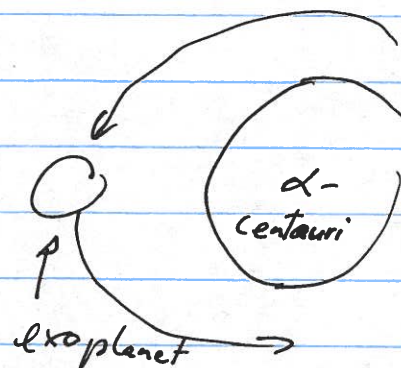
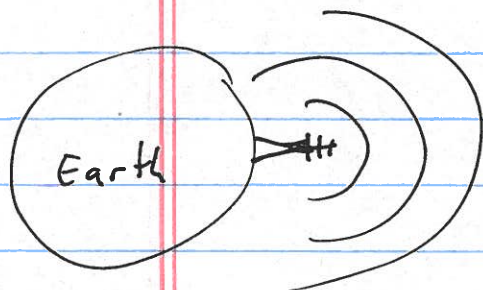


Monday, October 19, 2020

Question: Could Aliens on an exoplanet in the α -centauri system detect human radiowave emissions?



The most powerful radio transmitters on Earth ~~are~~ have a power of about $2000 \text{ kW} = 2 \text{ MW}$
 $= 2 \times 10^6 \text{ Watt}$

what is the power/area = intensity of these radio waves when they reach α -centauri?

distance to α -centauri = $4.4 \text{ light years} = 4.16 \times 10^{17} \text{ km}$
 $4.4 \times 9.4 \times 10^{12} \text{ km}$
 $= 4.16 \times 10^{16} \text{ m}$

$$\text{Intensity} = \frac{\text{Power}}{\text{Area}} = \frac{2 \times 10^6 \text{ W}}{1.089 \times 10^{34} \text{ m}^2} = 1.84 \times 10^{-28} \text{ W/m}^2$$

$$\text{Area} = \frac{1}{2} 4\pi R_\alpha^2 = 1.089 \times 10^{34} \text{ m}^2$$

↑
distance
to α -centauri

Detection by a 1 km dish telescope (Alien's telescope)

$$\text{Area of Dish} = \pi R_{\text{dish}}^2 = (3.1415926) \left(\frac{1000}{2}\right)^2 = 7.85 \times 10^5 \text{ m}^2$$

Total power detected by: $P_a = \text{Intensity} \times \text{Area of dish}$

$$= (1.84 \times 10^{-28} \text{ W/m}^2) (7.85 \times 10^5 \text{ m}^2)$$

$$= 1.44 \times 10^{-22} \text{ W}$$

$$= 1.44 \times 10^{-7} \text{ fW}$$

femto watts

Very limit of detectable
with cryogenic detectors

(might be detectable
might not be)