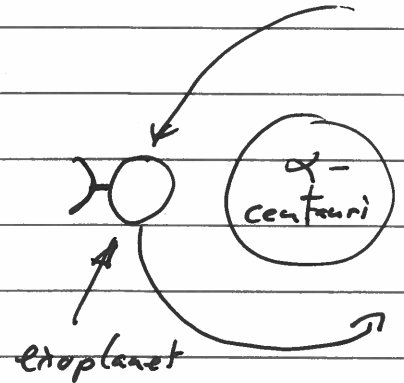
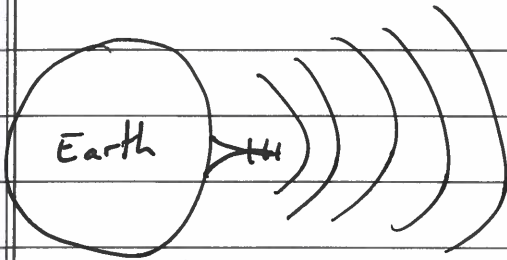


Friday, April 10, 2026

Question: Could aliens on an exoplanet in the α -Centauri system detect human radio-wave emissions?



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

- 1) What is the intensity (= power/area) of the radio-waves when they reach α -Centauri?

distance to α -Centauri = $4.4 \text{ light years} = 4.16 \times 10^{13} \text{ km}$
 $4.4 \times (9.5 \times 10^{12} \text{ km})$

$$= 4.16 \times 10^{16} \text{ m}$$

$$= R_{\alpha}$$

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

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

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

$$\text{Area of dish} = \pi R_{\text{dish}}^2 = (3.1415) \left(\frac{1000}{2} \right)^2 = 7.85 \times 10^5 \text{ m}^2$$

$$\begin{aligned} \text{Total power detected: } P_{\infty} &= \text{Intensity} \times \text{Area of dish} \\ &= (1.84 \times 10^{-28} \text{ W/m}^2) (7.85 \times 10^5 \text{ m}^2) \\ &= 1.44 \times 10^{-22} \text{ W} \\ &= 1.44 \times 10^{-7} \text{ fW} \end{aligned}$$

femtowatts

Very limit of detectable
with cryogenic detectors

(might be detectable ... might not be)