

Physics 202, Lecture 20

Today's Topics

- **Wave Motion**
 - **General Wave**
 - **Transverse And Longitudinal Waves**
 - **Wave speed on string**
 - **Reflection and Transmission of Waves**
 - **Wave Function**
 - **Sinusoidal Waves**
 - **Standing Waves**

General Waves

□ Wave:

Propagation of a physical quantity in space over time

$$q = q(x, t)$$

□ Examples of waves:

Water wave, wave on string, sound wave, electromagnetic wave, “light”, quantum wave....

□ Mechanical wave:

Propagation of small motion (“disturbance”) in a medium.

→ Physical quantity to be propagated: displacement.

Recall: Displacement is a vector.

Transverse and Longitudinal Waves

- ❑ If the direction of mechanic disturbance (displacement) is **perpendicular** to the direction of wave motion, the wave is called **transverse wave**.
- ❑ If the direction of mechanic disturbance (displacement) is **parallel** to the direction of wave motion, the wave is called **longitudinal wave**.

→ see demos.

- ❑ In general, a wave can be a combination of the above modes.
- ❑ The definition can be extended to other (non-mechanical) waves.
 - e.g **Electromagnetic waves are always transverse.**