Kepler's First Rocky Planet: Kepler-10b

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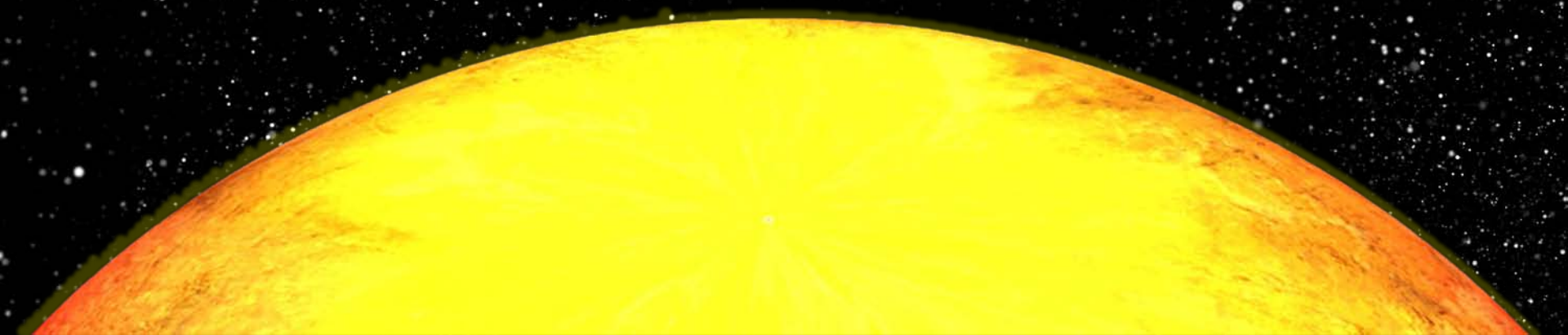
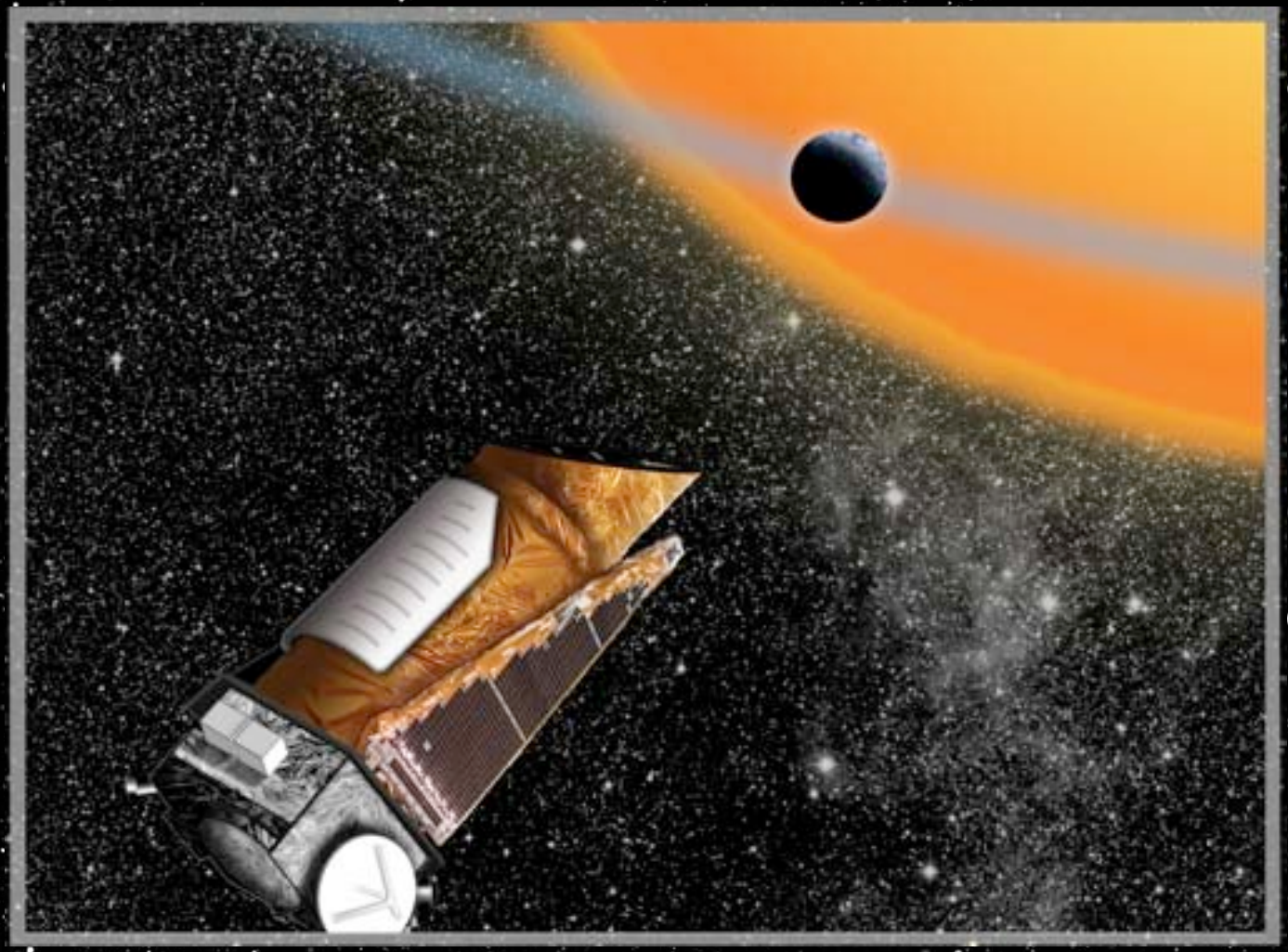
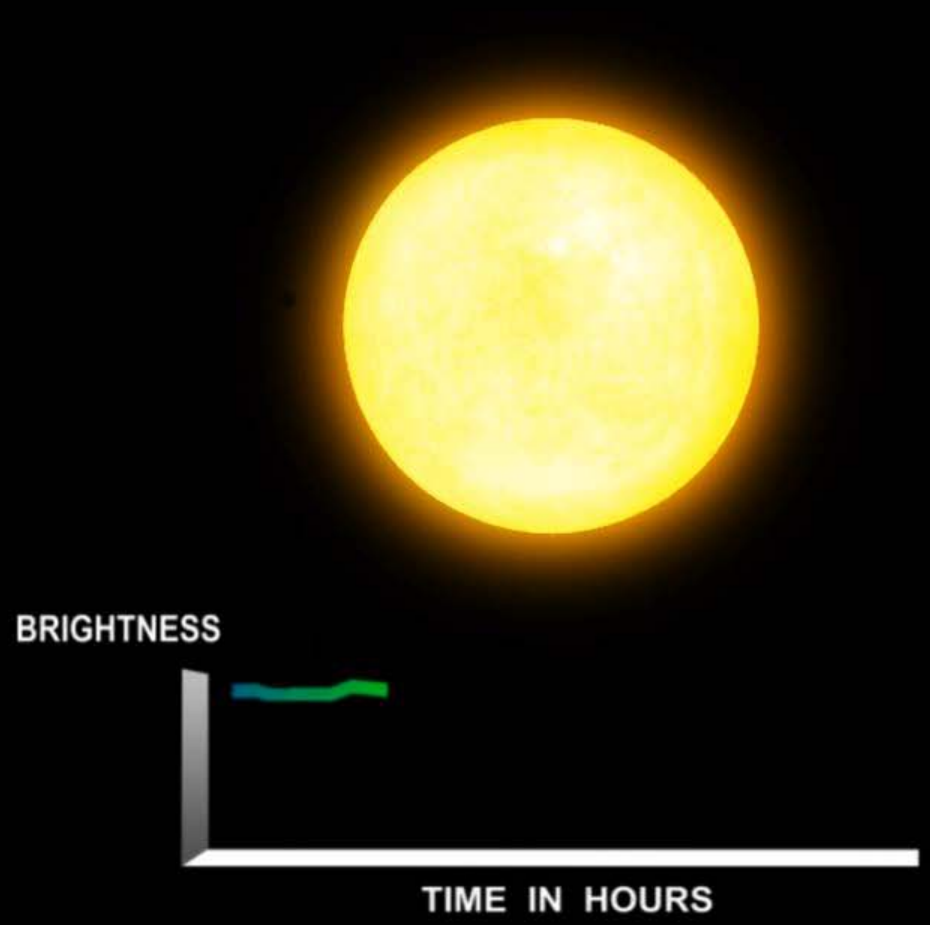


NASA's *Kepler Mission*

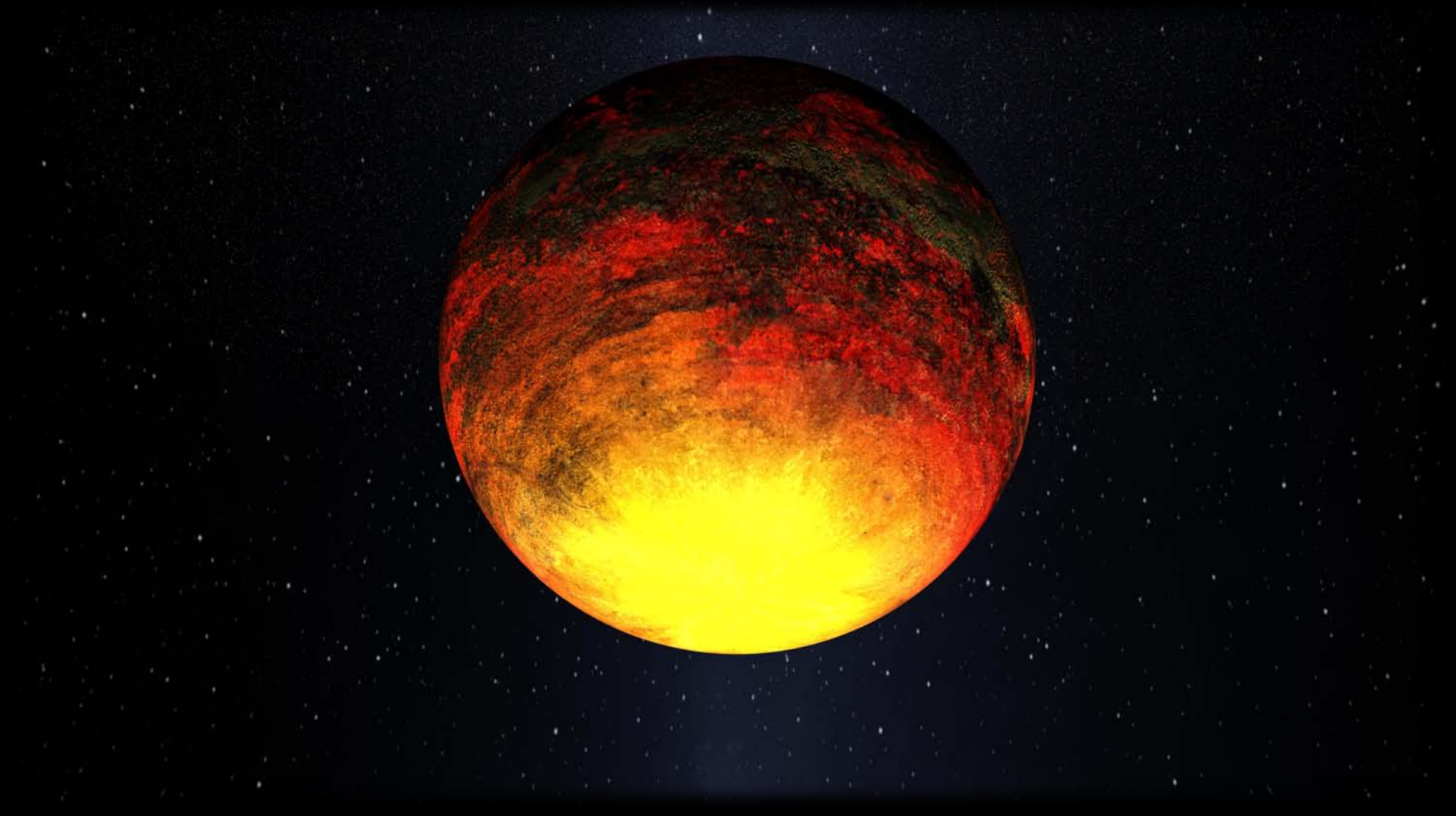
Determining the frequency of Earth-size and larger planets in the habitable zone of Sun-like stars



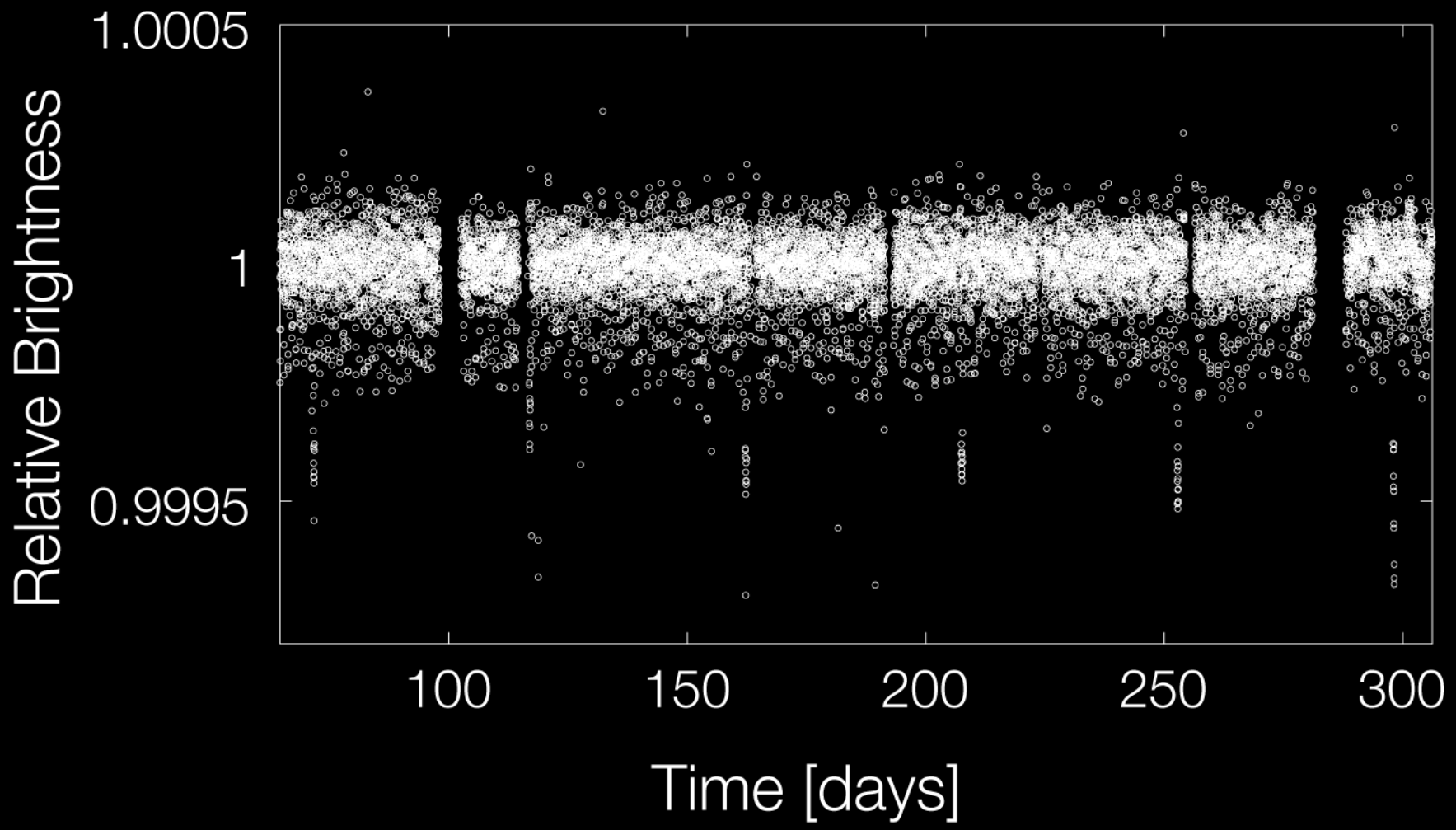
Transit Photometry



Kepler's First Rocky Planet

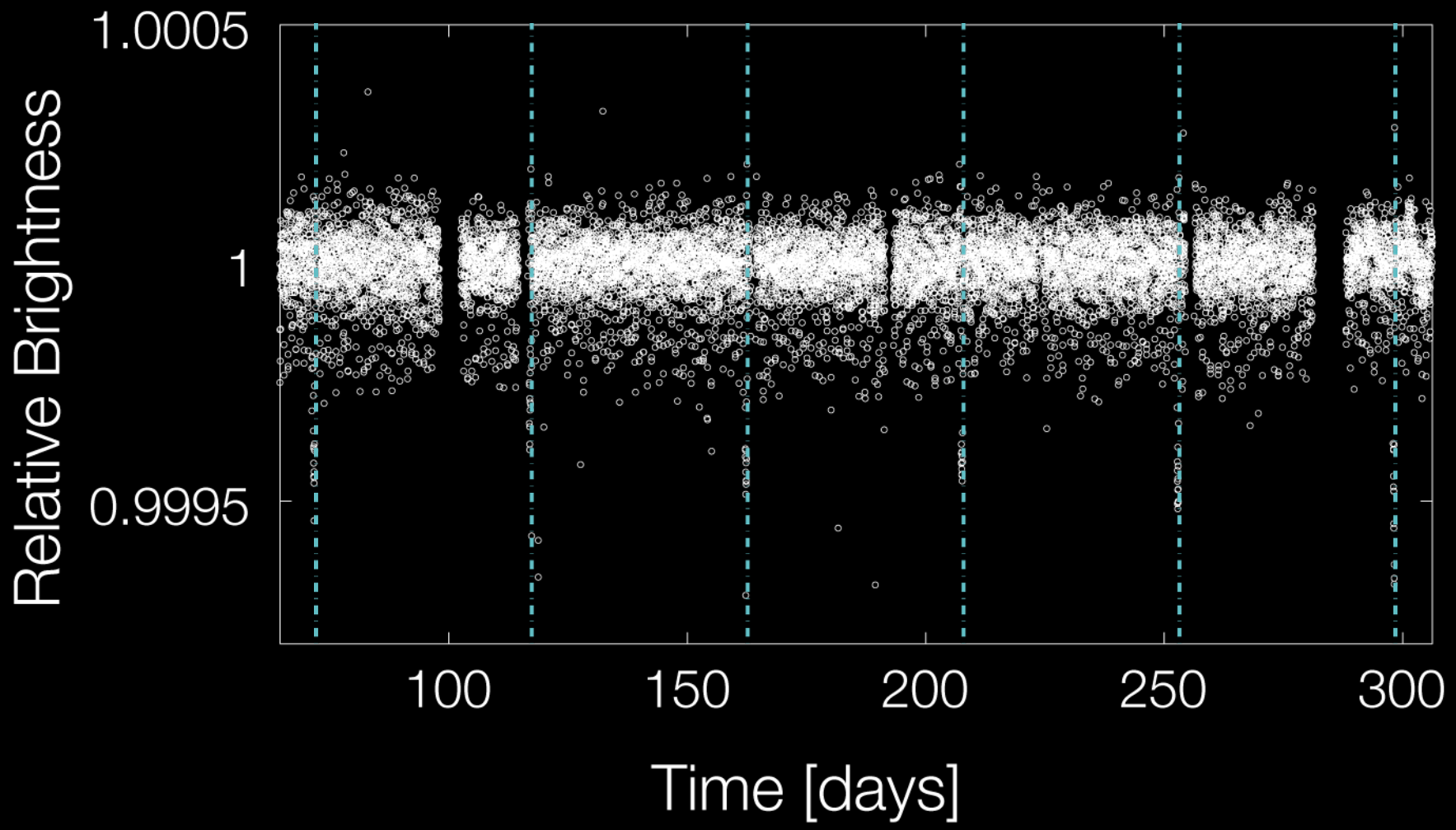


Kepler-10 Light Curve



Kepler-10 Light Curve

Period = 45.29 days



Kepler-10 Light Curve

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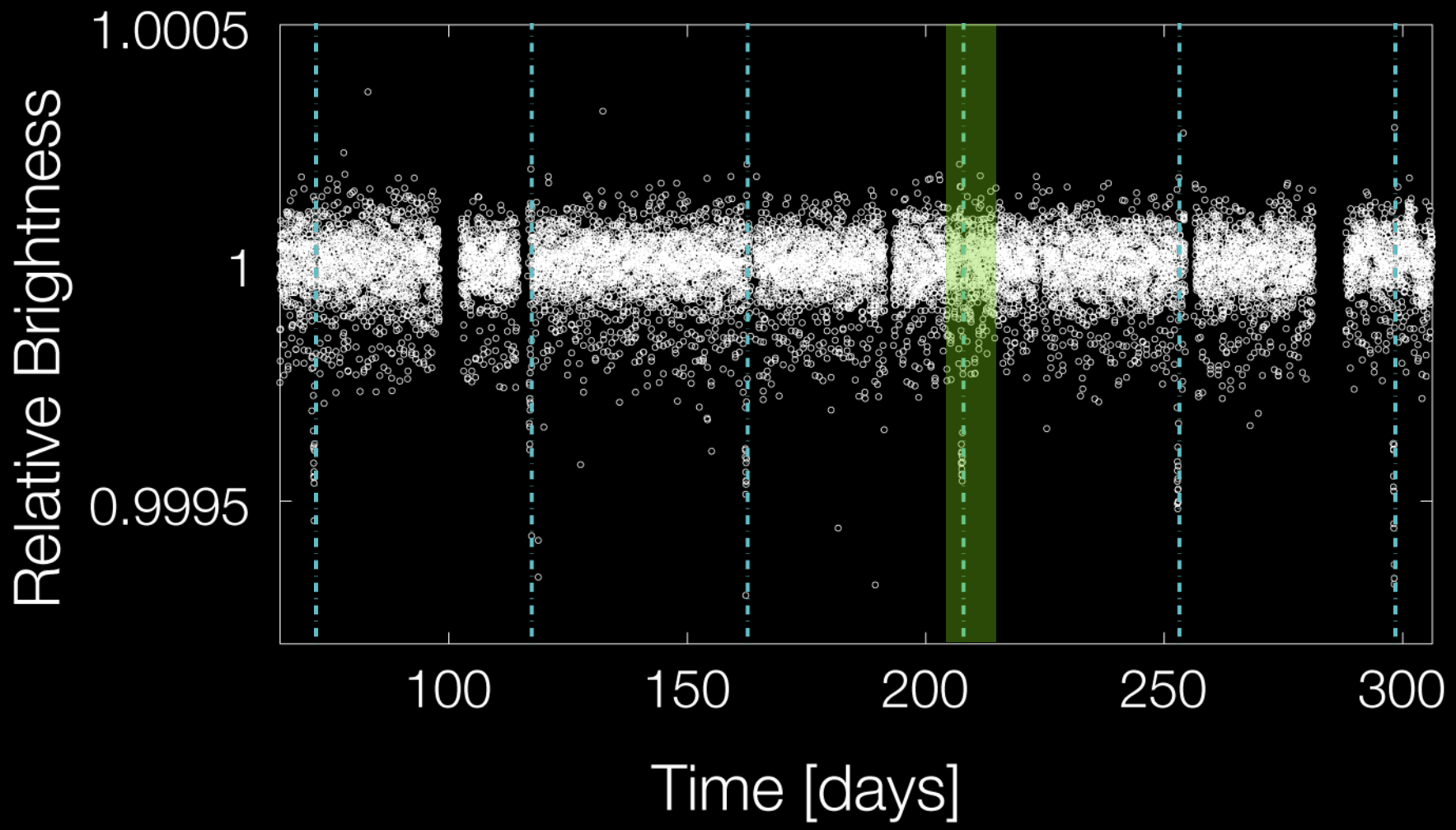
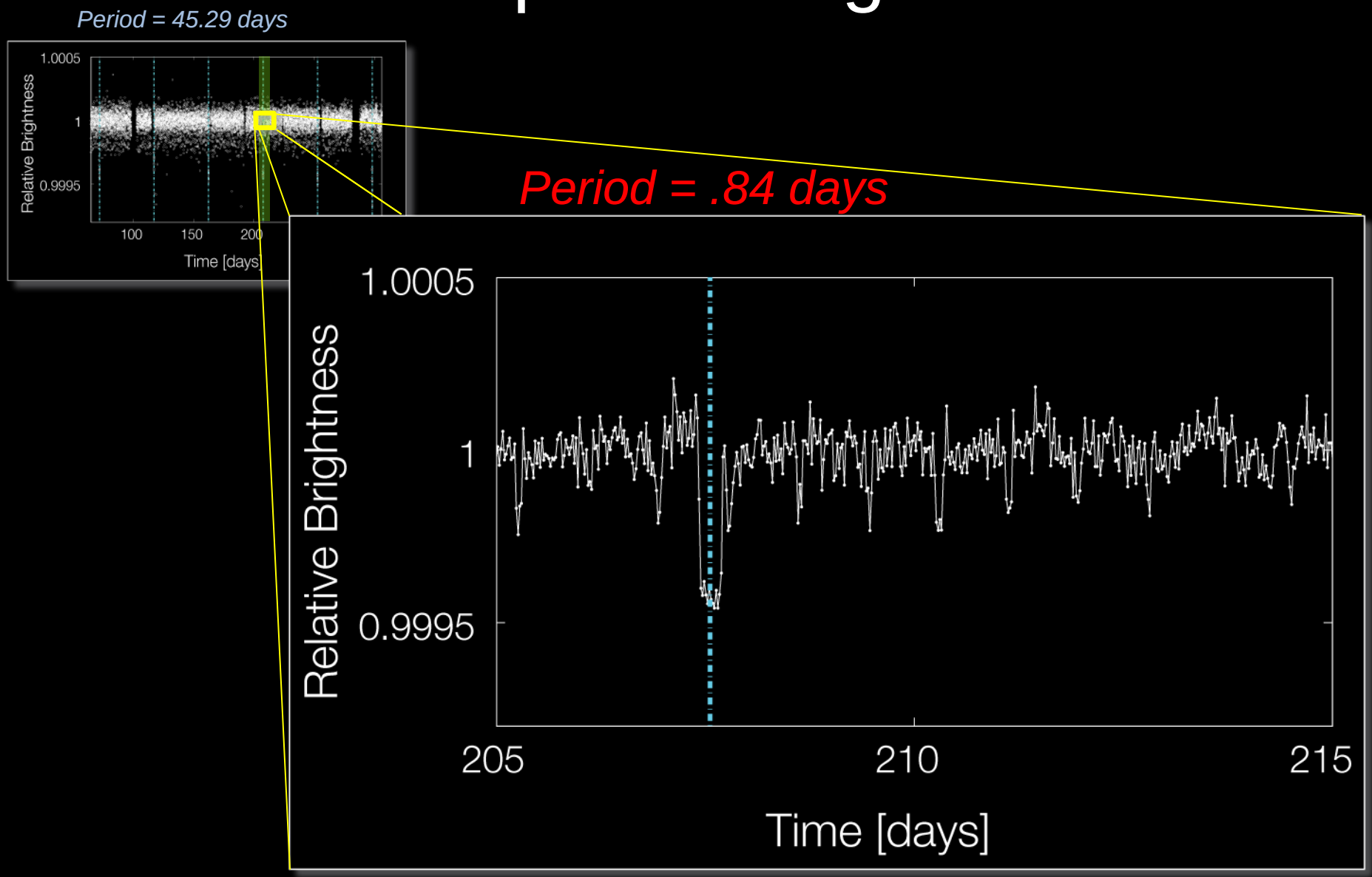


Kepler-10 Light Curve



Kepler-10 Light Curve

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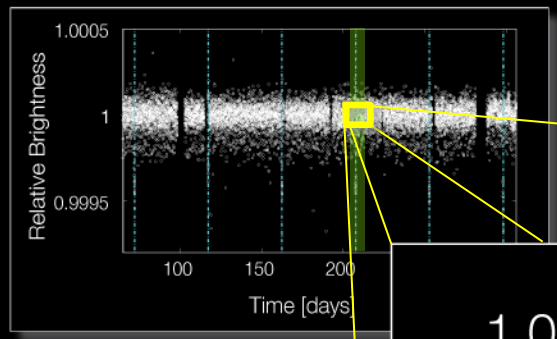
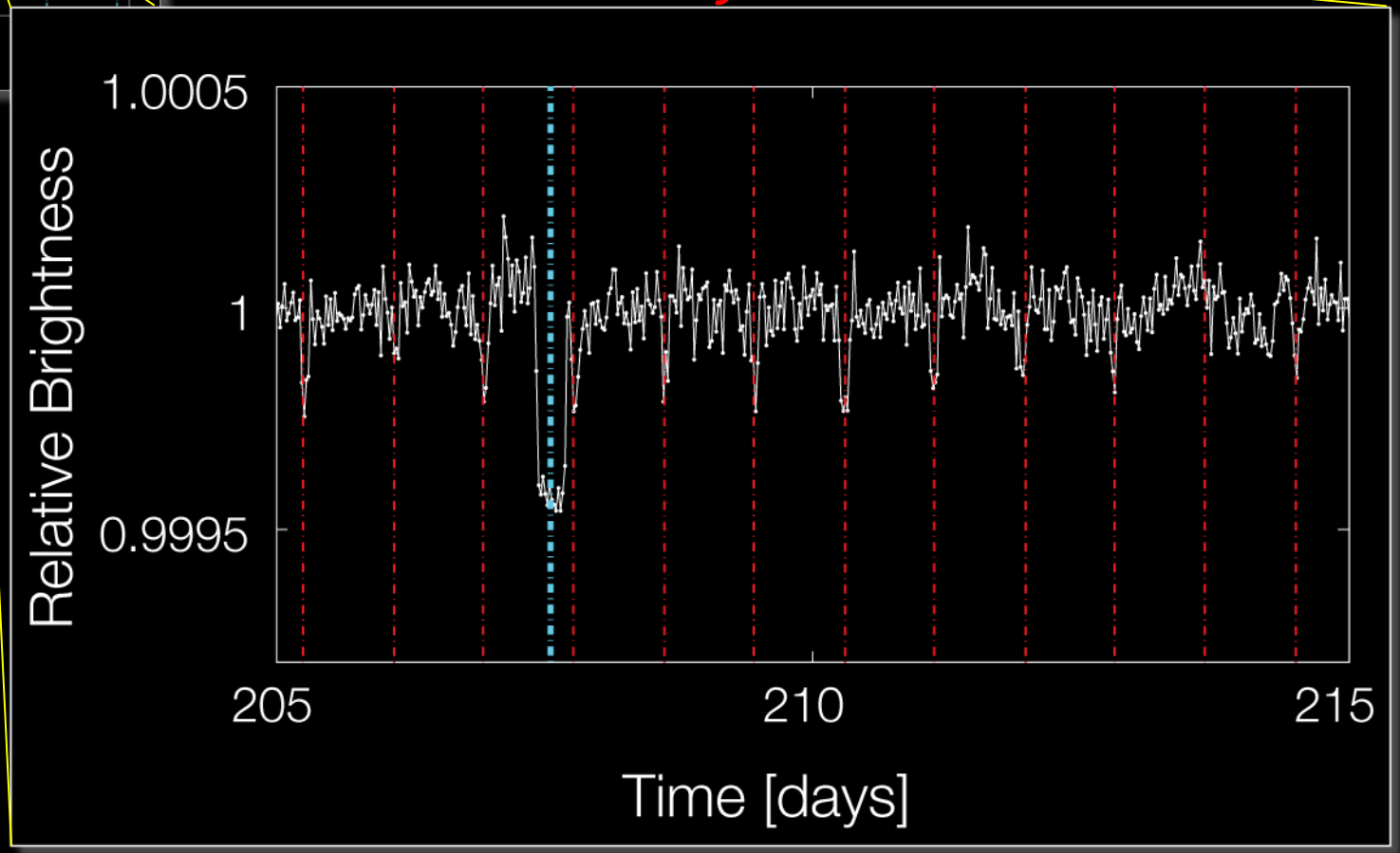
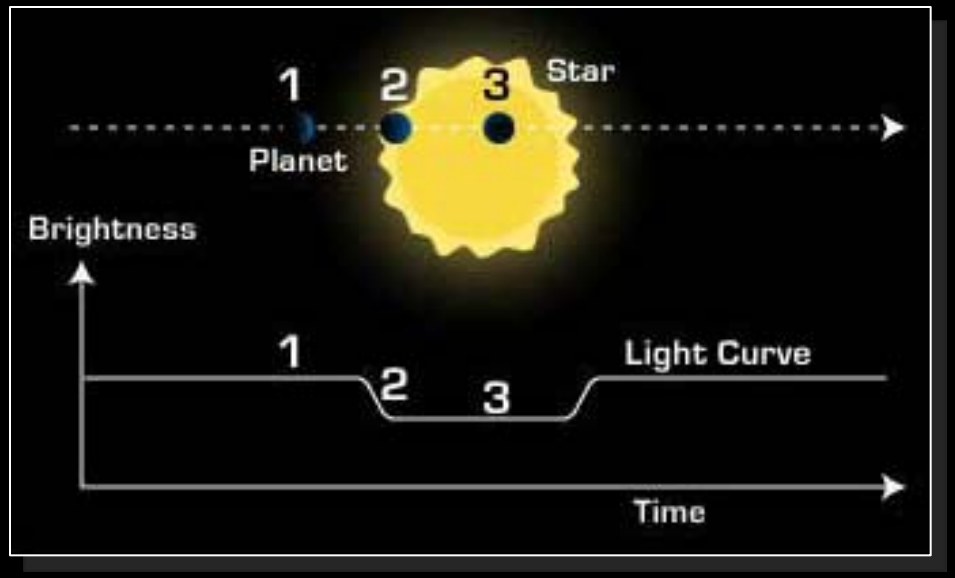
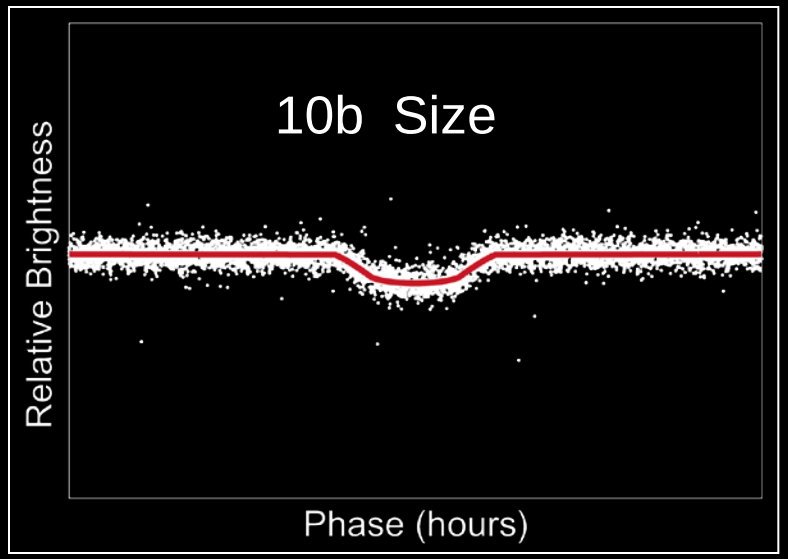


Period = .84 days



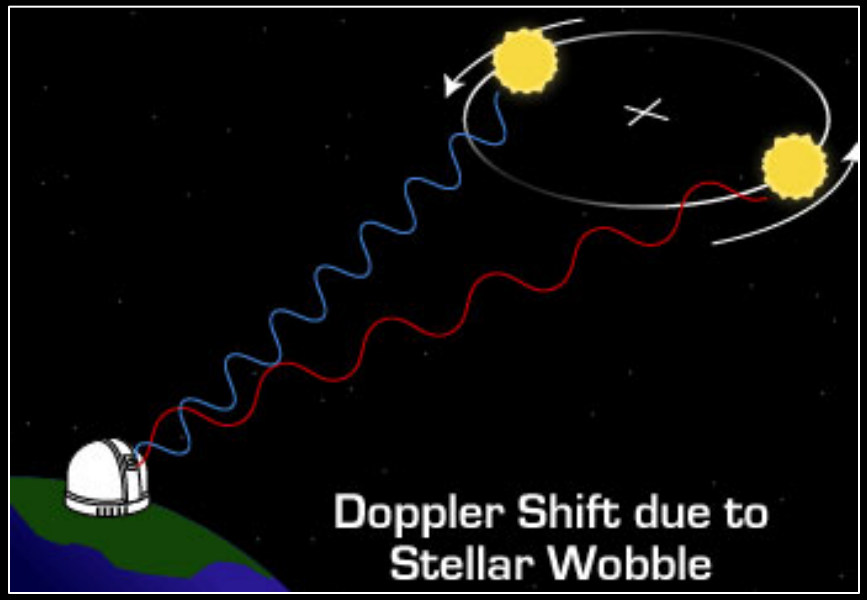
Transit Yields Planet Radius

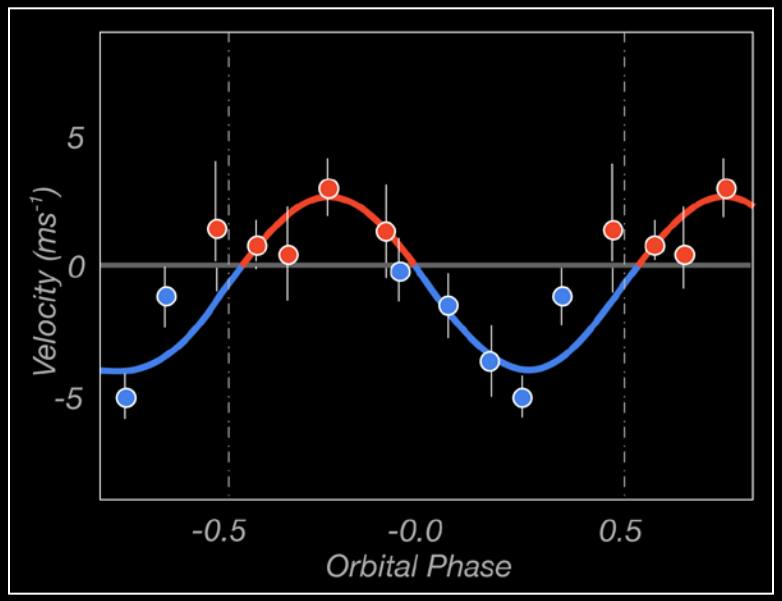




Radius = 1.4 $R_{\oplus}$

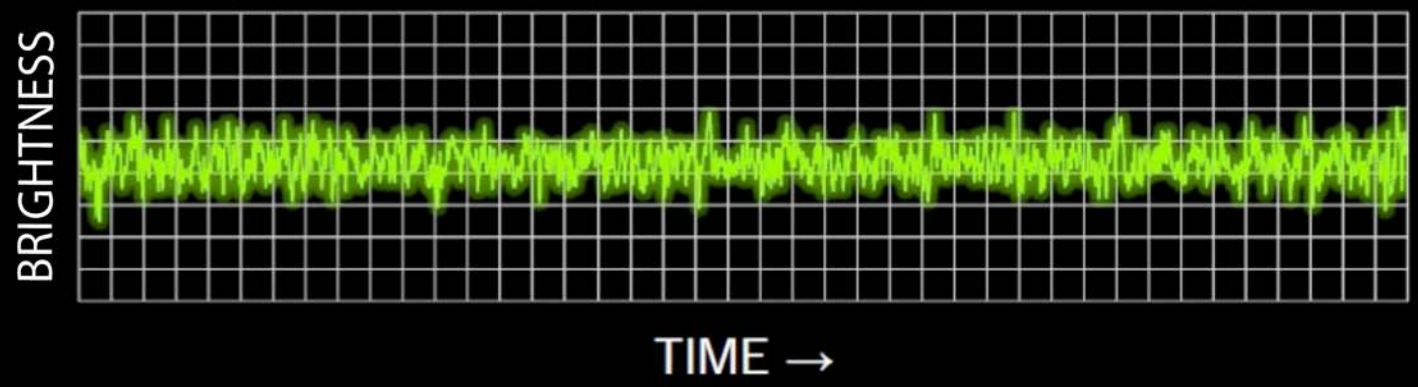
Doppler Measurements Yield Planet Mass





Mass = 4.6 $M_{\oplus}$

Asteroseismology



Sun

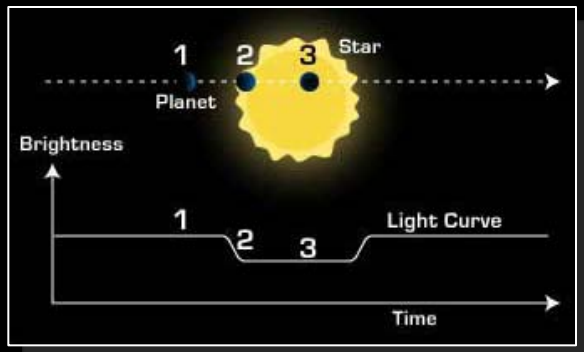
Travis Metcalfe, National Center for Atmospheric Research

Stellar Properties

Kepler-10

- G4V
- Mass = $0.90_{\odot}$
- Radius = $1.06\ R_{\odot}$
- Age > 8 Gyr
- Distance = 560 Light-years

Transit and Doppler Measurements Yield Density



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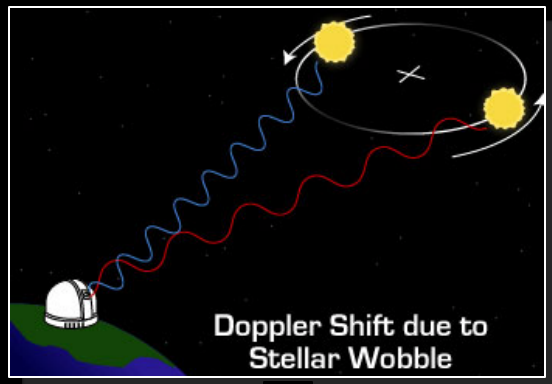
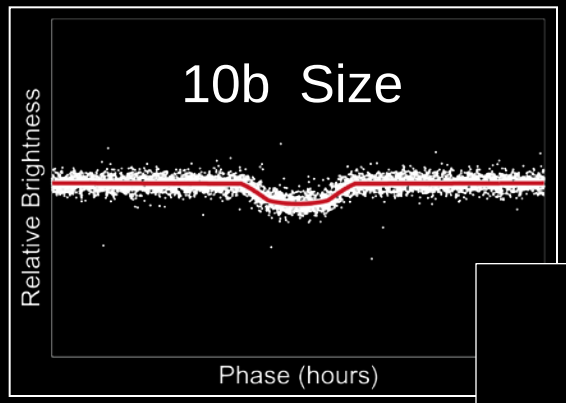
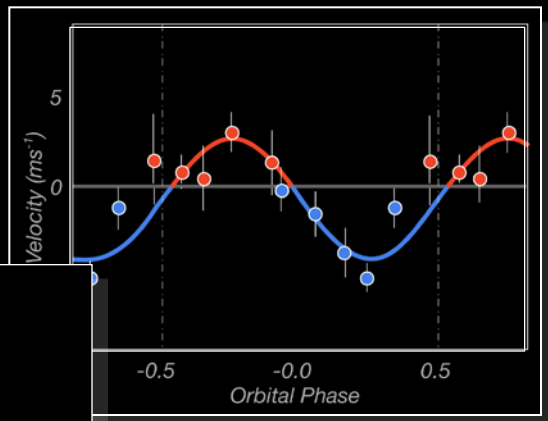


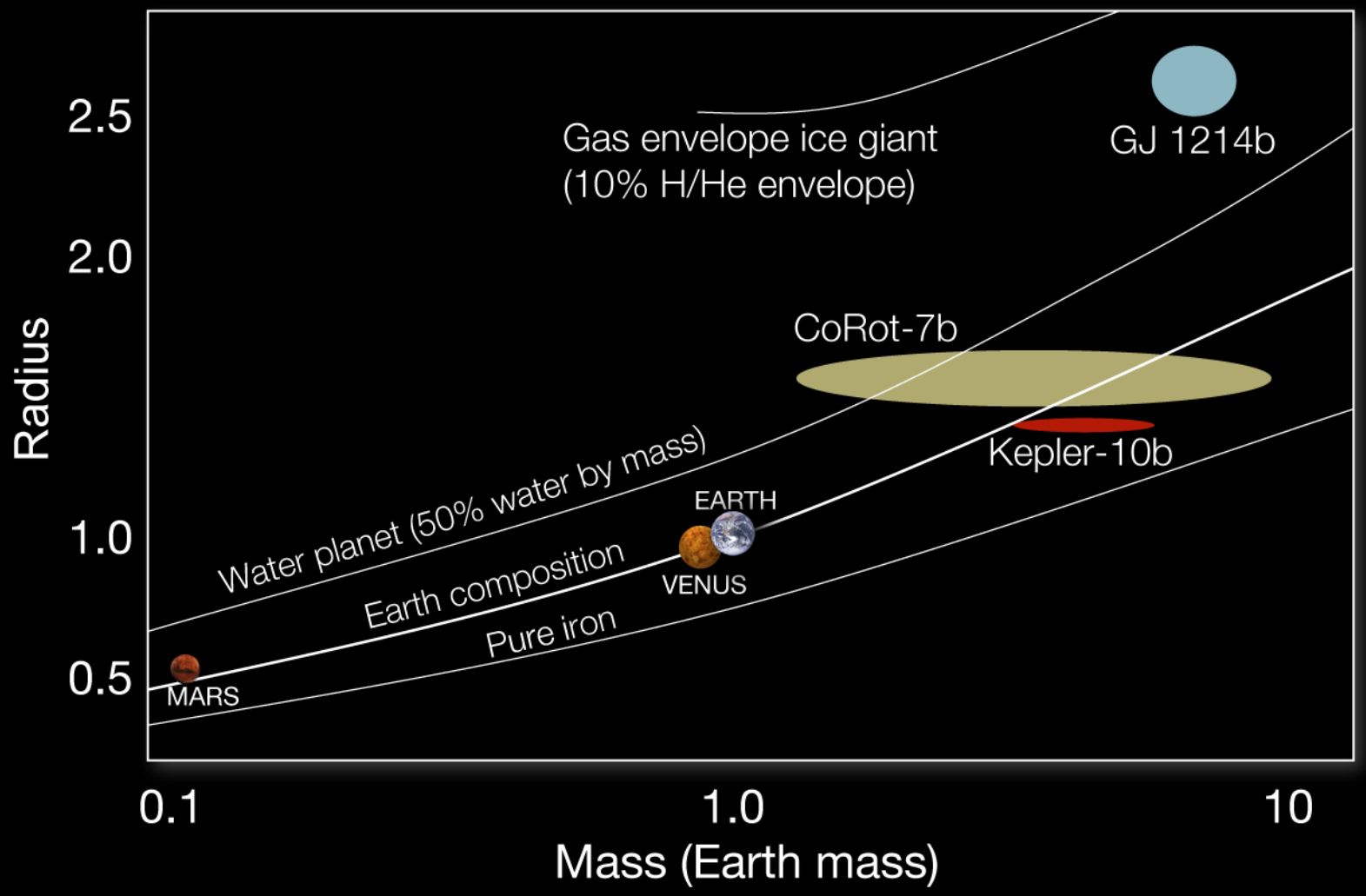




Density

$$\frac{\text{Mass}}{\text{Volume}} = 8.8\ \text{g/cm}^3$$

Composition of Kepler-10b



Summary

- Kepler-10b is orbiting a star very much like our own Sun, but with an age greater than 8 billion years, at a distance of 560 light years.
- Kepler-10b is the smallest exoplanet discovered to date and the first unquestionably rocky planet orbiting a star outside our Solar System.