

Day 1: Terminology

Classical Waves

Wave

A disturbance that travels through space and time, carrying momentum and energy. There are two different types of waves:

Transverse waves (waves on a string):

Vibration is *perpendicular* to the direction the wave is travelling.

Longitudinal waves (waves down a slinky):

Vibration is *parallel* to the direction the wave is travelling.

To visualize wave properties, imagine you are sitting on a boat in the ocean, moving up and down as waves pass by underneath you.

Wavelength (λ)

The distance between adjacent peaks in a wave.

Period (T)

The time it takes for one full wavelength to pass by (time it takes for your boat to move up and down).

Frequency ($f = 1/T$)

The number of peaks that pass per second (the number of times your boat moves up and down per second).

Energy (E)

A property of a system that describes the amount of work you must do to change the system in some way. We will discuss the following types of energy:

Potential energy (PE):

The energy stored within a system that results from the arrangement of the system. There are many types of potential energy (gravitational, electrostatic, elastic...)

Kinetic energy (KE):

The energy associated with motion.

Momentum ($p = \text{mass} \times \text{velocity}$)

Describes the tendency of an object to stay in motion when encountering resistance (an opposing force).

Discrete

Separate, individually distinct

New Terms

Quantization

Superposition

constructive interference

destructive interference

Boundary Conditions

Dynamics (Time Dependence)

wave behavior

diffusive behavior

Energy Landscape

Additional Notes: