

Novel and Simple Physical Explanations Supporting Max Planck's Universally Valid Energy Equation, the Saleh Experiment, and the Constancy of Photon Mass

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Part A:

Novel and Simple Physical Explanations Validating Max Planck's Universally Valid Energy Equation, the Saleh Simple Experiment, Which Concerns the Energy of Photons Based on Their Higher Frequency in the Universe:

Given that Planck's energy equation and the Saleh experiment are both experimentally established and supported by observable phenomena, it can be stated that, generally, as the frequency of electromagnetic radiation in the visible spectrum increases, the energy transferred to a surface also increases. Therefore, electromagnetic waves with higher frequencies can carry greater energy.

The main point is that the speed of photons remains constant across different wavelengths of electromagnetic radiation. This means that the speed of all photons is the same, whether it is in the red spectrum, blue spectrum, or any wavelength in between, as shown in spectral diagrams. It has also been demonstrated that their mass can be considered constant, which must be the case. (Ref: [*New Explanation Concerning Photon Constants Part B*](#))

Considering a radio wave with its long wavelength, which propagates through space in a wave-like manner, it can be said that electromagnetic waves, or photons, follow a wave-like path of motion. The longer the wavelength, the larger the distance the photon or electromagnetic wave travels. Since this extended, winding wave-like path is traversed at a constant speed, it implies that waves with longer wavelengths take more time to travel from the origin to the destination.

Indeed, it can be concluded that whenever the wavelength is longer, the time taken for the wave to travel from the origin to the destination will be greater; conversely, when the wavelength is shorter, the corresponding wave arrives at the destination sooner.

Thus, it can be generally stated that the higher the frequency, the shorter the wavelength, and consequently, a greater number of photons will reach the destination per unit of time; i.e.,

$$v = \lambda/T$$

Now, consider two points, A and B. Suppose a wave with a very high frequency (which has a shorter wavelength) is emitted from point A to B, whilst at the same instant, a wave that has a lower frequency and a longer wavelength is also emitted. In that case, it can be easily concluded that, within the same timeframe, a greater number of photons (or waves) will reach the destination for higher frequencies (shorter wavelengths). In essence, this means that because more photon impacts occur at the destination, the energy or heat produced there is greater. To illustrate, think of a lens focusing sunlight onto a single point. Sunlight—whether white or multicoloured—has no



effect when simply shining directly on a surface. But when focused with a lens, the concentration of photons at that point increases, multiplying their energy.

Thus, it can generally be stated that the higher energy observed in photons of different colours is due to the greater number of photons arriving in the same unit of time.

Part B:

Demonstration that Photon Mass Is Constant, Based on the Wave-like Motion of Photons in the Universe:

Examining the motion of electromagnetic waves—such as radio waves compared to visible, microwave, and others—reveals that radio wave wavelengths usually range from one to a hundred metres, and can extend up to several thousand kilometres.

This means that electromagnetic waves, or photons, might travel one metre per wavelength. Given that wave speed is always constant, it follows that, to cover this wavelength, a photon must travel a longer path. Consequently, the energy transferred by these long-wavelength waves would be several hundred times smaller than that of high-frequency waves.

In fact, it may be stated that mass remains constant across all waves, and only the number of oscillations per unit time (i.e., frequency) changes, which in turn alters the total energy perceived. Its period “T” would be significantly longer than that of high-frequency waves, potentially hundreds of times.

Therefore, the energy transferred by waves with very long wavelengths and very low frequencies is vastly less than that of waves with high frequencies and short wavelengths. Likewise, the number of photons travelling from source to destination is far greater for high-frequency, short-wavelength waves, which also carry substantially more energy. It can be concluded that the transfer of energy depends primarily on the quantity of particles or photons, not their mass. More particles mean more energy transfer.

Conclusion: The mass parameter of the particles is not the primary factor responsible for the greater energy of different waves. In fact, it can be said that the mass is constant for all waves.

References:

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