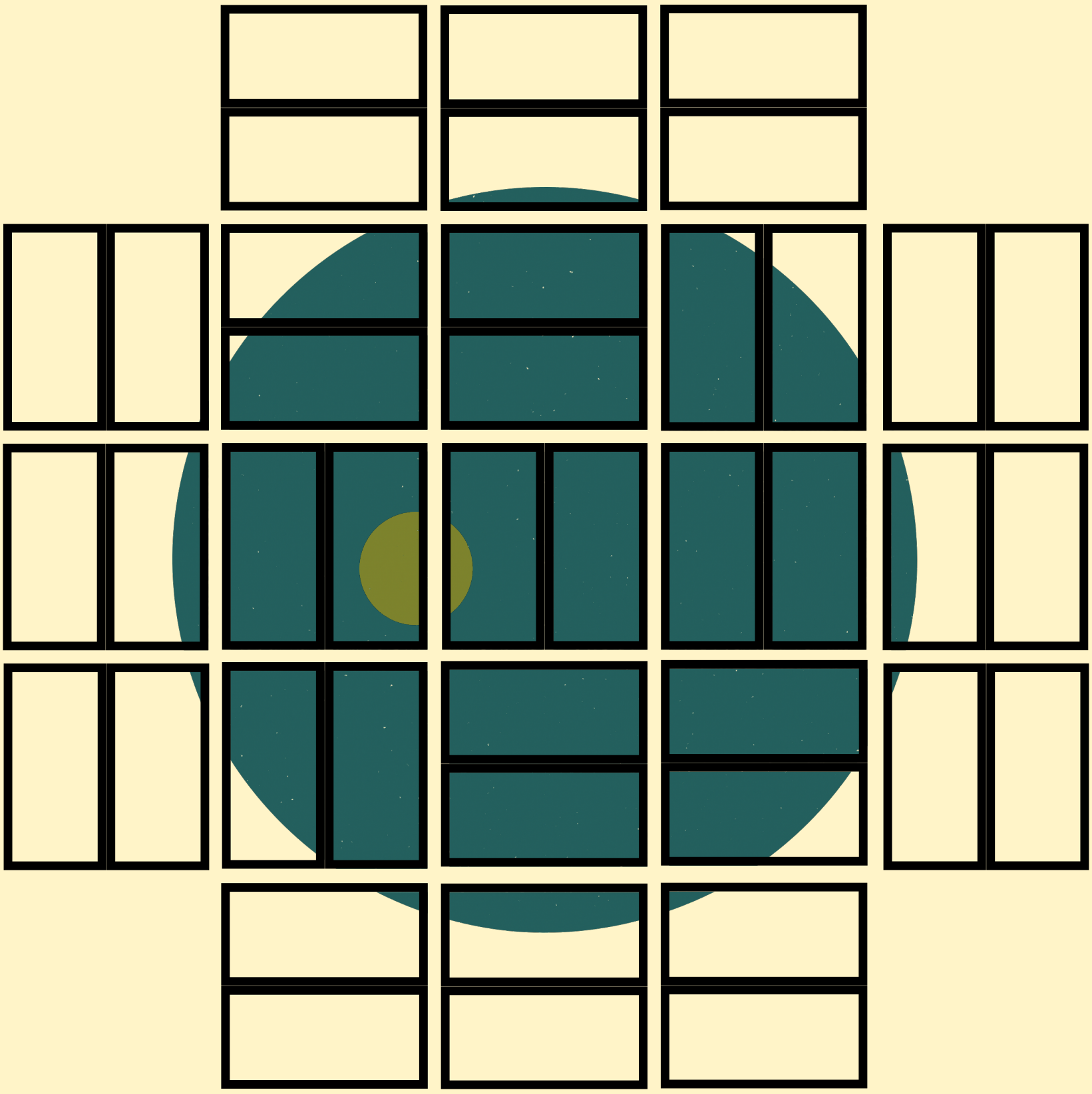
Kepler

2009



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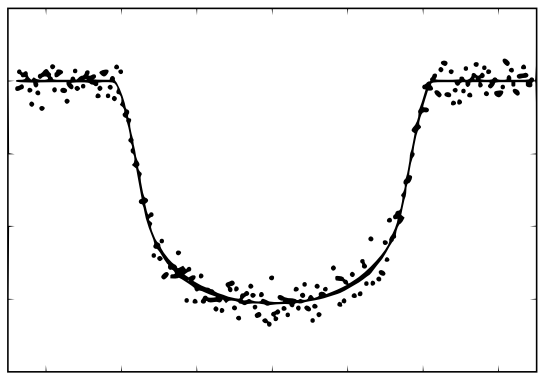
The Most Successful Planet Finder: *Kepler*

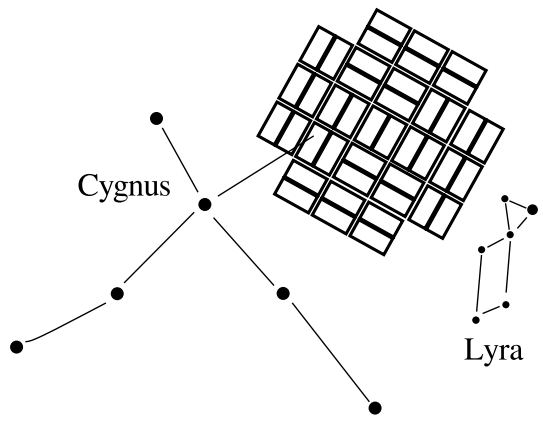
As of 2022, astronomers have found over 5,000 exoplanets, the majority of which were detected using the transit method. Chance alignments between the Earth, an exoplanet, and the star that it orbits means that the planet will periodically pass between the star and Earth blocking some of the light that we see (a transit event). If we continue to watch the star as the planet passes in front of it, we can construct a lightcurve; the shape of which gives a wealth of information about the planet. The depth of the lightcurve reveals the planet's size while recording the time between transits gives the orbital period from which astronomers can work out how far away the planet is from its parent star. The amount of starlight blocked by a planet is small. So small that in order to detect a planet like the Earth orbiting a star like our Sun, you would need to detect a difference in starlight of less than 1/100th of one percent.



Transit curve of a star showing how it's brightness decreases as a planet passes in front of it.

Nearly half of all known exoplanets were discovered with *Kepler* - a space telescope dedicated to observing transit events. Launched in 2009, *Kepler* was designed to continuously look at one patch of the sky near the constellation Cygnus and monitored around 150,000 stars for the tell-tale signature of a planet. In just a few years, *Kepler* had discovered so many worlds that astronomers could claim that, on average, every star in our galaxy was host to at least one planet. Among these discoveries are planets that are within the habitable zone of their star where liquid water could exist.

The *Kepler* mission continued until 2013 when two reaction wheels, critical for keeping the telescope pointed correctly, failed. A revised second mission, dubbed *K2*, took advantage of the remaining functional reaction wheels, its thrusters, and pressure from sunlight on the spacecraft to continue the search for exoplanets. In October of 2018, *Kepler's* fuel was spent and, after discovering 2,662 planets, was shut down.



Kepler's field of view covered a portion of the constellations Lyra and Cygnus.

Data from *Kepler* is still being analyzed today and new planets continue to be discovered adding more to the telescope's legacy. This poster shows a transiting exoplanet imprinted on *Kepler's* iconic arrangement of 42 rectangular CCD sensors. *Kepler's* camera encompassed 115 square degrees of sky amounting to over 500 full moons worth of coverage.

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