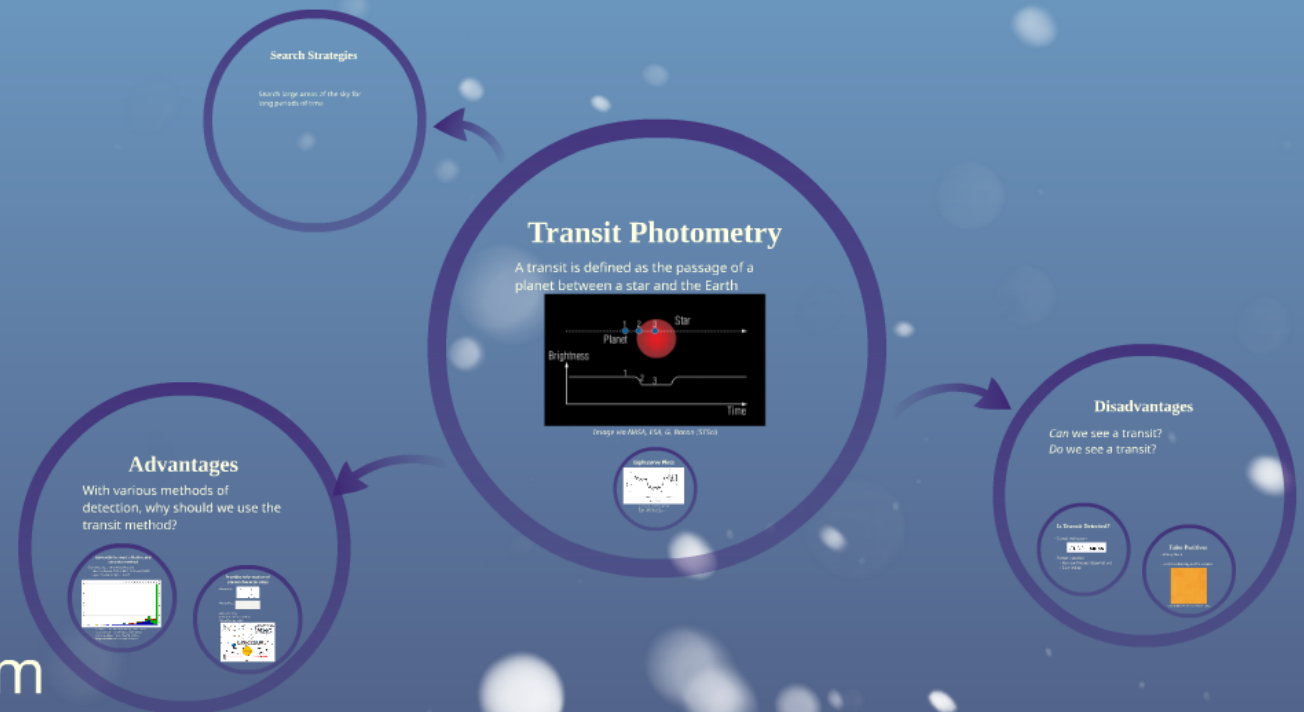
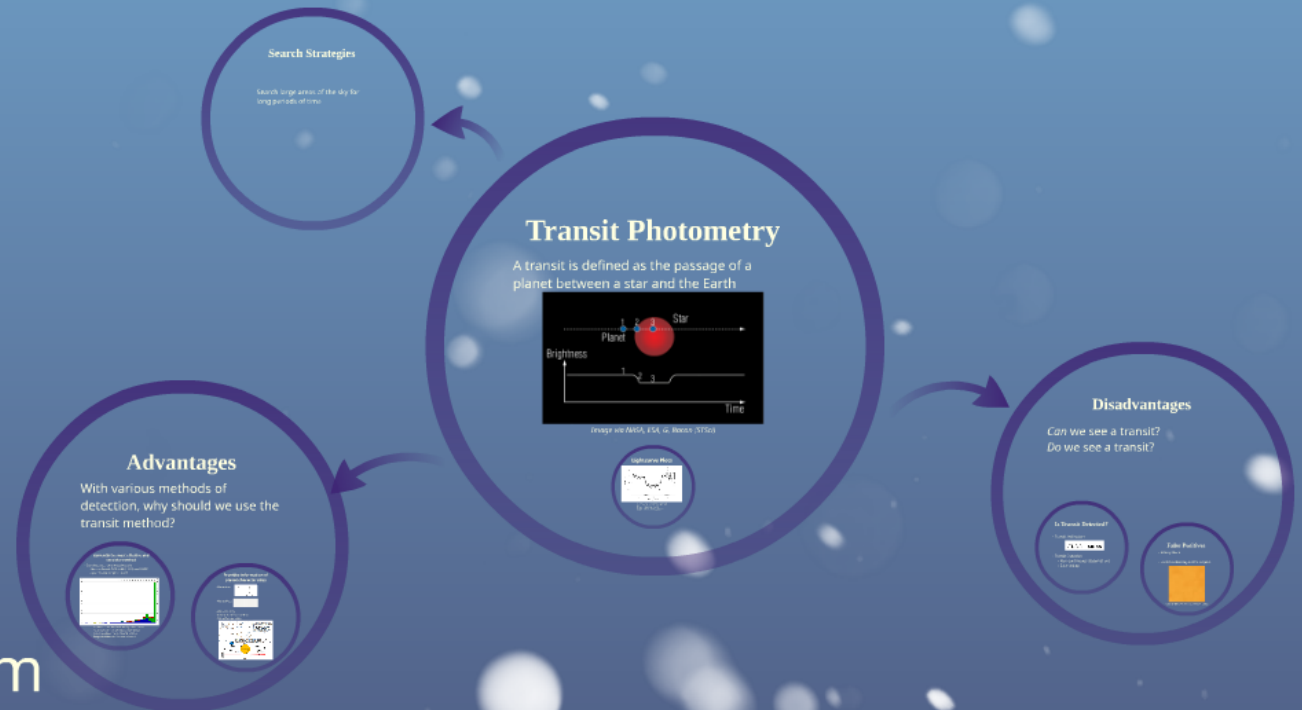


Transit Strategy Harvard Case Solution & Analysis



Transit Strategy Harvard Case Solution & Analysis



Transit Photometry

A transit is defined as the passage of a planet between a star and the Earth

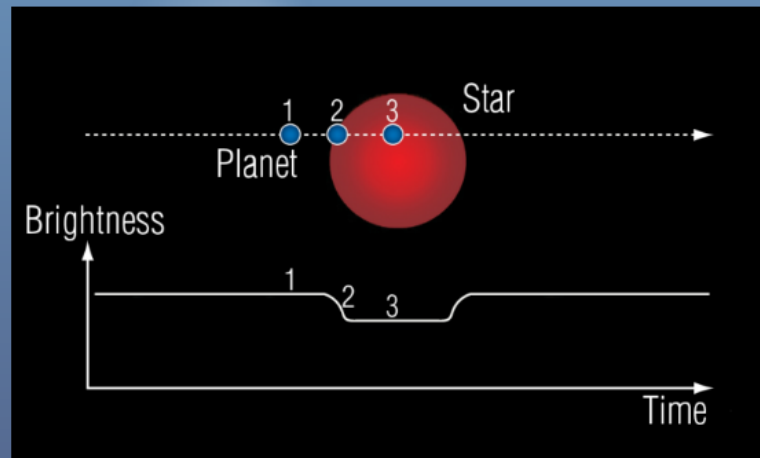
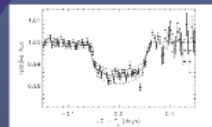


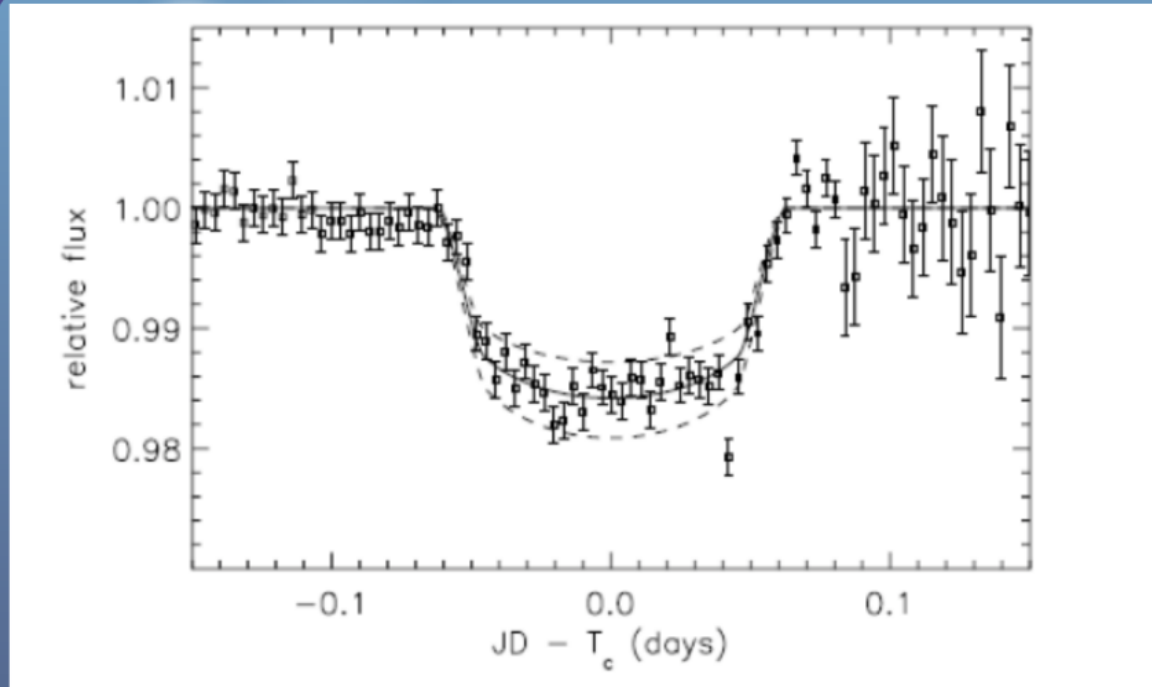
Image via NASA, ESA, G. Bacon (STSci)

Lightcurve Plots



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Image via M. A. C. Perryman, 2005

Lightcurve Plots



HD209458b, first discovered, best known transiting planet.

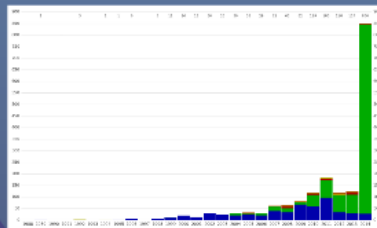
Image via M. A. C. Perryman, 2000

Advantages

With various methods of detection, why should we use the transit method?

Currently the most effective and sensitive method

- Searches occur on a massive scale
- Ground Based: TrES, OGLE, HAT, and WASP
- Space Based: Kepler, CoRoT



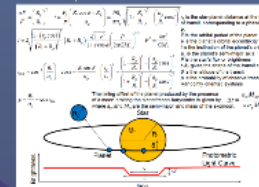
Method of detection indicated by color. Green = transit, blue = radial velocity, red = direct imaging, orange = gravitational lensing.
Image via Wikimedia Commons/Aldaron

Provides information of planet characteristics

• Planet Size
$$\frac{\Delta F}{F} = \left(\frac{R_p}{R_s} \right)^2$$

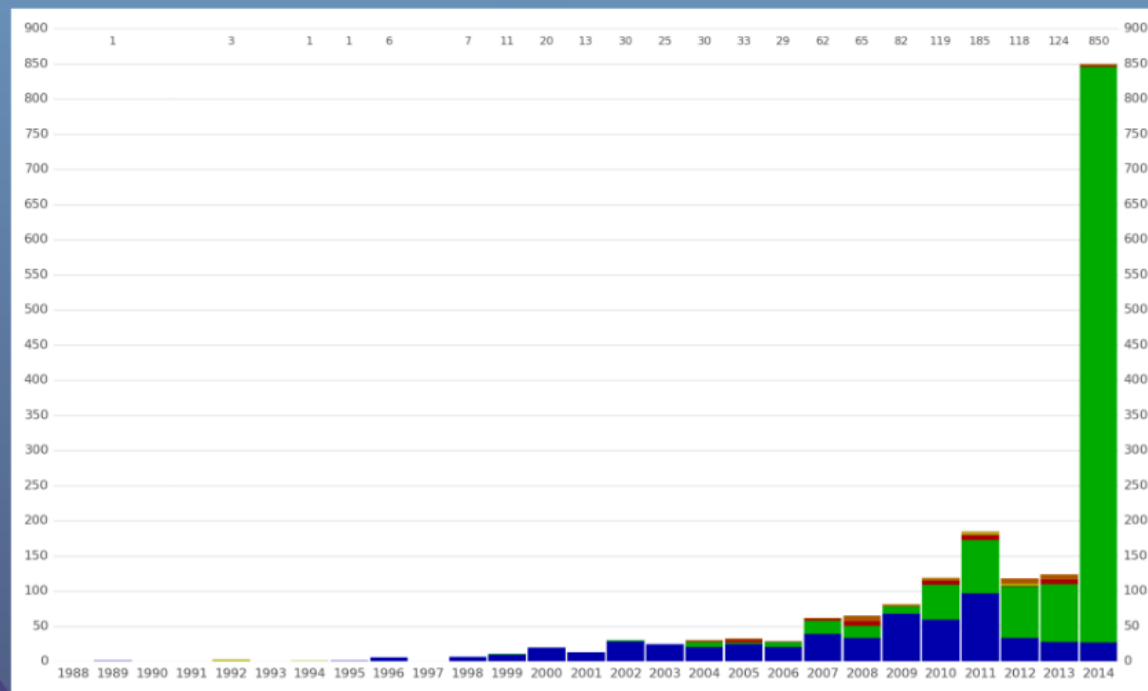
• Planet Mass
$$M_{\text{det}} = 28.4 \frac{M_p \sin i}{f^{1/3} \Delta t^{2/3}}$$

- Planet Density
- Atmospheric Composition
- Planet Temperature



Currently the most effective and sensitive method

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Image via Wikimedia Commons/Aldaron)

Provides information of planet characteristics

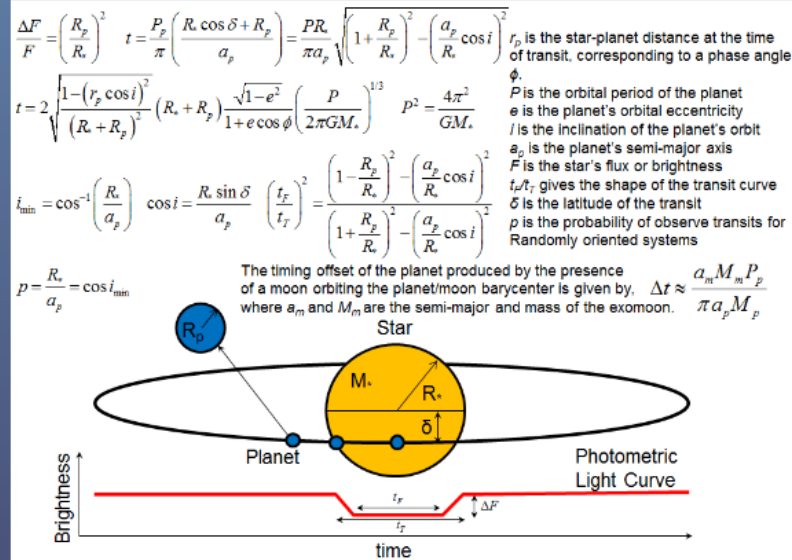
- Planet Size

$$\frac{\Delta L}{L} = \left(\frac{R_p}{R_*} \right)^2$$

- Planet Mass

$$v_{\text{obs}} = 28.4 \frac{M_P \sin i}{P_{\text{orb}}^{1/3} M_*^{2/3}}$$

- Planet Density
- Atmospheric Composition
- Planet Temperature



Disadvantages

Can we see a transit?
Do we see a transit?

Is Transit Detected?

- Transit Inclination

$$P(i)di = \sin i di$$

- Transit Duration
 - Non-continuous Observations
 - Eccentricity

False Positives

- Binary Stars
- Limb Darkening and Sunspots

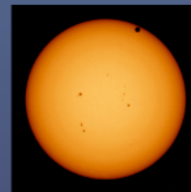


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