

LIGHT

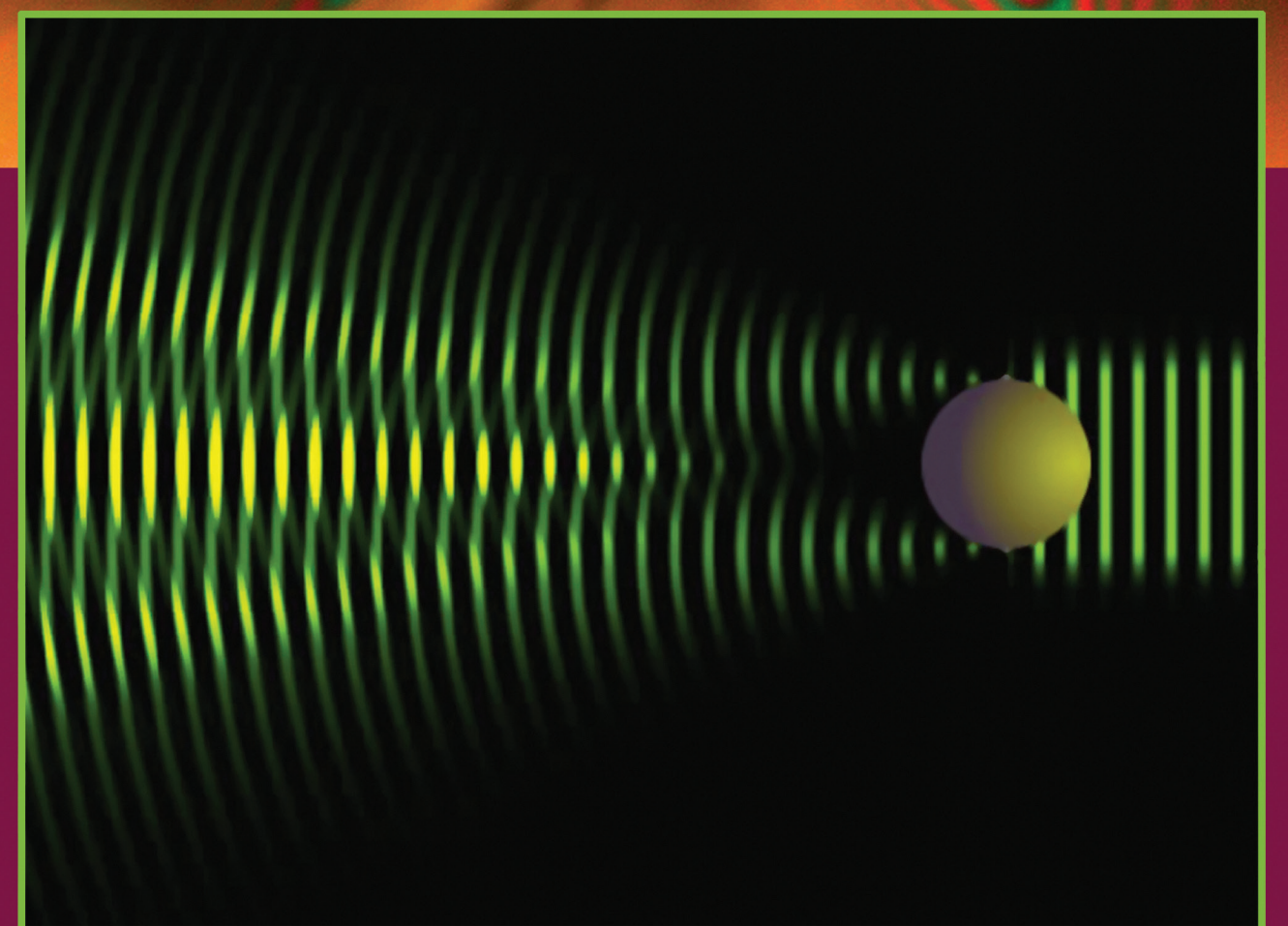
As a Wave

Photo courtesy Jane in Colour — <http://jane-in-colour.redbubble.com>

On this soap bubble, interference causes light waves to combine and reinforce certain colors.



A polarizing camera filter removes the light waves that are oriented in a direction that causes surface glare.



Light waves diffract when encountering a ball.

What is Light?

Light is part of the electromagnetic radiation spectrum, which is a form of energy. Light is usually considered to be the visible part of the spectrum. However, in physics, light is defined by all portions of the electromagnetic scale, including invisible forms such as infrared, ultraviolet, x rays, radio waves, and more. Light energy can be described as a wave, a particle (or photon), or a combination of both (called the wave-particle duality). The observations of how light behaves with matter demonstrates the various properties as a wave, particle, or ray.

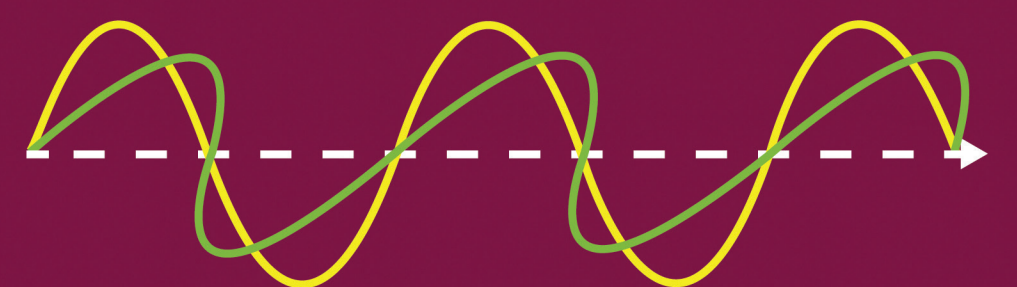
Wave properties of light include diffraction, interference, and polarization, and are studied and utilized in the field of Optics and Photonics. Uses have expanded into areas that are critical to the health and quality of human life, such as in stereoscopic surgery where doctors can more precisely and safely perform surgery. Crop health and the detection of oil slicks can be monitored from space satellites, called remote sensing.

New discoveries in the field of Optics and Photonics opens the door to addressing and solving the challenges of a modern world.

Diffraction—Diffraction is the bending and spreading of light waves when encountering an obstacle or when passing through an opening, called an aperture. Different kinds of light behave differently when diffracted, and this helps researchers to identify the composition of light of unknown objects' such as stars.

Interference—Interference is a phenomenon in which two or more light waves superimpose to form a new wave. The result is the production of bright colors of different shades, or else dark bands with no color. These characteristics can be used in filtering light. For example, coatings on optical lenses in binoculars or sunglasses remove certain unwanted colors or stray reflections by filtering out specified wavelengths.

Polarization—A beam of light is made up of a vast number of waves at different wavelengths, and these normally vibrate at many angles to one another. A light wave that is vibrating in more than one plane is referred to as unpolarized light. It is possible to transform unpolarized light into polarized light, in which the vibrations occur in a single plane. Camera filters are a common application of this property.



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