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In the mid-19th century, light was described by James Clerk Maxwell in terms of electromagnetic waves, but 20th-century physicists showed that it exhibits properties of particles as well; its carrier particle is the...

Light is a transverse, electromagnetic wave that can be seen by the typical human. The wave nature of light was first illustrated through experiments on diffraction and interference. Like all electromagnetic waves,...

Light is electromagnetic radiation that can behave as both a particle (photon) and a wave. It travels at 300 million meters per second in a vacuum. When light interacts with matter, it can be transmitted, reflected,...

The main source of natural light on Earth is the Sun. Historically, another important source of light for humans has been fire, from ancient campfires to modern kerosene lamps. With the development of electric lights and power systems, electric lighting has effectively replaced firelight.

Generally, electromagnetic radiation (EMR) is classified by wavelength into radio waves, microwaves, infrared, the visible spectrum that we perceive as light, ultraviolet, X-rays and gamma rays. The designation "radiation" excludes static electric, magnetic and near fields.

The behavior of EMR depends on its wavelength. Higher frequencies have shorter wavelengths and lower frequencies have longer wavelengths. When EMR interacts with single atoms and molecules, its behavior depends on the amount of energy per quantum it carries.

EMR in the visible light region consists of quanta (called photons) that are at the lower end of the energies that are capable of causing electronic excitation within molecules, which leads to changes in the bonding or chemistry of the molecule. At the lower end of the visible light spectrum, EMR becomes invisible to humans (infrared) because its photons no longer have enough individual energy to cause a lasting molecular change (a change in conformation) in the visual molecule retinal in the human retina, which change triggers the sensation of vision.

There exist animals that are sensitive to various types of infrared, but not by means of quantum-absorption. Infrared sensing in snakes depends on a kind of natural thermal imaging, in which tiny packets of cellular water are raised in temperature by the infrared radiation. EMR in this range causes molecular vibration and heating effects, which is how these animals detect it.

Above the range of visible light, ultraviolet light becomes invisible to humans, mostly because it is absorbed by the cornea below 360 nm and the internal lens below 400 nm. Furthermore, the rods and cones located in the retina of the human eye cannot detect the very short (below 360 nm) ultraviolet wavelengths and are in fact damaged by ultraviolet. Many animals with eyes that do not require lenses (such

as insects and shrimp) are able to detect ultraviolet, by quantum photon-absorption mechanisms, in much the same chemical way that humans detect visible light.

The speed of light in vacuum is defined to be exactly 299792458 m/s (approximately 186,282 miles per second). The fixed value of the speed of light in SI units results from the fact that the metre is now defined in terms of the speed of light. All forms of electromagnetic radiation move at exactly this same speed in vacuum.

L?on Foucault carried out an experiment which used rotating mirrors to obtain a value of 298000000 m/s[16] in 1862. Albert A. Michelson conducted experiments on the speed of light from 1877 until his death in 1931. He refined Foucault"s methods in 1926 using improved rotating mirrors to measure the time it took light to make a round trip from Mount Wilson to Mount San Antonio in California. The precise measurements yielded a speed of 299796000 m/s.[17]

The effective velocity of light in various transparent substances containing ordinary matter, is less than in vacuum. For example, the speed of light in water is about 3/4 of that in vacuum.