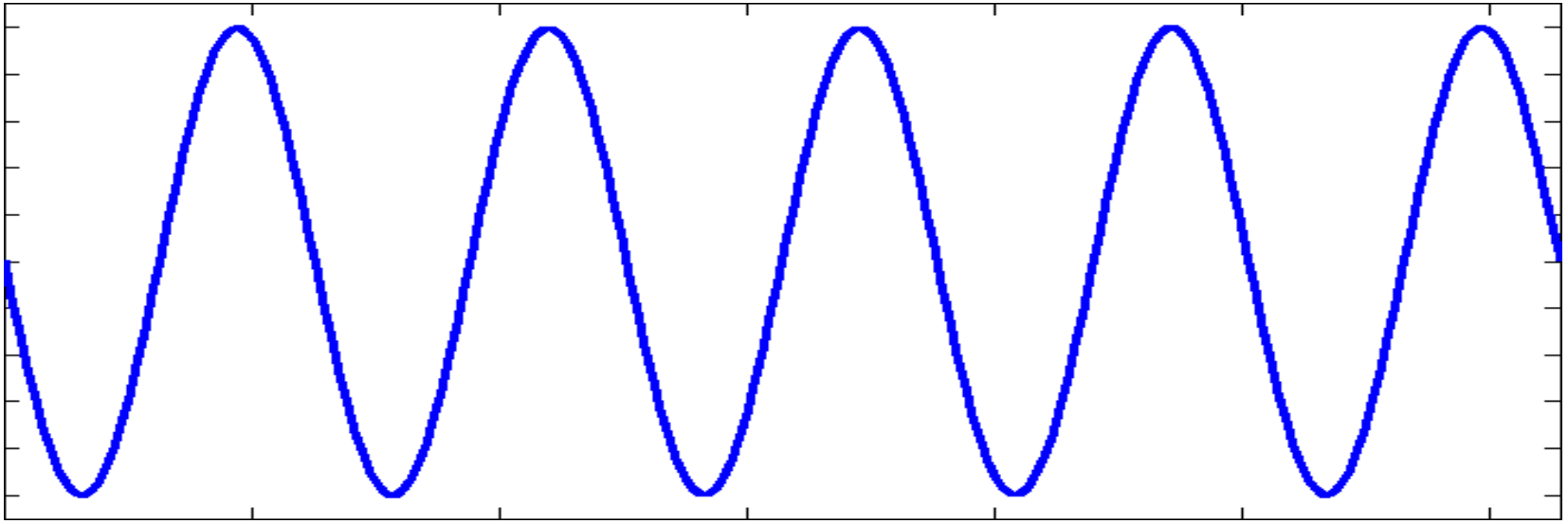
Can you identify two different kinds of mechanical waves that are created when someone plays a musical instrument?

What vibrates and where?

A traveling wave

is a wave that moves through space and matter.

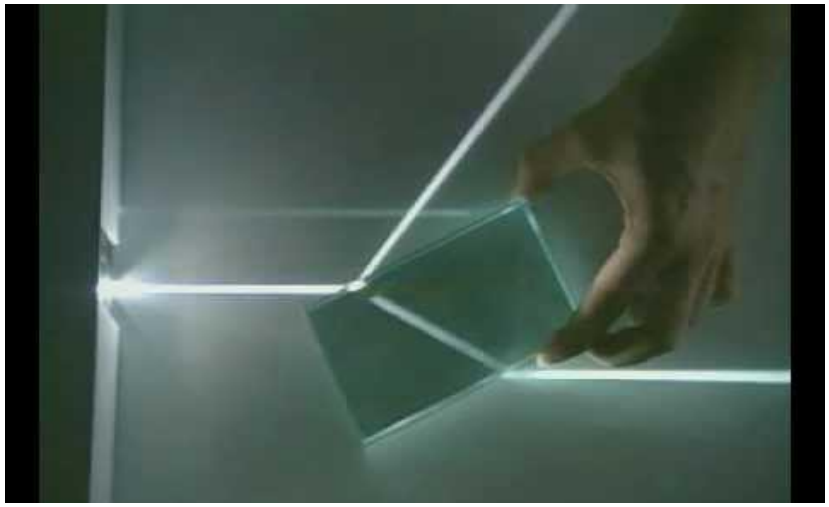


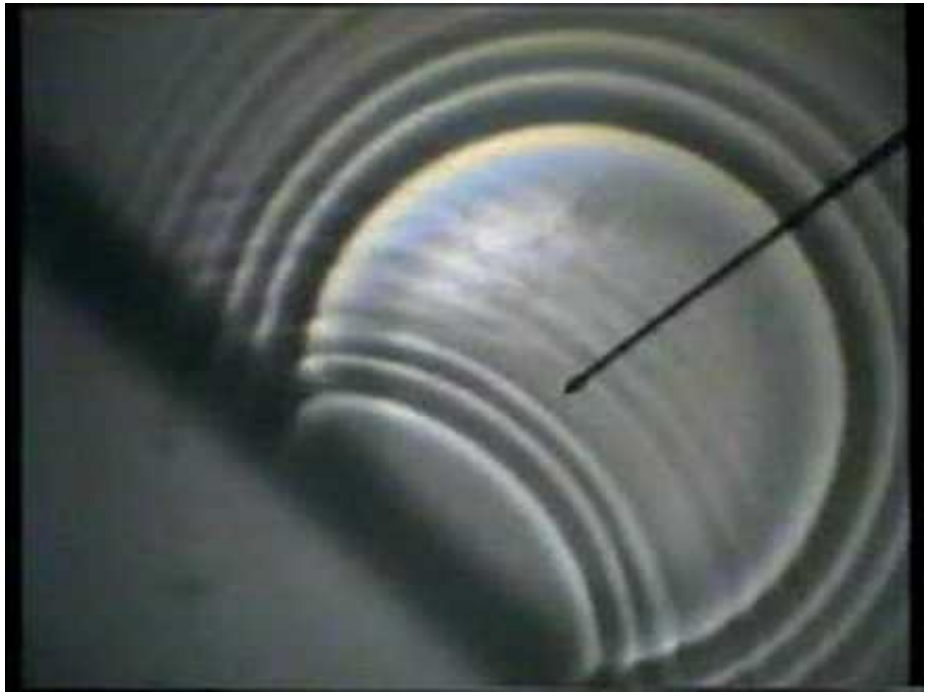
$$\text{FREQUENCY} = \frac{\text{VELOCITY(speed)}}{\text{WAVELENGTH}}$$

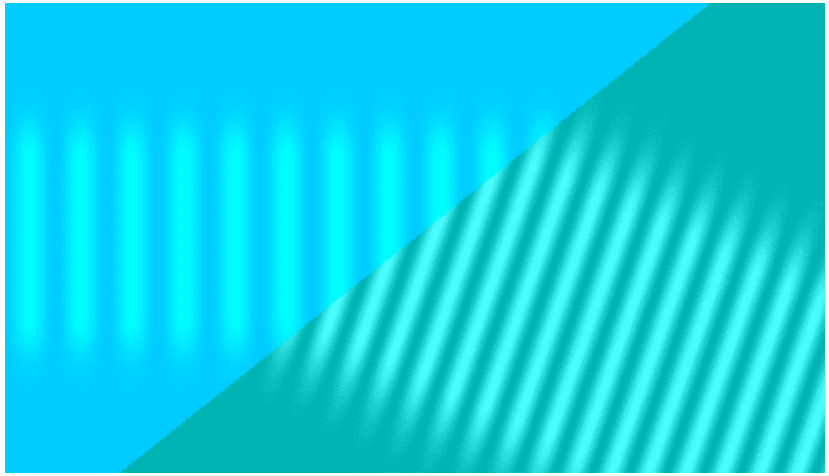
$$f = \frac{v}{\lambda}$$

Light and sound are both examples of traveling waves.

Traveling waves can **reflect** off objects and surfaces…





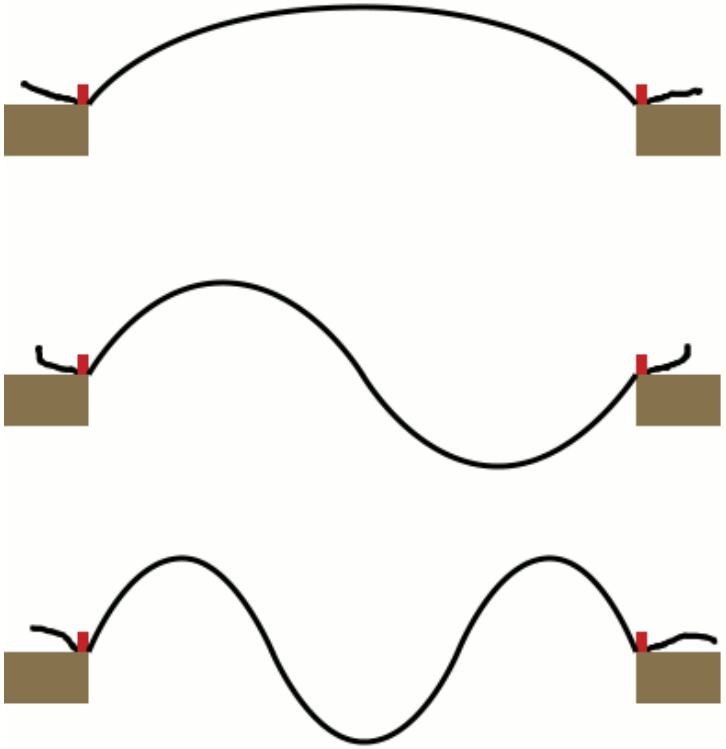


…and **refract** - change their direction when entering a different medium at an angle.

A standing wave

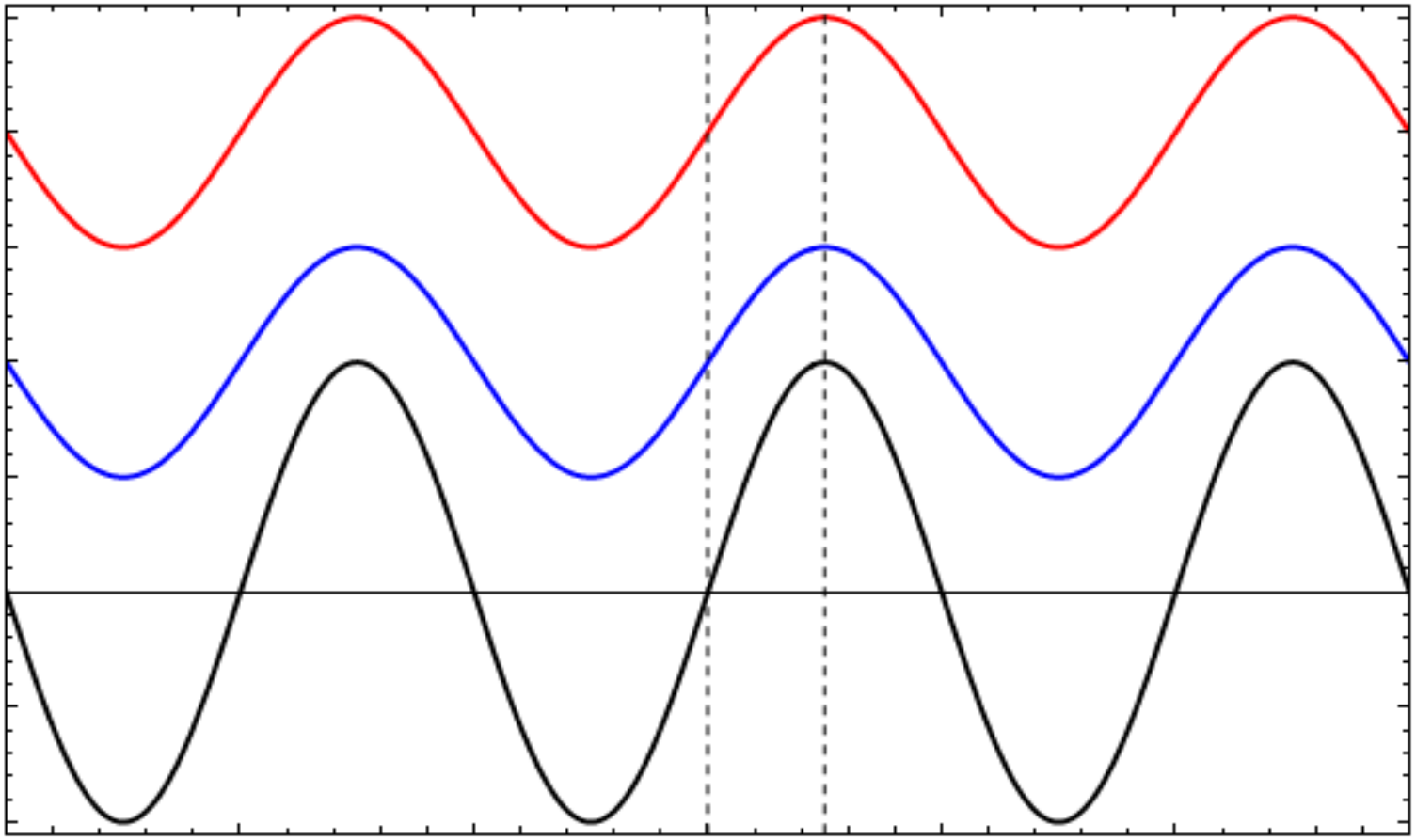
(also called a stationary wave)

is a wave that oscillates in one constant position.



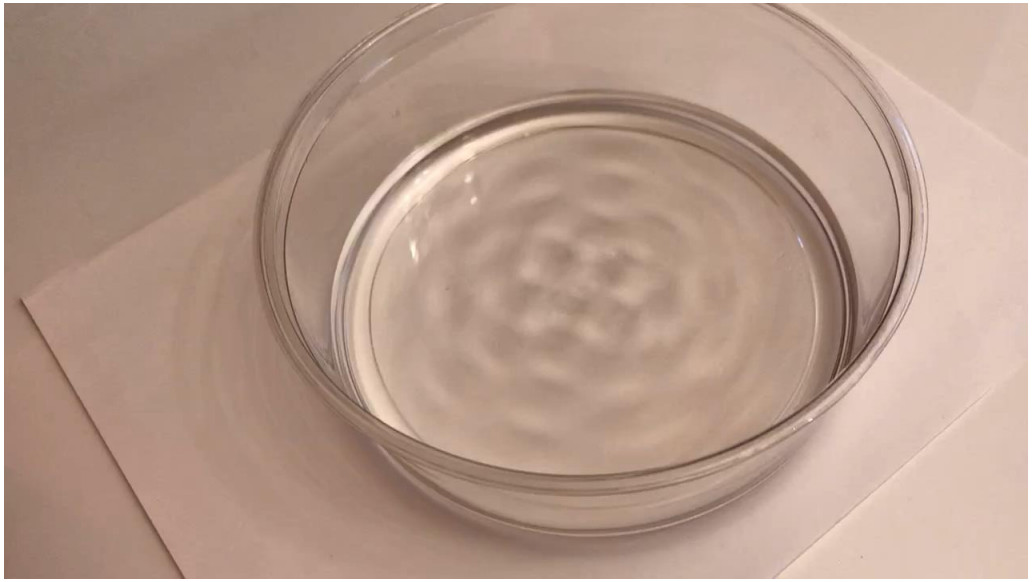
A vibrating guitar string is an example of a standing wave.

To make a standing wave…



…combine two travelling waves
that go in opposite directions!

A standing wave pattern forms when vibrations are confined.



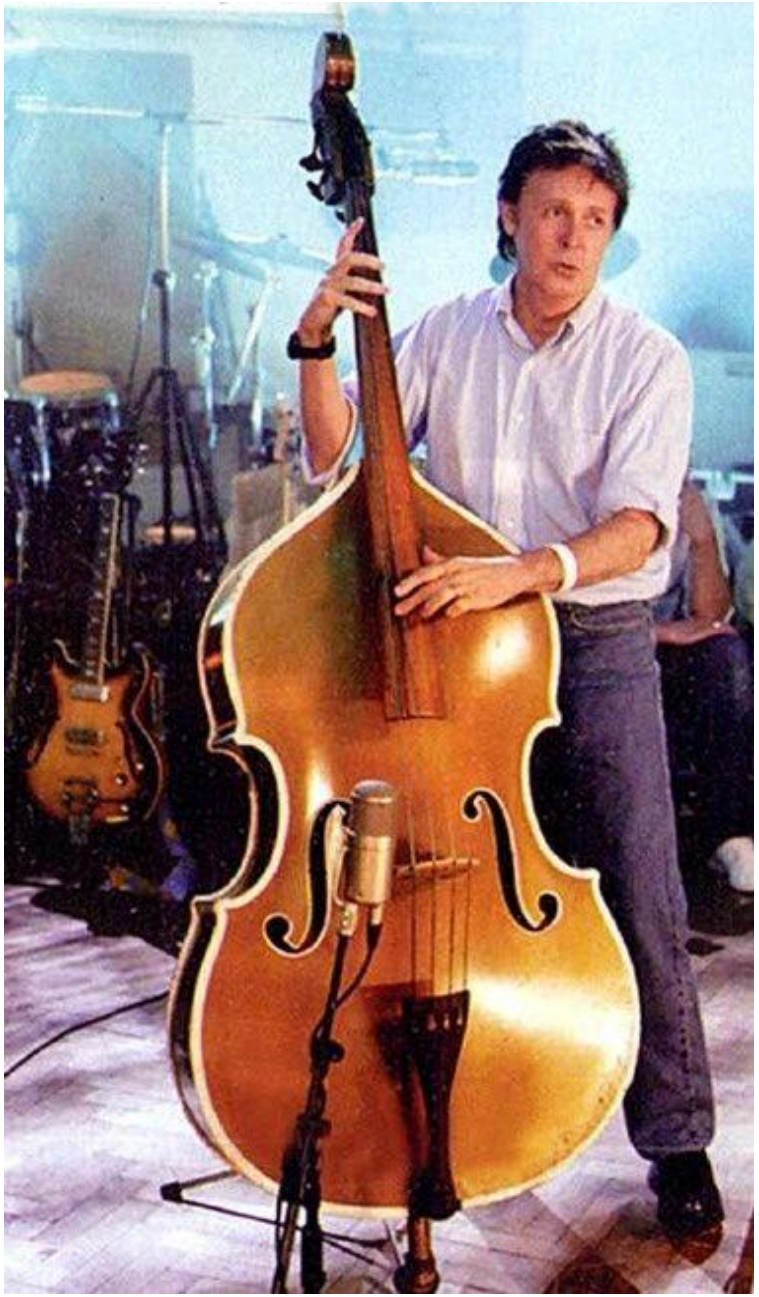
Watch out for hot spots!

In microwave oven, standing waves are created in the chamber due to reflection from metal surfaces.

This is exactly what causes hot spots and cold spots in the food. The rotating turntable moves the food around to mitigate this effect.

Can you identify two different kinds of vibrations that are created when someone plays a string instrument?

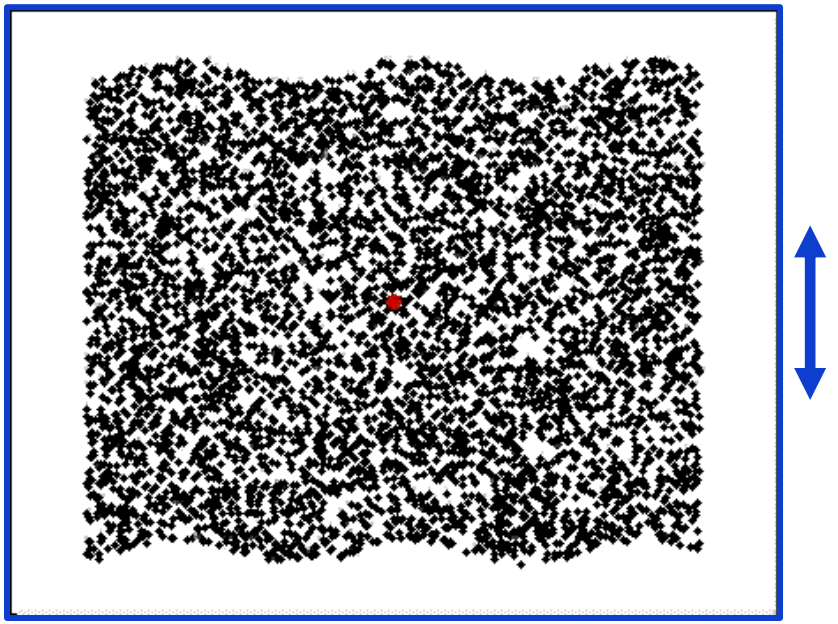
Now think about not only what vibrates but how exactly it vibrates!



Watch the particles!

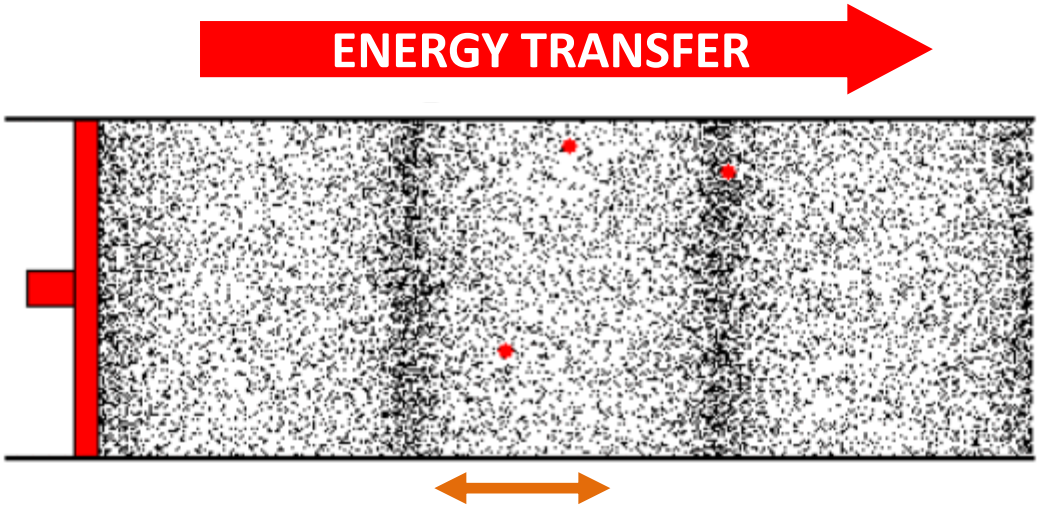
1. STRING vibration

oscillations are perpendicular to the direction of the energy transfer (or wave propagation)



2. AIR vibration

oscillations are parallel (same direction) to the propagation of the wave.



Types of mechanical waves

LONGITUDINAL WAVE

"compression-expansion"

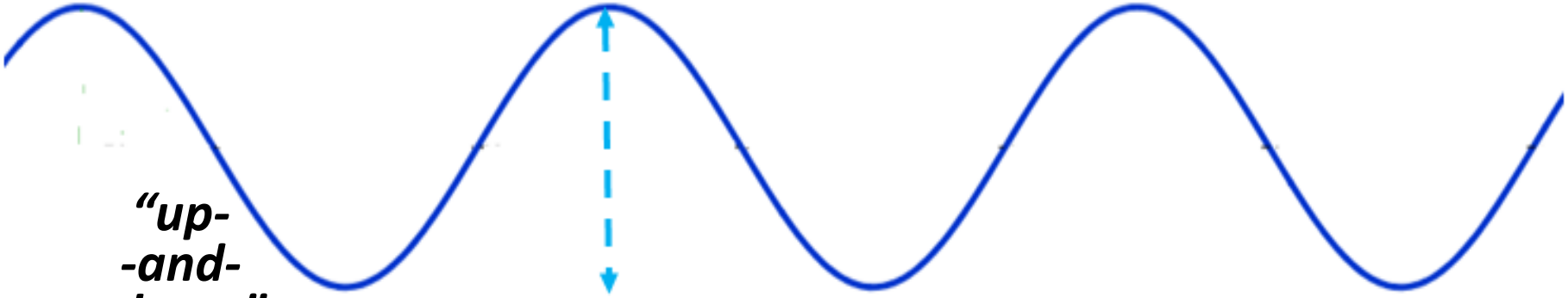
(or "forward-and-back")

can travel through solids, liquids and gases

TRANSVERSE WAVE

"up--and--down"

(or "side-to-side")

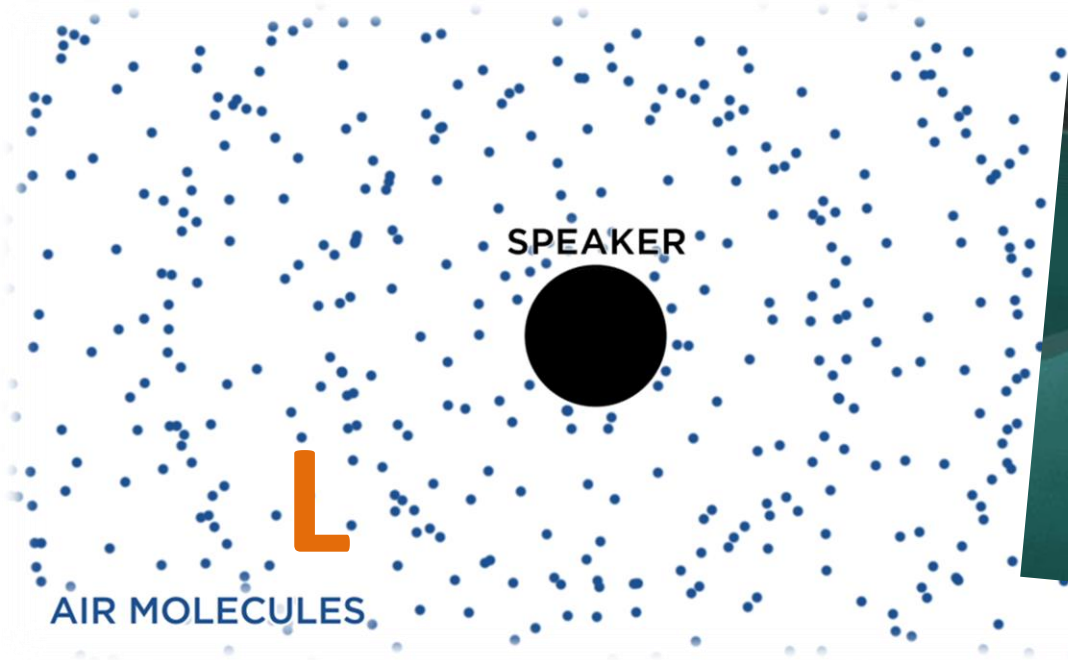


cannot travel through gases

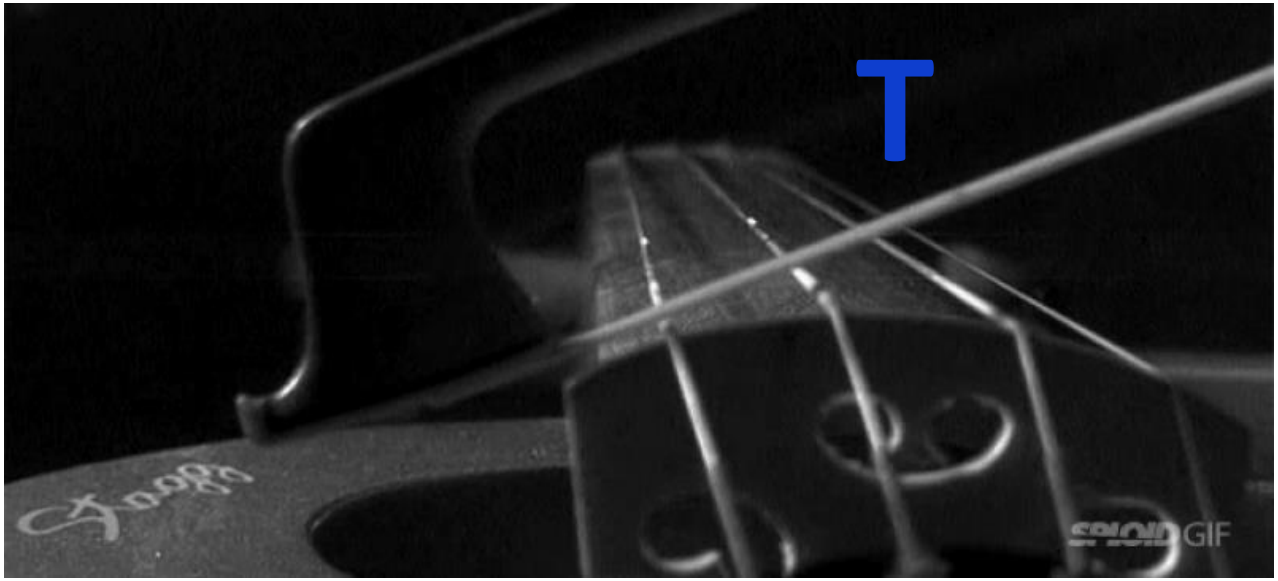
Let's classify!

T

T+L



And some more!



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