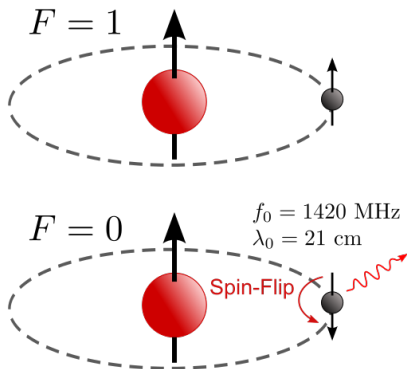


# Determining Galactic Structure through 21cm Emission Lines

Henry Shackleton

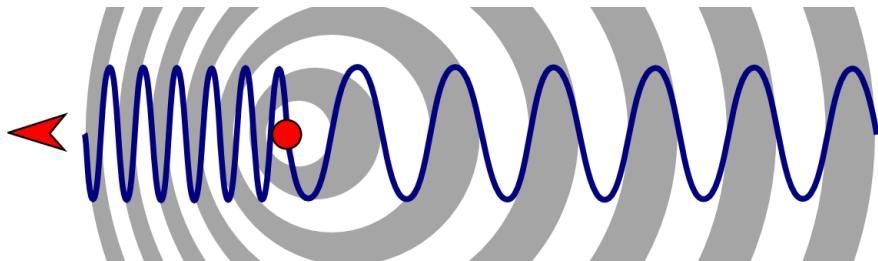
May 3, 2017

# Hyperfine Structure of Hydrogen Emits 21cm Wavelength Emission



- Hydrogen electron spin-flip causes electromagnetic radiation at a frequency of 1420.41 MHz.
- Low probability ( $2.9 \times 10^{-15} \text{ s}^{-1}$ ), but the vast amount of hydrogen in the galaxy allows for this detection

# Doppler Shift Gives Change in 21cm Line Proportional to Velocity



$$v = c \frac{1420.41 - \nu}{\nu}$$

# Doppler Shift Gives Change in 21cm Line Proportional to Velocity

