

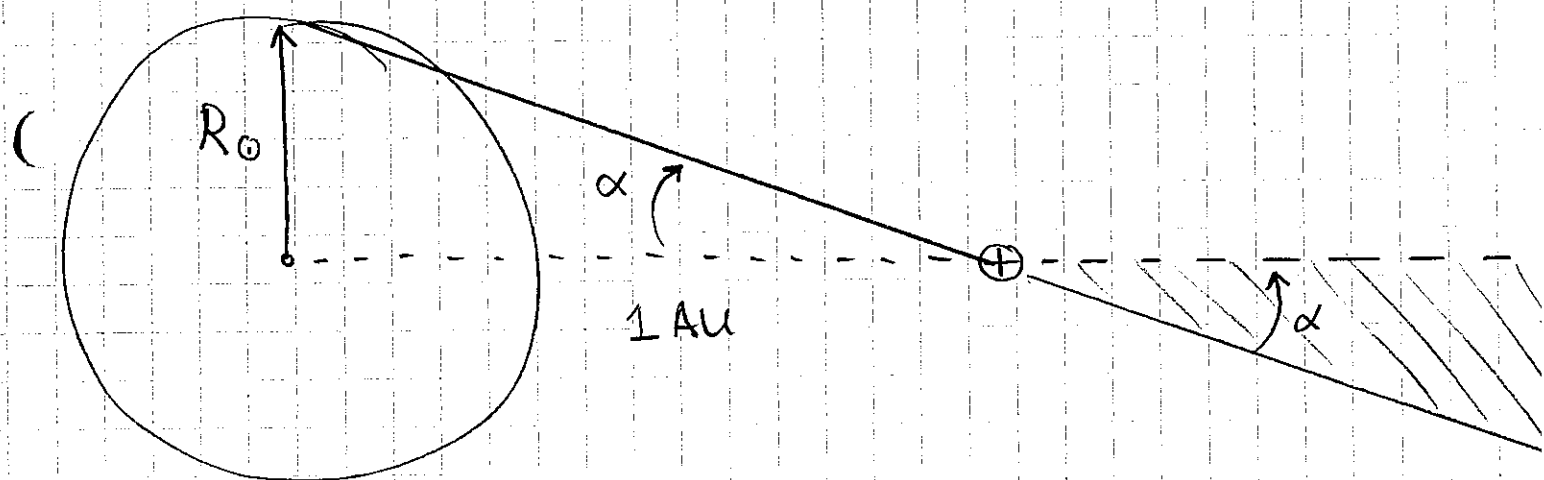
HW 5
#3

Start with Gliese catalog of Nearby stars.

3802 stars, within 25 pc of Sun.

- calculate ecliptic latitude for each star. Using obliquity of ecliptic $\epsilon = 23.4373^\circ$ @ 2015 and equation

$$\sin(\text{ecl lat}) = \sin(\text{Dec}) \cos(\epsilon) - \cos(\text{Dec}) \sin(\epsilon) \sin(\text{RA})$$



Any alien observer located an angle $\leq \alpha$ from orbital plane of Earth may (eventually) see a transit. That means the ecliptic latitude of alien must be less than

$$\alpha = \tan^{-1}\left(\frac{1 R_{\odot}}{1 \text{ AU}}\right) = 0.2666^\circ$$

in order for alien to (eventually) see a transit.



HW 5
#3
Cont'd

So, how many stars in Gliese catalog have ecliptic latitude with absolute value ≤ 0.2666 ?

26 stars see Earth transit

If we ask "can aliens see any planet transit"?
then

- a) "any planet" does not include Pluto;
max inclination to Earth's orbit is
Mercury, at $\text{incl} = 7.00487^\circ$.

430 stars have $|\text{ecl lat}| \leq 7.00$

- b) "any planet" does include Pluto;
max inclination is Pluto's, at 17.142° .

1138 stars have $|\text{ecl lat}| \leq 17.142$