

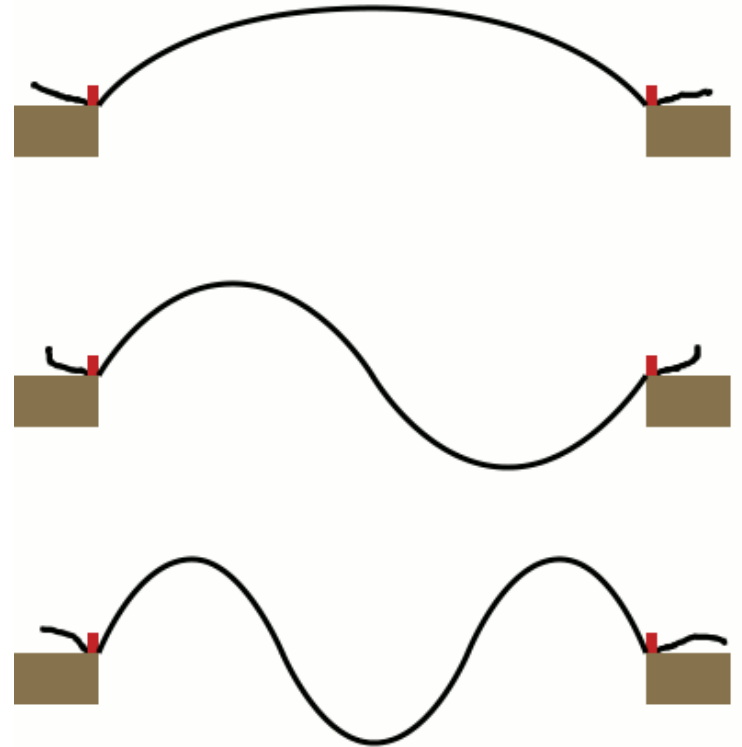
# Exercise: match wave parameters with their descriptions.

ANSWER	PARAMETER	DESCRIPTION
<b>C</b>	CREST	A. Maximum amount of vibration from the rest position; can be measured to the crest or to the trough.
<b>G</b>	THROUGH	B. The <u>distance</u> over which the wave's shape repeats itself in space.
<b>F</b>	NODE (REST)	C. The highest (maximum) point of a wave.
<b>A</b>	AMPLITUDE	D. Number of waves per second.
<b>B</b>	WAVELENGTH	E. The <u>time</u> it takes to make one complete vibrational cycle.
<b>E</b>	PERIOD	F. Equilibrium position of a wave.
<b>D</b>	FREQUENCY	G. The lowest (minimum) point of a wave.

# A standing wave

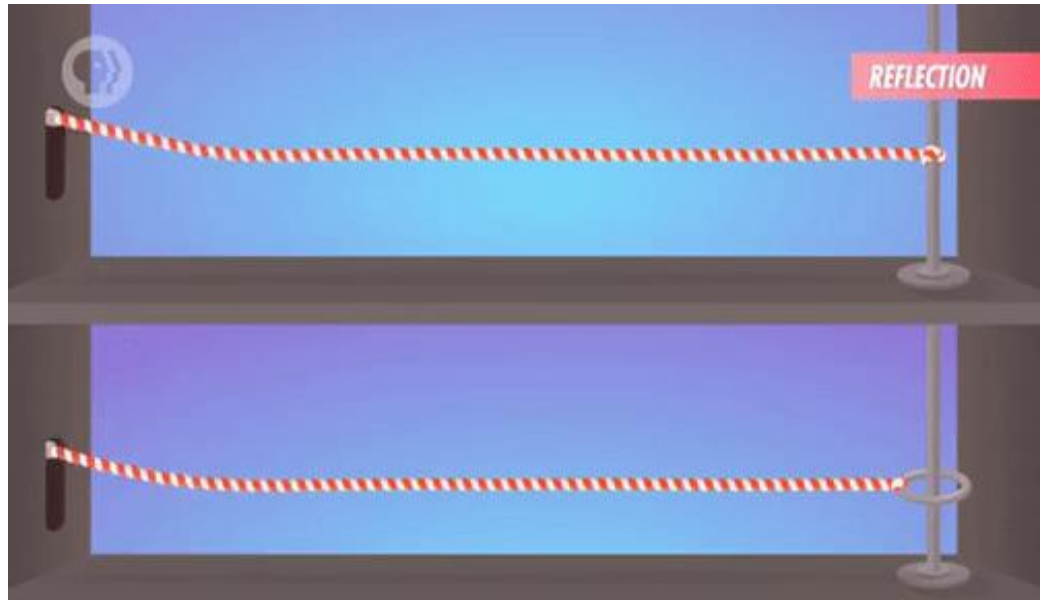
(also called a stationary wave)

is a wave that oscillates in one **constant position**.

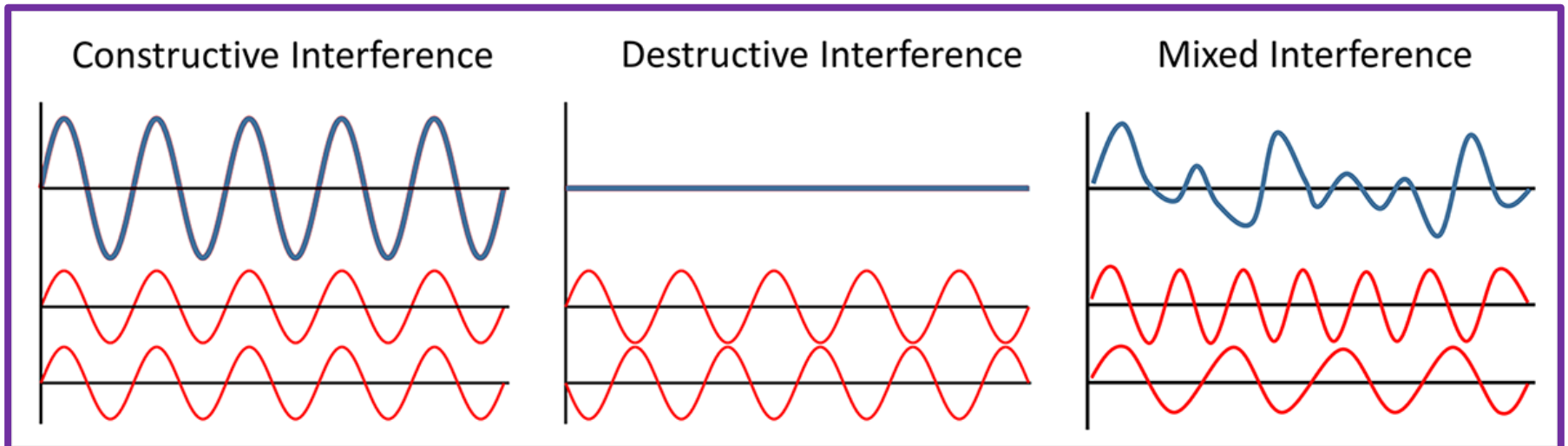


A vibrating guitar string is an example of a standing wave.

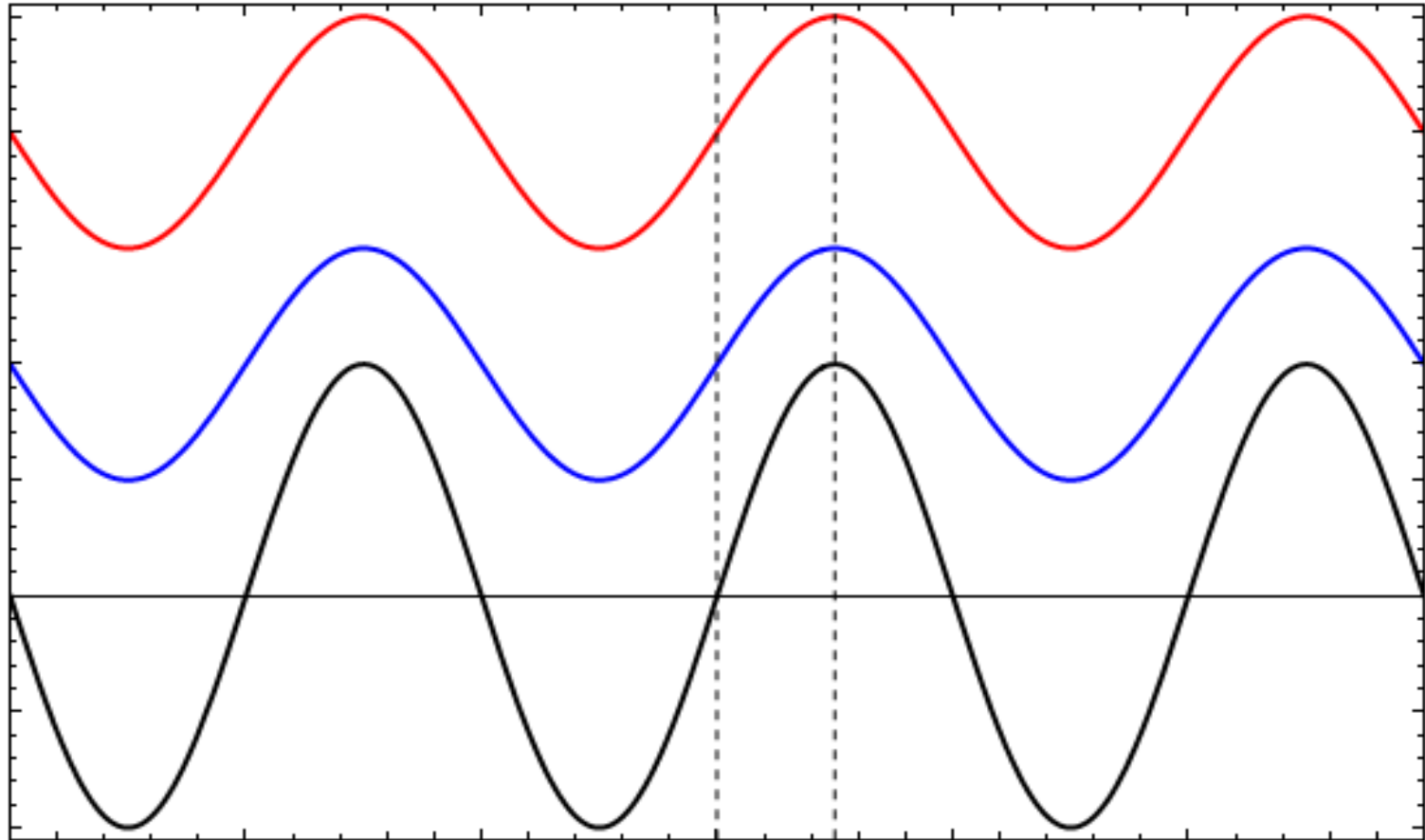
Traveling waves can **reflect** off objects and boundaries...



...and **interfere** (combine)

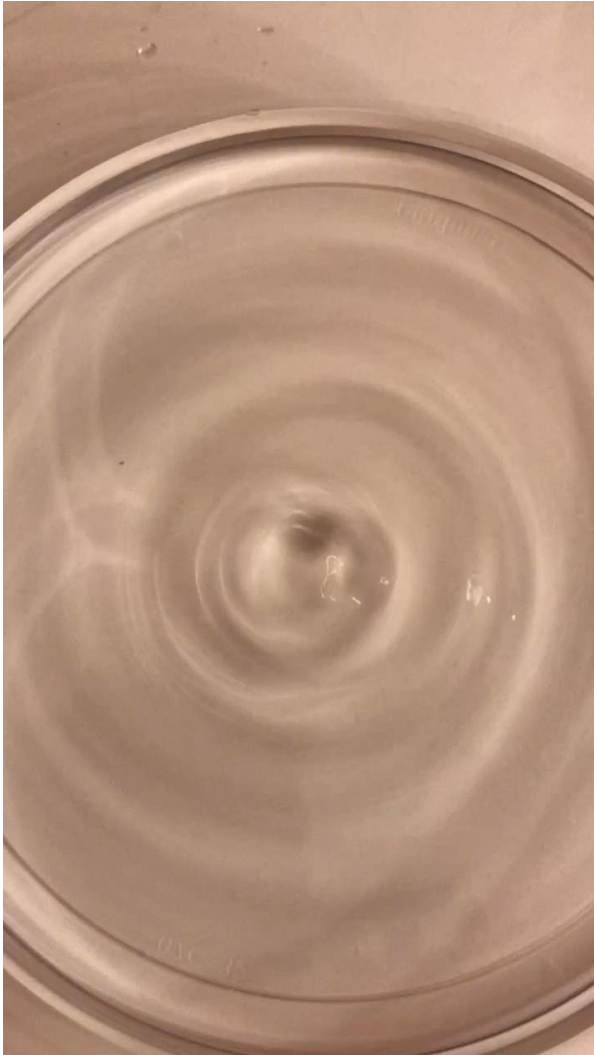


**To make a standing wave...**



**...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.

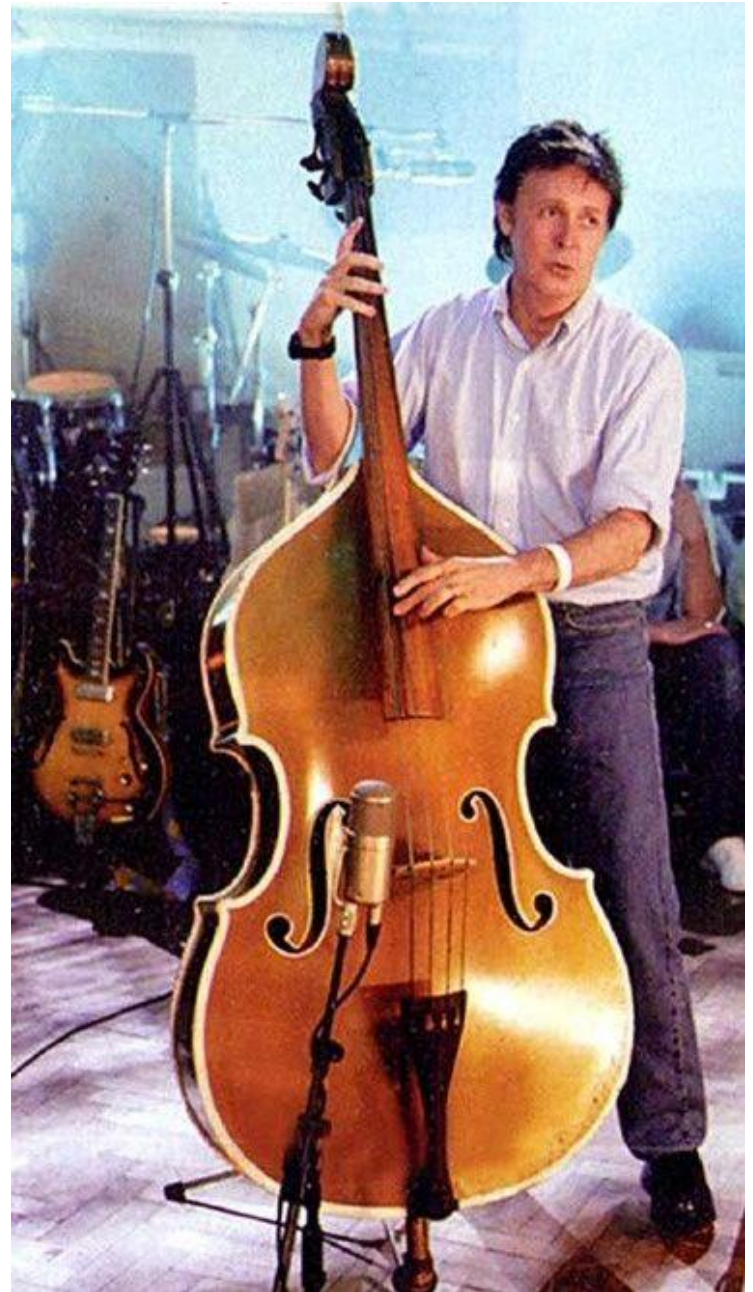


This is exactly what causes hot spots and cold spots in the food. The rotating turntable moves the food around to mitigate this effect.



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

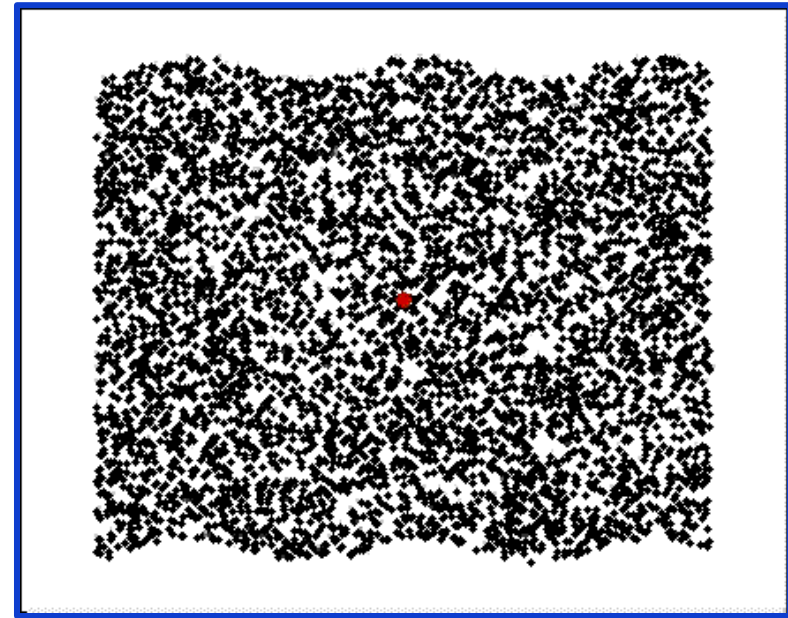
*Think about not only*  
***what*** vibrates but ***how***  
***exactly*** it vibrates!



# Watch the particles!

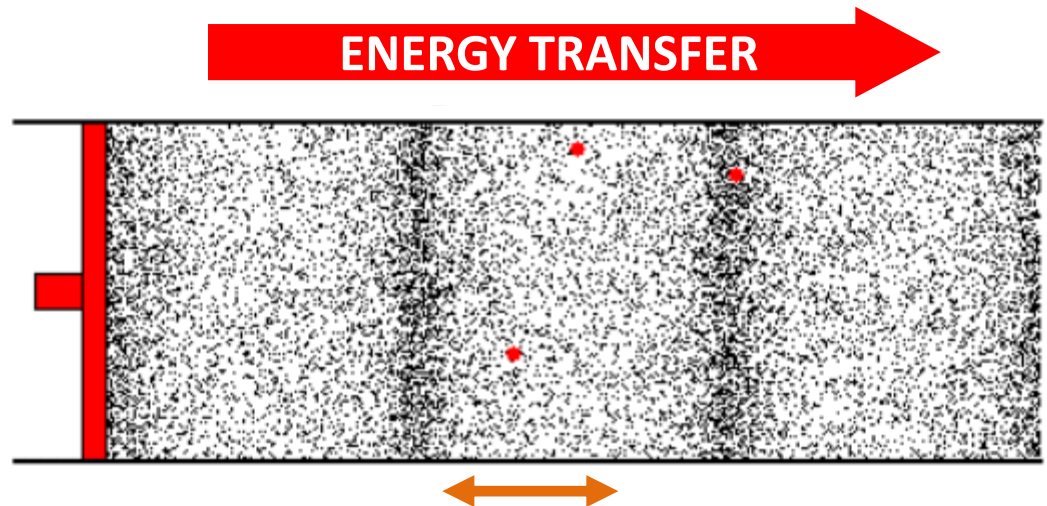
## 1. STRING vibration

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

can travel through solids, liquids and gases

*“compression-expansion”*



← - - - - →  
Vibration of particles

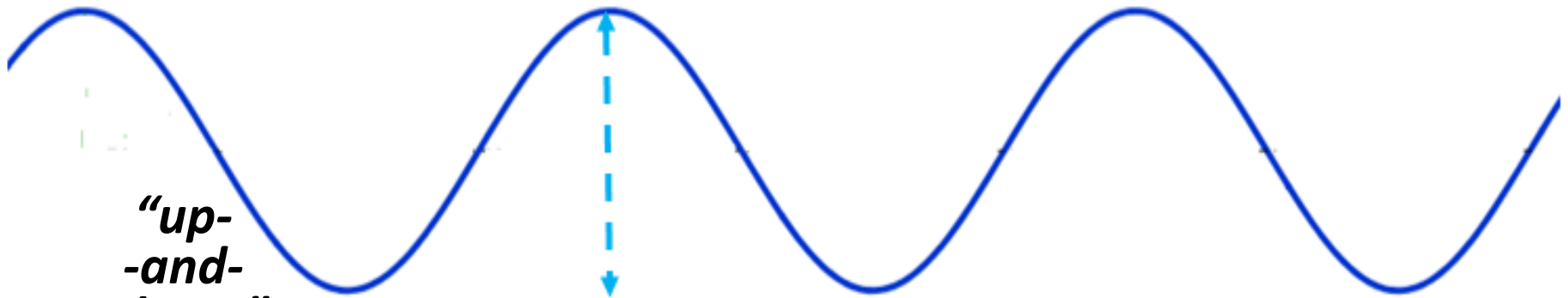
→  
Direction of Energy Transfer

*“up-  
-and-  
-down”*

Vibration of particles

## TRANSVERSE WAVE

cannot travel through gases

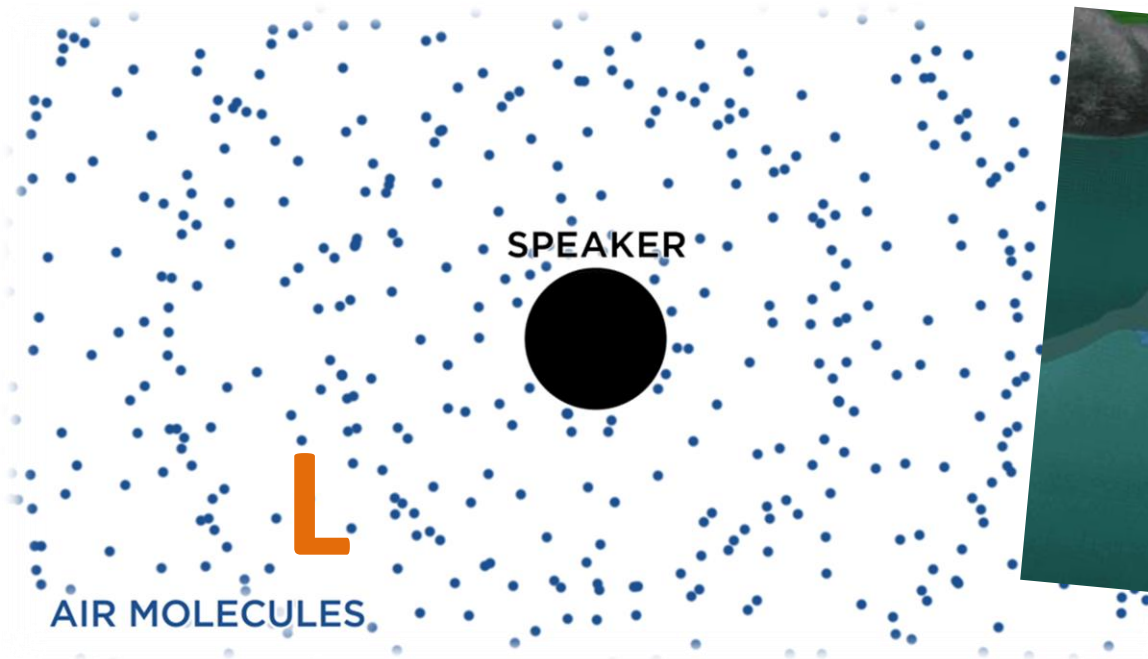


# Let's classify!

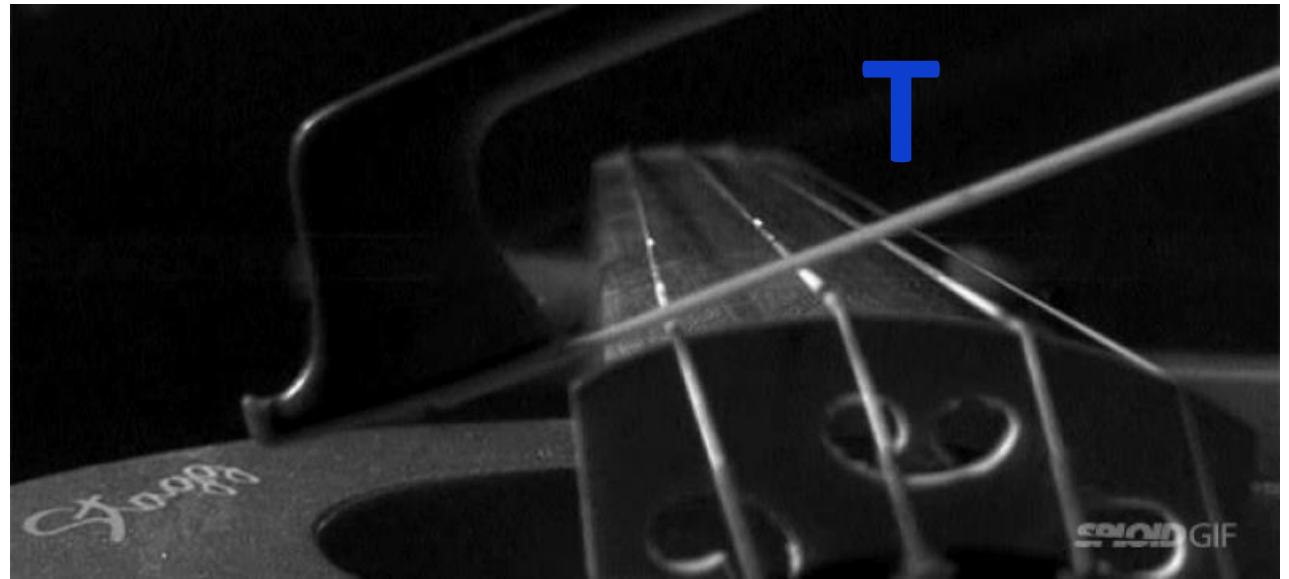
T



T



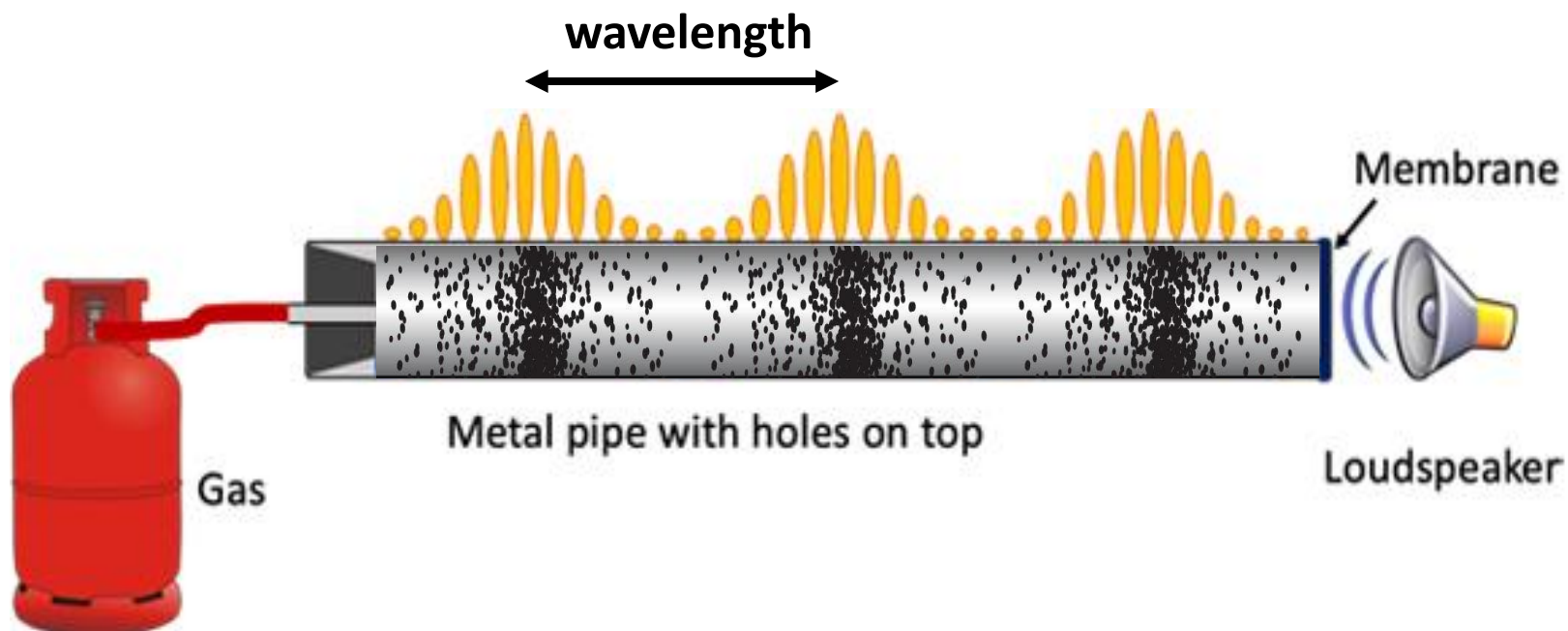
And  
some  
more!



# Ruben's Tube

Invented by German physicist Heinrich Rubens in 1905

visualizing sound waves



<https://www.youtube.com/watch?v=1ZcOusmB4Ls>