



Lab 3

Basic Sound

September 30, 2025

Dr. Austin

Lab 1 Report Feedback

- Units are important!
 - Include units in all tables, graphs, and calculations
 - Check unit consistency throughout your work
- Compare results quantitatively
 - Use ranges (value $\pm$ uncertainty) to judge agreement
 - Overlapping = agree, not overlapping = disagree
- Cite your equations
 - Clearly state which equation you used for each calculated value

Tips for calculations

- Record data with units every time
- Write down the formula first, then substitute values with units
- Track and cancel units to ensure the final answer has correct units
- Break complex expressions into smaller, manageable steps

Lab 3 Basic Sound – Equipment

- Acoustical line (plastic tube with integrated ruler)
- Oscillator (sine generator)
- Speaker
- Microphone
- Voltmeter
- Terminations (solid and absorber)
- Magnetic carriage
- Oscilloscope

Lab 3 Basic Sound – Procedure

- **Standing Wave Pattern**
- Set frequency to 500 Hz
- Adjust amplitude of oscillator to get 2-digit output on voltmeter
- Adjust position of microphone to find a maximum voltage
- Refine position of speaker to further maximize voltage
- Reduce oscillator output to minimize sound while retaining a signal
- Move microphone in 2cm increments; record position and voltage

Lab 3 Basic Sound – Calculations

- **Standing Wave Pattern**

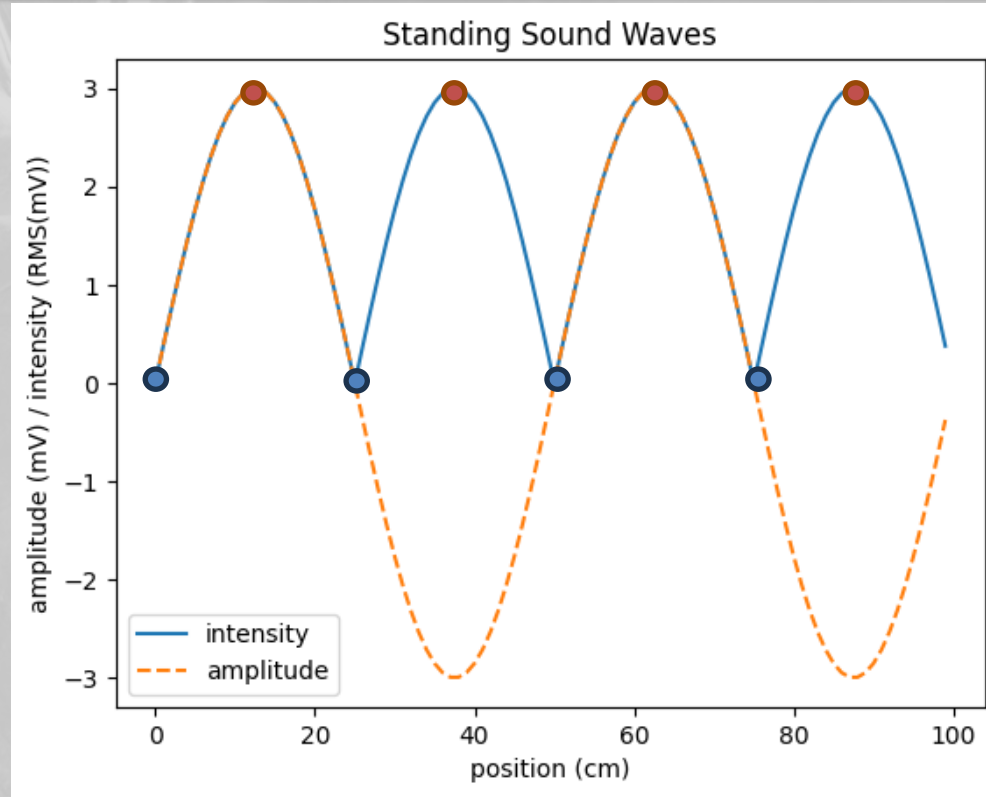
- Graph results to determine wavelength, λ
- Find the speed of sound using $v = f\lambda$, where v is the velocity (speed of sound), f is the frequency of the oscillations, and λ is wavelength
- Is there a node or anti-node at the end of the line?
- Determine standing wave ratio, amplitude ratio, and percentage of energy absorbed for each configuration

- Standing wave ratio:
$$r = \frac{\text{max_microphone_reading}}{\text{min_microphone_reading}}$$

- Amplitude ratio:
$$\frac{B}{A} = \frac{r-1}{r+1}$$

- % of energy absorbed:
$$100 * \left(1 - \left(\frac{B}{A}\right)^2\right)$$

Standing Wave Pattern



NO CLASS NEXT WEEK!

LAB 3 REPORTS WILL BE DUE ON OCTOBER 14