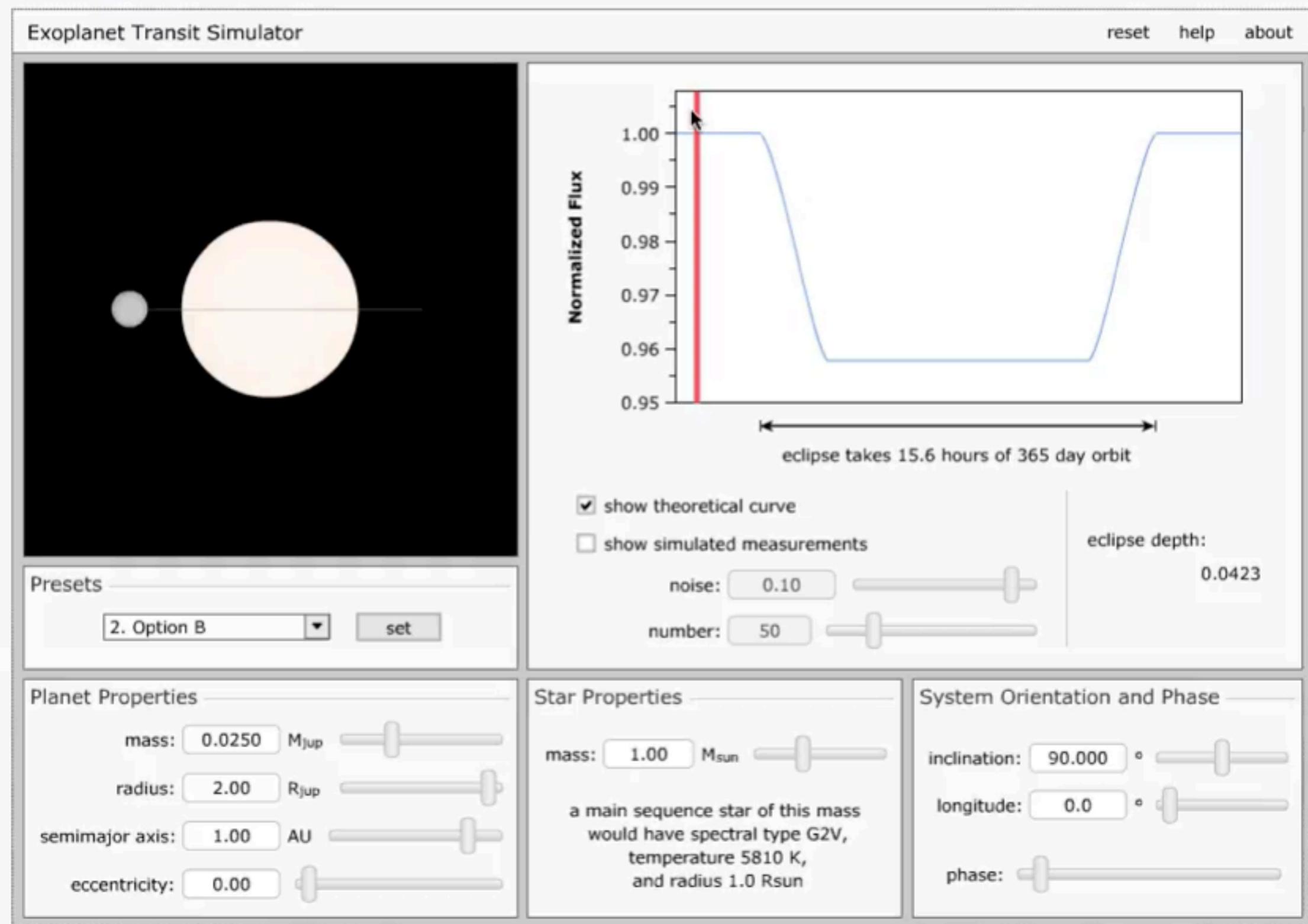




Astronomy Education at the University of Nebraska-Lincoln

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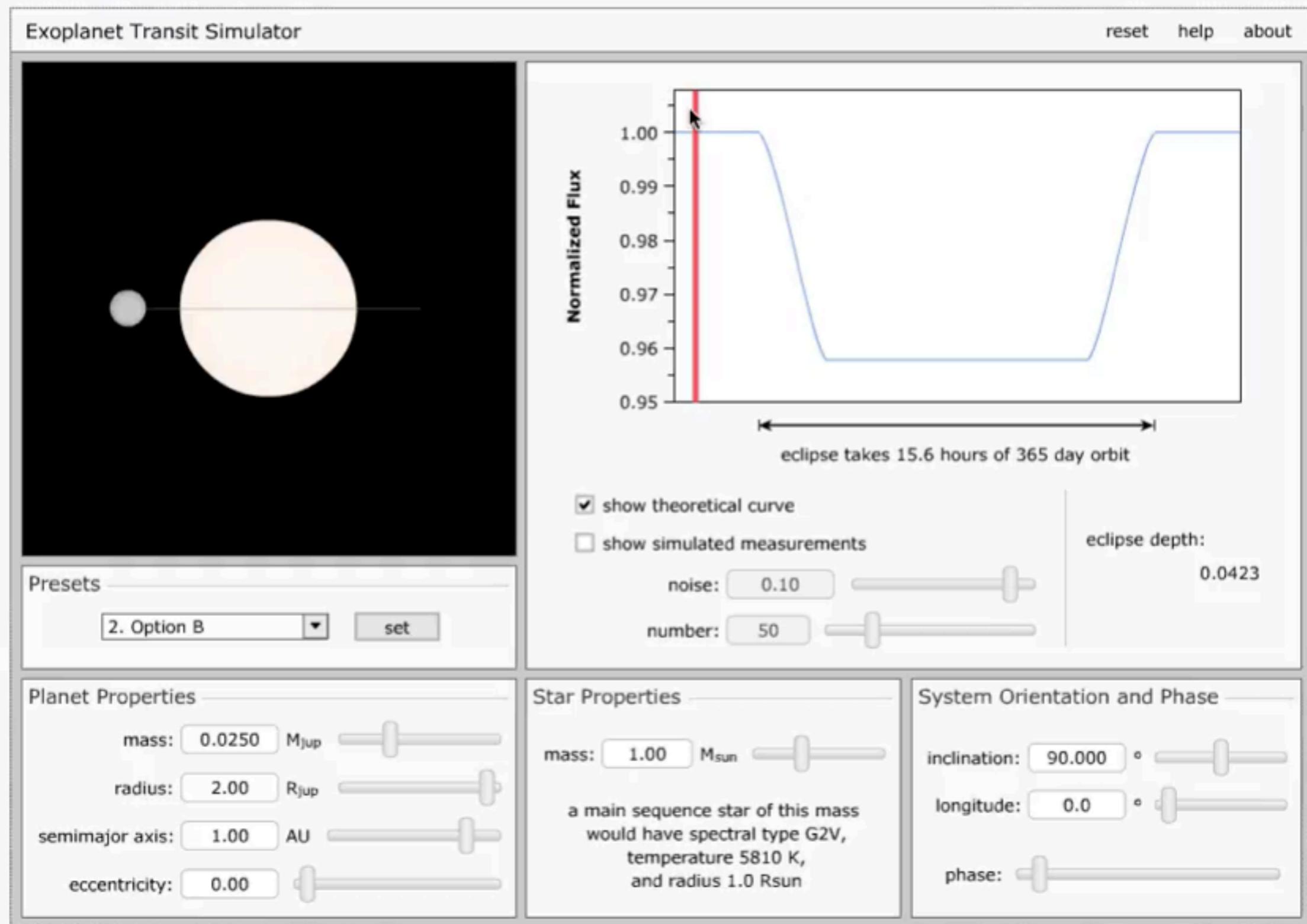
Home > NAAP Labs > Extrasolar Planets > Transit Simulator

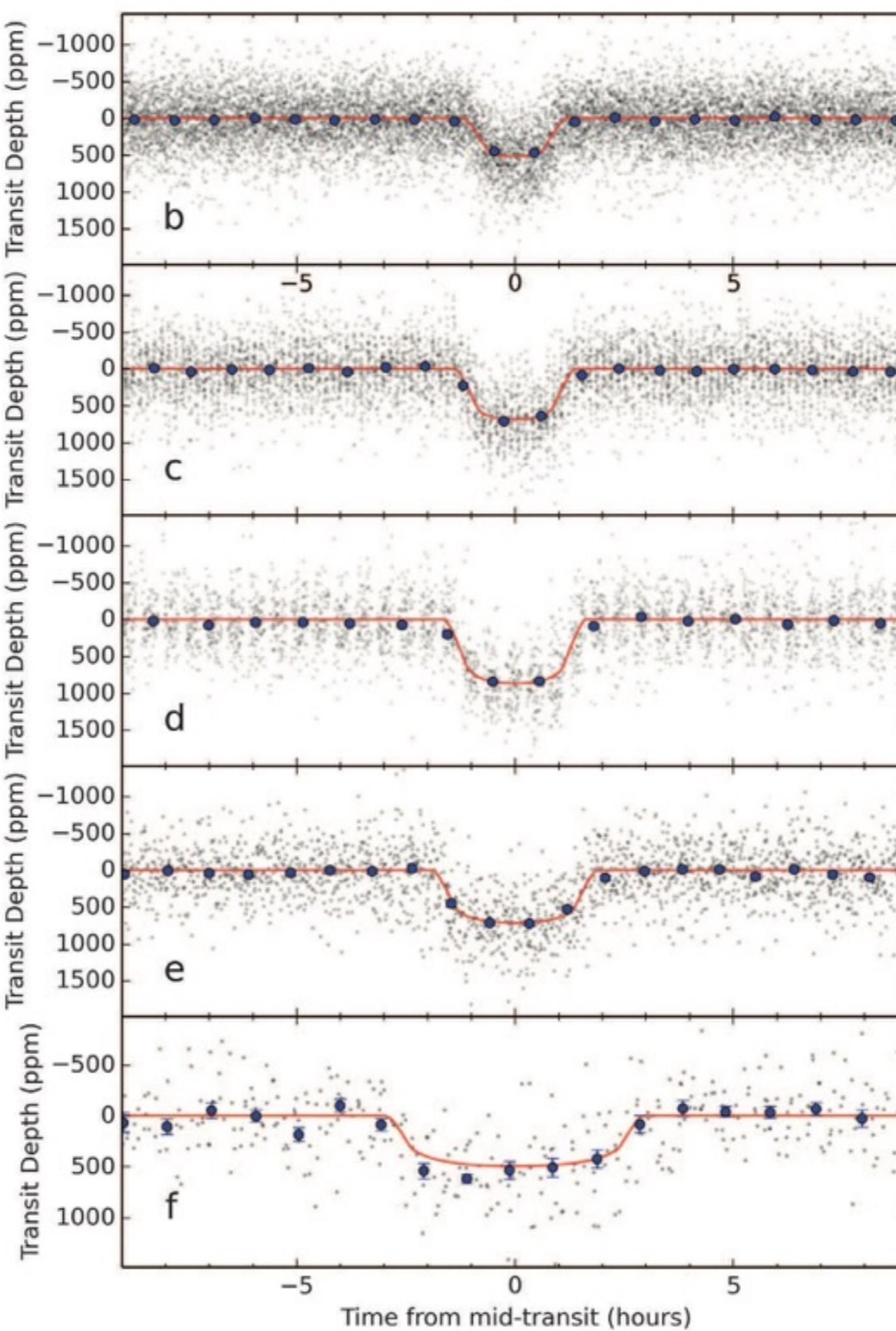


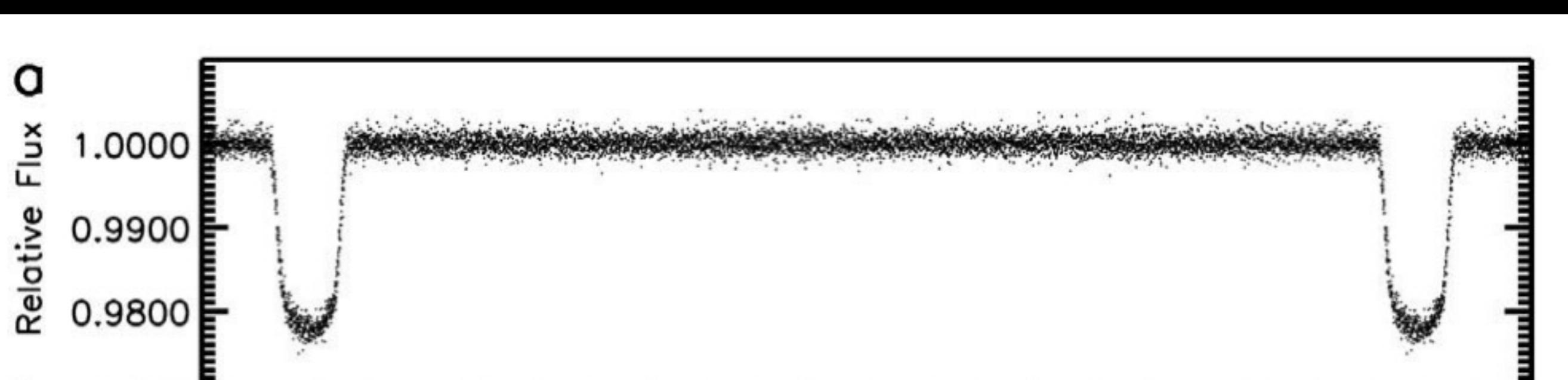
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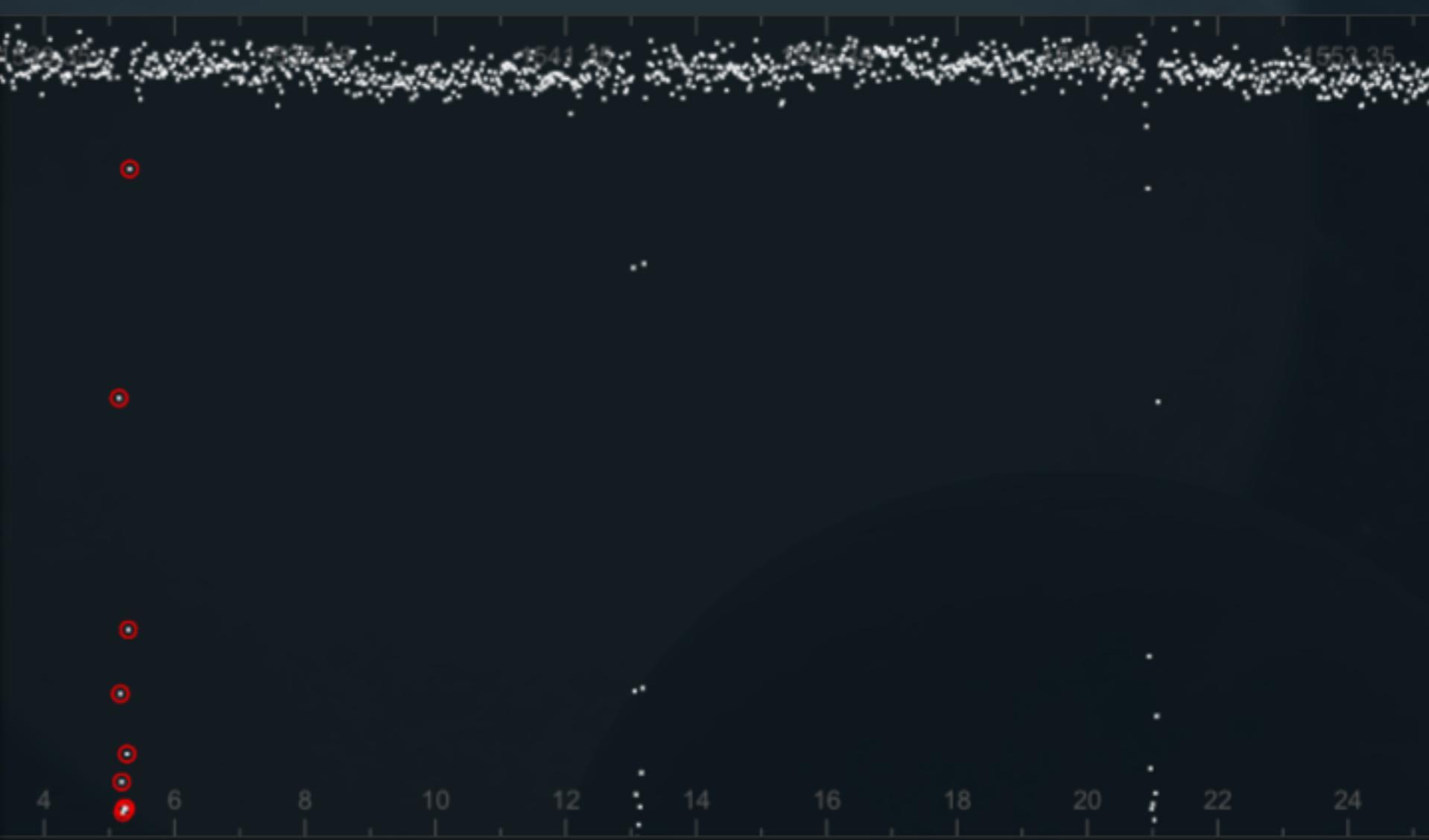
Do you see a transit?

If so, highlight it on the light curve below!

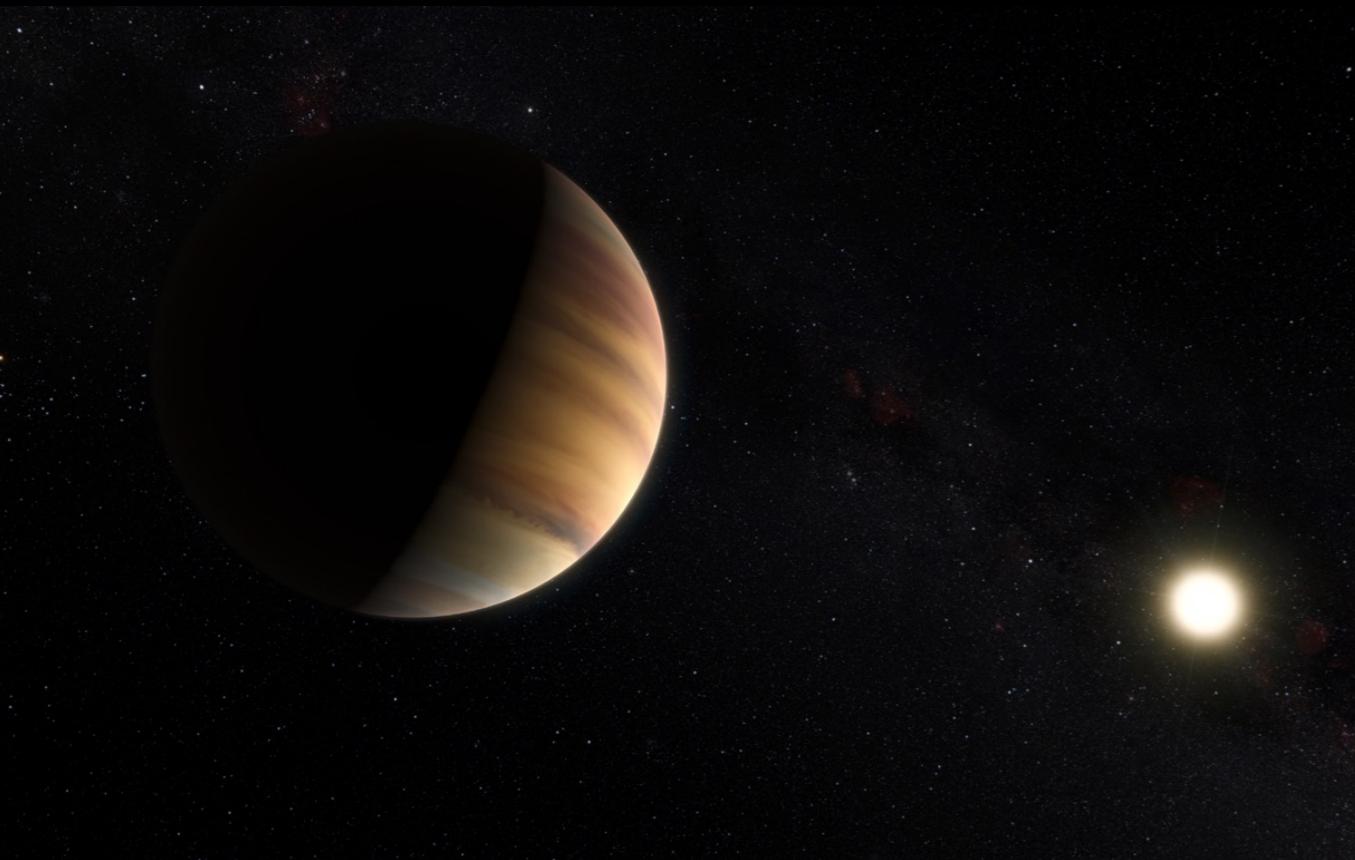
Can you spot
the transits?

Depending on how far the planet is from the star, you may see one or many dips in the light curve. Most transits that you'll typically see span a few hours to a day. Try marking the remaining transits in this example light curve.

Continue

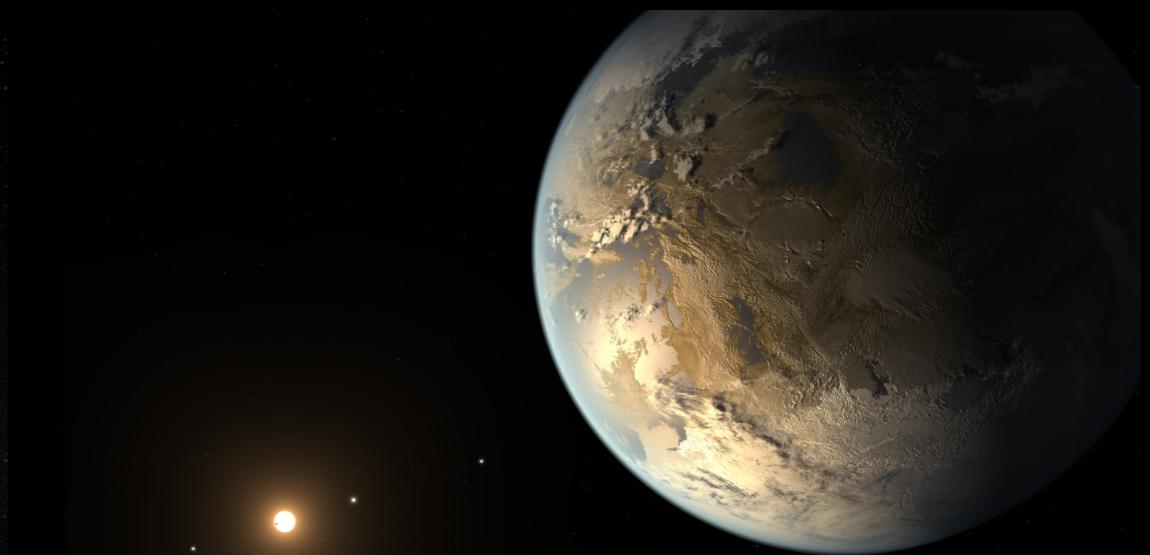


51 Peg b, RV



OMG
We've found
them!

Kepler 186-f, Transit



OMG
Earths! In the
HZ!

Pale red dot: activity?

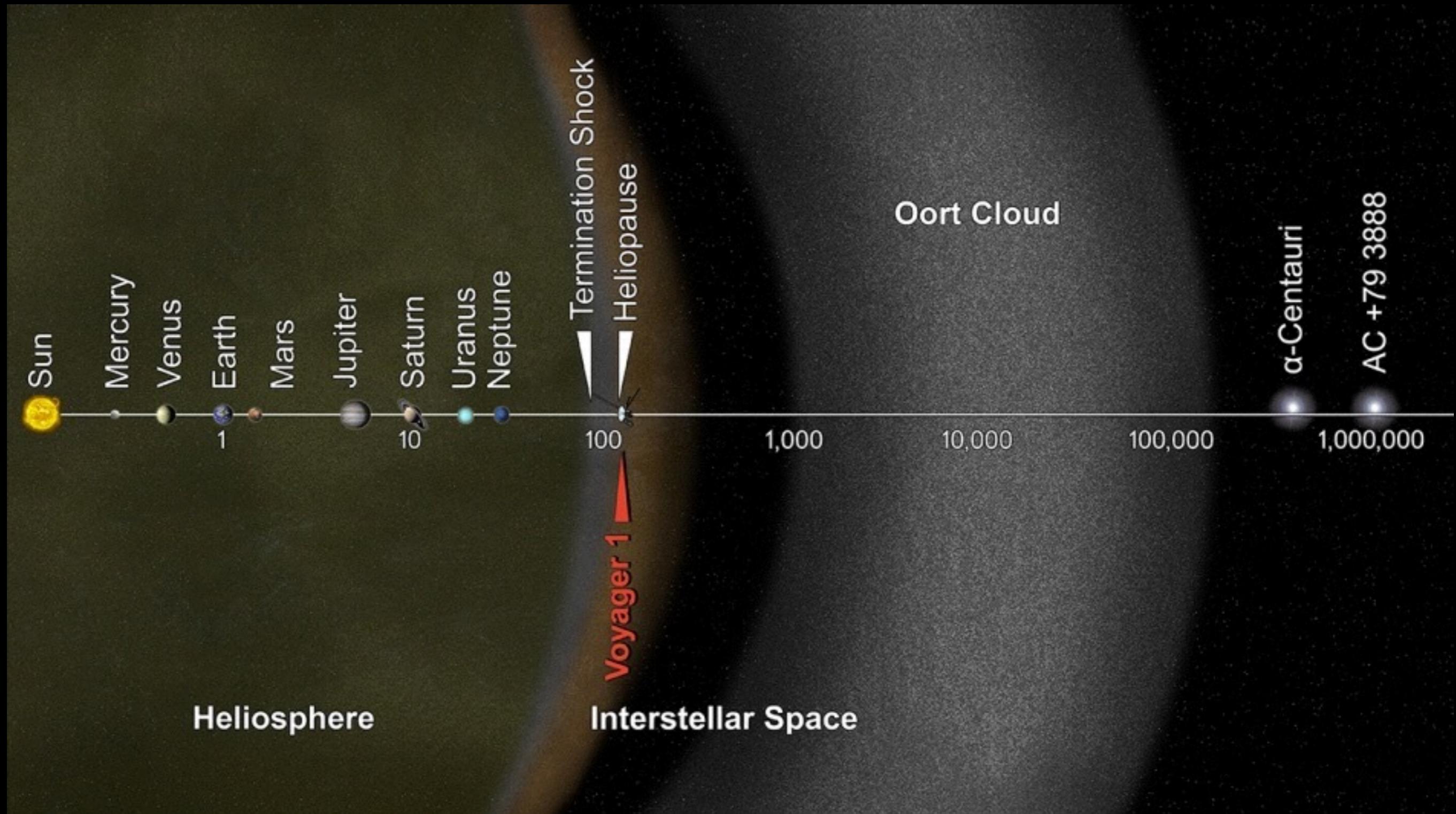


Photometry

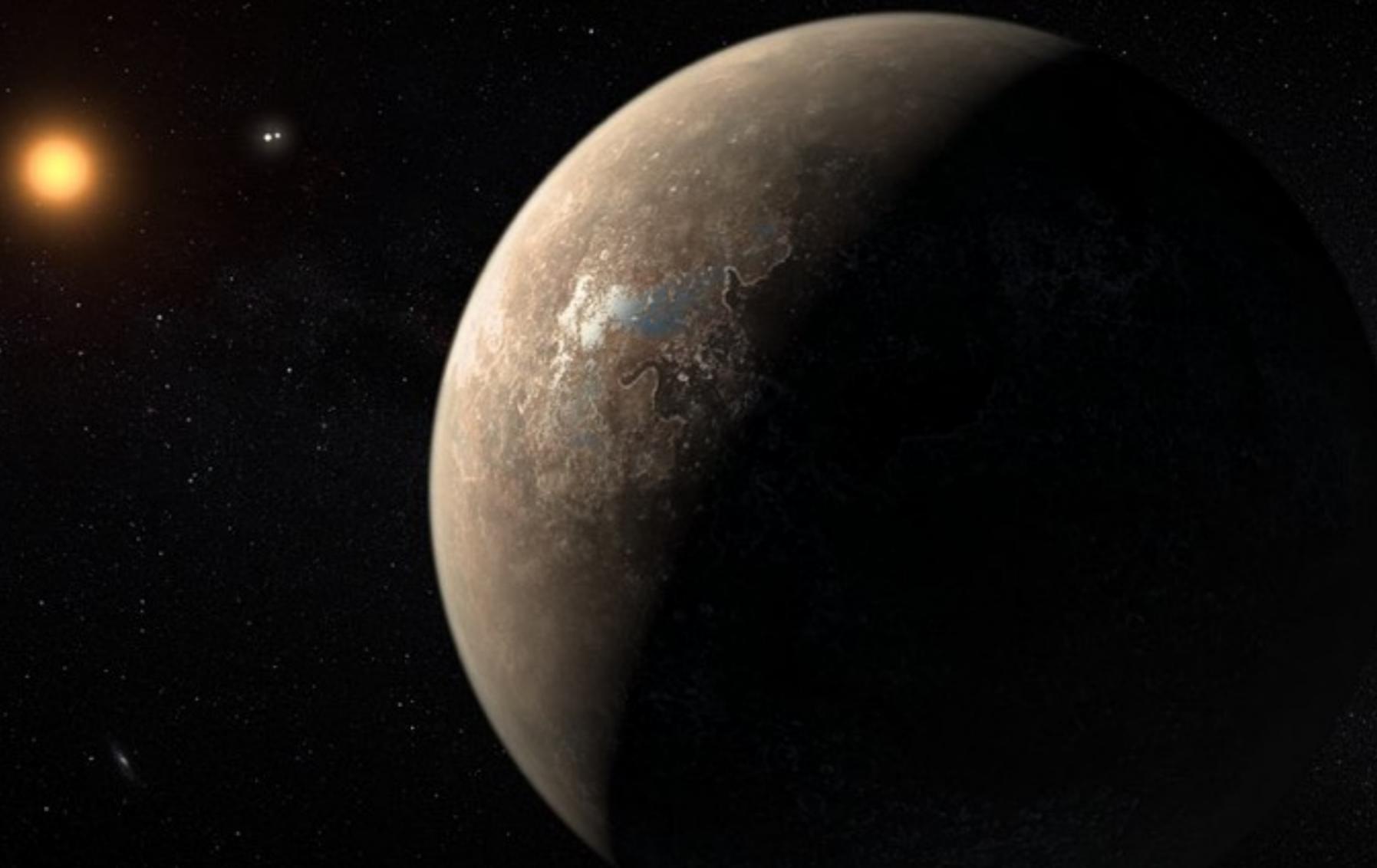
Line width

Doppler



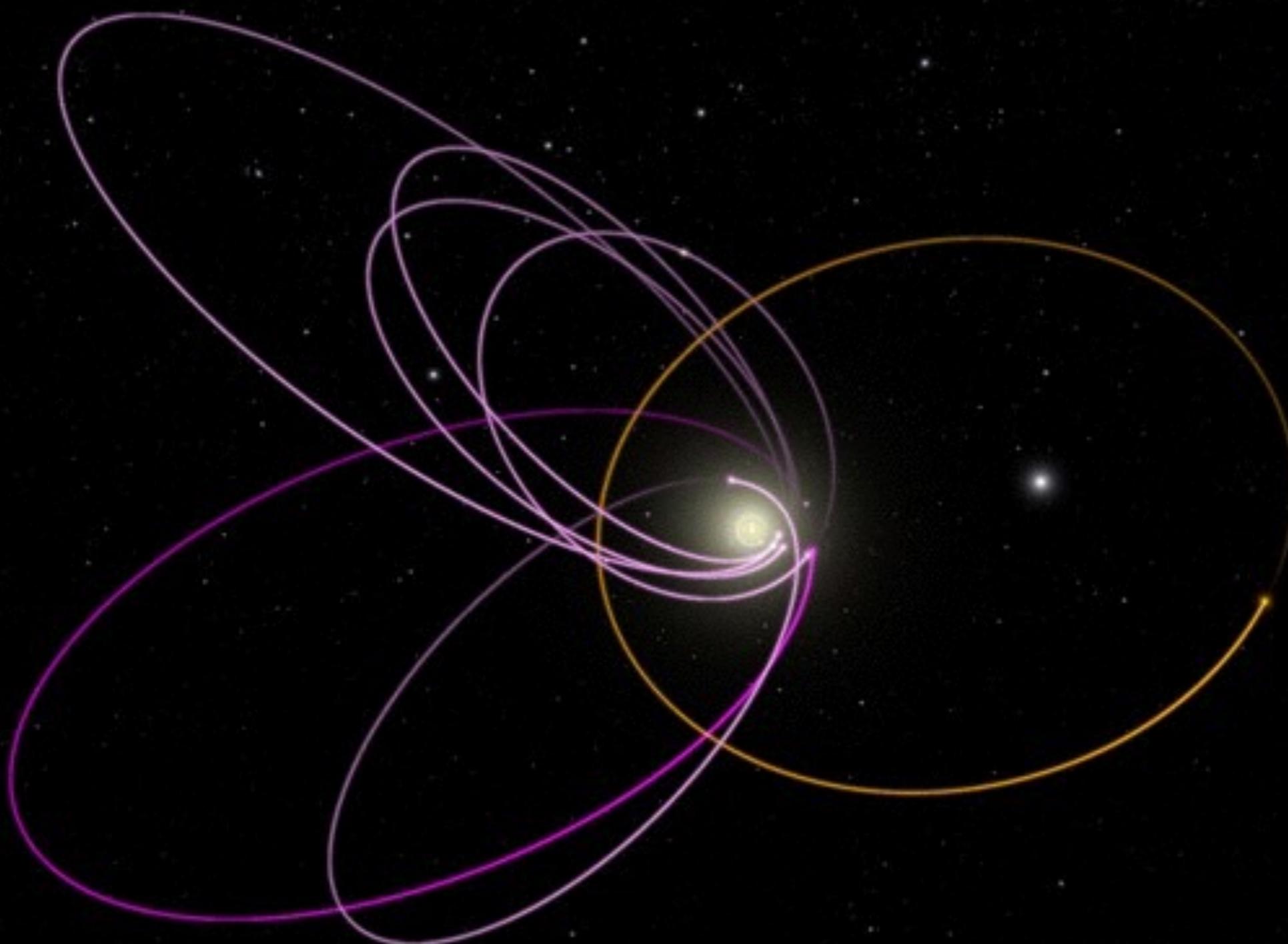


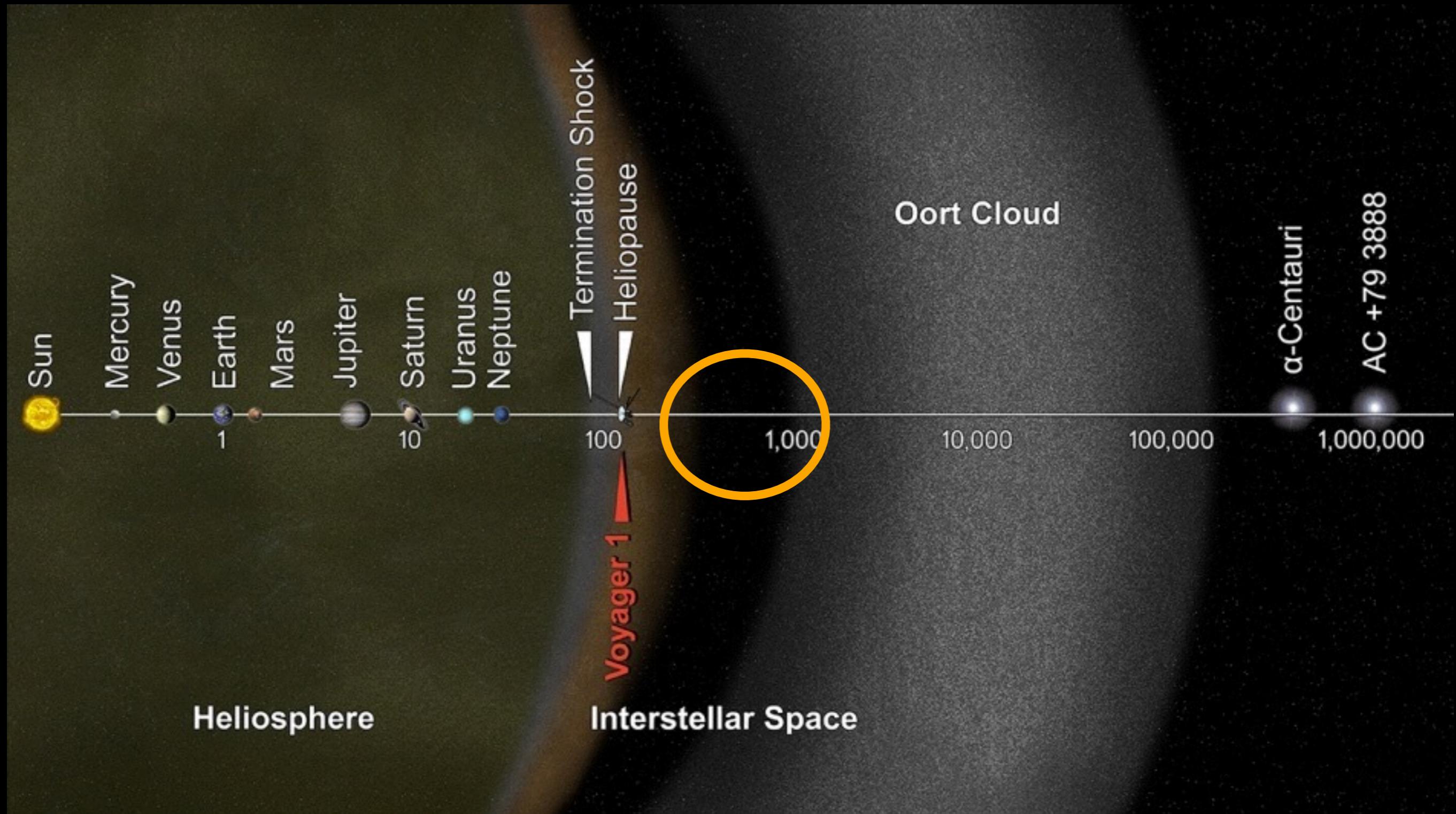
Proxima b





Planet 9 ?

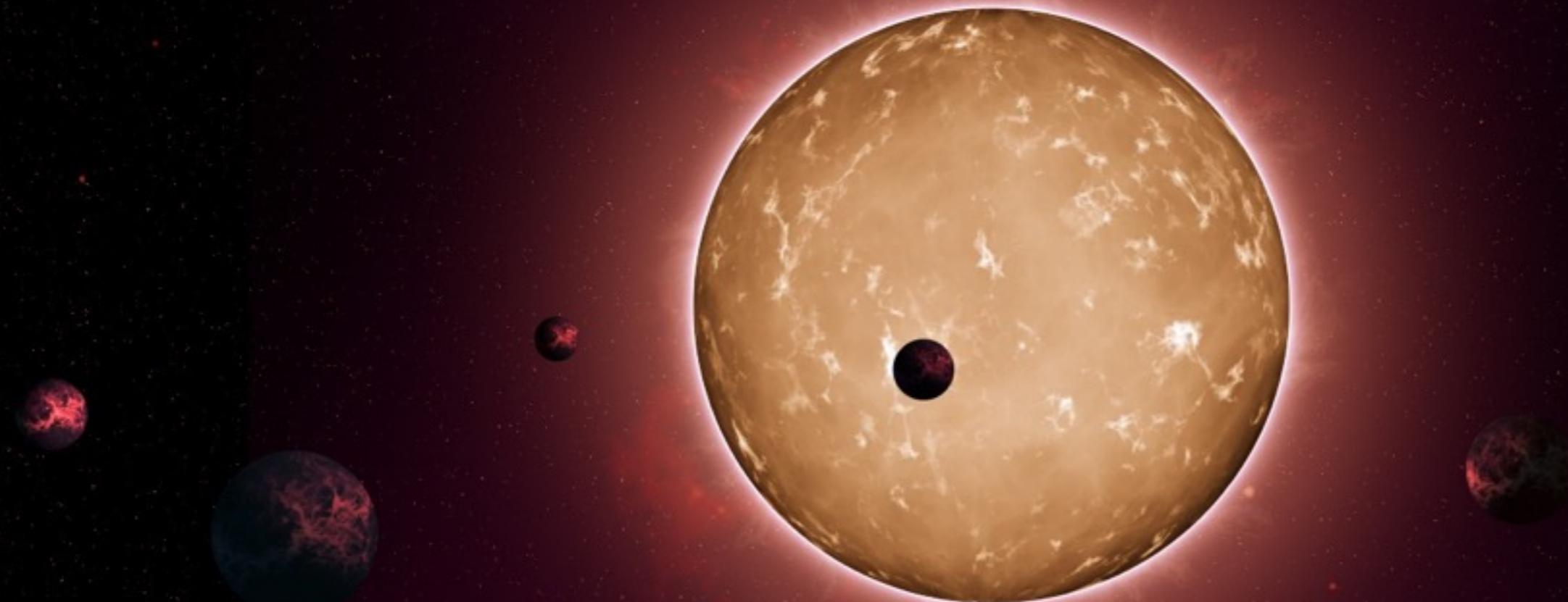


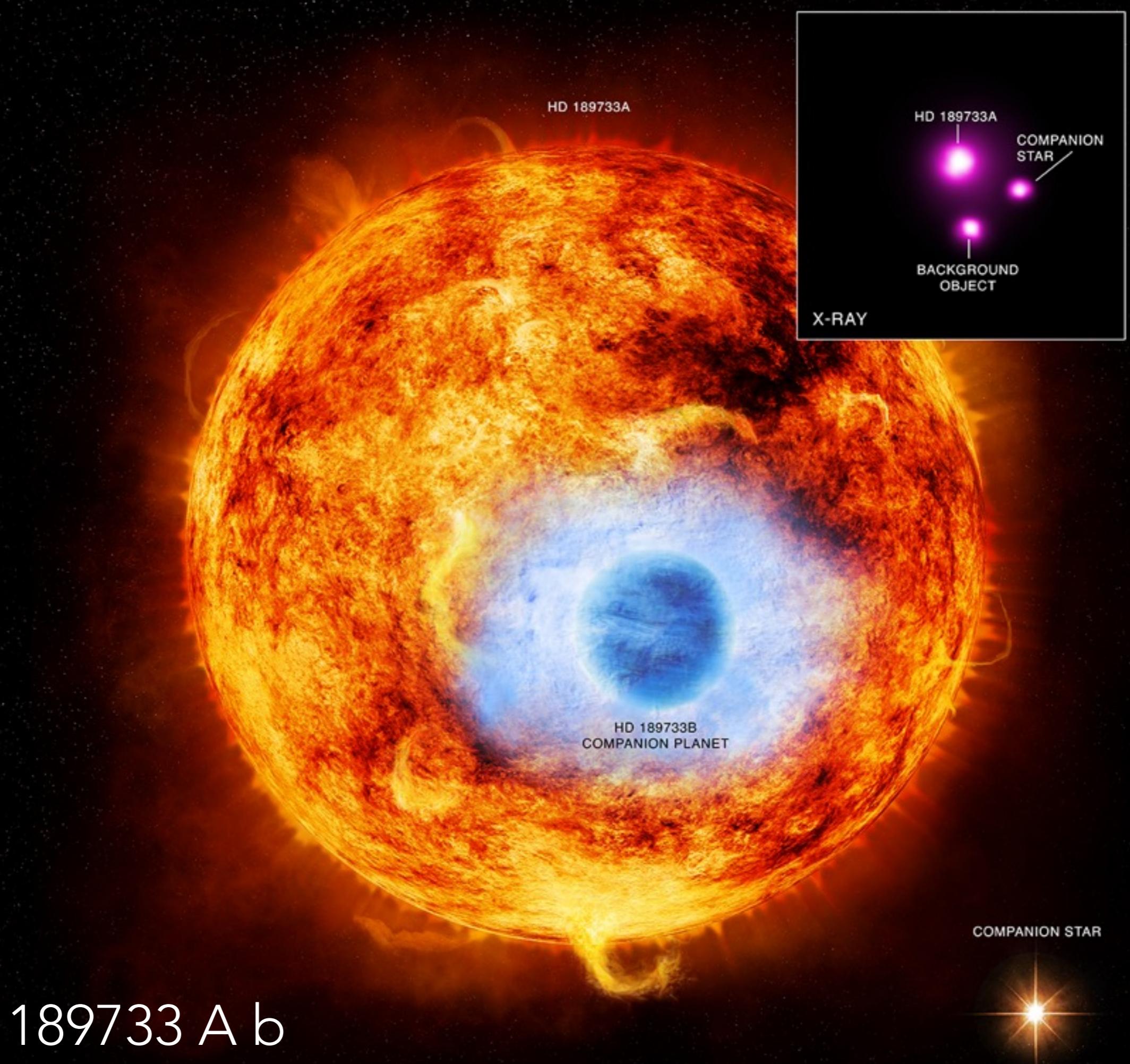


HIP 57050 b

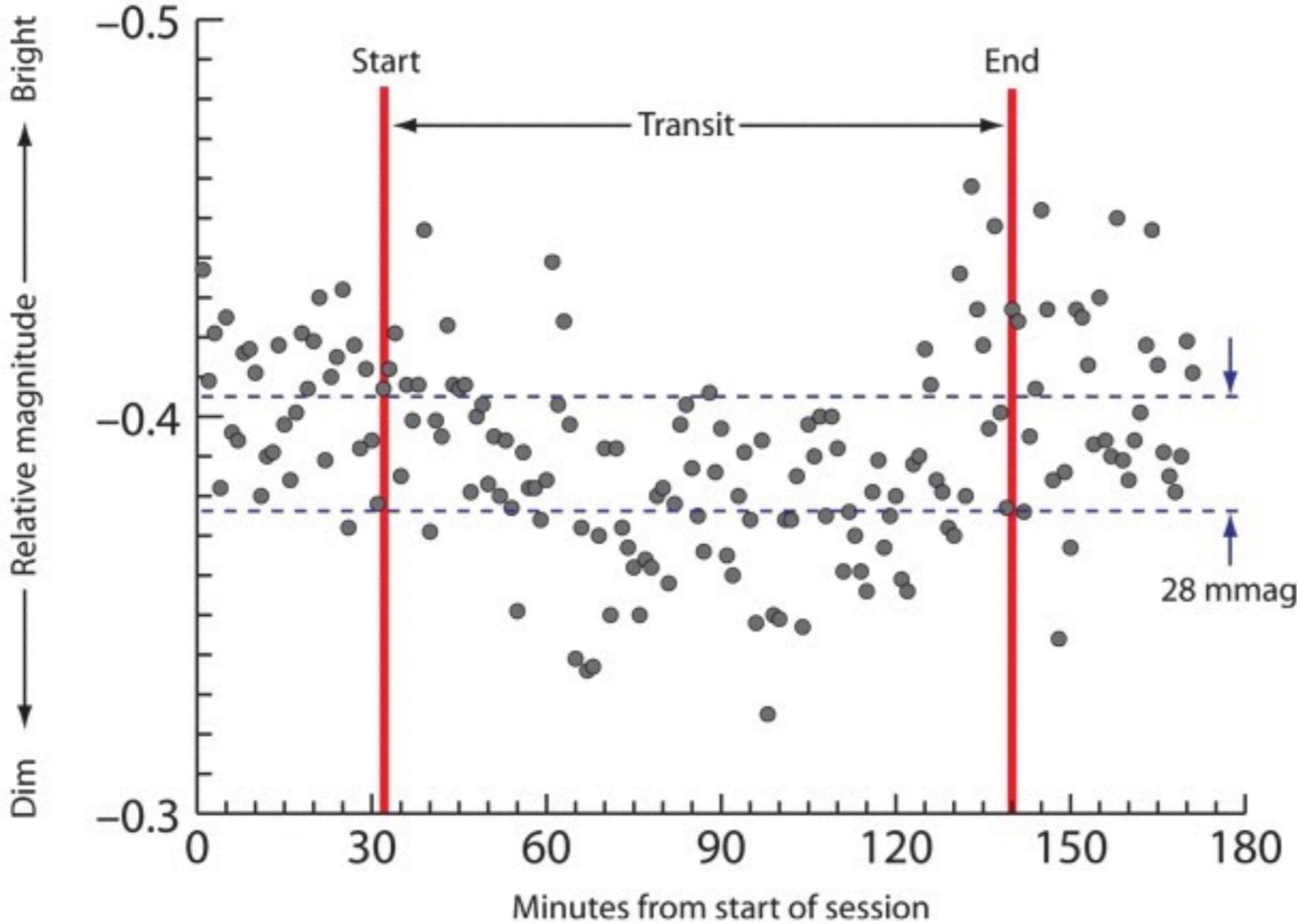


Kepler-444 b,c,d,e,f



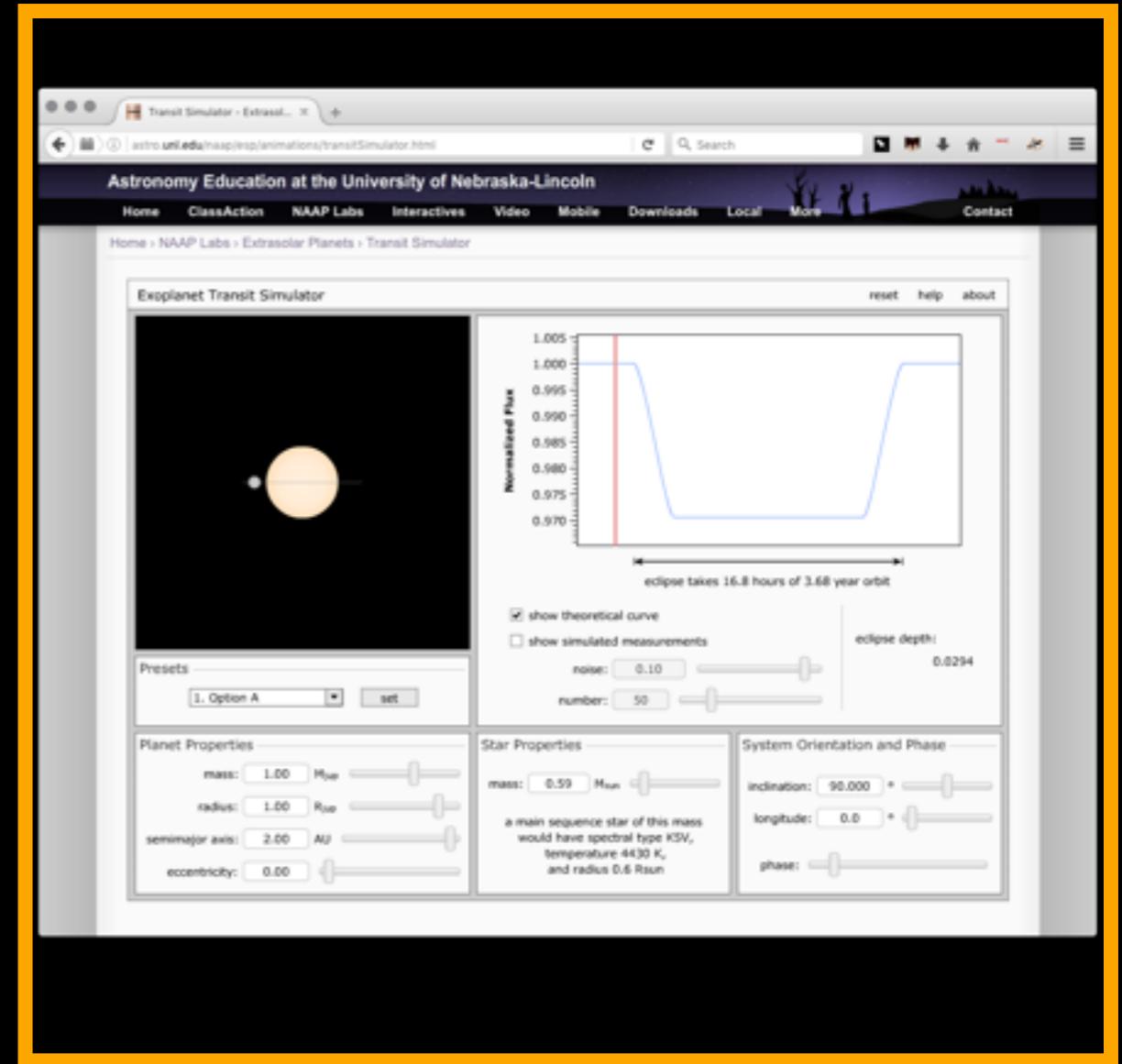
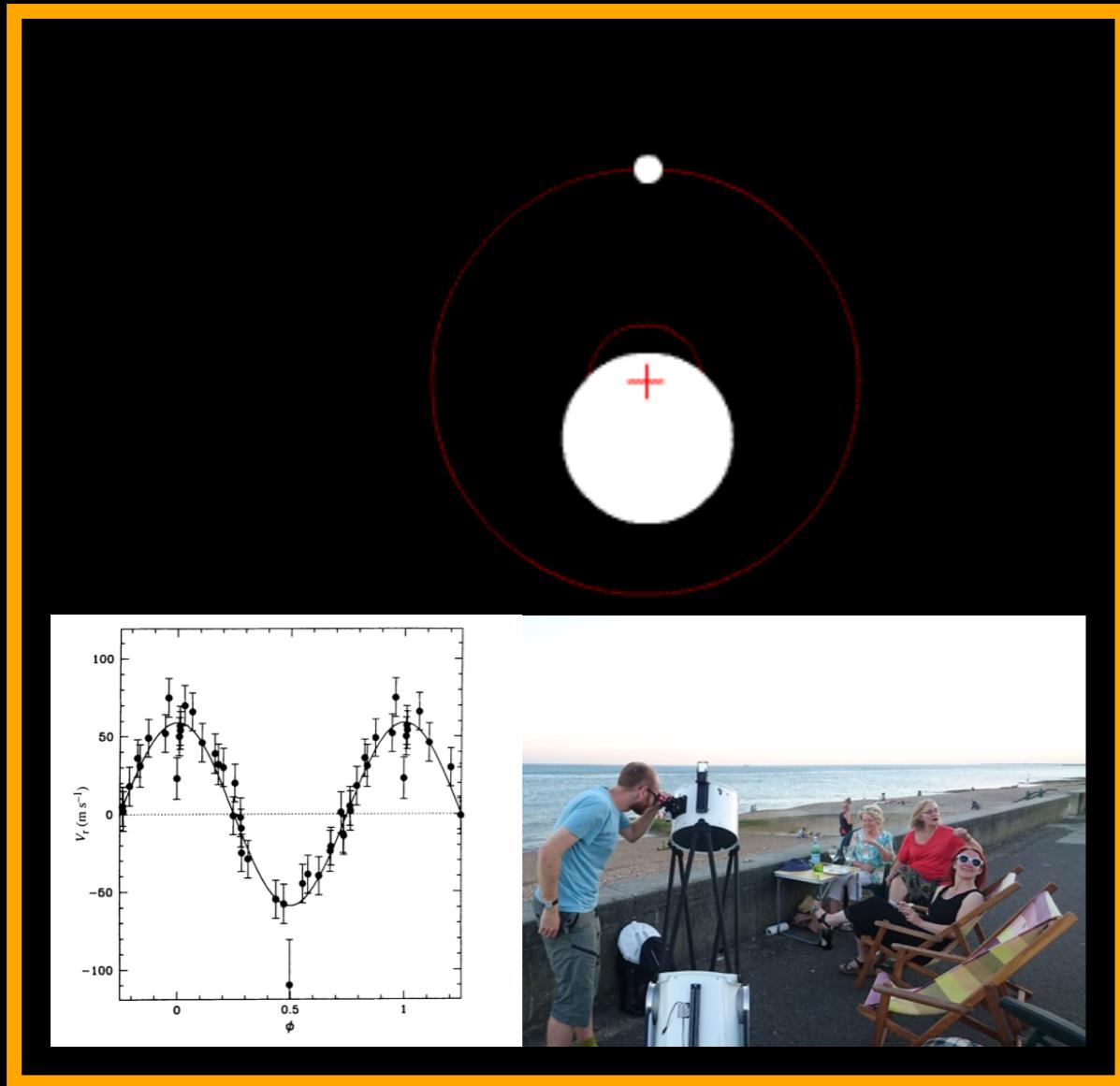


HD 189733 A b



- First! (51 Peg b)
- First Earth-ish (Kepler-186 f)
- Closest, Closest HZ (Prox b)
- Exomoons & weird orbits (HIP 57050b)
- Ancient (Kepler-444)
- One we could detect (HD 189733b)

RV



Transits



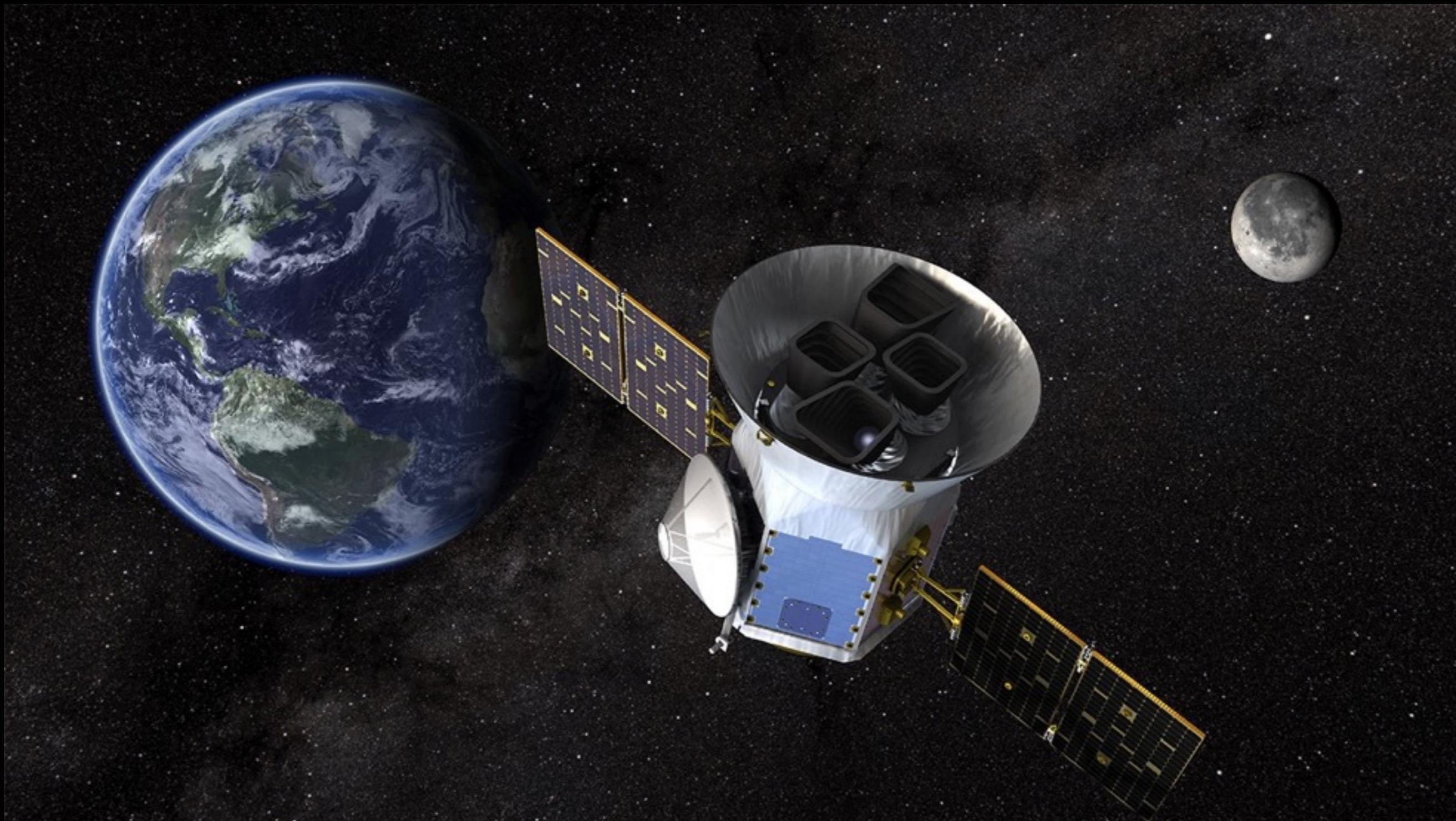
While there is much debate over which exoplanet discovery is considered the "first," one stands out from the rest. In 1995, scientists discovered 51 Pegasi b, forever changing the way we see the universe and our place in it. The exoplanet is about half the mass of Jupiter, with a seemingly impossible, star-hugging orbit of only 4.2 Earth days. Not only was it the first planet confirmed to orbit a sun-like star; it also ushered in a whole new class of planets called Hot Jupiters: hot, massive planets orbiting closer to their stars than Mercury. Today, powerful observatories like NASA's Kepler space telescope, will continue the hunt of distant planets.

RELAX ON KEPLER-16b



Like Luke Skywalker's planet "Tatooine" in Star Wars, Kepler-16b orbits a pair of stars. Depicted here as a terrestrial planet, Kepler-16b might also be a gas giant like Saturn. Prospects for life on this unusual world aren't good, as it has a temperature similar to that of dry ice. But the discovery indicates that the movie's iconic double-sunset is anything but science fiction.

Transiting Exoplanet Survey Satellite



CREDITS

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2.Artist's impression of the exoplanet 51 Pegasi b, by ESO/M. Kornmesser/Nick Risinger

<http://www.eso.org/public/unitedkingdom/images/eso1517a/>

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<http://exoplanetapp.com/>

4.Planet detection methods

The Exoplanet Handbook, Michael Perryman (2011)

5.Image of Haute-Provence Observatory, by user Gdgourou

https://en.wikipedia.org/wiki/Haute-Provence_Observatory#/media/File:OHP_telescope193.JPG

6.Diagram showing objects orbiting their centre of mass, author Zhatt
https://en.wikipedia.org/wiki/Doppler_spectroscopy#/media/File:Orbit3.gif

7.Image of Brighton Astro on the seafront in Brighton, by Richard Dallaway

8.Orbital motion of 51 Peg, fig. 4 from Mayor & Queiroz (1995), Nature, vol. 378, p. 255

9.Plot of exoplanet publication dates, created via exoplanets.org on 15 August 2016.

10. Artist's concept of Kepler-186f, NASA Ames/SETI Institute/JPL-Caltech
<http://www.nasa.gov/ames/kepler/nasas-kepler-discovers-first-earth-size-planet-in-the-habitable-zone-of-another-star>

11.HZ around Kepler-186 f, screen grab from exoplanetapp.com

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14.Kepler-186f, Where the Grass is Always Reder

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15. Cross section of the Kepler spacecraft, NASA Ames

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16.The focal plane consists of an array of 42 charge coupled devices, NASA Ames and Ball Aerospace, ibid.

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File:Kepler_FOV_hiRes.jpg](https://en.wikipedia.org/wiki/Kepler_(spacecraft)#/media/File:Kepler_FOV_hiRes.jpg)

18. Transit Simulator, University of Nebraska-Lincoln

<http://astro.unl.edu/naap/esp/animations/transitSimulator.html>

19. Kepler-197 transit signals, fig. 1 from Quintana et al. (2014), Science, vol. 334, p. 277.

20. Transit light curve, source unknown

21. Screen grab from planethunters.org

22. Proxima b press conference,

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23. The Solar System, in Perspective, NASA

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24. Artist impression of Prox b

<http://www.eso.org/public/unitedkingdom/news/eso1629/>

25. Artist impression, above the surface of Prox b, ibid.

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<http://www.skyandtelescope.com/astronomy-news/making-the-case-for-planet-nine-012020167/>

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28.Artist impression of Kepler-444

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29.Artist impression of HD 189733 A b

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30. DIY Exoplanet Detector

<http://spectrum.ieee.org/geek-life/hands-on/diy-exoplanet-detector>

31.Two posters from NASA Exoplanet Travel Bureau

<https://exoplanets.nasa.gov/alien-worlds/exoplanet-travel-bureau/>

32.TESS, <https://tess.gsfc.nasa.gov/>