

PART 1. FUNDAMENTALS

Chapter 1: Light

1.1 The nature of light

Light is part of the electromagnetic spectrum that stretches from cosmic rays to radio waves (Figure 1.1). What distinguishes the wavelength region between 380–780 nanometers from the rest is the response of the human visual system. Photoreceptors in the human eye absorb energy in this wavelength range and thereby initiate the process of seeing.

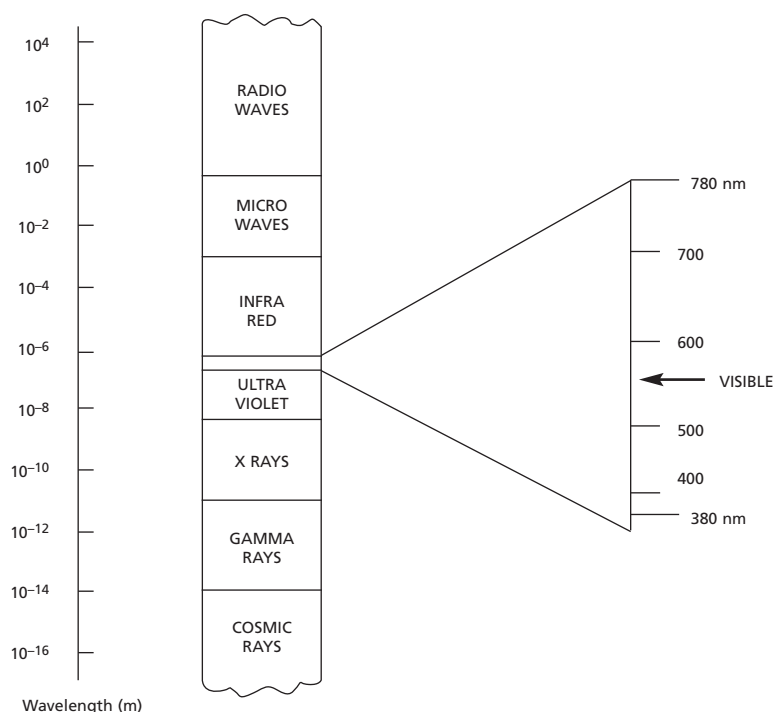


Figure 1.1 A schematic diagram of the electromagnetic spectrum showing the location of the visible spectrum. The divisions between the different types of electromagnetic radiation are indicative only.

1.2 The CIE standard observers

The sensitivity of the human visual system is not the same at all wavelengths in the range 380 nm to 780 nm. This makes it impossible to adopt the radiometric quantities conventionally used to measure the characteristics of the electromagnetic spectrum for quantifying light. Rather, a special set of quantities has to be derived from the radiometric quantities by weighting them by the spectral sensitivity of the human visual system. The result is the photometry system (see Section 1.3).

The Commission Internationale de l'Eclairage (CIE) has established three standard observers to represent the sensitivity of the human visual system to light at different wavelengths, in different conditions. In 1924, the CIE adopted the Standard Photopic Observer to characterise the spectral sensitivity of the human visual system by day.