

Astronomy 423

Worksheet #1

Spring 2021

Problem: Suppose ETs on a planet 10 pc from Earth use a 200 Megawatt transmitter to broadcast a signal at 21 cm with a 10 kHz bandwidth. What will be the flux density that we receive in Jy? How many Watts would be collected by a 100 m diameter antenna?

Step 1: Convert 10 parsecs to cm using $1 \text{ pc} = 3.09 \times 10^{18} \text{ cm}$ and calculate the flux density in Jy. Recall $1 \text{ Jy} = 10^{-23} \text{ W cm}^{-2} \text{ s}^{-1} \text{ Hz}^{-1}$

Step 2: Write down the equation for power (W) in terms of collecting area (A), flux density and bandwidth. Then solve for the power collected in Watts.

Step 3: What does this imply about our ability to detect ETs?

Done!