Transit survey of extra-solar planet

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Contents

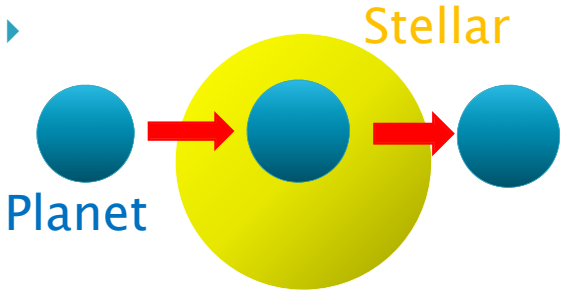
1.Transit

- Extra-solar planets is a hot topic these days. So we decided to study about them.
- Our subject of study is a transit survey and to draw the light curve.

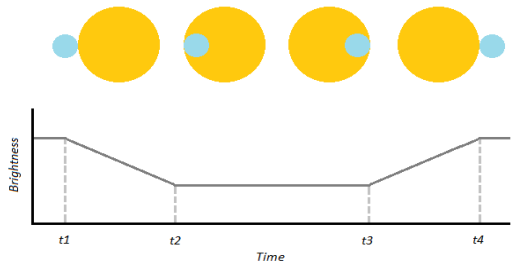
What is transit?

- Transit, in astronomy, is the passage of a relatively small body across the disk of a larger body, usually a star or a planet, occulting only a very small area.
- (quoted by "The Editors of Encyclopedia Britannica")

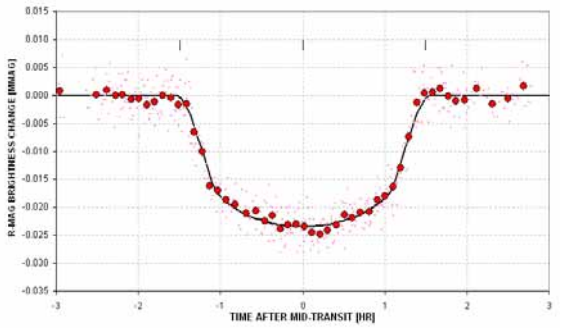
An Image of Transit



An Image of a Light curve



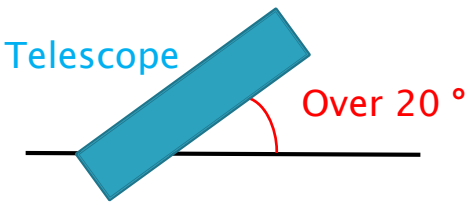
A Light curve



2.Observation

Conditions

- A transit can be observed on July 18th, 19th, 20th in Japan.
- The star magnitudes is 14 or under 14.
- The fading rate is over 1%.
- Coordinate.
- Time.



Candidates

- 18th Kepler-17b
- 19th Qater-48b
- 20th WASP-1b

Observation Conditions

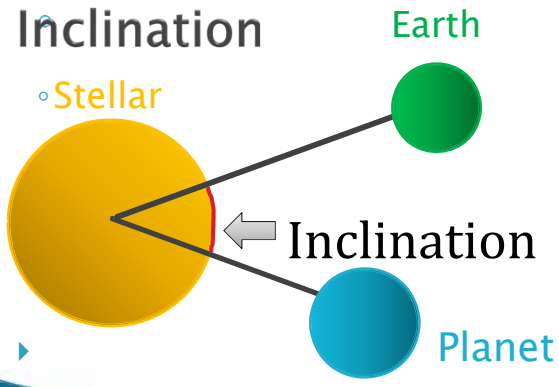
- Rain does not fall.
  ←to keep the rain off of the mirror of the telescope
- Humidity is under 95%.
  ←to prevent it from being wet

Subject

If we are able to draw the light curve, we know the size of the planet and the inclination.

Inclination

- Stellar



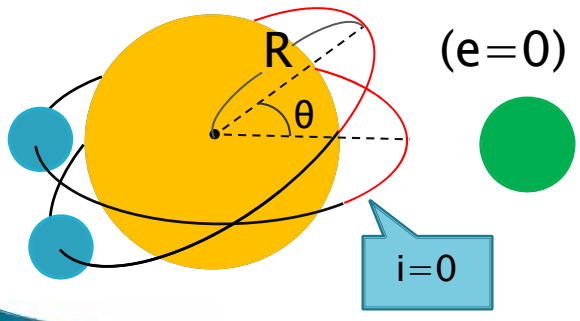
Observation

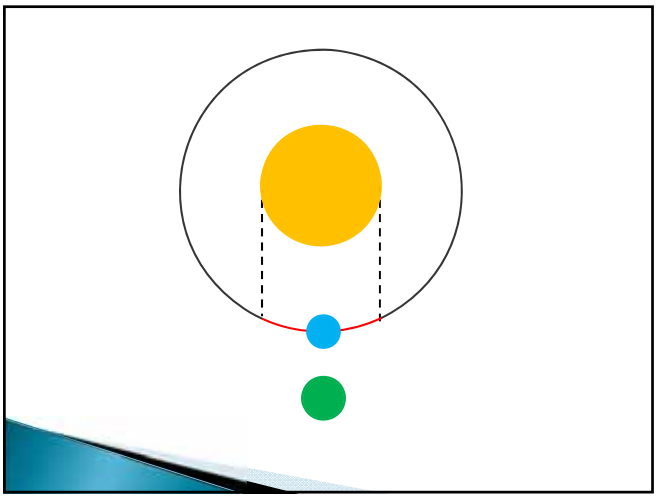
- 18th failed due to bad weather
- 19th failed due to bad weather
- 20th failed due to high humidity

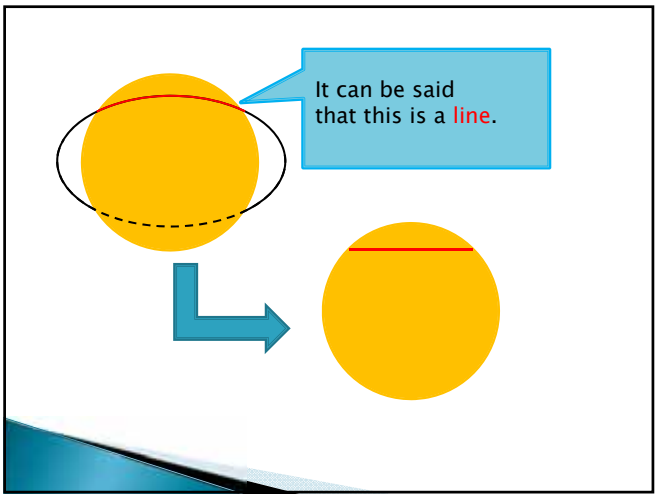
We are going to try again in September.

3.Theory

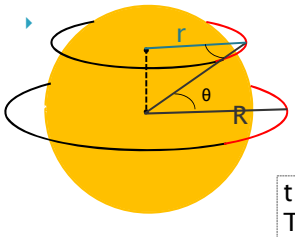
How to find the inclination







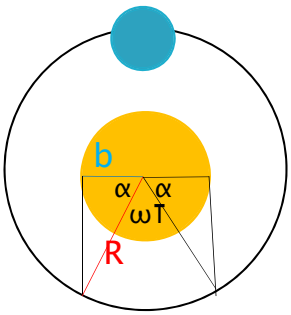
- From the observation, it can be said that the model is as follows.



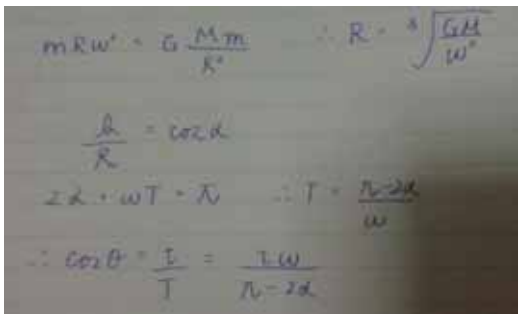
t:T=r:R

$t = T\cos\theta$

t:transit duration
T:transit duration(i=0)



b:radius
M:mass of the stellar
ω:angular velocity
m:mass of the planet



References

- TTV法による新たな系外惑星研究の展開
  (天文月報2012年3月) 福井暁彦
- Detection of orbital parameter changes in the TrES-2 exoplanet?
  D.Mislis-J.H.M.M.Schmitt

Thank you for listening.

My teammates
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