Dynamic Chiropractic

EDUCATION & SEMINARS

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PHYSICS XIII: LIGHT ETERNAL

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By the 1850s, scientists had agreed that light traveled in waves, but nevertheless rectilinearly through space from its source. This meant that light must be propagated through some sort of medium in space, one which, like air for sound, allowed the wave patterns to be expressed. Albert A. Michelson, for you trivia buffs, was the first American Nobel Laureate (1907) in science. In the 1850's, Michelson had invented the interferometer. In 1887, he teamed up with Edward W. Morley to measure the velocity of the earth relative to the ether medium in which it was presumed to move. This was one of the most critical and famous experiments in the history of science, and it was a dismal failure. However, its failure, in effect, proved the ether was non-existent, or if not non-existent, then at least totally inert and therefore absolutely undetectable. Prior to the Michelson-Morley experiment, there had been many of these "ether-drift" experiments which attempted to measure the influence of the ether on the velocity of light. Designing an elaborate but elegant experiment around the recently developed interferometer, the two scientists were surprised to discover no indications of the existence of the ether medium, nor have repetitions of their experiment and others since 1887 been any more successful.

In a vain attempt to explain the undetectable ether, Lorentz invented an ad hoc "hypothesis of contraction" based upon the theory that the ether was absolutely at rest in space. The Lorentz "contraction of mass in the direction of its motion" was later resurrected by Einstein in his Special Theory of Relativity; although slightly modified, it is still unchallenged.

The Photoelectric Effect: The emission of electrons from a substance due to the action of ultraviolet light or x-rays on that substance. The amount of charge liberated from a metal surface is directly proportional to the intensity (amount) of light falling on it. The greater the intensity of light, the more "waves" or photon particles there will be, which are observed to move through a given space in a given time. Thus, the greater the frequency (number of wave crests) of a light beam, the more "energetic" it is, i.e., the more waves it has. X-ray waves have greater energy -- hence smaller but more numerous -- frequencies than visible light. X-ray wavelengths are approximately 10,000 times smaller and therefore x-ray quantum energy is some ten thousand times greater. The generation of man-made x-rays takes advantage of the artificial ordering of their paths in a desired direction.

A photon is quantum of electromagnetic energy; thus, one may speak of a photon of gamma, x-ray or microwave energy as well as a photon of light energy.

Light Intensity is the amount of light radiation.

Interference occurs when two separate wave-trains of light, traveling in the same direction, match wave patterns, i.e., crests and troughs coincide with each other. When they do match, they are then "in phase" and reinforce one another to produce brighter light or amplitude. This is referred to as "constructive interference." This suggests that there are two kinds of darknesses, does it not? There is

the absolute, energyless darkness of no elecromagnetic energy in a given space (the total absence of light), and there is the relative, energy-produced darkness of cancellation in a given space. Interference then is the positive or negative overlapping of light waves.

Refraction is the "bending," or more properly, the change in direction, of a photonic wave-train as it passes obliquely from one transparent medium to another, or the convergent or divergent behavior of light through lenses of different shapes.

Diffraction is the "bending around a corner" of an opaque object, or better still, the bending or scattering of a beam of light as it passes the edge of any opaque body or the edge of a narrow slit through which a light beam is directed.

Reflection: Photons don't actually "bounce off" the surface of an opaque substance like billiard balls off the side cushions of a pool table, but they interact with the "outside" electrons in that substance at an incredible rate. It is the "bouncing back" of energy waves (as light radiation, sound or water waves) from a solid surface. Reflected sound waves are called "echoes."

Absorption: If that interaction with the outside electrons of a surface proceeds only one way, i.e., inside the substance and there is no "bounce back," the photons are then absorbed into the substance or, more specifically, by the electrons of the atoms of the substance.

Dispersion most commonly refers to the splitting of white light (incoherent light) into a spectrum, as when it passes through a prism or forms a rainbow.

Fluorescence is a secondary emission of light or glow from some types of substances called phosphors, when they are excited by radiation of a shorter wavelength.

LASER (Light Amplification by the Stimulated Emission of Radiation) is a device which emits a beam of light composed of rays all of the same wavelength, called coherent light.

Polarization is the selective elimination of unpolarized light, which propagates as a jumble of transverse vibrations in many directions, into waves of light of only one plane of vibration.

The Electromagnetic Spectrum or Range of Radiations:

1. Micropulsations: Frequencies less than one cycle; wavelengths of more than 300,000 kilometers; traveling at the speed of light, then one wave takes more than half the distance to the moon.

2. Radio Waves: Long-wave radio waves have frequencies from 550,000 cycles to 1,600,000 cycles and wavelengths from 550 meters down to 185 meters; short-wave radio waves have wavelengths in the 30-meter range; television waves are in the three-meter range.

3. Microwaves: Frequencies are from one billion (109) to 100 billion (1011) and wavelengths from 30 centimeters to 0.3 centimeters; radar is in this range.

4. Infrared Rays: Frequencies from 100 billion (1011) cycles to nearly a quadrillion (1014) cycles and wavelengths from 0.3 centimeters to 0.000075 centimeters.

5. Visible Light Waves: Frequencies from 1015 with wavelengths from 0.000076 (red) to 0.000035 (blue) (or, 7600 angstrom units to 3500 angstrom units).

6. Ultraviolett Rays: Frequencies from 1015 cycles up to 1017 cycles, and wavelengths from 3,800 angstrom units down to about 100 angstrom units.

7. X-rays: Frequencies from 1017 to 1020 cycles, with wavelengths from 100 down to 0.1 angstrom units.

8. Gamma Rays: Frequencies more than 1020 cycles and wavelengths less than 0.1 angstrom units. There is no really sharp boundary between x-rays and gamma rays.

A particular wavelength has a specific energy and thus a particular set of properties.

Cosmic rays have wavelengths smaller than 0.0001 angstrom units, but cosmic rays are particulate instead of electromagnetic radiation.

Concluding Statements About Light: The hypothesis of the existence of the ether as a necessary medium for the propagation of light was one such idea for which no operations could be devised to prove its existence. Faced with the fact of light propagation without the provable existence of a medium in which it propagated, science was forced to reluctantly accept the paradox this presented and conceive of the wave phenomena in the new terms of a mediumless propagation. And there the matter stands; all the operations (experiments) to date which describe the behavior of light still do not add up to a model which can satisfactorily account for the conflicting particle and wave properties of light. Thus, light exhibits an oscillating behavior during propagation which is independent of any medium through which the waves are propagated. Light is a "train of electrical waves of high frequency." It is thus an electrical process rather than a mechanical one and so consists of rapid changes of an electric and magnetic field. And given the ideal circumstances of an infinitely empty vacuum, light will, once originated, continue to "propagate itself" rectilinearly in that vacuum forever!

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