Structure of the photon Is duality solved? [A Review Article].

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Abstract: Bueche and Jerde 2001 came to the conclusion that till the moment there are **Great Controversies.** The Bueche text of physics contains three essays entitled Great Controversies in Physics. These are historical vignettes that demonstrate that our present understanding of physics is based on struggles between competing ideas and experimental observations, often over long spans of time. The topics covered are the controversies about falling objects, the nature of heat, and the nature of light. The role of critical questions in deciding the outcome of these controversies, asked in the form of definitive experiments, is emphasized. .(Bueche textbook of physics). The answer to our original question on the nature of light has a more complicated answer (and to many, a more disturbing one) than anyone expected.

[Sayed S.E.H. Saif; Mohamed Yasser Sayed Saif; Ahmed Tamer S. Saif and Passant Sayed Saif. **Structure of the photon Is duality solved?.** *J Am Sci* 2013;9(3):446-454]. (ISSN: 1545-1003). http://www.jofamericanscience.org. 69

Key words: Great Controversies , duality of light , shape of the photon , Saif Number

Introduction

1) Great Controversies

The Bosh text of physics contains three essays entitled Great Controversies in Physics. These are historical vignettes that demonstrate that our present understanding of physics is based on struggles between competing ideas and experimental observations, often over long spans of time. The topics covered are the controversies about falling objects, the nature of heat, and the nature of light. The role of critical questions in deciding the outcome of these controversies, asked in the form of definitive experiments, is emphasized. .(Bosh textbook of physics)

2) The nature of light

Of all the physical phenomena our senses perceive, light is the most important and perhaps the most perplexing. (Beuche - Jerde)[1]

The most difficult question to answer has proved to be what light is— Whether it consists of a stream of particles [**Newton's** theory (1643-1727)] or waves of some kinds [**Huygens'** theory 1629-1695)]. Over the years there have been many arguments advanced to support each of these competing views. (Beuche - Jerde)[1]

Reflection and **refraction** are explained well by the particle theory, but in 1804, the Englishman **Thomas Young** provided the first definitive test of the competing models of light. He and **Fresnel** (1808-1815) performed an experiment that showed the phenomena of interference and polarization which could be explained only by the wave model. (Beuche - Jerde)[1] With all this accumulating evidence one might think that all doubts as to the wave nature of light would vanish. Such was not the case, however. One major question remained: "How does light travel through vacuum, where there seems to be no material that can carry the wave?” (Beuche - Jerde)[1]

Maxwell (1831-1879) supplied the answer to this last question with his theory of oscillating electric and magnetic fields. He also predicted the existence of an entire spectrum of electromagnetic waves, of which light was only a small part. Thus at the close of the nineteenth century, it seemed that the age-old question of the nature of light had been conclusively settled. Light is a nonmaterial wave composed of oscillating electric and magnetic fields and, being nonmaterial, the wave can travel through vacuum without the aid of a material substance. (Beuche – Jerde particles with $m0 \neq 0$. (Demtröder)[2] To define the characteristic properties of a photon, such as momentum [$\boldsymbol{p}$phot= $hk = (h/\lambda)k$], energy $[E=h\nu=h\omega]$ and mass $[m = h\nu/c^2]$, one needs the wave properties frequency (ν), wavelength (λ) and wave vector (k). This shows the duality in the description of light. (Demtröder)[2]

The wave character of particles is proved experimentally by diffraction and interference phenomena. Examples are the Bragg reflection of neutrons by single crystals, neutron interferometry and numerous experiments in atom optics, demonstrating diffraction and interference of matter waves. (Demtröder)[2]

The photon is a particle and as a particle this photon is deviated at a narrow aperature changing its direction for a while and at the same time velocity.

This will end in areas with photons and areas without photons. This explains the circles of illumination followed by dark areas. (Saif)[4]

Matter waves show dispersion, even in a vacuum. Their phase velocity, which equals one half of the particle velocity, depends on the frequency *(ω)*. (Demtröder)[2]

Particles can be described by wave packets. The particle velocity equals the group velocity of the wave packet. (Demtröder)[3]

The absolute square $|\Psi(x,t)|^2$ of the matter wave function represents a probability density. This means that $|\Psi(x,t)|^2 dx$ gives the probability to find the particle at time *(t)* in the interval *(dx)* around *x*. (Demtröder)[3]

Position x and momentum p_x of a particle cannot be simultaneously accurately measured. Heisenberg's uncertainty relation $\Delta x.\Delta p_x \geq \hbar$ puts a principle lower limit to the uncertainties Δx of the particle position and Δp_x to its momentum, if both are measured simultaneously. (Demtröder)[3]

Analogous to the situation in classical optics the uncertainty Δx for the location of a particle cannot be smaller than the wavelength

($\lambda = h/p$) of its matter wave. (Demtröder)[3]

A similar uncertainty relation $\Delta E.\Delta t \geq \hbar$ is valid for the measurement of the particle energy *(E)* and the time duration (Δt) of this measurement. The energy of an excited atomic state with mean lifetime (τ) can only be measured with an uncertainty ($\Delta E = \hbar/\tau$). (Demtröder)[3]

Bohr's classical atomic model, where the electrons orbit around the nucleus on circles like planets around the sun, needs an additional quantum condition in order to explain the discrete energy levels of the atom. The condition for the radius (r) of the orbit can be formulated as [$2\pi r = n\lambda$], where [$\lambda = h/p$] is the de Broglie wave-length of the electron's matter wave, or as the quantization [$|l| = rp = nh$] of the angular momentum (l) of the electron. Both conditions are equivalent and lead to a quantization of the energy levels. (124, Demtröder)[3]

The allowed energy levels of atoms or ions with only one electron and nuclear charge Z_e are

[$En = -Ry^* Z2 /n2$] ($n = 1, 2, 3, \ldots$) ,

where [$Ry^* = \mu e4 / (8\pi\varepsilon 2\ 0h2)$] is the Rydberg constant for the system consisting of the electron and nucleus with reduced mass *(μ)*. (Demtröder)[3]

Bohr's model predicts many features of atomic spectra correctly, but has to be modified on some essential points. (Demtröder)[3]

However, nature always seems to have a few humbling surprises just when we think we've got it right. The closing years of the nineteenth century and the first decade of the twentieth posed new challenges to our understanding of the nature of light. The spectrum of light **radiated by heated objects** could not be explained by the wave model. Nor could the wave model explain the **photoelectric effect**, by which electrons are ejected from metal surfaces when the surfaces are illuminated by light. Both observations were explained rather neatly and precisely [by **Planck** (1858-1947) and then **Einstein** (1879-1955)] only by assuming that light consists of a stream of particles, called photons. In the 1920s, **Compton** observed that when X-rays strike electrons they exchange energy and momentum precisely as if the **x-rays are particles** which collide elastically with the electrons. (Beuche - Jerde)[1]

As if the above developments weren't confusing enough, in 1924 the French physicist **de Broglie** theorized that material particles should possess a "matter wave" whose wavelength is inversely proportional to the particle's momentum. If true, particles passing through narrow apertures should display wave effects such as diffraction and interference. In 1927, electron diffraction was observed in agreement with de Broglie's prediction, and wave effects involving beams of protons and neutrons have since been observed also. (Beuche - Jerde)[1]

Thus we arrive at the present state of affairs in which light has a dual nature: it displays a wave nature in some experiments and particle-like behavior in others. The same is true for these bits of matter we call particles. Importantly, only one of the two opposite types of behavior is shown in any given experiment. The answer to our original question on the nature of light has a more complicated answer (and to many, a more disturbing one) than anyone expected: Whether the nature of light is a wave or a stream of particles depends on the question a given experiment is designed to ask. (Beuche - Jerde)[1]

Two big theoretical systems were founded in the beginning of the 20[th] century. The first one, dealing with basic substance units, is Plank's Quantum theory and the other has been dealing with space, time, and their mutual dependence, known as Einstein's theory of relativity. (Wiki)[2]

Both theories are the foundations of contemporary physics, and give equations that determine the laws of radiations and light spreading with great precision. Neither of those two big theories get into the essence of the luminous phenomenon, nor explain how is it possible that photons (carriers of the luminous phenomenon) move corpuscularly and at the same time possess wave characteristics. (Wikipedia)[2]

a)Properties of Light and Quantum Mechanics

Many experimental results prove the particle character of Electromagnetic waves. Examples are the spectral distribution of blackbody radiation, the photoelectric effect, the Compton effect or measurements of the photon structure of the light emitted by a weak light source. (Demtröder)[3]

The derivation of Planck's radiation formula based on the photon model gives results that are in complete agreement with experiments. (Demtröder)[3]

The energy quanta $h\nu$ of the electromagnetic field are called photons. One can formally define the photon mass as $m=h\nu/c2$.

Photons are deflected by gravitational fields like other particles with mass m. There are no photons at rest. Nevertheless, one defines a rest mass $m0=0$, in order to describe photons by the same relativistic equations for energy and momentum used for other particles with $m0\neq0$.

The uncertainty relation explains the stability of atomic ground states. (Demtröder)[3]

All excited atomic states Ek are unstable. They decay under emission of a photon $h\nu = Ek - Ei$ into lower states (Ei) (Demtröder)[3]

The quantization of atomic energy levels is corroborated by the results of the Franck-Hertz experiment and by the observation of line spectra in absorption and emission of atoms. (Demtröder)[3]

The quantum mechanical description replaces the exactly determined path of a microparticle by a probability distribution $|\Psi(x,t)|^2$ of a wave packet. This distribution spreads in time. The uncertainty Δx becomes the larger the more accurate the initial location $x(t0)$ had been known. (Demtröder)[3]

The interference phenomena observed for matter waves in interference experiments, where the matter wave is split and later recombined, are due to the imperfect knowledge of which path the particle has taken. The final state of the particle therefore has to be described by a linear combination of two or more wave functions. If the path of the particle is defined by additional experiments the interference pattern disappears, because now the linear combination can be reduced to one of the terms in the linear combination. (Demtröder)[3]

b) Review of Literature

After scanning the literature about the structure of the photon apart from the two big theories of Newton's corpuscular theory and Huygens' wave theory that has prevailed for centuries there are only three suggestions until now:

I) According to Quantum Chromodynamics, a real photon can interact both as a point-like particle, or as a collection of quarks and gluons, i.e., like a hadron. The structure of the photon is determined not by the traditional valence quark distributions as in a proton, but by fluctuations of the point like photon into a collection of partons.[4] This is to be compared with what is achieved in my suggestion about the structure of the photon.

II) The nature of luminous radiation based on the new hypothesis of photon structure. (Janjusević)[5]

The complex nature of corpuscular-wavy photon movement, may not be explained by one particle movement. So, Janjusević assumed that two or more particles are concerned, rotating around the mutual center of the attraction forces. (Figure 1) (Janjusević)[5]

It is obvious that such a complex movement satisfies corpuscular-wavy dualism conditions. (Janjusević)[5]

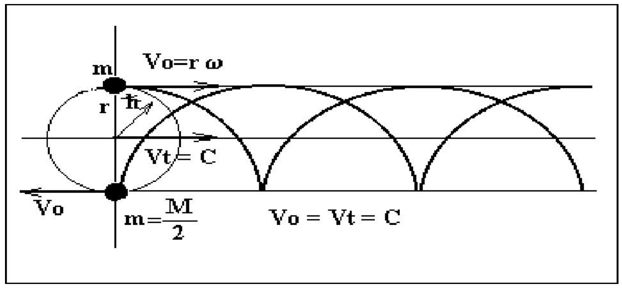


Figure 1: The light in this physical phenomenon caused by the motion of photon of binary structure consisting of two particles of equal masses rotating around the mutual center of attraction, analogous to the center of gravity. The binary system does translatory motion at the speed of light, while the trajectory of each individual particle is cycloid. Calculation of known dimensions in physics of elementary particles by implementation of the equation [rω= C] , derived from the hypothesis on binary structure of photon (Janjusević)[5] This is to be compared with what i suggest about the structure of the photon. (Saif)[4]

What is new?

The explanation of the duality of light is actually perplexing as concluded by Beuche and Jerde[1].

1) At the beginning, I thought that light moved in an elliptical path as in figure 2, moving from point A to point C and returning in an elliptical path to point B. This would result in one wave while moving to point C and an opposite wave while returning to its final point (B). I presumed that this would be repeated during the pass of the particle of light in its propagation with the speed of light. The frequency being the number of cycles and the wavelength would be from A to B. I rejected this suggestion because it is devoid of the electric and magnetic properties of photons. (Fig. 2)

2) Maxwell gave me the clue of an oscillating electric and magnetic field to further suggest when the photon particle (in the form of a sphere) expands it will give a wave and when it contracts it will give a wave in the opposite direction.

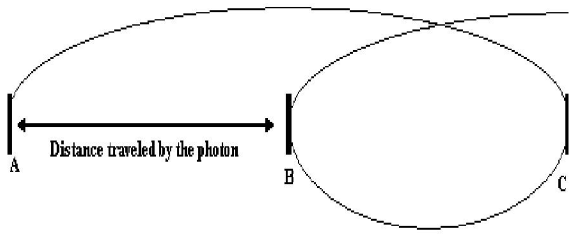


Figure 2: My first thoughts on an explanation of duality, later proved otherwise.

I further rejected my second suggestion because it is devoid of the magnetic and electric fields that are necessary for the dual characters of light.

3) More research led to my third suggestion. The photon is a particle in the form of a magnet with North and South poles in the form of a sheet or sheets mostly rectangular (i.e. it is a dipole). It is in continuous motion rotating anti-clock-wise with the frequency determined by the number of rotations per second. This motion will create an electric field exactly the same as in the case of a generator or dynamo. (Saif)[4]

So, the photon like the rectangle in the dynamo, will produce an electric field whose current in the first 180o will describe a positive wave and in the second 180o (to complete 360o) will describe a negative wave. (Saif)[4] (Figures 3,4).

I also suggest that the photon has a receptor for other photons, electrons, protons or neutrons. (Saif)[4]

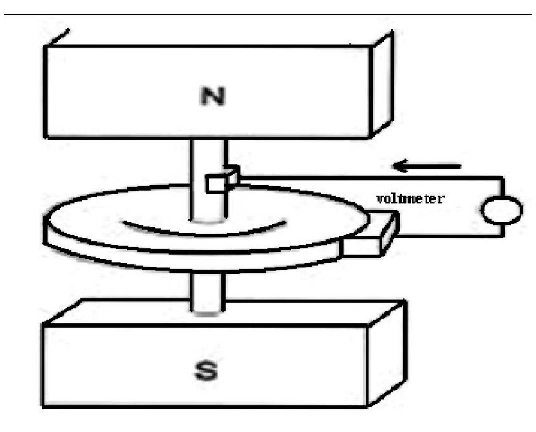


Figure 3: Principle of dynamo

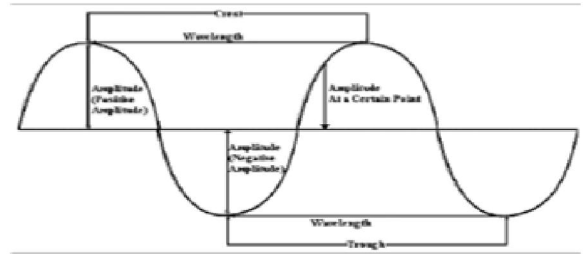


Figure 4: The current in the first 180o will describe a positive wave and in the second 180o (to complete 360o) will describe a negative wave.

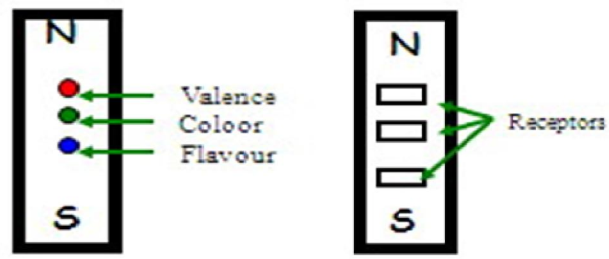
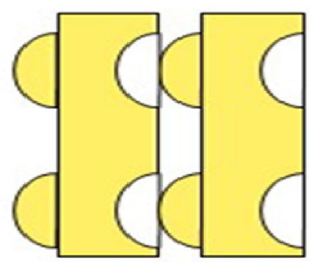
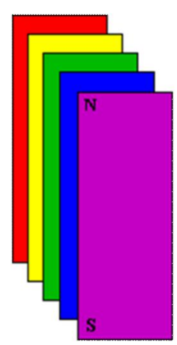


Figure 5: The shape of the photon in the form of micro magnet of north and south rotating anti-clock wise and has receptors for interaction



<u>Figure 6:</u> The photon in side view denoting protrusion anteriorly and corresponding cavity posteriorly.



<u>Figure 7:</u> Multilayered photons to form a composite photon.

For every photon there is a frequency related inversely to the wavelength and directly to its energy as shown in the graph (Table 1). (Saif)[4]

Now we are faced with the question; is the photon of the highest energy a composite photon of the unit of the smallest energy (the graviton—which described later) and therefore a multi layered photon or is the photon the same in the beginning of the electromagnetic spectrum and at its end with the difference being in the form of velocity of rotations? (Saif)[4]

The calculations proved the first suggestion. That means at the lowest frequency it will be one unit (the graviton) and at the highest frequency it will be a multilayered photon formed of units of the lowest frequency.

This is clear from dividing the mass of the highest frequency or highest energy by the lowest frequency or lowest energy. The result will be an integer number of photons of the lowest frequency according to the following equation. (Saif)[4].

The number of units of photons of the highest frequency is equal to:

$$\frac{Mass\ of\ the\ highest\ energy\ (frequency)}{Mass\ of\ the\ lowest\ energy\ (frequency)}$$

E=nhv

Table 1: The Unit of Matter is a Primon which is equal to the Electron formed of multiple of Gravitons.

Element	Mass (MeV/c^2)	Mass (Kgm)	Freq (HZ)	Wavelength (m)	Energy ($Joule/c^2$)
Primon	0.511	$9.1\ 10^{-31}$	$1.234\ 10^{20}$	$2.43\ 10^{-12}$	$0.818\ 10^{-13}$
Graviton	$4.134\ 10^{-21}$	$0.734\ 10^{-50}$	1	$3\ 10^{8}$	$7.09\ 10^{-34}$
no	$1.24\ 10^{+20}$	$1.24\ 10^{+20}$	$1.23\ 10^{+20}$		$1.15\ 10^{+20}$

Phenomena of Light Explained by Our Model of the Photon

Reflection, Refraction, Dispersion, Transmission, and Absorption can be easily explained by the model as a particle inducing an electromagnetic field that describes a positive wave in the first 180 degrees of rotation and its opposite (negative wave) when it rotates to complete 360 degrees. (Saif)[4]

The phenomena of diffraction and interference that are theoretically explained by waves alone was revealed in 1924 when the French physicist de Broglie theorized that material particles should possess a "matter wave" whose wavelength is inversely proportional to the particle's momentum. If true, particles passing through narrow apertures should display wave effects such as diffraction and interference. In 1927, electron diffraction was observed in agreement with de Broglie's prediction and wave effects involving beams of protons and neutrons have since been observed also. (Beuche - Jerde)[1]

The wave theory in interference means nullification of the energy which is against the law of conservation of energy. Again the wave theory alone means no confinement & it cannot be imagined a wave with a length of 3x108 m. (Saif)[4]

Polarization of light can be explained by a stream of particles that when transmitted through a polarizing material or surface are arranged in one plane. (Saif)[4]

Fluorescence, **Doppler effect** and the effect on the photons when moving against **gravity** could be explained easily by the multilayered photon with a high frequency that is stripped layer by layer which that ends in a photon with less layers, that is, a photon with a longer wave length and less frequency of rotation.

Our model is the only way to explain these phenomena until now.

As regards to lasers, they are controlled by the construction of the cavity that will induce the phenomena of laser. That is to say, the parallel beam and coherence mean that the particles are moving in phase with each other. (SAIF)[4]

The details of the fundamental forces will be discussed in another article. Also the relation of the neutrino to other photons will be mentioned later.

This structure will explain the duality as well as other photons of the electromagnetic force, the gluons of the strong force and the neutrinos and their relation to the W and Z of the weak force or as mentioned the graviton which is responsible for gravity as will be mentioned. (Saif)[4]

Notice that we cannot detect the deviation of the photon in any electric or magnetic field because of its velocity and nearly mass-less weight. (Saif)[4]

The structure of the photon is in accordance to the rule of duality in every aspect. (Saif)[4]

All interactions need time, space & a suitable environment or field. (Saif)[4]

Saif Number

Is the number of photons in a proton for each wavelength (Saif A) and in a proton distributed like the solar radiation (Saif B) and in a quark (Saif C) and in a primon (Saif D) (Tables 2-5) (Saif)[4]

Saif Number A

The number of photons in a proton when it is converted to energy according to the equation $E=mc^2$ at a certain λ will give a number of photons in a proton like the Avogadro's number in relation to number of molecules in a mole of gas. (Saif)[4]

So **Saif number A** is equal to:

Energy in a proton ($m \times c^2$) =Energy in a photon at a certain lamda

This will result in a number specific for each wavelength or frequency.

SAIF Number A			Table 2	
Wavelength (nm)	Frequency (Hz)	Energy (MeV)	Energy (Joules)	Saif Number (A)
0.001	3.00E+20	1.24	1.99E-13	7.578E+02
0.01	3.00E+19	0.124	1.99E-14	7.578E+03
0.1	3.00E+18	1.240E-02	1.99E-15	7.578E+04
1	3.00E+17	1.240E-03	1.99E-16	7.578E+05
10	3.00E+16	1.240E-04	1.99E-17	7.578E+06
100	3.00E+15	1.241E-05	1.99E-18	7.578E+07
200	1.50E+15	6.204E-06	9.94E-19	1.516E+08
250	1.20E+15	4.963E-06	7.95E-19	1.895E+08
300	1.00E+15	4.136E-06	6.63E-19	2.273E+08
350	8.57E+14	3.545E-06	5.68E-19	2.652E+08
400	7.50E+14	3.102E-06	4.97E-19	3.031E+08
425	7.06E+14	2.919E-06	4.68E-19	3.221E+08
450	6.67E+14	2.757E-06	4.42E-19	3.410E+08
475	6.31E+14	2.612E-06	4.18E-19	3.600E+08
500	6.00E+14	2.481E-06	3.97E-19	3.789E+08
525	5.71E+14	2.363E-06	3.79E-19	3.978E+08
550	5.45E+14	2.556E-06	4.10E-19	4.168E+08
575	5.22E+14	2.158E-06	3.46E-19	4.357E+08
600	5.00E+14	2.068E-06	3.31E-19	4.547E+08
625	4.80E+14	1.985E-06	3.18E-19	4.736E+08
650	4.62E+14	1.909E-06	3.06E-19	4.926E+08
675	4.44E+14	1.838E-06	2.94E-19	5.115E+08
700	4.28E+14	1.772E-06	2.84E-19	5.305E+08
725	4.13E+14	1.711E-06	2.74E-19	5.494E+08
750	4.00E+14	1.654E-06	2.65E-19	5.684E+08
800	3.75E+14	1.551E-06	2.48E-19	6.062E+08
900	3.33E+14	1.379E-06	2.21E-19	6.820E+08
1000	3.00E+14	1.241E-06	1.99E-19	7.578E+08
1100	2.73E+14	1.128E-06	1.81E-19	8.336E+08
1200	2.50E+14	1.034E-06	1.66E-19	9.094E+08
1300	2.31E+14	9.540E-07	1.53E-19	9.852E+08
1375	2.18E+14	9.020E-07	1.45E-19	1.042E+09
1400	2.14E+14	8.860E-07	1.42E-19	1.061E+09
1500	2.00E+14	8.270E-07	1.32E-19	1.137E+09
1600	1.88E+14	7.750E-07	1.24E-19	1.212E+09
1625	1.85E+14	7.640E-07	1.22E-19	1.231E+09
1700	1.76E+14	7.300E-07	1.17E-19	1.288E+09
1800	1.67E+14	6.890E-07	1.10E-19	1.364E+09
1875	1.60E+14	6.620E-07	1.06E-19	1.421E+09
1900	1.58E+14	6.530E-07	1.05E-19	1.440E+09
2000	1.50E+14	6.200E-07	9.93E-20	1.516E+09
2100	1.43E+14	5.910E-07	9.47E-20	1.591E+09
2125	1.41E+14	5.830E-07	9.34E-20	1.610E+09
2200	1.36E+14	5.640E-07	9.04E-20	1.667E+09
2250	1.33E+14	5.510E-07	8.83E-20	1.705E+09
2300	1.30E+14	5.390E-07	8.64E-20	1.800E+09

2375	1.26E+14	5.224E-07	8.28E-20	1.819E+09
2400	1.25E+14	5.170E-07	8.28E-20	1.819E+09
2500	1.20E+14	4.960E-07	7.95E-20	1.895E+09
1E+04	3.00E+13	1.240E-07	1.99E-20	7.578E+09
1E+05	3.00E+12	1.240E-08	1.99E-21	7.578E+10
1E+06	3.00E+11	1.240E-09	1.99E-22	7.578E+11
1E+07	3.00E+10	1.240E-10	1.99E-23	7.578E+12
1E+08	3.00E+09	1.240E-11	1.99E-24	7.578E+13
1E+09	3.00E+08	1.240E-12	1.99E-25	7.578E+14
1E+10	3.00E+07	1.240E-13	1.99E-26	7.578E+15
1E+11	3.00E+06	1.240E-14	1.99E-27	7.578E+16
1E+12	3.00E+05	1.240E-15	1.99E-28	7.578E+17
1E+13	3.00E+04	1.240E-16	1.99E-29	7.578E+18
1E+14	3000	1.240E-17	1.99E-30	7.578E+19
1E+15	300	1.240E-18	1.99E-31	7.578E+20
1E+16	30	1.240E-19	1.99E-32	7.578E+21
1E+17	3	1.240E-20	1.99E-33	7.578E+22
2E+17	1.5	6.200E-21	9.94E-34	1.516E+23
3E+17	1	4.140E-21	6.63E-34	2.273E+23

Saif Number B

Is the number of photons in a proton distributed like the solar radiation. (Saif)[4]

	Wave length (nm)	% Solar Radiation Spectrum	% of Energy in a Proton (MeV)	λ	Energy (MeV)	No. of Photons in Proton (SAIF B)
UV	200-400	0.1198	112.405944	300	4.136E-06	2.718E+07
Sum of UV		11.980%	112.405944			
Visible	400-450	0.058	54.42024	425	2.919E-06	1.864E+07
	450-500	0.0623	58.454844	475	2.612E-06	2.238E+07
	500-550	0.06223	58.3891644	525	2.363E-06	2.471E+07
	550-600	0.06	56.2968	575	2.158E-06	2.609E+07
	600-650	0.063	59.11164	625	1.985E-06	2.978E+07
	650-700	0.06	56.2968	675	1.838E-06	3.063E+07
Sum of Visible		36.553%	342.969488			
Infrared	700-750	0.053	49.72884	725	1.711E-06	2.906E+07
	750-850	0.09	84.4452	800	1.551E-06	5.445E+07
	850-950	0.085	79.7538	900	1.379E-06	5.783E+07
	950-1050	0.063	59.11164	1000	1.241E-06	4.763E+07
	1050-1150	0.037	34.71636	1100	1.128E-06	3.078E+07
	1150-1250	0.032	30.02496	1200	1.034E-06	2.904E+07
Sum of Infrared		36.000%	337.7808			
Microwave	1250-1500	0.0677	63.521556	1375	9.020E-07	7.042E+07
	1500-1750	0.038	35.65464	1625	7.640E-07	4.667E+07
	1750-2000	0.027	25.33356	1875	6.620E-07	3.827E+07
	2000-2250	0.0158	14.824824	2125	5.830E-07	2.543E+07
	2250-2500	0.00617	5.7891876	2375	5.224E-07	1.108E+07
Sum of Microwave		15.467%	145.123768			
Total			938.28			

Saif Number C

The number of photons in a quark distributed like the solar radiation if the standard model is correct. (Saif)[4]

	Wave length (nm)	% Solar Radiation Spectrum	% of Energy in Up quark (MeV)	No. of Photons in Up quark (SAIF C"up")	% of Energy in down quark (MeV)	No. of Photons in down quark (SAIF C"down")
UV	200-400	0.1198	39.534	9558510.638	39.8934	9645406.19
Sum of UV		11.980%	39.534		39.8934	
Visible	400-450	0.058	19.14	6557040.082	19.314	6616649.538
	450-500	0.0623	20.559	7870980.092	20.7459	7942534.456
	500-550	0.06223	20.5359	8690605.163	20.72259	8769610.664
	550-600	0.06	19.8	9175162.187	19.98	9258572.753
	600-650	0.063	20.79	10473551.64	20.979	10568765.74
	650-700	0.06	19.8	10772578.89	19.98	10870511.43
Sum of Visible		36.553%	120.6249		121.72149	
Infrared	700-750	0.053	17.49	10222092.34	17.649	10315020.46
	750-850	0.09	29.7	19148936.17	29.97	19323017.41
	850-950	0.085	28.05	20340826.69	28.305	20525743.29
	950-1050	0.063	20.79	16752618.86	20.979	16904915.39
	1050-1150	0.037	12.21	10824468.09	12.321	10922872.34
	1150-1250	0.032	10.56	10212765.96	10.656	10305609.28
Sum of Infrared		36.000%	118.8		119.88	
Microwave	1250-1500	0.0677	22.341	24768292.68	22.5441	24993458.98
	1500-1750	0.038	12.54	16413612.57	12.654	16562827.23
	1750-2000	0.027	8.91	13459214.5	8.991	13581571
	2000-2250	0.0158	5.214	8943396.226	5.2614	9024699.828
	2250-2500	0.00617	2.0361	3897584.914	2.05461	3933017.504
Sum of Microwave		15.467%	51.0411		51.50511	
Total			330		333	

Saif Number D

The number of photons in a primon distributed like the solar radiation. (Saif)[4]

	Wave length (nm)	% Solar Radiation Spectrum	% of Energy in an Electron (MeV)	No. of Photons in Electron (SAIF D)
UV	200-400	0.1198	0.0612178	14801.2089
Sum of UV		11.980%	0.0612178	
Visible	400-450	0.058	0.029638	10153.4772
	450-500	0.0623	0.0318353	12188.0934
	500-550	0.06223	0.03179953	13457.2704
	550-600	0.06	0.03066	14207.5996
	600-650	0.063	0.032193	16218.136
	650-700	0.06	0.03066	16681.1752
Sum of Visible		36.553%	0.18678583	
Infrared	700-750	0.053	0.027083	15828.7551
	750-850	0.09	0.04599	29651.8375
	850-950	0.085	0.043435	31497.4619
	950-1050	0.063	0.032193	25941.1765
	1050-1150	0.037	0.018907	16761.5248
	1150-1250	0.032	0.016352	15814.3133
Sum of Infrared		36.000%	0.18396	
Microwave	1250-1500	0.0677	0.0345947	38353.3259
	1500-1750	0.038	0.019418	25416.2304
	1750-2000	0.027	0.013797	20841.3897
	2000-2250	0.0158	0.0080738	13848.7136
	2250-2500	0.00617	0.00315287	6035.35118
Sum of Microwave		15.467%	0.07903637	
Total			0.511	

Applications of Saif Numbers

The Saif number (D), which is the number of photons in a primon distributed like solar radiation will have its impression on the structure of the primon, electron, quark, proton and neutron.

Also, it may introduce a new concept for the construction of the proton provided by the standard model in the form of quarks.

Furthermore, the solar distribution of the primon (SAIF number D) may give a clue to the infrastructure of the primon, electron, proton and neutron. The solar distribution of the primon may also clarify the role of gluons, the mediators of the Strong Force, in these infrastructures.

If we shall consider that the unit of the electromagnetic spectrum is the graviton as will be detailed later, and that other bands are multiples of this graviton this will mean that it will not only be the unit of the electromagnetic spectrum, but the unit of matter as well.

The science of photochemistry will be reevaluated consequently.

Finally, the perplexing point of the nature of light and its dualism is solved!

Conclusion

Bueche and Jerde 2001 came to the conclusion that till the moment there are **Great Controversies**

The Bueche text of physics contains three essays entitled Great Controversies in Physics. These are historical vignettes that demonstrate that our present understanding of physics is based on struggles between competing ideas and experimental observations, often over long spans of time.

The topics covered are the controversies about falling objects, the nature of heat, and the nature of light. The role of critical questions in deciding the outcome of these controversies, asked in the form of definitive experiments, is emphasized.. (Bueche textbook of physics).

The answer to our original question on the nature of light has a more complicated answer (and to many, a more disturbing one) than anyone expected.

Whether the nature of light is a wave or a stream of particles depends on the question a given experiment is designed to ask.(Bueche textbook of physics)

At last but not the least is the controversy about the nature of light is still valid ? The answer there is no controversy after this article about the controversy related to nature of light (Saif)[4].

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2/21/2013