Doppler effect

Do you ever notice how sometimes when you are sitting in the car and hear the ambulance it seems to take forever for it to come around you? Or how about times when you yell “ hey you” or “ mom” in a grocery store standing in the middle of the aisle people from all directions can hear you…. and some even answer? Or lastly how about this example, have you ever seen an insect in the water kicking and it seems if the ripple is getting bigger and bigger and the waves are going in all directions not just straight back? If so, then you’ve experienced The Doppler Effect.

The Doppler Effect is defined by the Encarta dictionary as, “ Change in frequency because of motion: a perceived change in the frequency of a wave as the distance between the source and the observer changes. For example, the sound of a siren on a moving vehicle appears to change as it approaches and passes an observer. ” (Dictionary, 2009) Named after Austrian physicist and mathematician Christian Johann Doppler, our book defines the Doppler Effect as a change in a wave’s frequency due to motion of the source as measured by an observer. Simply saying, a waves frequency can be altered due to motion.

But how do we see this or know when the frequency of a wave length has changed? Can we observe these wave lengths, or maybe notice a change in sound or pitch? The Doppler Effect is proven through many types of waves. Consequently, waves travel through many different mediums. Water waves are spread across different flat surfaces of water. On the other hand, sound and light waves travel in 3D space in all different kinds of directions. The change in pitch from high to low, depending on the movement of the observer can be seen through the example below.

The sound waves change in wavelength, caused the change of frequency as heard by the observer. This is the evidence of the Doppler effect as shown below. Light waves also experience the Doppler Effect. As light waves come closer to the source, the frequency increases making it brighter. This is called a blue shift due to the increase at the blue end of the color spectrum. When the light waves recede, the frequency decreases and it gets darker. This is called a red shift due to a shift in the lower frequency towards the red end of the color spectrum. The Doppler Effect is also used in the scientific branch of astronomy.

Astronomers and physicists use the Doppler Effect to determine the relative location of the stars and other galaxies. First proposed and observation made by American astronomer Edwin Hubble, the galaxies show a red shifting in the light they emit. He noted that the red-shifting in the light emitted must’ve meant the galaxies were moving away from Earth. He continued his observation and results with saying, the farther a galaxy is away from Earth the faster it is moving away. We now have evidence of galaxies moving far and wide from earth, so we can concur that the universe is constantly changing and expanding.