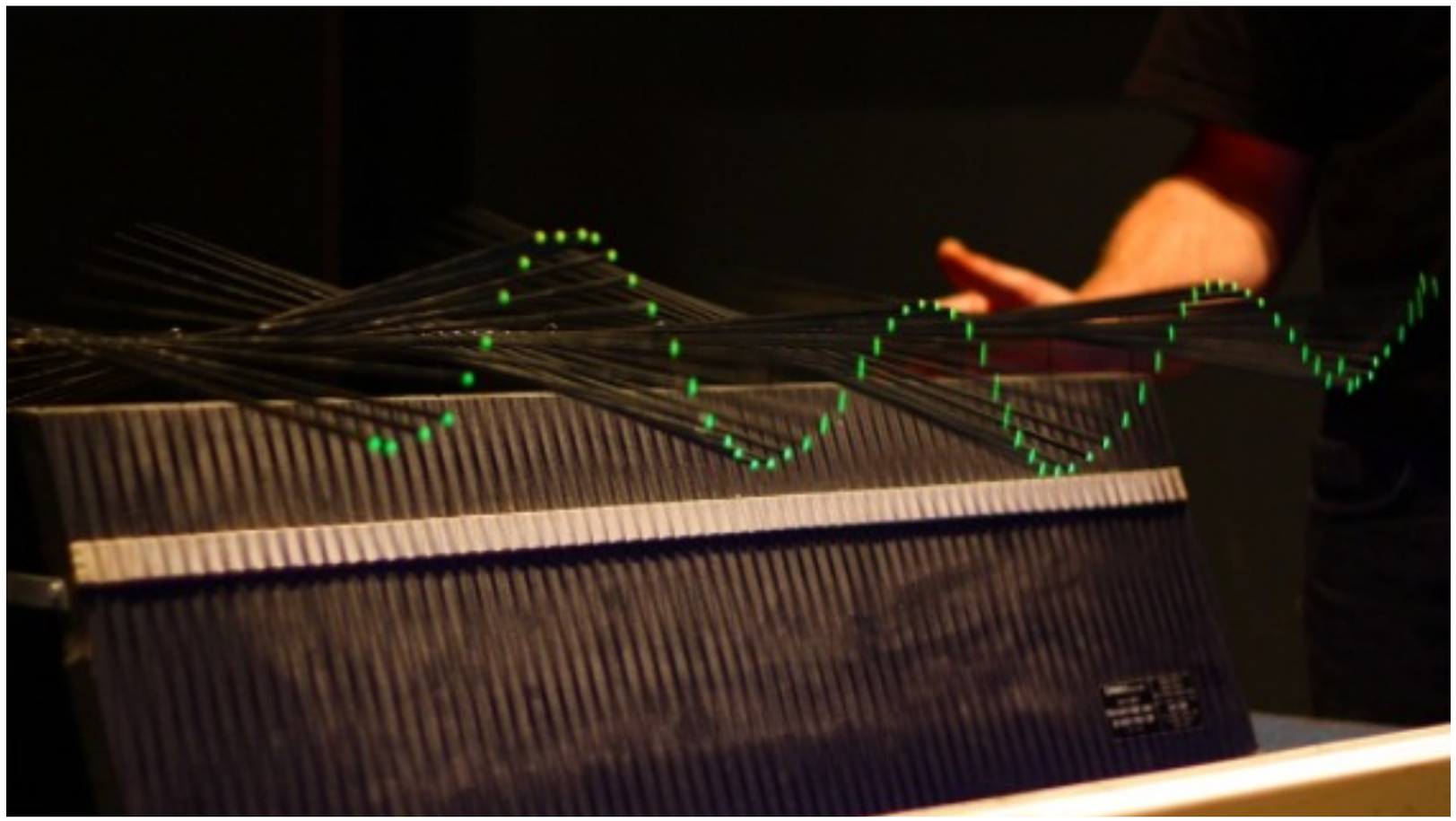
Boundary Behavior

- Energy is transmitted through a medium.
- When it reaches the end of the medium, there is nowhere to transfer the energy.
- The energy begins to bounce back through the medium.



Demo

Reflection

- The impulse wave reaches the end of the medium and is reflected back through the medium.
- The wave inverts during reflection.

Transmission

- Some of the energy is transferred to the next medium.
- This vibrates the second medium.
- Some energy is lost to it and the reflected wave is smaller.

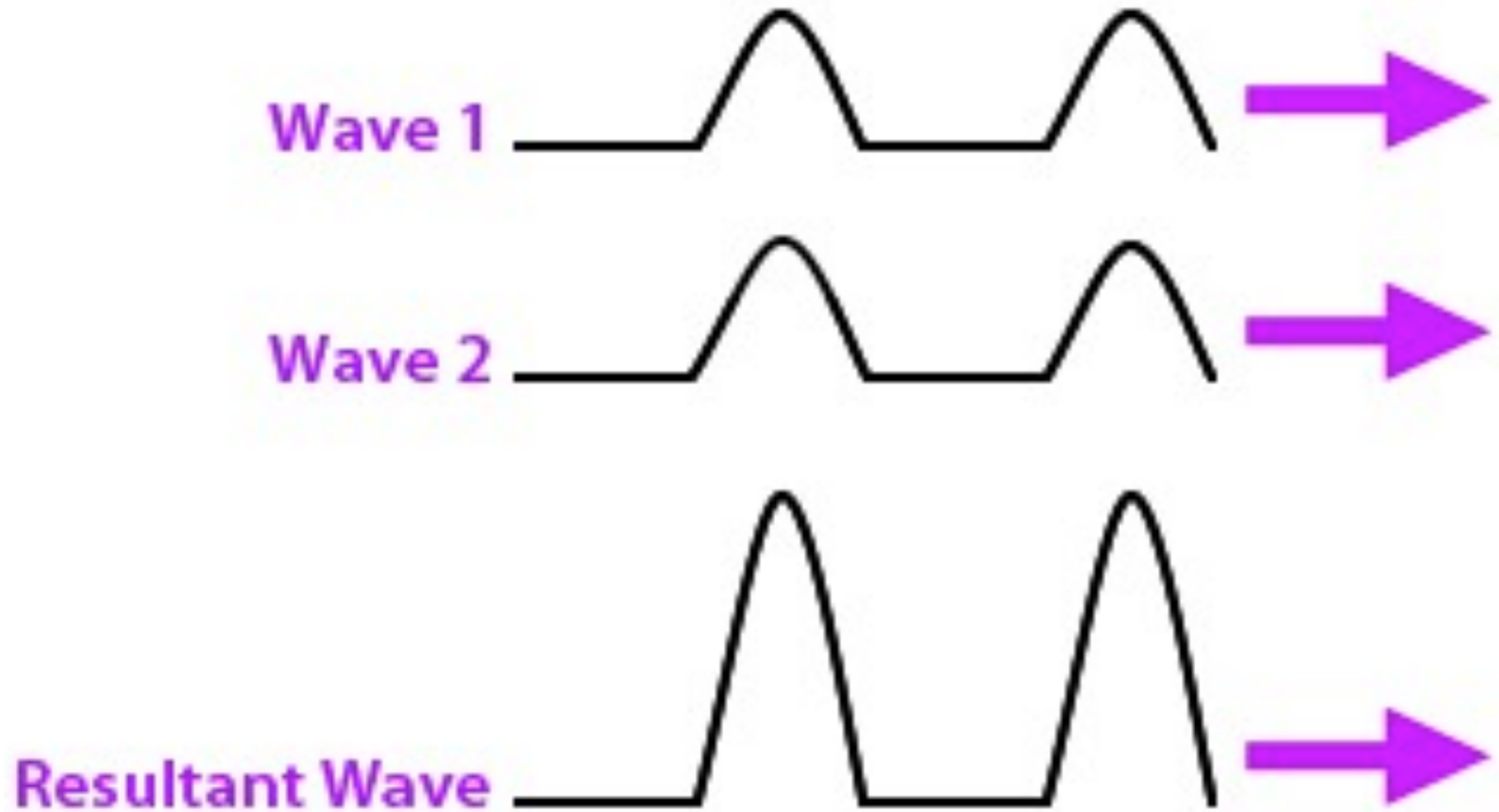
Interference

Interference

- Two (or more) waves meet.
- The energy of the waves combine.
- This causes a change in the amplitude of both waves.
- If they meet head on, the energy could cancel out.

Constructive Interference.

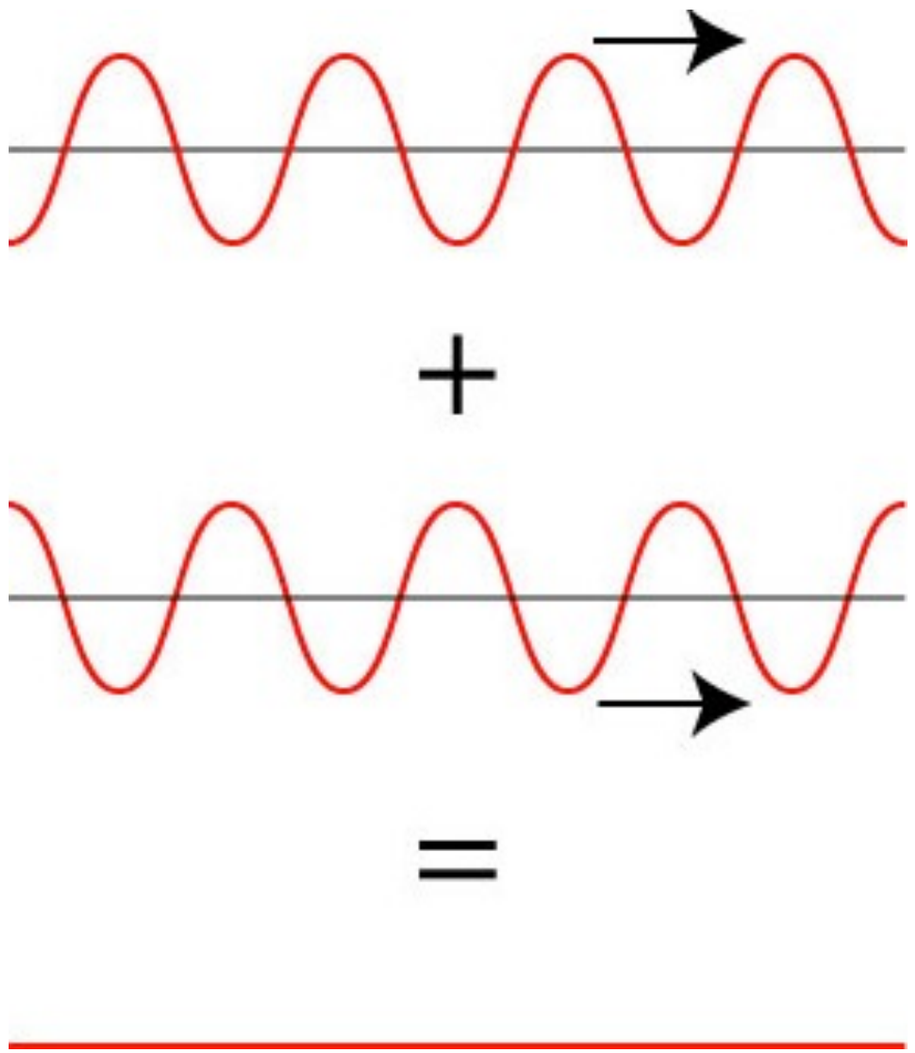
- To wave with the same orientation meet.
- This could be head on or in the same direction.
- Their energies combine.
- The result is an amplitude that is twice that of one wave by it self.



Example

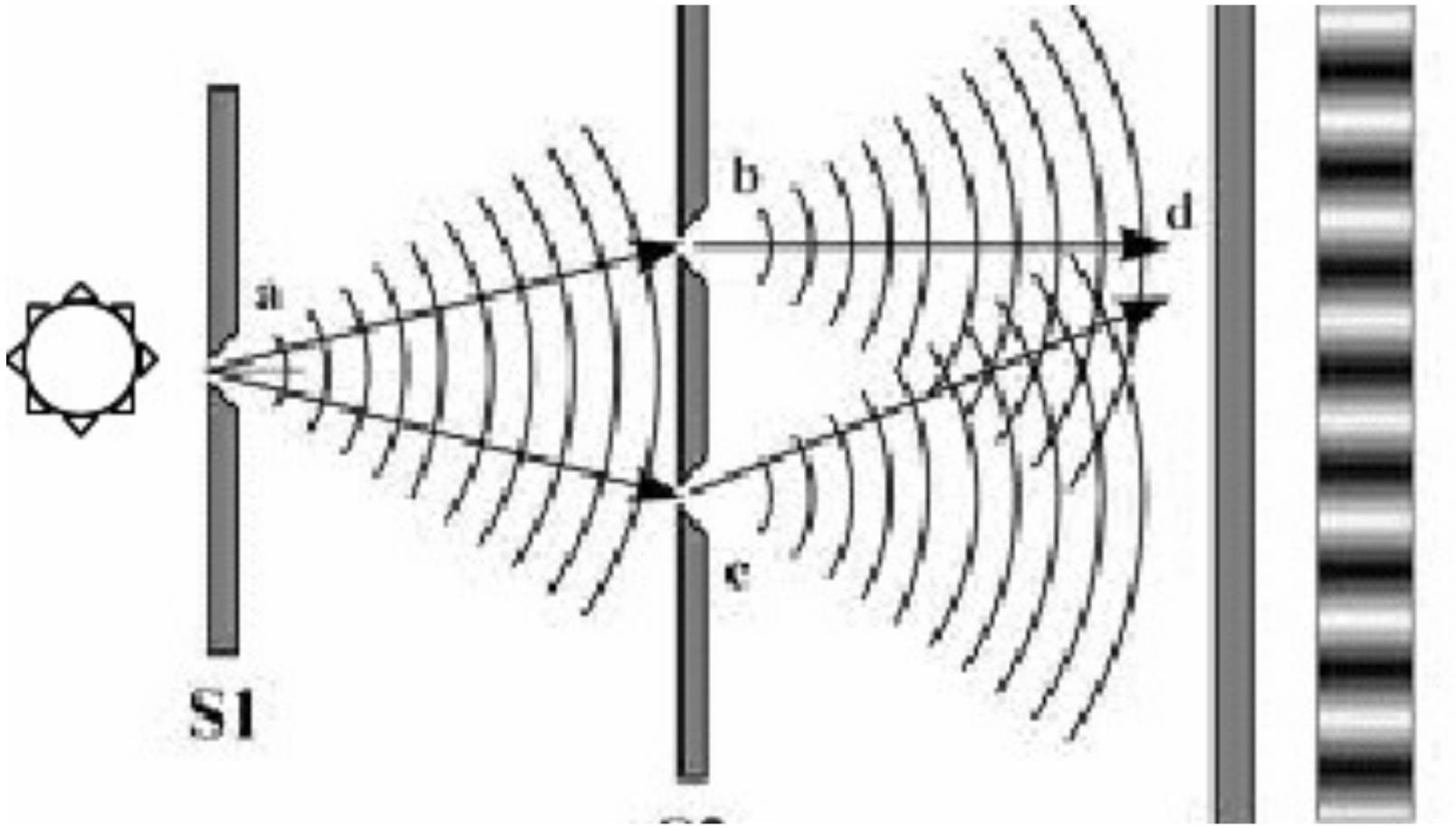
Destructive Interference

- Waves with opposing orientations meet.
- The energy of each wave opposes the other.
- This creates a neutralization.
- The result is a wave form that is smaller than either original wave.



Implications

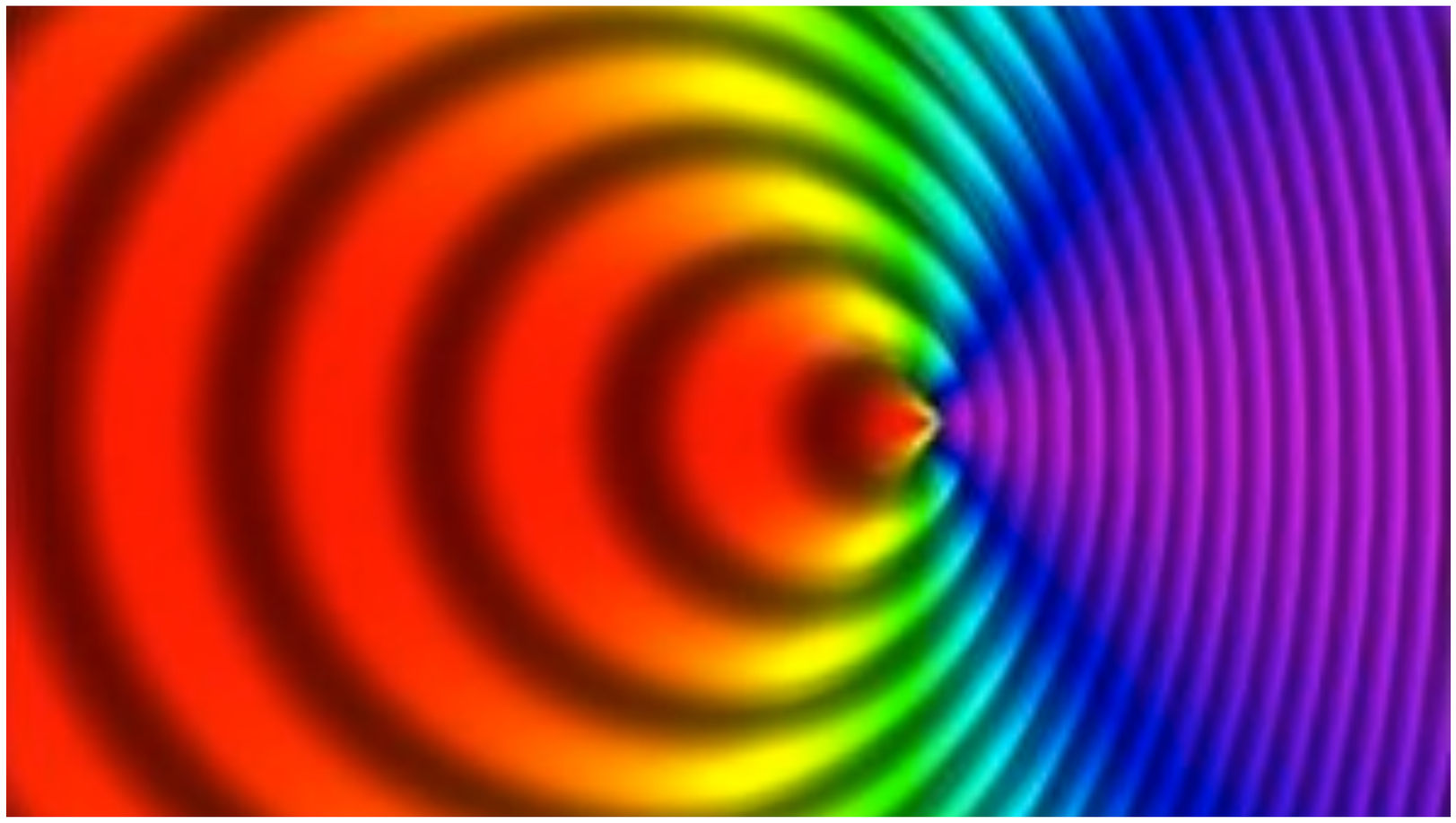
- Most waves travel from a source in all directions.
- If there are two sources, there are points where there is both constructive and destructive interference.



Young's Double Slit

The Original Double Slit Experiment

Video Expo



Doppler Effect

Moving Source

- A siren on a fire engine is on.
- It moves down the street.
- When it passes you what happens?

Before and After

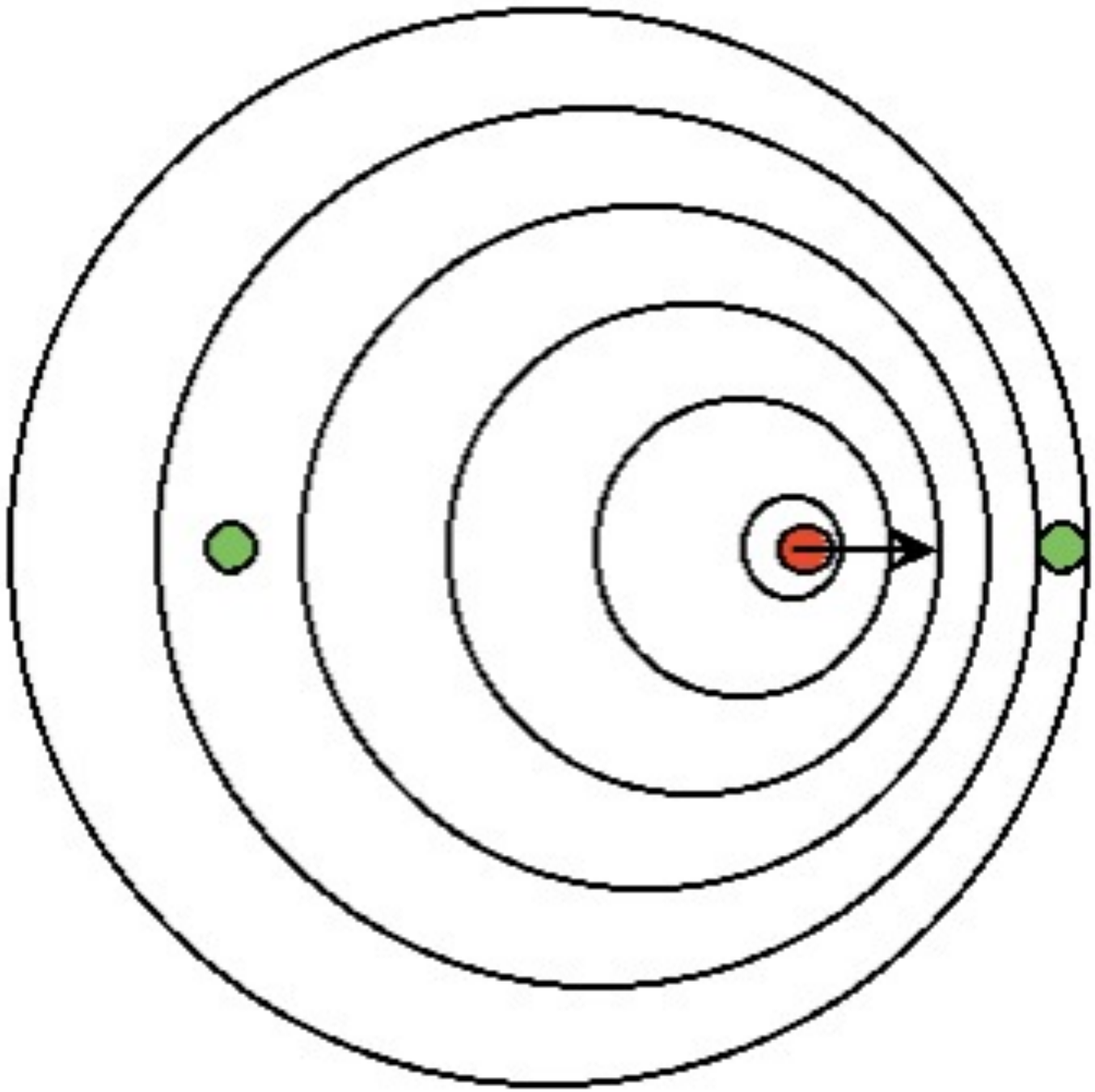
- As the siren approaches, the sound waves are closer together and move faster.
- This gives the effect of having a shorter wavelength and higher frequency.
- The opposite is true when the siren passes you and moves away from you.

Moving Toward You

- We assume that the speed of sound in air is about 345m/s.
- If the source is moving toward you at 10m/s, the speed appears to be faster.
- Fobserved=((Vsound + Vsource)/ Vsound)xFsource.

Moving Away

- We assume that the speed of sound in air is about 345m/s.
- If the source is moving away from you at 10m/s, the speed appears to be faster.
- Fobserved=((Vsound - Vsource)/ Vsound)xFsource.



Illustration

A siren plays a tone of 600Hz. The car passes you at 37m/s. What is the perceived frequency of the siren before and after the car passes you?

A bullet train passes you going 120m/s. If the train has a whistle with a frequency of 532Hz, what is the perceived frequency of the whistle before and after the train passes you?

Doppler and Wavelength

- $C=\lambda V$
- If we know the speed of sound (345m/s) and the frequency (V) we can determine the perceived wavelength.

A siren plays a tone of 600Hz. The car passes you at 37m/s. What is the perceived wavelength of the tone before and after the car passes you?

A bullet train passes you going 120m/s. If the train has a whistle with a frequency of 532Hz, what is the perceived wavelength of the whistle before and after the train passes you?