

INTEGRATING PHYSICS**● Red Shift, Blue Shift**

Light can be described as traveling in the form of waves. The distance from the crest (top) of one wave to the crest of the next wave is the wavelength. Each color that the human eye can see has a different wavelength. The longest visible wavelengths are in the red end of the spectrum. The shortest visible wavelengths are in the blue end of the spectrum.

The wavelength of light that an observer sees coming from an object depends on the motion of the object relative to the observer. If either the object or the observer moves, the wavelength will change. The relationship between motion and observed wavelength is called the Doppler effect.

When a Blue Shift Occurs

If a star is moving toward Earth, each light wave that it emits will be released closer to Earth than the previous wave. To an observer on Earth, the distance between wave crests will be smaller than if the star were at rest relative to Earth. The observer would see light that has a shorter wavelength than it had when it was emitted. In this example, the light has shifted toward the blue end of the spectrum, making what is called a blue shift.

When a Red Shift Occurs

If the star is moving away from the observer, the distance between crests appears longer. The observer sees light of a longer wavelength than it had when it was emitted. In this case, the observed light has made what is called a red shift.

Your Turn to Think

1. An astronomer discovers two stars. Both stars appear red, but Star A appears redder than Star B. What can the astronomer conclude?
2. If an astronaut in a spacecraft saw a star ahead that seemed to be growing bluer as time passed, what might she assume about the motion of the object relative to the spacecraft? List four possibilities.
3. How could the Doppler effect be applied to determine if a celestial body is rotating, and, if it is rotating, in which direction it rotates?