Very Basic Introductory Quantum Mechanics

At the beginning of the 20^{th} century, Planck, Einstein, and others postulated (and then it was experimentally verified) that light and other matter consisted of *discrete* wavelike particles.

This forms part of the "kookiness" of quantum mechanics – the wave-particle duality. Others include, for example, that QM events are inherently unpredictable (Bell's theorem) or that identical particles (such as two electrons) are indistinguishable from each other (quantum field theory);

The basic unit of quantum mechanics is *Planck's constant*,
$h = 6.626 \times 10^{-34}$ Joule-seconds.

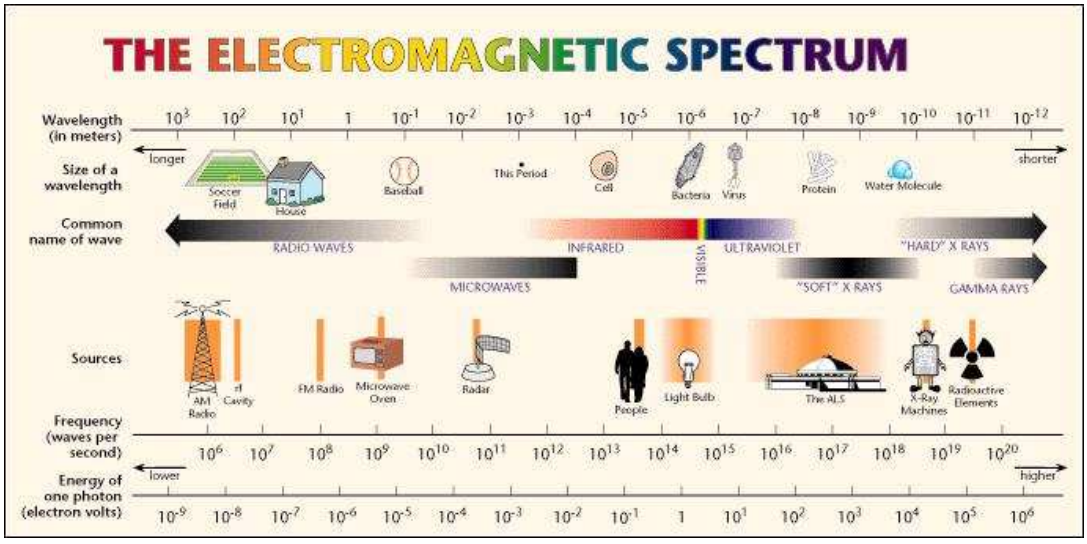
The energy of a single photon (single particle of light) is:

$$E = h\nu = hc/\lambda$$

Where ν is *frequency* and λ is wavelength.

The standard unit of length when measuring the wavelength of light, atoms, and molecules is the *Angstrom* ($\mathring{A}$).

$$1\,\text{Å} = 10^{-10} \text{ meters}$$



Introduction to Units

Every quantity that has been observed or is observed (energy, speed, etc.) can be constructed from three things:

- MASS M
- LENGTH L
- TIME T

Some common measurements include:

- volume: L^3
- area: L^2
- number density: L^{-3}
- mass density: ML^{-3}
- velocity (speed): LT^{-1}
- acceleration $\equiv$ speed/time: LT^{-2}
- force $\equiv$ mass $\times$ acceleration: MLT^{-2}
- pressure $\equiv$ force/area: $ML^{-1}T^{-2}$.
- energy $\equiv$ mass $\times$ velocity^2: ML^2T^{-2}
- power $\equiv$ energy/time: ML^2T^{-3}