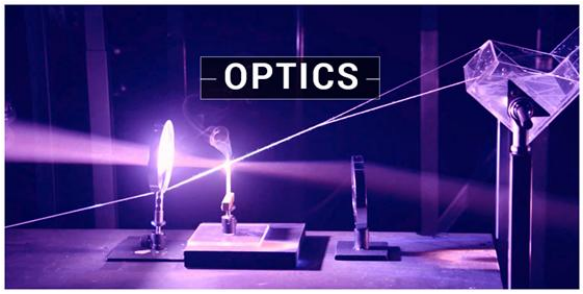
Optics

Introduction

Like all the different types of light, the spectrum of visible light is absorbed and emitted in the form of tiny packets of energy called photons. These photons have both the properties of a wave as well as a particle.

Hence this type of property is called wave-particle duality and the *study of light* in the area of physics is known as ***Optics***.

Optics is the branch of physics which is concerned with light and it's behavioral pattern and properties.



Optics is a branch of physics that deals with the determination of behavior and the properties of light, along with its interactions with the matter and also with the instruments which are used to detect it.

Optics, in a simple manner, is used to describe the behavior of visible light, infrared light, and ultraviolet. Imaging is done with the help of a system called an image forming an optical system.

Ray optics is also called geometrical optics. It is a branch of science that describes light propagation in terms of "rays".

Light And Its Optical Properties

Light is a form of energy that is in the form of an electromagnetic wave and is almost everywhere around us. The visible light has wavelengths measuring between 400–700 nanometres. The Sun is the primary source of light by which plants utilize this to produce their energy.

In physics, the term light also refers to electromagnetic radiation of different kinds of wavelengths, whether it is visible to the naked eye or not. Hence, by this, the gamma rays, microwaves, X-rays, and radio waves are also types of light. Learn more by visiting the links below.

- ***Gamma rays***
- ***Microwaves***
- ***X-rays***
- ***Radio waves***

Light exhibits various properties which are given below:

Reflection

Reflection is one of the primary properties of light. Reflection is nothing but the images you see in the mirrors. Reflection is defined as the change in direction of light at an interface in-between two different media so that the wave-front returns into a medium from which it was originated. The typical examples for reflection of light include sound waves and water waves.

Speed of light

The rate at which the light travels in free space is called the Speed of light. For example, the light travels 30% slower in the water when compared to vacuum.

Refraction

The bending of light when it passes from one medium to another is called Refraction. This property of refraction is used in a number of devices like microscopes, magnifying lenses, corrective lenses, and so on. In this property, when the light is transmitted through a medium, polarization of electrons takes place which in turn reduces the speed of light, thus changing the direction of light.

Total Internal Reflection (TIR)

When a beam of light strikes the water, a part of the light is reflected, and some part of the light is refracted. This phenomenon is called as Total internal reflection.

Dispersion

It is a property of light, where the white light splits into its constituent colours. Dispersion can be observed in the form of a prism.

The other properties of light include diffraction and interference. So, what do you observe when you look out at the beautiful scenario? Whether the light gets reflected, dispersed, refracted, internally reflected, or diffracted.

Applications of Optics

The properties of optics are applied in various fields of Physics-

- The refraction phenomenon is applied in the case of lenses (Convex and concave) for the purpose of forming an image of the object.
- Geometrical optics is used in studies of how the images form in an optical system.
- In medical applications, it is used in the optical diagnosis of the mysteries of the human body.
- It is used in the therapeutical and surgeries of the human tissues.