

# Physics 223

## Experiment 2: Sound Waves

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Sound is simply a traveling wave of pressure rarefactions and compressions

$$\Delta p = \Delta p_m \sin(kx - \omega t + \phi)$$

where  $\Delta p_m$  is the maximum pressure deviation,  $k$  is the wave number,  $\omega$  is the angular frequency, and  $\phi$  is a phase shift. The speed of sound  $v$  is related to these parameters by  $v = \omega/k$ . The intensity of this sound wave is proportional to the square of the maximum amplitude of the pressure deviation emitted by the source. A simple derivation can show that the intensity  $I = \text{power}/\text{area}$  of a wave (sound or light) emitted by a point source varies as the inverse square of the distance from the source,  $I \propto 1/r^2$ .

If a sound wave is reflected from a surface, the two oppositely traveling waves will interfere, however there will usually never be complete destructive interference because of this  $1/r^2$  variation of the amplitude and the fact that surfaces are rarely 100% reflective.