

Day 2: Terminology

Waves (Part II)

New Terms

Oscillation

Repetitive variation, or something that changes with a given frequency.

Examples:

- a). A pendulum *oscillates* back and forth
- b). A transverse wave *oscillates* up and down

Phase

A reference point of a wave.

Imagine the frequency of a wave like the hand on a clock. The faster the hand moves, the higher the frequency. Now imagine the *phase* like the starting point of the clock hand (4 min, 38 min, etc). Two waves can have the same frequency (rate at which clock hand moves) but different *phases* (starting point of the clock hand). When we talk about phases, we are typically only interested in phase *changes*.

Sine Wave

An oscillation with a single frequency.

Cosine Wave

Differs from a sine wave by a phase change.

Constructive interference

The amplitudes of two waves *add* together, creating a wave with a *larger amplitude*

Destructive Interference

The amplitudes of two waves subtract from one another, creating a wave with a *smaller amplitude*

Coherent

Agreement (correlation) between all properties of two or more waves. If something produces coherent waves, it produces many waves of the same frequency and phase. A laser is an example of a coherent source (as opposed to sunlight, which is *not* a coherent source)

Evidence for Wave Behavior

Evidence for Particle Behavior

Photon

Duality

Path Integral

Additional Notes: