What is Light?

Light plays a vital role in our daily lives and has become an important tool in meeting the needs of our 21st century world. Light-based technologies protect health and safety, provide sustainable energy, enable space explorations, advance lighting options in rural areas, enable communication via the Internet, and hold the promise of limitless possibilities to improve the human condition and protect the earth.

Light is part of the electromagnetic radiation spectrum and is a form of energy. Light is usually considered to be the visible part of the spectrum. However, in physics, light can be defined as all portions of the electromagnetic scale, including invisible forms such as infrared, ultraviolet, X-rays, radio waves, and more.

Electromagnetic waves can be described by their wavelengths, energy, and frequency.

Wavelength (λ) - Light waves are vibrations in the electromagnetic field. The wavelength of a light wave is measured as the distance between two wave crests. Light wavelengths can vary greatly; for example, radio waves can be about the size of small buildings, while gamma rays are subatomic size.

Frequency (ν) - The number of wave crests passing by a fixed point in a given time period—usually one second—is called frequency. Frequency is measured in hertz (Hz). Higher-frequency waves have shorter wavelengths.

Energy (E) - The greater the energy, the higher the frequency and the shorter (smaller) the wavelength. Given the relationship between wavelength and frequency—the higher the frequency, the shorter the wavelength—it follows that shorter wavelengths are more energetic than long wavelengths.

This full-color image was taken from a new NASA movie of the sun based on data from NASA's Solar Dynamics Observatory, or SDO, showing the wide range of wavelengths—visible to the naked eye—shed by the Sun. The Sun’s surface is shown in different colors to help scientists understand different parts of the Sun. The Sun’s surface is shown in different colors to help scientists understand the Sun's inner workings and the processes that take place on the Sun's surface, helping to paint a complete picture of our star.