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Condensed Photons: Matching with Quarks

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CONDENSED PHOTONS: MATCHING WITH QUARKS

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Abstract

Based on the logical basis of twistor theory, it is reasoned that quarks came into existence from the condensation of 7 photonic strings (Violet, Indigo, Blue, Green, Yellow, Orange, Red). It is reasoned that condensation of green photon (leading to green colour light) led to the "electron particle/string" in our proximity of universe. Also, an effort is made to specifically match the quarks with the condensation of photons of 7 colours.

1. INTRODUCTION:

Edwin Hubble proposed the theory of "BIG BANG" based on observation of light coming from distant galaxies. Penzias and Wilson provided an interesting experimental confirmation of Hubble's theory by observing (using radio telescopes) that the cosmic microwave background radiation is "isotropic" in the universe. Roger Penrose in his twistor theory proposed that the universe started with a burst of photons. Scientists proposed the theory of condensed matter physics and developed a large body of research literature. The author in his research efforts tried to provide a confirmation of the hypothesis of Roger Penrose. This short research paper is an effort in that direction.

The author attempts to reason that the quarks resulted from condensation of 7 types of photons. Also, some approaches to validate the hypothesis are proposed. The initial observation (to confirm the hypothesis) was the Crooke's dark tube experiment. Also, the concepts in Twistor theory and String theory led the author to initiate efforts to validate the hypothesis. Several new innovative ideas are proposed in this research paper.

This research paper is organized as follows. In Section 2, well known information related to quarks is summarized. In Section 3, an effort is made to match quarks with condensation of 7 photons (associated with 7 colours of light). The research paper motivates the interpretation of various properties related to quarks with the condensation of photons. The research paper concludes in Section 4.

2. TYPES OF QUARKS: QUARK PARAMETERS:

Quarks as fundamental particles were proposed by Murray Gell-mann and George Zweig independently. In the past 6 decades, vast number of scientific facts related to quarks are documented [1], [2]. Some of the relevant facts are briefly summarized here for completeness.

Like electrons, quarks are a type of elementary particles. They form a fundamental constituent of matter. Composite particles such as hadrons are formed by a combination of quarks. Hadrons such as protons, neutrons are stable particles that are components of atomic nuclei. Our understanding of quarks has been primarily based on observations of hadrons.

- There are 6 flavours of quarks are
  up (u), down (d), strange (s), charm(c), bottom (b), top (t).
  The corresponding anti-quarks are
  $\bar{u}, \bar{d}, \bar{s}, \bar{c}, \bar{b}, \bar{t}$.
  Anti-quarks have the same mass, mean lifetime and spin as their respective quarks, but the electric charge and other charges have opposite sign.

- Quarks with lowest masses are up quarks and down quarks. The heavier quarks decay into up and down quarks i.e. transformation from a higher mass state to a lower mass state.

- The matter observable on planet earth is composed of up quarks, down quarks and electrons.

- Due to a phenomenon known as COLOR CONFINEMENT, quarks are never found in isolation; they are found only within hadrons (which include baryons like protons and neutrons) and mesons or in quark-gluon plasmas

- Quarks are the only known elementary particles that experience all 4 fundamental forces (electromagnetism, gravitation, strong interaction and weak interaction)

- Like other fundamental particles, quarks have intrinsic properties such as electric charge, mass, color charge and spin. Also, electric charge of quarks is not an integer multiple of electric charge

- Up and down quarks are stable and most commonly observed in universe, whereas strange, charm, bottom and top quarks can only be produced in high energy collisions.

- For every quark flavor, there is a corresponding anti particle, known as an antiquark. It differs from quark only in that some of its properties (such as electric charge) have equal magnitude but opposite sign.

- Many other types of classification of quarks such as “valence quarks”, “sea quarks”, “tetraquarks”, “pentaquarks” exist. Such quarks are studied in particle physics.

  Note: For the purpose of this research paper such known ideas/concepts are not repeated. Detailed results are available in books such as [2].

3. QUARKS: MATCHING WITH CONDENSED PHOTONS:

Hypothesis: Quarks and Anti-Quarks have resulted from condensation of photons. Universe started with a burst of photons.

- In the Crooke's dark tube experiment, when the pressure is "sufficiently" low and the potential (electric) difference between the electrodes is "sufficiently" high, the space inside the tube is completely dark and the glass walls of the tube exhibit "green colour" glow. After a careful interpretation of the experiment (given known facts from physics), we conclude that the "electron string" transforms into "green photon".

  MAIN INFERENCE:. The green photon condensed into "electron string" in our region of the universe

- Quarks are $spin - \frac{1}{2}$ particles i.e. they are *Fermions.* But, photons are Bosons with integral spin. We attribute this discrepancy to the fact that spinning Bosonic strings after condensation (by space generation and travel through the generated space) lead to "unwinding" of th strings leading to spinning/vibrating Fermionic quark strings.

- Up and down quarks have the lowest masses of all quarks. They are hypothesized to be generated by condensation of { Yellow, Orange, Red) photons. Such a matching is done based on the fact that by Planck's law, a photonic string has the associated energy given by

  $E = h\,\vartheta,\ \ where\ \ \vartheta = \frac{c}{\mu}\ \ with\ \ c\ being\ the\ speed\ of\ light\ and\ \mu\ is\ the\ wavelength.$

  and Einstein's equation

  $E = m\ c^2,\ where\ m\ is\ mass$. Since the masses of up and down quarks have the lowest possible values (among six of them and electron), the associated energy assumes lowest possible values. Hence, based on the above hypothesis, up and down quarks must have resulted from condensation of { Yellow, Orange, Red } photons.

More generally, using Planck's law, it should be possible to match energy associated with various types of photons and that of the quarks (using Einstein equation). The discrepancy in energy can be associated with the "condensation loss"

- Photon Mutations: The photonic strings (7 of them) could be transformed from a lower energy string (red photon) into a higher energy string (violet photon) when supplied with sufficient energy i.e transformation of one photon to another photon is possible (as in the case of associated quarks). It is conceivable that the 7 photonic strings are higher/lower energy versions of a single spinning bosonic string. In that sense, an electron string (associated with green photon) could transform into violet photonic string when supplied with sufficient energy. As in the case of Raman effect, photonic string transformations can even explain some quantum phenomena.

- In particle physics literature, vast amount of information related to quark flavor properties (such as Mass, Total angular momentum, Baryon number, Electric charge, Isospin, Charge, Strangeness, Topness, Bottomness) is already well documented. Accounting for "condensation loss", such information can be PROPERLY INTERPRETED (along with physical laws such as Planck's law, mass-energy equivalence) to MATCH the observed quarks with 7 photons.

- Photon condensation into electro-magnetic waves such as "microwaves" (resulting in isotropic microwave background radiation) is hypothesized and may be validated using "photon decelerators" (unlike particle accelerators)

4. **CONCLUSION**:

In this brief research paper, an effort is made to reason that condensation of 7 colours of photonic strings resulted in 6 quarks and the electron string/particle. It is hoped that the currently known facts related to quarks can be interpreted from the point of view of such hypothesis. It is emphasized that the research areas like "condensed matter physics", "string theory", "twistor theory" provide deeper insights into the natural physical reality (our universe).

REFERENCES:

[1] Wikipedia Page on "QUARK"

[2] Povh, Rith, Scholz and Zetsche,"Particles and Nuclei: An Introduction to the Physical Concepts," Springer, 1999