Phys 2110-3 12/1/10

Note Title 12/1/2010

Sound Waves

$v = \sqrt{\frac{F}{\mu}}$ (String!)

Air $v = \sqrt{\frac{\gamma P}{\rho}}$

Air $\gamma = 7/5$

He $\gamma = 5/3$

Temp dependent!

0° $v \approx 331 \frac{m}{s}$ 25° $v \approx 340 \frac{m}{s}$

Human hearing

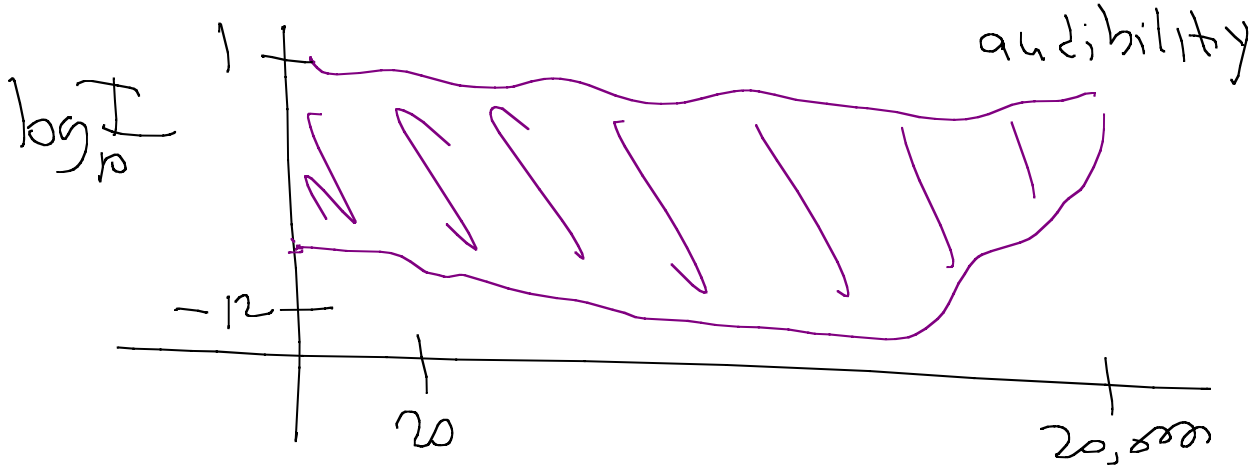
Youngsters $20\ Hz - 20{,}000\ Hz$

Dogs: ? $-30{,}000\ Hz$

Bats $\longrightarrow 100{,}000\ Hz$

Intensities are $\sim 10^{-12}\ \frac{W}{m^2}$ audibility

$1\ \frac{W}{m^2}$ Threshold of pain



$10^{-12}\ \frac{W}{m^2}$ $10^{0}\ \frac{W}{m^2}$

Useful: $\log_{10}\frac{I}{10^{-12}\ \frac{W}{m^2}} = \log_{10}\frac{I}{I_0}$

Intensity level

$$\beta = 10 \log_{10}\frac{I}{I_0}$$ decibels

Interference: Adding Waves!