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PHYSICS & SPACE SCIENCE

Reformulating Thermodynamics via Laws of Unity

Quantum Superposition and Dark Energy Generation

Quantum, Gravity, and Atom Computing Framework

Dialectics of Science and Magnetism

Discovering Thoughts, Inventing Future

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Preface

The Global Journal of Science Frontier Research (GJSFR) is pleased to present this issue, bringing together a curated collection of high-quality research papers that explore the cutting-edge frontiers of natural and applied sciences.

This issue features research spanning topics including physics & space science, chemistry, biological science, agriculture & veterinary science, marine science, mathematics & decision science, biotechnology & genetics, environment & geology, and interdisciplinary scientific inquiry. Each paper has undergone a rigorous double-blind peer-review process to ensure scientific rigor and originality.

We would like to express our sincere gratitude to the authors for entrusting their research with us, to the reviewers for their thorough and constructive evaluations, and to our readers for their continued engagement with the scientific discourse.

We hope that the research presented herein inspires further discovery and contributes meaningfully to the advancement of scientific knowledge.

The Chief Editor
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Table of Contents

GLOBAL JOURNAL
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Volume 26 | Issue 1 | 2026 Article ID: GJSFR-186211 Language: English

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The Principles of Thermodynamics

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Abstract

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The Principles of Thermodynamics

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Abstract

This paper proposes a reformulation of thermodynamics based on the Principles of Matter or Laws of Unity, redefining heat, inertia, gravity, and the structure of matter. Heat is redefined as the excess-energy (Ee) carried by free particles. Matter is described as a unity of potential-energy (Ep) and sharing-energy (Es), with inertia arising from their combined unity force (Fu = Es + Ee). This framework replaces entropy, the second law, and the third law of thermodynamics. The paper traces the origin of heat to the Big Bang, where four base particles – protons (p), electrons (e), neutrinos (ν), and photons (γ) – formed two base unities (pν and eγ), which remain as free heat-carrying particles. It then applies the Laws of Unity to reinterpret nuclear fusion, beta decay, nuclear fission, photosynthesis, combustion, and planetary heat as processes of energy sharing (Ep → Es) and excess-energy release (Es → Ee). Radiation is reframed as heat transfer through the equalisation of excess-energy during particle collisions. A quantum is redefined as a free particle, with its minimum initial Ee equalling its Es or gravity. The paper further argues that electricity and magnetism are misconceptions, proposing that electricity is "electronic heat" and that magnetic fields are electronic fields generated by repelling free electrons. This leads to a reinterpretation of electric generators as devices that transfer electronic heat rather than induce electromagnetic currents. Finally, the paper extends the Laws of Unity to astrophysical structures, proposing that stars, planets, galaxies, and black holes are hierarchical unities governed by sharing-energy and excess-energy flows. A galaxy is described as an ultimate unity centred on a black hole where potential-energy converts entirely into sharing-energy, producing infinite pull towards its centre.

Keywords: *thermodynamics, heat, inertia, unity, unity force, gravity, nuclear fusion, beta decay, photosynthesis, radiation, electric generator, electricity, electromagnetism, astrophysics*

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1. Introduction

This paper defines **thermodynamics** as the study of the origin, generation and transfer of heat, and the related measurements.

But what is heat?

In his first law of motion, Isaac Newton described inertia as the natural tendency of objects in motion to remain in motion and objects at rest to remain at rest, unless a force causes the velocity to change.[1]

So, Newton had realized that inertia has two states: inertia in motion and inertia at rest. But the causes of them were unknown.

The following Principles of Matter or Laws of Unity will demonstrate the causes of inertia and redefine and generalize "inertia in motion" as heat.

Until the establishment of the Principles of Matter, heat had never been defined correctly, causing the following misconceptions in current thermodynamics:[2]

1. **Entropy**, an abstract thermodynamic quantity of an isolated system, cannot decrease spontaneously with time, but increases to the highest when reaching the system's thermodynamic equilibrium. "High" entropy means that energy is more disordered or dispersed, while "low" entropy means that energy is more ordered or concentrated. Entropy is central to the second law of thermodynamics.
2. **The third law of thermodynamics**: as the temperature of a system approaches absolute zero, all processes cease and the entropy of the system approaches a minimum value.

The Principles of Matter set the foundation for the Principles of Thermodynamics and replace the above misconceptions.

2. The Principles of Matter and the Definition of Heat

Heat is described by the Principles of Matter or Laws of Unity, updated from my original version.[3][4]

1. **Matter** is any substance that has **mass (m)** and **energy**. Mass and energy are properties of matter, not physical entities. Matter's energy is scalar, not vector.
2. Matter shows its energy as **forces**. A **force** is a measurable vector that transfers energy.
3. Matter retains its **potential-energy (Ep)** and **sharing-energy (Es)** as a **unity member** ($Ep + Es$), within a hierarchical unit called a **unity**, until being pushed out of the unity by sufficient external **excess-energy** ($Ee \geq Es$) as a **free particle** with the Ee ($Ep + Es + Ee$). See Figure 1.

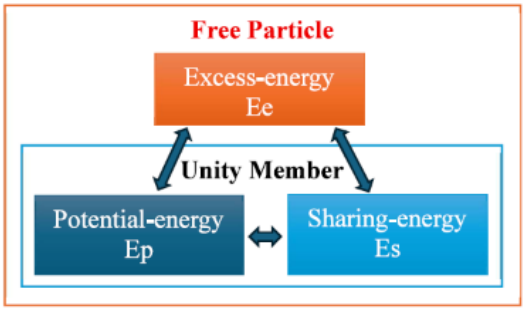

Figure 1. Matter

4. Matter forms and maintains unity by combining its Es and Ee into a **unity force** or **inertia**:

$$\mathbf{Fu} = Es + Ee,$$

where Es causes an active and constant pull, as **inertia-at-rest** or **gravity (F)** or **weight (W)**, towards the unity centre ($Es = F = W$); and Ee produces **inertia-in-motion** or **heat**, away from the external excess-energy.

   (a) Matter oscillates away with the Ee ($Ee \geq Es$) as a free particle, transferring the Ee as inertia-in-motion or heat ($Ee \rightarrow Ee \rightarrow 0$) – for example, as light waves if the particle is a photon or a neutrino, or as electron waves with magnetic effects if the particle is an electron – until it returns to or joins a unity ($Ee = 0$).

   (b) In the unity, $Ee = 0$, leaving only Es in its unity force, matter orbits or gravitates to the unity centre, like an electron orbiting an atomic nucleus or a planet orbiting a star, showing as inertia-at-rest or gravity (F) or weight (W): $Fu = Es = F = W$.

5. Matter does not show its Ep but converts its Ep between its Es and Ee (as shown in Figure 1). For example, when we travel upwards in an airplane, our weight decreases while our potential-energy increases ($Es \rightarrow Ep$). At the same time, the plane's external excess-energy also increases our potential-energy ($Ee \rightarrow Ep$). When we travel even higher in a spacecraft, we become "weightless" (weighing less). When landing on the Moon or Earth, our potential-energy decreases while our weight increases ($Ep \rightarrow Es$).

6. Breaking free a member with Es from a unity requires sufficient external excess-energy ($Ee \geq Es$), causing inertia-in-motions and heat transfers ($Ee \rightarrow Ee$), leading to new unities. The more energy is shared ($Ep \rightarrow Es$, such as in a nuclear fusion), the tighter the formed unity (such as the produced nucleus unity), the more external excess-energy is required to break the unity, and vice versa (such as in beta decay).

As proposed above:

1. Gravity or weight or inertia-at-rest is redefined as matter's active and constant pull towards its unity centre due to its sharing-energy.

2. Inertia is redefined and generalized as the unity force resulting from both sharing-energy (as inertia-at-rest or gravity or weight) and excess-energy (as inertia-in-motion or heat).

3. Matter moves relative to its unity centre, as its reference point, nullifying the basis of the observational reference frame and relativity.[3][4][5]

4. Matter's unity force or inertia governs the Principles of Matter or Laws of Unity:

> "
>
> $$Fu = Es + Ee,$$
>
> where,
>
> $$Es = F = W = mg,$$
>
> where m is the mass of the matter, g is the acceleration due to the Es, F or W.
>
> $$Ee = ma,$$
>
> where m is the mass of the matter, a is the acceleration due to the Ee.
> Hence,
>
> $$Fu = mg + ma = m(g + a),$$
>
> cycling through the following states:

- $a = 0$ (the matter is in its unity),
- $a \geq g$ (the matter is out of the unity),
- $a \rightarrow 0$ (the matter is returning to or joining a unity).

Therefore:

1. **Heat** is redefined as the excess-energy carried by free particles. In short, **heat** is a stream of free particles, such as free photons, neutrinos, electrons, air and water particles.

2. With matter's structure, matter's energy composition and flow, and the definition of heat, the Laws of Unity replace entropy, the second law and the third law of the current thermodynamics.

But where do the free particles come from?

3. The Origin and Generation of Heat

According to the Big Bang model, the universe began 13.8 billion years ago by expanding from a single point of infinite density and energy, known as the singularity.[6]

As the universe expanded and cooled, matter formed, as four kinds of base particles: proton, electron, neutrino, and photon, in descending order of mass.[7][8][9][10][11] These free particles from the Big Bang are the origins of heat.

Then, each free proton (p) shares energy with a free neutrino (ν) as a proton unity ($p\nu$) because their mass fit each other to be a unity:

$$p + \nu \rightarrow p\nu.$$

Each free electron (e) shares energy with a free photon (γ) as an electron unity ($e\gamma$), also because their mass fit each other to be a unity:

$$e + \gamma \rightarrow e\gamma.$$

Proton unities ($p\nu$) and electron unities ($e\gamma$) are called base unities, still as free particles and heat.

Therefore:

1. The Big Bang created four kinds of free base particles: proton (p), electron (e), neutrino (ν) and photon (γ), as the origin of heat.

2. Then, the four base particles form into two base unities: proton unities ($p\nu$) and electron unities ($e\gamma$), still as free particles and heat.

In the process of expansion and heat dispersion, the base unities ($p\nu$ and $e\gamma$) were distributed into numerous nebulae.

Since then, in the centre of each nebula, the base unities have been so dense and hot that they have become more energy sharing ($Ep \rightarrow Es$) and have begun nuclear fusion, while transferring out more high-energy base particles like γ^+, ν^+ and e^+ (the superscript + indicates high energy in this paper).

The process of energy sharing, producing new unities, while transferring out heat particles is called **heat generation**: $Es \rightarrow Ee$, causing subsequent heat transfers or radiation ($Ee \rightarrow Ee$), as demonstrated in the following examples.

4. Heat Generation – Nuclear Fusion

In a nuclear fusion centre, which is also a unity centre, the base unities ($p\nu$ and $e\gamma$) have been so dense and hot that they have become more energy sharing ($Ep \rightarrow Es$) and have started nuclear fusion, mainly through the proton-proton chain reaction,[12] in the following simplified steps, updated from my original version:[7][8][9][10][11]

1. Two proton unities and two electron unities share energy to form a hydrogen-2 nucleus called deuterium, transferring out a high-energy neutrino (ν^+), a high-energy electron (e^+ or positron) and a high-energy photon (γ^+ or gamma ray) as excess-energy:

$$2p\nu + 2e\gamma \rightarrow {}^2p\nu e\gamma + \nu^+ + e^+ + \gamma^+.$$

2. The deuterium ${}^2p\nu e\gamma$ shares energy with another proton unity to form a helium-3 nucleus, transferring out another high-energy photon (γ^+ or gamma ray) as excess-energy:

$${}^2p\nu e\gamma + p\nu \rightarrow {}^3p^2\nu e + \gamma^+.$$

3. Two helium-3 nuclei share energy to form one helium-4 nucleus and transfer out two proton unities to continue the process:

$${}^3p^2\nu e + {}^3p^2\nu e \rightarrow {}^4p^2\nu^2 e + 2(p\nu)^+.$$

4. The helium-4 nucleus, ${}^4p^2\nu^2 e = 2({}^2p\nu e)$, becomes repelling while transferring the excess-energy mentioned above as heat, and moves out of the fusion centre to the outer core as the nucleus unity, and the product of the fusion.

5. Or the helium-4 nucleus $2({}^2p\nu e)$ shares more energy with other nuclei or proton unities to form a heavier nucleus unity: $n({}^2p\nu e)$, where atomic number $n > 2$, while producing more heat, if the situation permits.

6. Therefore, in a newly formed nucleus unity from nuclear fusion, every two protons share energy with one neutrino and one electron as $n({}^2p\nu e)$, where the atomic number $n \geq 2$. Although isotopes happen, this is the main composition.

7. Most fusion centres transfer out their excess-energy as heat, including high-energy neutrinos, photons, and electrons:

   - The high-energy neutrinos and photons (ν^+ and γ^+) carry their excess-energy away directly as light (heat), bumping into outside particles while equalising their excess-energy, causing radiation: $Ee \rightarrow Ee$.
   - The high-energy electrons (e^+) bump into outside electron unities ($e\gamma$), transferring the excess-energy to their bonded photons (no "annihilation"), producing gamma rays (γ^+) as light (heat):

$$e^+ + e\gamma \rightarrow 2e + \gamma^+.$$

   - Then the gamma rays bump into outside particles while equalising their excess-energy, causing radiation: $Ee \rightarrow Ee$, becoming visible light, until they transfer all the Ee and return to or join electrons that lost their photons previously.

8. The rest, extra-large fusion centres cannot transfer out their excess-energy in the inner core but use the Ee instead for energy sharing of tighter unities. Without repelling by heat release, these extra-large fusion centres become black holes.

So, I propose and summarize:

1. Nuclear fusion is the unity force or inertia in action, creating nucleus unities so that every two protons share energy with one neutrino and one electron as $n({}^2p\nu e)$, where atomic number $n \geq 2$. In a nucleus unity, neutrinos and electrons are energy-sharing agents, orbiting protons to share and distribute energy. Thus, unity force or inertia replaces strong force and quantum chromodynamics.[4][7][8][9][10][11]

2. When energy sharing ($Ep \rightarrow Es$) leads to new unties, the excess-energy transfers out as heat, such as high-energy photons (γ^+), neutrinos (ν^+) and electrons (e^+): $Es \rightarrow Ee$. Then these particles bump into outside particles while equalizing their excess-energy, causing radiation: $Ee \rightarrow Ee$. So, nuclear fusion has this energy flow: $Ep \rightarrow Es \rightarrow Ee \rightarrow Ee$.

3. A "positron" is redefined as a high-energy electron. Matter's energy is scalar, not vector. Any "antimatter" is a misconception, including the concept of a "positively charged electron" and the idea of "annihilation".

4. In the universe, most nuclear fusion centres transfer out excess-energy as heat, forming stars and planets. The rest, extra-large fusion centres with inner cores unable to transfer out heat as repelling forces, form black holes.[4][7][8][10][11]

5. In a black hole, matter transfers its Ep completely into Es, so that $Ep = 0$, and Es becomes infinity: $Es = Fu = F \rightarrow \infty$, producing infinite pulls towards its centre, making the black hole into a physical singularity.

6. Every galaxy is a unity, the ultimate unity with its ultimate unity force, with at least one black hole as the unity centre. If two or more black holes exist in one galaxy, they are close enough to attract each other and will eventually merge into one.[4][7][8][10]

7. Unity force or inertia (its sharing-energy Es showing as gravity) forms the hierarchical structure of each galaxy, with the black hole as its unity centre. Under a galaxy, each star is the unity centre of a star system. Under the star system, each planet is the unity centre of its moons. Then, each atomic nucleus is the

unity centre of an atom. Inside the nucleus, every proton is a unity centre. Outside the nucleus, each electron is the unity centre of an electron unity ($e\gamma$).[4][7][8][10]

In a nuclear fusion process, some nuclei are formed with more potential-energy and less sharing-energy, hence unstable, easier to break into more energy-sharing (hence more stable) nuclei, while transferring out the excess-energy as heat, in a later process called beta decay.

5. Heat Generation – Beta Decay

According to the Laws of Unity, an external free particle (Ee^+) with sufficient excess-energy ($Ee^+ \geq Es$) can break free a unity member with Es.

In the case of beta decay, the external free particles mostly come from random environmental sources (besides those manually induced in nuclear fission), including cosmic rays and other high-energy photons (γ^+, gamma rays or X-rays), neutrinos (ν^+) or electrons (e^+), most of which are nearly untraceable.

Beta decays happen in those unstable nuclei with more potential-energy and less sharing-energy ($Ep^+ + Es$) that can be broken easily by those nearly untraceable free particles ($Ep + Es + Ee^+$):

$$(Ep^+ + Es) + (Ep + Es + Ee^+) \rightarrow 2(Ep + Es + Ee^+),$$

simplified as the energy flow:

$$Ep^+ + Ee^+ \rightarrow Ep + 2Ee^+.$$

As stated before, nuclei of helium and heavier atoms are created in nuclear fusion by every two protons sharing energy with one neutrino and one electron as $n(^2pve)$, where atomic number $n \geq 2$, and every pair of (pe) shows as a neutron.

In the following beta decay processes, **electron emission** breaks a neutron (pe) into $p + e$; while **electron capture** is a reversal: $p + e \rightarrow pe$.

1. Electron emission[13]. The external free particle (Ee^+) breaks free an electron and a neutrino shared with a proton, causing one less neutron and one more proton:

$$pe\nu + Ee^+ \rightarrow p + e^+ + \nu^+.$$

The broken-free neutrino (ν^+) carries the excess-energy away as heat. The broken-free electron (e^+ or positron) transfers the excess-energy to an outside electron unity ($e\gamma$), producing a gamma ray or X-ray (γ^+ as heat) depending on the energy level:

$$e\gamma + e^+ \rightarrow 2e + \gamma^+.$$

2. Electron capture[14]. The external free particle can also energize an electron in the orbit of an unstable nucleus. The energized orbiting electron (e^+) can break the unity of its nucleus, forming a new unity with a proton, causing one less proton and one more neutron:

$$p\nu + e^+ \rightarrow pe + \nu^+,$$

transferring out a high-energy neutrino ν^+ as heat.

So, I propose and summarize:

1. Beta decay is also unity force or inertia in action: sufficient external excess-energy ($Ee^+ \geq Es$) breaks free a neutrino and an electron (electron emission) or just a neutrino (electron capture) from an unstable nucleus unity ($Ep^+ + Es$), causing inertia-in-motion ($Ep^+ + Ee^+ \rightarrow Ep + 2Ee^+$), leading to subsequent radiation ($Ee^+ \rightarrow Ee^+$), and a more energy-sharing and hence more stable nucleus unity ($Ep + Es$). Thus, unity force or inertia replaces weak force.[4][7][8][9][11] So, beta decay has this energy flow: $Ep + Ee \rightarrow Ee \rightarrow Ee$.
2. In beta decays, electron emission breaks a neutron (pe) into $p + e$; while electron capture is a reversal: $p + e \rightarrow pe$.
3. As stated before, the concept of a "positively charged electron" is a misconception. Beta decays should be categorized into electron emission and electron capture, instead of "negative or minus" and "positive or plus".

Nuclear fission is also a type of beta decay.

6. Heat Generation – Nuclear Fission

In a nuclear fission process, sufficient external excess-energy ($Ee^+ \geq Es$) breaks an unstable nucleus unity ($Ep^+ + Es$), causing inertia-in-motion and subsequent chain reactions ($Ep^+ + Ee^+ \rightarrow Ep + 2Ee^+$), and more heat as radiation ($Ee^+ \rightarrow Ee^+$), leading to more energy-sharing hence more stable unities ($Ep + Es$).

An example is U-235 ($_{92}U$) breaking into Kr-92 ($_{36}Kr$) and Ba-141 ($_{56}Ba$).[8][9][15]

Uranium-235 has 92 protons and 143 neutrons ($^{235}p^{92}\nu^{143}e$). In this breaking process, one high-energy neutron $(pe)^+$ and one high-energy neutrino ν^+ are induced into the nucleus of uranium-235 ($_{92}U$), breaking it into two smaller nuclei:

1. Krypton-92 ($_{36}Kr$) with 36 protons and 56 neutrons ($^{92}p^{35}\nu^{56}e$);
2. Barium-141 ($_{56}Ba$) with 56 protons and 85 neutrons ($^{141}p^{55}\nu^{85}e$);

and transferring three more high-energy neutrons $(pe)^+$ and three more high-energy neutrinos ν^+:

> $(^{235}p^{92}\nu^{143}e) + (pe)^+ + \nu^+ \rightarrow (^{236}p^{93}\nu^{144}e) \rightarrow (^{92}p^{35}\nu^{56}e) + (^{141}p^{55}\nu^{85}e) + 3(pe)^+ + 3\nu^+$

The transferred three $(pe)^+$ and three ν^+ as heat will cause chain reactions if the situation permits.

Still having enough potential-energy to be unstable ($Ep^+ + Es$), the produced Kr-92 and Ba-141 can break out more high-energy electrons and neutrinos as heat ($Ep^+ + Ee^+ \rightarrow Ep + 2Ee^+$), causing subsequent heat transfer or radiation ($Ee^+ \rightarrow Ee^+$), leading to even smaller and more energy-sharing nuclei ($Ep + Es$).

7. Heat Generation – the Light-Dependent Reactions in Photosynthesis

Photosynthesis [16] takes place within chloroplasts in plants and algae, using the chlorophyll to absorb and transfer light (γ^+ or Ee).

The process has two stages: light-dependent reactions and light-independent reactions (Calvin Cycle). Only the first stage is discussed here.

Light-Dependent Reactions occur in the thylakoid membranes within the chloroplasts, in which the chlorophyll absorbs and transfers the light (γ^+ or Ee) into chemical energy (potential-energy Ep) in the form of ATP and NADPH: $Ee \rightarrow Es \rightarrow Ep$.

The overall equation for the light-dependent reactions of non-cyclic electron flow in green plants is:[16]

> $2H_2O + 2\text{NADP}^- + 3ADP + 3P_i + 7\gamma^+ \rightarrow 2\text{NADPH} + 2H^- + 3ATP + O_2$

where NADP^- and H^- means each of them has lost an electron (e^+) to transfer heat, P_i is inorganic phosphate.

In which light is absorbed ($Ee \rightarrow Ee$) to break free the energy-sharing electrons (e) in H_2O into e^+:

$$2\text{H:O:H} + 4\gamma^+ \rightarrow 4H^- + O_2 + 4e^+.$$

Then the H^- and NADP^- use the freed electrons (e^+) as sharing-energy (Es) to form NADPH ($Ee \rightarrow Es \rightarrow Ep$):

$$2\text{NADP}^- + 4H^- + 4e^+ \rightarrow 2\text{NADPH} + 2H^-$$

The absorbed light (γ^+) is also used as sharing-energy to form ATP ($Ee \rightarrow Es \rightarrow Ep$):

$$3ADP + 3P_i + 3\gamma^+ \rightarrow 3ATP$$

The formed NADPH and ATP will provide the sharing-energy ($Ep \rightarrow Es$) for the second stage.

Photosynthesis eventually produces sugars ($Ee \rightarrow Es \rightarrow Ep$) as food for the plant. So, its energy flow is: $Ee \rightarrow Ee \rightarrow Es \rightarrow Ep$.

The Consequences of Photosynthesis

- Carbon cycle: the carbon from the CO_2 is used in the second stage to store the transferred potential-energy from the excess-energy of light: $Ee \rightarrow Es \rightarrow Ep$.
- Oxygen Production: photosynthesis transfers out the oxygen O_2 as heat that animals and other organisms breathe, which are burning processes of their stored potential-energy (sugars first): $Ep \rightarrow Es \rightarrow Ee$.
- Photosynthesis ($Ee \rightarrow Es \rightarrow Ep$) is the ultimate source of food for most life on Earth, as the sugars produced are the base of food chains. The biomass on the food chains eventually becomes fossil fuels as heat sources (Ep).

8. Heat Generation – Burning of Fossil Fuels

An example of a fossil fuel burning process is the burning of gasoline, a combustion reaction between the hydrocarbon components of gasoline (like octane C_8H_{18}) and oxygen (O_2), transferring out hot carbon dioxide (CO_2), water steam (H_2O), and free photons (γ^+) as heat and light ($Ep \rightarrow Es \rightarrow Ee$):

$$2C_8H_{18} + 25O_2 \rightarrow 16CO_2 + 18H_2O + \gamma^+.$$

This process requires an initial spark to provide external heat to break out the energy-sharing electron unities ($e\gamma$) within the C_8H_{18} and O_2 molecules, causing subsequent heat and light:

$$(e\gamma)^+ \rightarrow e^+ + \gamma^+,$$

and chain reactions, leading to energy sharing of more stable unities – the exhaust gas (CO_2 and H_2O), also as heat.

1. External heat: The process begins with a spark that provides the initial heat, the sufficient excess-energy ($Ee^+ \geq Es$).
2. Atom separation: The heat (Ee^+) breaks out the energy-sharing electron unities ($e\gamma$):

$$Ee^+ + (e\gamma) \rightarrow (e\gamma)^+,$$

separating the carbon (C) and hydrogen (H) atoms in the C_8H_{18}, and the oxygen atoms (O) in O_2, producing heat and light:

$$(e\gamma)^+ \rightarrow e^+ + \gamma^+,$$

causing subsequent energy sharing.

3. Energy sharing: The now-separated carbon C and hydrogen H atoms then share energy with the separated oxygen O atoms, forming new unities, producing heat ($Ep \rightarrow Es \rightarrow Ee$):

- Carbon atoms C share energy with oxygen atoms O to form carbon dioxide (CO_2) as heat,
- Hydrogen atoms H share energy with oxygen atoms O to form water steam (H_2O) as heat,

and transferring out more e^+ and γ^+ as heat and light, causing subsequent chain reactions and radiation: $Ee \rightarrow Ee$.

The Consequences of the Burning

- Imperfect burning: In real engines, combustion is not always complete. The exhaust can also contain other substances, such as carbon monoxide (CO) and nitrogen oxides (NO_x), formed due to incomplete reactions or the presence of other gases like nitrogen in the air.
- Energy transfer: This process transfers chemical energy (Ep) stored in the fuel into heat, powering engines, with this energy flow: $Ep \rightarrow Es \rightarrow Ee \rightarrow Ee$.

The generated heat particles continue to transfer heat.

9. Heat Transfer or Radiation

1. Heat transfers continuously, causing **radiation**: $Ee \rightarrow Ee$. When two free particles bump into each other, their respective excess-energies (Ee^{+3} and Ee^{+1}) equalise:

$$Ee^{+3} + Ee^{+1} = Ee^{+2} + Ee^{+2},$$

thus transfers the heat.

2. That is, free particles transfer heat by bumping while **equalising** their excess-energy ($Ee \rightarrow Ee$), causing radiation. So, **radiation** is redefined and generalised as heat transfer.
3. A free particle with a smaller mass is easier to transfer heat just because of its size.
    - Being almost massless, the free photons (γ^+) and the free neutrinos (ν^+) are the best heat-transferring agents. The free photons (γ^+) are called **photonic heat**.
    - The next are the free electrons (e^+), which are called **electronic heat**.
    - Then come gas particles (such as H_2, He, N_2, O_2 and CO_2) and liquid molecules (like H_2O). These are called **atomic and molecular heat**.
4. Atoms of solid materials (such as metal atoms or rock atoms) transfer heat through themselves as well as their outermost electrons.

- When the atoms of the solid materials get collisions from external *atomic heat particles*:
  - The atoms' *Ee* gets equalized with the external *Ee* ($Ee \rightarrow Ee$).
  - When the external heat gets higher than the melting point of the atoms, the heat transfer continues in a liquid state.
- When the atoms' outermost electrons get collisions from external *electronic heat particles* (e^+):
  - If the outermost electrons are easier to break free as e^+ (good electronic conductors), the heat transfer becomes electricity.
  - Otherwise, the heat transfer is between atoms.
- When the atoms' outermost electrons get collisions from external *photonic heat particles* (γ^+):
  - If the outermost electrons are easier to break free as e^+ (good photovoltaic materials), the heat transfer becomes electricity.
  - Otherwise, the heat transfer is between atoms.

5. After transferring all their excess-energy, those free particles return to or join their own unities:[3][4][7]

- An electron returns to or joins an atom unity that lost an electron previously, pulling again as inertia-at-rest or gravity or weight.
- A photon returns to or joins an electron that lost its photon previously: $\gamma + e \rightarrow e\gamma$.
- A neutrino returns to or joins a proton that lost its neutrino previously: $\nu + p \rightarrow p\nu$.
- A gas or liquid particle falls closer to the centre of Earth, or another planet it belongs to.

The following are examples of heat transfer or radiation.

10. Heat Transfer – Geothermal Energy

In the formation of the universe, planets are formed at the disk edge of each star system, as much smaller nuclear fusion centres. By now, the planets have burned their main fuel, even the nuclear fusion of heavier nuclei would stop gradually, leading to the current much cooler planets that we mostly see: the elements that moved out of the cores have cooled down to become mantles and crusts, the previous fusion centres are still hot, with some unstable nuclei from the nuclear fusion going through beta decays and nuclear fissions, releasing more heat, causing planetary quakes and volcanoes.[10]

Geothermal energy is the heat (*Ee*) extracted from the Earth's crust, which is transferred from the beta decays ($Ee \rightarrow Ee$), including the nuclear fissions, which were previously transferred from the nuclear fusion that formed the Earth, which originated from the base particles of the Big Bang.

11. Heat Transfer – Electric Generator

According to current knowledge, an electric generator [17] converts mechanical energy (motion) into electrical energy. It works on the principle of electromagnetic induction [18], which was discovered by Michael Faraday in 1831, and James Clerk Maxwell mathematically described it as Faraday's law of induction.

Faraday's law was later generalized into the Maxwell-Faraday equation, one of the four Maxwell equations in his theory of electromagnetism.[18]

According to Albert Einstein, much of the groundwork and discovery of his special relativity theory was presented by this law of induction by Faraday in 1834.[18]

According to the Principles of Matter:

1. The "electric charge" and "electricity" are misconceptions and should be redefined as **electronic heat**. And the "electric field" should be redefined as an electronic field.[4]
2. An **electronic field** is formed by the free electrons repelling in the same direction and flowing out from the repelling end and returning to the opposite (attracting) end.[4]
3. Electronic fields transfer heat ($Ee \rightarrow Ee$), causing magnetic effects. When close enough, two electronic fields with similar repelling directions attract each other and merge into one: the electrons with stronger *Ee* bump the electrons with weaker *Ee* into the same direction and energy level, releasing their bonding photons as light: $(e\gamma)^+ \rightarrow e + \gamma^+$ (mostly weaker and invisible); otherwise, the two fields repel each other and clash into one: the electrons from one field collide with the electrons from the other field, releasing their bonding photons as light: $(e\gamma)^+ \rightarrow e + \gamma^+$ (stronger and visible, such as a lightning). This phenomenon is called **electronism**, replacing the mis-conceptualized "magnetism" and "electromagnetism".[4]
4. Therefore, there are no such things as "magnetic field" and "magnetism". Any "magnetic field" or "electromagnetic field" is an electronic field.[4][7][9]

As a demonstration, the following are comparisons of the current (a) and the replacement (b) theories of the electric generator:

> (a) When a wire (conductor) moves through a magnetic field, the magnetic force "pushes" the electrons inside the wire, creating a flow of electricity. A generator essentially forces these electrons through an external circuit to power devices.

> (b) When a wire (conductor, like copper Cu) moves through an electronic field, the wire increases the excess-energy (heat) of the free electrons as they bump into and break free the outermost electrons of the wire (Cu) atoms, transferring (equalizing) the heat, causing subsequent heat transfer (radiation) along the wire: $Ee \rightarrow Ee$, which is the flow of electricity.

Key Components:
Rotor: The moving part that rotates.

> (a) It holds magnets or electromagnets to create a spinning magnetic field.

> (b) It holds free and aligned electrons to create a spinning electronic field.

Stator: The stationary part containing coils of copper wire.

> (a) As the rotor spins, the magnetic field "cuts" through these stationary coils.

> (b) As the rotor spins, the energized electrons break free the outermost electrons of the coil (Cu) atoms and transfer their heat: $Ee \rightarrow Ee$.

How It Works:

1. Input Source: To keep the rotor spinning, an external force is needed, which can be heat from burning fossil fuels or nuclear fission, falling water (hydro), wind, or geothermal energy.

2. Motion:

> (a) Magnetic: The spinning rotor creates a rotating magnetic field.

> (b) Electronic: The spinning rotor creates a rotating electronic field, energizing the electrons.

3. Electronic flow:

> (a) Inducing: The moving magnetic field passes through the stator's wire coils, inducing a voltage that makes an electric current.

> (b) Transferring: The energized electrons in the rotating electronic field break free the outermost electrons from the stator's wire (Cu) atoms, transferring the heat ($Ee \rightarrow Ee$), causing an electronic flow.

Since "electric" has been redefined as electronic heat, "electric generator" is redefined as **electric transferor**.

12. Heat Transfer – Hydroelectricity

Hydroelectricity comes from the potential-energy (Ep) of water molecules transferred from the excess-energy of sunlight or photonic heat ($Ee \rightarrow Ep$). As the water flows down by its sharing-energy (Es) with Earth, transferring the potential-energy to excess-energy: $Ep \rightarrow Es \rightarrow Ee$, turning turbines connected to generators (transferors), the Ee from the water is transferred to Ee of electricity: $Ee \rightarrow Ee$.

1. **Water Source**: The water with potential-energy (Ep) on higher grounds (such as a mountain) deposited there by the photonic heat: $Ee \rightarrow Ep$.

2. **Turbine**: The water flows down from the higher grounds through a penstock (a pipe) to a turbine: $Ep \rightarrow Es \rightarrow Ee$, turning its blades.

3. **Generator (Transferor)**: The turning turbine is connected to an electronic heat transferor, transferring the Ee from the water to Ee of electricity (electronic heat): $Ee \rightarrow Ee$.

13. Heat Transfer – Wind Energy

The excess-energy of air particles (Ee of wind), transferred from the excess-energy of sunlight (photonic heat), turns wind turbines connected to generators (transferors), transferring the Ee from the wind to Ee of electricity ($Ee \rightarrow Ee$), as Wind energy:

1. **Wind**: The free air particles with excess-energy transferred from the photonic heat ($Ee \rightarrow Ee$).

2. **Turbine**: The wind turns the blades of a turbine connected to a rotor.

3. **Generator (Transferor)**: The rotating rotor spins a transferor, transferring the Ee from the wind to Ee of electricity (electronic heat): $Ee \rightarrow Ee$.

14. Heat Transfer – Mechanical Vibrations

Free air or water particles (Ee of wind or rain) can cause mechanical vibrations ($Ee \rightarrow Ee$). When the vibrations happen in an electronic field surrounded with wire coils, the Ee from the vibrations will increase Ee of the free electrons in the field, producing electronic flow or electricity ($Ee \rightarrow Ee$) in the wire coils, the same principles described in the section of Electric Generator (Section 11).

15. The Measurement of Heat Transfer or Radiation

As stated before, free particles transfer heat by bumping while equalizing their excess-energy ($Ee \rightarrow Ee$), causing radiation.

In the International System of Units (SI), heat is measured in joules (J).

The standard unit for heat transfer is the watt (W): 1 W = 1 joule/second.

Heat flux is defined as heat transfer per unit area: watts per square metre (W/m^2).

In weather and climate, heat transfer is measured by air temperature, wind speed, and atmospheric pressure.

One of the most common devices for measuring temperature is the glass thermometer, consisting of a glass tube filled with mercury or some other liquid. Temperature change causes the volume change of the fluid: the ambient free particles transfer their heat by bumping while equalizing their Ee with the particles in the fluid, changing each particle's motion space – a particle with higher Ee takes more space – causing volume change of the fluid, so that the temperature can be determined by measuring the fluid volume, or by reading the level of the fluid in the thermometer.

15.1. Electronic Heat Transfer

As stated before, "electric charge" and "electricity" in current physics are misconceptions and should be redefined as electronic heat. To be precise, **electricity** is the heat of free electrons.

We often use heaters to transfer electronic heat to air-particle heat: $Ee \rightarrow Ee$.

In electricity, the same watt (W) is used for heat transfer, which equals one ampere under the pressure of one volt:

> 1 W = 1 amp x 1 V = 1 joule/second.

Some devices require only a few watts to operate, so that their heat transfer (power consumption) is usually measured in watts (W). Other devices require larger amounts of heat transfer measured in kilowatts (1 kW = 1000 W). Electricity generation (heat transfer) capacity is often measured in multiples of kW, such as megawatts (1 MW = 1000 kW) and gigawatts (1 GW = 1000 MW).

Electricity transfer over time is measured in Watt-hours. A Watt-hour (Wh) equals the energy transfer of one watt steadily through an electronic circuit for one hour. The transfer of electricity through an electronic circuit is typically measured in kilowatt-hours (kWh).

15.2. Photonic Heat Transfer

As stated before, **light** is redefined as photonic heat. To be precise, light is the heat of free photons.

When light is transferred from electricity, it can also be measured in watts (W): 1 W = 1 joule/second.

Luminosity[19], the measurement of heat transfer from an astronomical object (like a star or galaxy), is also in joules/second or watts (W).

The Standard Candle[20] was a measurement of light transfer, originally defined as a one-sixth-pound candle of sperm wax, burning at the rate of 120 grains per hour. Now, it has been used to estimate the distance of a star to the Earth.

The mole is a base unit in the SI for the amount of substance: 1 mole = 6.022×10^{23} elementary entities. So, 1 mole of light = 6.022×10^{23} photons or quanta.

According to current physics, a quantum[21] is the minimum amount of any physical entity (such as a photon) **involved in an interaction**, emphasising that the magnitude of the physical property can take on only **discrete values** of one quantum.

According to the Principles of Matter, when matter with sharing-energy (Es) is pushed out of its unity by sufficient external excess-energy ($Ee \geq Es$) as a free particle with the Ee, it transfers the Ee as inertia-in-motion or heat (**involved in an interaction**), such as light if it is a photon.

The free particle, over the threshold of its Es or gravity (hence a **discrete value**), can take on any value of energy, not only integer multiples of the Es.

Therefore, a **quantum** should be redefined as a free particle, with its minimum initial Ee equalling its Es or gravity.

16. Conclusion

1. Matter structures itself in a nested unity with its **potential-energy** (Ep) and **sharing-energy** (Es) as a **unity member**, until being pushed out of the unity by sufficient external **excess-energy** ($Ee \geq Es$) as a **free particle** to transfer the excess-energy ($Ee \rightarrow Ee \rightarrow 0$) as **heat**. After transferring all its excess-energy ($Ee = 0$), it returns to or joins a unity again.

2. Matter forms and maintains unity by combining its Es and Ee into a **unity force** or **inertia**: $Fu = Es + Ee$, where Es causes an active and constant pull, as **inertia-at-rest** or **gravity** (F) or **weight** (W), towards the unity centre ($Es = F = W$); and Ee produces **inertia-in-motion** or **heat**, away from the external excess-energy.

3. That is, **heat** is redefined as the Ee carried by free particles. In short, **heat** is a stream of free particles, such as free photons, neutrinos, electrons, air and water particles.

4. With matter's structure, matter's energy composition and flow, and the definition of heat, the Laws of Unity replace entropy, the second law and the third law of the current thermodynamics.

5. The Big Bang created four kinds of free base particles: proton (p), electron (e), neutrino (ν) and photon (γ), as the origin of heat. Then, the four base particles form into two base unities: proton unities ($p\nu$) and electron unities ($e\gamma$), still as free particles and heat.

6. The process of energy sharing, producing new unities, while transferring out heat particles is called **heat generation**: $Es \rightarrow Ee$, causing subsequent heat transfers or radiation ($Ee \rightarrow Ee$).

7. Nuclear fusion, beta decay, nuclear fission, photosynthesis, burning of fossil fuel, are all examples of heat generation.

8. Heat transfers continuously. Free particles transfer heat by bumping into one another while **equalizing** their excess-energy ($Ee \rightarrow Ee$), causing radiation. That is, **radiation** is redefined and generalized as heat transfer.

9. A free particle with a smaller mass is easier to transfer heat just because of its size.

    - Being almost massless, the free photons (γ^+) and the free neutrinos (ν^+) are the best heat-transferring agents. The free photons (γ^+) are called **photonic heat**.
    - The next are the free electrons (e^+), which are called **electronic heat**.
    - Then come gas particles (such as H_2, He, N_2, O_2 and CO_2) and liquid molecules (like H_2O). These are called **atomic and molecular heat**.

10. Atoms of solid materials (such as metal atoms or rock atoms) transfer heat through themselves as well as their outermost electrons.

11. After transferring all their excess-energy, those free particles return to or join their own unities.

12. Therefore, "electric charge" and "electricity" are misconceptions and should be redefined as **electronic heat**. And an "electric field" should be redefined as an electronic field.

13. An **electronic field** is formed by the free electrons repelling in the same direction and flowing out from the repelling end and returning to the opposite (attracting) end.

14. Electronic fields transfer heat ($Ee \rightarrow Ee$), causing magnetic effects. When close enough, two electronic fields with similar repelling directions attract each other and merge into one: the electrons with stronger Ee bump the electrons with weaker Ee into the same direction and energy level, releasing their bonding photons as light: $(e\gamma)^+ \rightarrow e + \gamma^+$ (mostly weaker and invisible); otherwise, the two fields repel each other and clash into one: the electrons from one field collide with the electrons from the other field, releasing their bonding photons as light: $(e\gamma)^+ \rightarrow e + \gamma^+$ (stronger and visible, such as a lightning). This phenomenon is called **electronism**, replacing the mis-conceptualized "magnetism" and "electromagnetism".[4]

15. So, there are no such things as "magnetic field" and "magnetism". Any "magnetic field" or "electromagnetic field" is an electronic field, nullifying the basis of Faraday's electromagnetic induction, Maxwell's theory of electromagnetism, and Einstein's special relativity.[17][18]

16. As an example of heat transfer, an "electric generator" is redefined as an **electric transferor**, acting as a mechanical transferor for hydroelectricity, wind energy, and mechanical vibration.

17. Heat transfer (including electricity and light) can be measured in watts (W): 1 W = 1 joule/second. The measurement is called luminosity in astronomy.

18. Temperature also measures heat transfer by measuring free particles' motion space – a particle with higher Ee takes more space – usually as a changing liquid volume in a glass tube.

19. A **quantum** should be redefined as a free particle, with its minimum initial Ee equalling its Es or gravity.

20. In the universe, most nuclear fusion centres transfer out excess-energy as heat, forming stars and planets. The rest, extra-large fusion centres with inner cores unable to transfer out heat as a repelling force, form black holes.

21. In a black hole, matter transfers its Ep completely into Es ($Ep \rightarrow Es$), so that $Ep = 0$, and Es becomes infinity: $Es = Fu = F \rightarrow \infty$, producing infinite pulls towards its centre, making the black hole into a physical singularity.

22. Every galaxy is a unity, the ultimate unity with its ultimate unity force, with at least one black hole as the unity centre. If two or more black holes exist in one galaxy, they are close enough to attract each other and will eventually merge into one.

23. Of all the nuclear fusion centres in the universe, most will deplete their fuels gradually, transferring out less new heat, leaving the existing free particles to transfer heat further ($Ee \rightarrow Ee \rightarrow 0$), or join unities gradually; the rest are black holes, which will continue to attract heat as their own fuels and transfer out nothing, reducing heat in the universe outside the black holes, until one of the black holes (a singularity) explodes and expands in the existing universe, replacing and renewing that part of the universe – as a prediction.

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Quantum Superposition Effect of Gravitational Field, Negative Pressure and Dark Energy

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Quantum Superposition Effect of Gravitational Field, Negative Pressure and Dark Energy

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Abstract

This paper explains how dark energy is generated through a simplified model based on noncommutative quantum gravity.

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1. Introduction

In the paper [1],[2],[3],[4],[5],[6] and [7], we introduce the noncommutative quantum gravity and its applications. In this paper, from a simplified model based on the theory of noncommutative quantum gravity, we have found a mechanism that can cause negative pressure in a system and generate dark energy.

2. Quantum Superposition effect of Gravitational Field, Negative Pressure and Dark Energy

In the paper [1] and [2] we introduce a wave packet approximate to the Dirac δ-function which can be explained as a semiclassical graviton. It can be written as follows

$$\xi^i(x,r)=\begin{cases}\xi^r=r+C^r(x)\exp(-\dfrac{r}{l_P})\\ \xi^\theta=\theta(x)\\ \xi^\phi=\phi(x)\\ \xi^t=t+C^t(x)\exp(-\dfrac{|t|}{t_P})\end{cases}\tag{2.1}$$

The dynamic variables of ξ^i are $C^i(x)=\big(C^r(x),\theta(x),\phi(x),C^t(x)\big)$. Quantization only quantizes the dynamic variable $\dot{C}^i(x)$. Therefore, in this paper, for the sake of brevity, we directly consider $C^i(x)$ as the fundamental state function of gravitational field.

From the paper [1] we have the Lagrangian density of graviton is

$$\mathcal{L}=-\frac{\eta^{\mu\nu}}{2}\frac{\partial\xi^i(x,r)}{\partial x^\mu}\frac{\partial\xi^j(x,r)}{\partial x^\nu}\eta_{ij}\tag{2.2}$$

For simplicity, assume that the initial state has two gravitational fields $C^i_{(1)}$ and $C^i_{(2)}$, and $C^i_{(2)}=k\cdot C^i_{(1)}, k>0, k\in\mathbb{R}$. Let the gravitational source of $C^i_{(1)}$ and $C^i_{(2)}$ be $j^i_{(1)}$ and $j^i_{(2)}$, respectively. If the gravity between $j^i_{(1)}$ and $j^i_{(2)}$ neglect as negligible, the joint propagator $K_{(1+2)}$ of $C^i_{(1)}+C^i_{(2)}$ in the Feynman path integral form can be written as follows

$$\begin{aligned}K_{(1+2)}&=\int\mathcal{D}[C^i_{(1)}+C^i_{(2)}]e^{i\left(S[C^i_{(1)}]+S[C^i_{(2)}]\right)/\hbar}\\&=\int\mathcal{D}[C^i_{(1)}+C^i_{(2)}]\left(e^{iS[C^i_{(1)}]/\hbar}\cdot e^{iS[C^i_{(2)}]/\hbar}\right)\end{aligned}\tag{2.3}$$

If $C^i_{(2)}=k\cdot C^i_{(1)}$, for the Lagrangian density (2.2), we have

$$S[C_{(2)}]=k^2\cdot S[C_{(1)}]\tag{2.4}$$

Then

$$\begin{aligned}K_{(1+2)}&=\int\mathcal{D}[C^i_{(1)}+C^i_{(2)}]\left(e^{iS[C^i_{(1)}]/\hbar}\cdot e^{iS[C^i_{(2)}]/\hbar}\right)\\&=\int\mathcal{D}[C^i_{(1)}+C^i_{(2)}]\left(e^{i(1+k^2)S[C^i_{(1)}]/\hbar}\right)\end{aligned}\tag{2.5}$$

The final state $\tilde{C}^i_{(1+2)}$ of $C^i_{(1)}+C^i_{(2)}$ is

$$\tilde{C}^i_{(1+2)}=\int d^4xK_{(1+2)}\cdot\left(C^i_{(1)}+C^i_{(2)}\right)\tag{2.6}$$

Consider the case where there is gravity between sources $j^i_{(1)}$ and $j^i_{(2)}$ of the initial state $C^i_{(1)}+C^i_{(2)}$. In this case, the Feynman path integral should be written as follows

$$K_{(1\oplus2)}=\int\mathcal{D}[C^i_{(1)}+C^i_{(2)}]\left(e^{iS[C^i_{(1)}+C^i_{(2)}]/\hbar}\right)\tag{2.7}$$

where $\oplus$ denotes the quantum superposition of states.
For the Lagrangian density (2.2), if $C^i_{(2)}=k\cdot C^i_{(1)}$, we have

$$S[C^i_{(1)}+C^i_{(2)}]=(1+k)^2\cdot S[C^i_{(1)}]\tag{2.8}$$

Then Eq. (2.7) can be written as follows

$$\begin{aligned}K_{(1\oplus2)}&=\int\mathcal{D}[C^i_{(1)}+C^i_{(2)}]\left(e^{iS[C^i_{(1)}+C^i_{(2)}]/\hbar}\right)\\&=\int\mathcal{D}[C^i_{(1)}+C^i_{(2)}]\left(e^{i(1+k)^2S[C^i_{(1)}]/\hbar}\right)\end{aligned}\tag{2.9}$$

The propagator $K_{(1\oplus 2)}$ is not equal to $K_{(1+2)}$. Then the final states will be different

$$\tilde{C}^i_{(1\oplus 2)} \neq \tilde{C}^i_{(1+2)} \tag{2.10}$$

Therefore the sources of the final states will be different

$$j^i_{(1\oplus 2)} \neq j^i_{(1+2)} \tag{2.11}$$

Now let's analyze the meaning of Eq. (2.11). Recall Eq. (2.9), it can be written as

$$\begin{aligned} K_{(1\oplus 2)} &= \int \mathcal{D}\big[C^i_{(1)} + C^i_{(2)}\big]\left(e^{iS[C^i_{(1)}+C^i_{(2)}]/\hbar}\right) \\ &= \int \mathcal{D}\big[C^i_{(1)} + C^i_{(2)}\big]\left(e^{i(1+k)^2 S[C^i_{(1)}]/\hbar}\right) \\ &= \int \mathcal{D}\big[C^i_{(1)} + C^i_{(2)}\big]\left(e^{iS[C^i_{(1)}]/\hbar}\right)^{(1+k^2+2k)} \\ &= \int \mathcal{D}\big[C^i_{(1)} + C^i_{(2)}\big]\left(e^{iS[C^i_{(1)}]/\hbar}\cdot e^{iS[C^i_{(2)}]/\hbar}\cdot e^{iS[C^i_{(3)}]/\hbar}\right) \end{aligned} \tag{2.12}$$

where $C^i_{(3)} = \sqrt{2k}\cdot C^i_{(1)}$. The source of $C^i_{(3)}$ can be written as $j^i_{(3)}$. The measure of the Feynman path integral can be written as

$$\int \mathcal{D}\big[C^i_{(1)} + C^i_{(2)}\big] = \frac{1+k}{1+k+\sqrt{2k}} \int \mathcal{D}\big[C^i_{(1)} + C^i_{(2)} + C^i_{(3)}\big] \tag{2.13}$$

Factor $\frac{1+k}{1+k+\sqrt{2k}}$, as an overall constant factor, is independent of field configurations and external sources, so it can be reduced and eliminated via functional integration when calculating all physical observables, such as correlation functions, scattering cross sections. This factor has no observable physical effects. While it may perturb vacuum fluctuations, among other effects, we do not consider it in this paper. By comparing Eq. (2.5) and Eq. (2.12), we can see that $K_{(1+2)} \neq K_{(1\oplus 2)}$, therefore Eq. (2.12) isn't an algebraic rewriting of the same two-field system, a new physical degree of freedom is introduced in Eq. (2.12). Eq. (2.12) implies that there is an additional energy-momentum field $j^i_{(3)}$ in the final state, which is similar to the sources $j^i_{(1)}$ and $j^i_{(2)}$. And Eq. (2.12) also implies that the gravity between $j^i_{(1)}, j^i_{(2)}$ and $j^i_{(3)}$ can be neglected as negligible, indicating that the spacetime in the final state has expanded sufficiently.

The addition of energy-momentum field $j^i_{(3)}$ indicates an increase in total energy of the system, and the space is expanding, it means that the quantum superposition of the gravitational field does negative work during the expansion process, therefore the corresponding pressure p is a negative value. Written the energy density of the system as ρ. According to the Friedman acceleration equation and the Raychaudhuri equation, if $p < -\frac{\rho}{3}$, the negative pressure will cause gravitational repulsion. The negative pressure are rarely occurs, it is precisely the characteristic of dark energy, therefore the energy-momentum fields such as $j^i_{(3)}$ can be regarded as dark energy. So that dark energy is continuously generated by the quantum superposition effect of the gravitational fields, until the space expands to a sufficiently large final state where the gravity between the gravitational sources neglect as negligible.

According to the model proposed in this paper, dark energy originates from the conversion induced by the quantum superposition effect of the gravitational field. Therefore, it can be reasonably conjectured that dark energy only participates in gravitational interaction.

3. Conclusion

This paper calculate the quantum effects of gravitational fields by the Feynman path integration. The calculation results indicate that the quantum superposition of the gravitational fields will be converted into the additional energymomentum fields. The quantum superposition of gravitational fields produces negative work, increasing the energy of the system and resulting in a negative pressure in the system. When the negative pressure reaches a certain strength, it will cause gravitational repulsion, so the energy-momentum fields converted through quantum superposition can be understood as dark energy.

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Quantum, Gravity and Atom Computing

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Abstract

This paper proposes a unified framework connecting quantum phenomena, gravity and computation through a re-definition of matter and particle behaviour based on the Principles of Matter, or Laws of Unity. The paper addresses two fundamental questions it identifies as unresolved in current physics: how a quantum is produced and why its magnitude is discrete, by advancing a model in which matter comprises potential-energy, sharing-energy and excess-energy, whose interactions generate a unified force interpreted as inertia. Within this framework, gravity (inertia-at-rest) is attributed to sharing-energy, whereas motion and heat (inertia-in-motion) are attributed to excess-energy. On this basis, the paper redefines a quantum as a free particle that emerges when sufficient excess-energy overcomes binding sharing-energy, rather than as an intrinsically discrete packet. It then examines the implications of this reinterpretation for contemporary computing, arguing that transistor computing faces material scaling constraints and that quantum computing inherits both practical limitations and conceptual weakness on the current definition of the quantum. As an alternative, the paper introduces atom computing, in which atoms replace transistors and controlled flows of single electrons or photons enable deterministic switching, through electronic and photonic implementations. Analogue optical computing is discussed as another promising paradigm for specialised computation. The paper argues that this revised account of matter and energy interactions may support computational architectures beyond the limits of current transistor- and qubit-based systems.

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Quantum, Gravity and Atom Computing

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Abstract

This paper proposes a unified framework connecting quantum phenomena, gravity and computation through a redefinition of matter and particle behaviour based on the Principles of Matter, or Laws of Unity. The paper addresses two fundamental questions it identifies as unresolved in current physics: how a quantum is produced and why its magnitude is discrete, by advancing a model in which matter comprises potential-energy, sharing-energy and excess-energy, whose interactions generate a unified force interpreted as inertia. Within this framework, gravity (inertia-at-rest) is attributed to sharing-energy, whereas motion and heat (inertia-in-motion) are attributed to excess-energy. On this basis, the paper redefines a quantum as a free particle that emerges when sufficient excess-energy overcomes binding sharing-energy, rather than as an intrinsically discrete packet. It then examines the implications of this reinterpretation for contemporary computing, arguing that transistor computing faces material scaling constraints and that quantum computing inherits both practical limitations and conceptual weakness on the current definition of the quantum. As an alternative, the paper introduces atom computing, in which atoms replace transistors and controlled flows of single electrons or photons enable deterministic switching, through electronic and photonic implementations. Analogue optical computing is discussed as another promising paradigm for specialised computation. The paper argues that this revised account of matter and energy interactions may support computational architectures beyond the limits of current transistor- and qubit-based systems.

Keywords: *quantum, gravity, inertia, unity, free particle, transistor computing, quantum computing, atom computing, analogue optical computing*

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1. Introduction

In current physics, a quantum[1] is generally defined as the minimum amount of a physical entity, such as a photon, involved in an interaction, emphasising that the magnitude of that entity can assume only discrete values corresponding to integer multiples of one quantum.

This paper argues that two foundational questions remain unresolved within that account:

1. How is a quantum produced?
2. Why is a quantum discrete in its magnitude?

Without answers to these fundamental questions, the hypothesis of quantisation, together with the definition of a quantum, is questionable, and the foundation of quantum mechanics is weak.

The aim of this paper is therefore to propose an alternative explanation of matter, inertia and free particles, and to examine its implications for both physics and computational architectures.

In his first law of motion, Isaac Newton described inertia as the natural tendency of objects in motion to remain in motion and of objects at rest to remain at rest unless acted upon by a force that changes their velocity.[2]

Newton therefore recognised two states of inertia: inertia in motion and inertia at rest. However, their causes remained unknown.

The next section introduces the Principles of Matter, or Laws of Unity, as the basis for the proposed explanation of inertia and for the subsequent redefinition of the quantum.

2. The Principles of Matter

A free particle is described by the Principles of Matter or Laws of Unity, updated from my original version.[3][4][5]

1. **Matter** is any substance that has **mass** and **energy**. Mass and energy are properties of matter, not physical entities. Matter's energy is scalar, not vector.

2. Matter retains its **potential-energy** (Ep) and **sharing-energy** (Es) as a **unity member** ($Ep + Es$), within a hierarchical unit called a **unity**, until being pushed out of the unity by sufficient external **excess-energy** ($Ee \geq Es$) as a **free particle** with the Ee ($Ep + Es + Ee$). See Figure 1.

3. Matter expresses its Es and Ee as measurable **vector forces** to form and maintain unity, and combines them into a **unity force or inertia:**

$$Fu = Es + Ee$$

where,

- Es causes a constant pull, as **inertia-at-rest** or **gravity** (F) or **weight** (W), towards the unity centre ($Es = F = W$);
- Ee produces a push, as **inertia-in-motion** or **heat**, away from the external excess-energy.
- Matter oscillates away with the Ee ($Ee \geq Es$) as a free particle, transferring the Ee as inertia-in-motion or heat

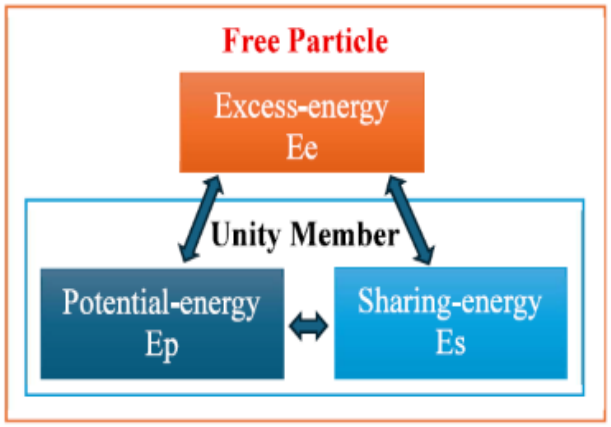

Figure 1. Matter

($Ee \rightarrow Ee \rightarrow 0$) – for example, as light waves if the particle is a photon or a neutrino, or as electron waves with magnetic effects if the particle is an electron – until it returns to or joins a unity ($Ee = 0$).

- Within the unity, $Ee = 0$, leaving only Es in the unity force, matter therefore orbits or gravitates towards the unity centre, like an electron orbiting an atomic nucleus or a planet orbiting a star, expressed as inertia-at-rest, gravity (F), or weight (W): $Fu = Es = F = W$.

4. Matter does not express its Ep but converts its Ep between its Es and Ee (as shown in Figure 1). For example, when we travel upward in an airplane, our weight decreases while our potential-energy increases ($Es \rightarrow Ep$). At the same time, the plane's external excess-energy also increases our potential-energy ($Ee \rightarrow Ep$). When we travel even higher in a spacecraft, we become "weightless" (weighing less). When landing on the Moon or Earth, our potential-energy decreases while our weight increases ($Ep \rightarrow Es$).

5. Breaking free a member with Es from a unity requires sufficient external excess-energy ($Ee \geq Es$), causing inertia-in-motions and heat transfers ($Ee \rightarrow Ee$), leading to new unities. The more energy is shared ($Ep \rightarrow Es$, such as in a nuclear fusion), the tighter the formed unity (such as the produced nucleus unity), the more external excess-energy is required to break the unity, and vice versa (such as in beta decay).

Based on the above principles, I summarise:

1. Gravity or weight or inertia-at-rest is redefined as matter's constant pull towards its unity centre due to its sharing-energy.

2. Inertia is redefined and generalised as the unity force resulting from both sharing-energy, as a pull (inertia-at-rest or gravity or weight), and excess-energy, as a push (inertia-in-motion or heat).

3. Matter moves relative to its unity centre, which serves as its reference point, thereby nullifying the basis of the observational reference frame and relativity.[3][4][5][6]

3. The New Definition of a Quantum

When matter with sharing-energy (Es) is pushed out of its unity by sufficient external excess-energy ($Ee \geq Es$) as a free particle with the Ee, it transfers the Ee as inertia-in-motion or heat (***involved in an interaction***), by pushing or colliding with other particles while equalising their Ee.[5] After transferring all its Ee ($Ee = 0$), it returns to or joins a unity, pulling again with its Es or gravity.

That is, only a free particle is ***involved in an interaction*** with other particles by pushing with its Ee.

Having crossed the threshold of its Es or gravity (hence a ***discrete value***), the free particle can take continuous values of Ee, rather than only integer multiples of Es.

After the initial threshold set by Es or gravity, the free particle does not "quantum leap", because there is no further threshold to cross or descend from.

Therefore, the hypothesis of quantisation, together with the definition of a quantum as the foundation of quantum mechanics, is considered a misconception.

To retain the term, this paper redefines a **quantum** as a free particle with a minimum initial Ee equal to its Es or gravity.[5]

However, current quantum theories based on the hypothesis of quantisation, including quantum mechanics and the practical quantum computing built upon them, are not easily adapted to this new paradigm. To align with this new paradigm, they require substantial revision.

This argument provides the context for reassessing contemporary computing paradigms and for considering possible alternatives.

4. Transistor Computing

Transistor computing[7][8] uses transistors as tiny switches to control electron flow, with On and Off representing binary 1 and 0. They operate in binary logic gates (AND, OR, NOT, NAND, NOR, XOR, XNOR) and in pairs to amplify, switch, and store data. Binary is used because it is easy to distinguish, enabling dependable, simple, and efficient circuitry.

The Principles of Transistor Computing:

1. Switching mechanism: Transistors have a source, receiver, and gate. Applying voltage to the gate allows electrons to flow between the source and receiver (On); whereas removing it stops the flow (Off).

2. Binary logic gates: Transistors are arranged into binary logic gates that perform Boolean logic, forming the foundation of processors.

Modern computers are built with Integrated Circuits (ICs), which integrate billions of transistors on a single silicon substrate (a chip) to perform calculations, manage memory, and handle graphics.[8]

ICs offer three main advantages over circuits built from discrete components: smaller size, lower cost and better performance. Chips are manufactured as single units by photolithography rather than assembled from separate transistors, which reduces both size and cost. Packaged ICs also require far less material than discrete circuits. Their performance is improved by the small size and close spacing of components, allowing faster switching and lower power consumption.

Transistor density and performance:[8]

- Miniaturization: Transistor dimensions shrink over time, allowing more transistors to fit in the same space.

- Pipelining: Transistors enable pipelining, where multiple instructions are processed simultaneously in various stages.

- Three-dimensional Integration: To continue scaling beyond two-dimensional limits, modern transistors are increasingly arranged in three-dimensional structures.

- Exponential Growth: The number of transistors on a chip has historically doubled about every two years (Moore's law), boosting performance while lowering cost.

Physical limitations:

- Energy Requirements: Silicon transistors typically require a base-emitter voltage of 0.6–0.7 V to switch effectively.
- Heat dissipation: as transistors become smaller and more densely packed, thermal management becomes a major constraint.
- Noise sensitivity: further miniaturisation is limited by thermal and atomic-scale interference that can compromise integrated-circuit performance.

These constraints motivate consideration of alternative computational paradigms, including quantum computing.

5. Quantum Computing

In quantum computing[9], the basic unit of information is the qubit (quantum bit), which serves a function analogous to that of the bit in transistor computing. Unlike a binary bit, which occupies one of two states, a qubit can exist in multiple specific states described as a quantum superposition. During computation, this superposition is manipulated and measured, and wave interference can be used to increase the probability of a desired outcome. In this sense, a qubit can encode many probable values beyond binary 1 and 0 together with their associated manipulations.

In theory, a quantum computer using qubits can compute much faster than a transistor computer using binary bits, if the result of each qubit manipulation can be measured easily and distinguished clearly, which depends on reliable state preparation, manipulation and measurement.

However, that is a big "if", as the reliability has been very hard to realise.

The superposition of a quantum is difficult to measure and distinguish in the presence of environmental interference, in addition to interference introduced by measurement itself. Because the result is probabilistic and carries a corresponding error rate, repeated manipulations and measurements within each computing cycle can greatly increase the overall error rate. The cost of environmental control is therefore extremely high.

Based on the argument developed here, the quantum in current physics is itself a misconception. To retain the term requires redefining the quantum as a free particle, and this reinterpretation in turn motivates a major revision of quantum computing as a computational paradigm.

6. Paradigm Shift – Atom Computing

As an alternative paradigm, this paper proposes **atom computing**, defined as the use of free particles directed at atoms to achieve faster switching and computation. Two implementations are considered: **electronic atom computing** based on free electrons, and **photonic atom computing** based on free photons.

6.1. Conceptual basis (push–release model):

- Deterministic cause and effect: one definite push (heat transfer) or release causes one definite effect.
- The effects or results of the push and release are easy to distinguish.

6.2. Proposed objectives:

- To reduce chip size further by replacing transistors with atoms.
- To minimise energy use and heat transfer by targeting atoms with single-electron or single-photon flows.
- To increase computing speed through faster switching at the atomic level.

6.3. Proposed implementations:

6.3.1. Electronic Atom Computing:

The Process:

1. The design resembles the current IC, except that integrated transistors are replaced with integrated atoms, each with one outermost electron unity ($e\gamma$).
2. A free electron (e^+, where the superscript + indicates high energy in this paper) from an electronic source, such as a battery, transfers its heat (Ee) and pushes the outermost electron unity ($e\gamma$) off an integrated atom (A), leaving the atom with one fewer electron unity ($A \rightarrow A^-$) as an On state or 1, while producing light (γ^+):
$$A + e^+ \rightarrow A^- + 2e + \gamma^+.$$
3. When heat transfer stops, a depleted electron (e) returns to the integrated atom (A^-), producing an Off state or 0:
$$A^- + e \rightarrow A,$$
and a depleted photon ($\gamma^+ \rightarrow \gamma$) returns to the depleted electron (e) to form a new electron unity:
$$e + \gamma \rightarrow e\gamma.$$

Materials:

1. Metal atoms as switches are integrated (embedded) into a current Integrated Circuit (IC), forming logic gates for control, data storage and computing.
2. The integrated metal atoms should ideally have only one outermost electron, such as Copper (Cu), Chromium (Cr) or Silver (Ag). Their costs (including abundance and purification requirements) and ease of integration are important considerations.
3. Heat Sources: batteries, such as Lithium-ion (Li-ion) batteries. The key criterion is ease of control, so that they can transfer single-electron flows.

6.3.2. Photonic Atom Computing:

The Process:

1. The design resembles the current IC, except that integrated transistors are replaced with integrated atoms – each with one outermost electron unity ($e\gamma$) – embedded in a connecting optical fibre that functions as the integrated circuit.
2. The outermost electron unity ($e\gamma$) of the integrated atom receives heat transfer as a push from a free photon (γ^{++}) emitted by a photonic source, such as an LED or laser device, producing light (2 γ^+) and leaving only the outermost electron (e) of the atom, as an On state or 1:
$$e\gamma + \gamma^{++} \rightarrow e + 2\gamma^+.$$
3. Stopping the heat transfer releases a depleted photon ($\gamma^+ \rightarrow \gamma$) to return to the outermost electron (e) of the integrated atom, as an Off or 0:
$$e + \gamma \rightarrow e\gamma.$$

Materials:

1. Hydrogen or metal atoms – each with one outermost electron unity ($e\gamma$) – are integrated (embedded) into a connecting optical fibre as an Integrated Circuit (IC), forming logic gates for control, data storage and computation.

2. If Hydrogen atoms prove difficult to integrate, metal atoms with only one outermost electron unity (like Cu, Cr or Ag) may serve as suitable alternatives.

3. As a high-capacity, low-latency medium, optical fibre offers very high bandwidth and low signal loss, potentially relieving the "von Neumann bottleneck"[10] created by the separation of memory and compute.

4. Heat Sources: LED or laser devices. The key criterion is ease of control, so that they can transfer single-photon flows.

7. Paradigm Shift – Analog Optical Computing

In addition to atom computing, analogue optical computing is another promising paradigm, for specialised computation.

Analog optical computers (AOCs)[11] use light generated by LEDs and manipulated through lenses and modulators to perform AI inferences and optimizations. These systems combine optics with analogue electronics in a feedback loop to achieve faster, more energy-efficient computation for specific workloads than transistor computing.

Main features of Analog Optical Computers:

- Mechanism: instead of binary switches, AOCs use the physical properties of light, including interference and diffraction, to perform large-scale matrix–vector multiplications.
- Process: they operate by passing light through modulators, capturing it with sensors, and iterating in a feedback loop until a steady-state solution is reached.
- Applications: they are designed for AI tasks, combinatorial optimisation, and complex matrix calculations rather than as replacements for digital computers.
- Efficiency and Speed: they avoid the "von Neumann bottleneck", improve energy efficiency, and may be substantially faster than digital counterparts for suitable tasks.
- Technology: they use low-cost, scalable components such as micro-LED arrays, spatial light modulators, and cameras.
- Noise Robustness: the iterative, fixed-point character of the design offers inherent robustness against analogue hardware noise.

8. Conclusion

1. When matter with sharing-energy (Es) is pushed out of its unity by sufficient external excess-energy ($Ee \geq Es$) as a free particle with the Ee, it transfers the Ee as inertia-in-motion or heat (***involved in an interaction***), by pushing or colliding with other particles while equalising their Ee.[5] After transferring all its Ee ($Ee = 0$), it returns to or joins a unity, pulling again with its Es or gravity.

2. That is, only a free particle is ***involved in an interaction*** with other particles by pushing with its Ee.

3. Having crossed the threshold of its Es or gravity (hence a ***discrete value***), the free particle can take continuous values of Ee rather than only integer multiples of Es. It does not "quantum leap" after this initial threshold because there is no further threshold to cross or descend from.

4. On this basis, the hypothesis of quantisation, together with the current definition of a quantum on which quantum mechanics depends, is considered a misconception.

5. To retain the term, a **quantum** is redefined as a free particle, with a minimum initial Ee equal to its Es or gravity.[5]

6. Transistor computing uses transistors as tiny switches to control electron flow, with On and Off representing binary 1 and 0. These switches operate in binary logic gates to amplify, switch, and store data in dependable, simple, and efficient circuitry.

7. Modern computers are built with integrated circuits (ICs) because of their advantages in size, cost, and performance, integrating billions of transistors on a single silicon chip to perform calculations, manage memory, and handle graphics.

8. These integrated circuits are approaching physical limits, mainly in energy requirements, heat dissipation and noise sensitivity.

9. Quantum computing may offer substantial computational advantages in principle, but in practice it remains constrained by the difficulty of preparing, measuring and distinguishing superposed states under environmental interference, with corresponding error rates and control costs. Within the framework advanced here, these practical limitations are compounded by the currently mis-conceptualised quantum itself.

10. In response, the paper proposes atom computing as an alternative paradigm in which free particles push atoms for deterministic switching through electronic and photonic implementations, with the broader implication that new computational models may emerge from a re-examination of matter, inertia and free-particle dynamics.

11. Analogue optical computing is discussed here as another promising paradigm, for specialised computation.

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The Dialectics of Science and Magnetism

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Abstract

The lack of rigor and the resulting ambiguity of the Definition of the Magnetic Field were hidden behind a mathematization borrowed from hydrodynamics. But in both cases, ideological aspects remained unexplained, leading the very existence of the rotor used to a direct contradiction with Curie's Theorem. And through Maxwell's electrodynamics, this contradiction was extended into the Theory of Relativity. Thus, a formal, in-depth combing of the Basic Experiments underlying the Theory of Relativity, through modeling and a more rigorous mathematization of the Magnetic Field, proved insufficient. A refinement upwards, into the realm of the basis that defines the UNDERSTANDING of Relativism, was also required. And this view from above gives us not a polished History of Persons, but the Genesis of Scientific Ideas.

fragmentation of Science | contradictions of fragments | paradoxes | the principle of logarithmic relativity | elementary mathematics | relativism

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The Dialectics of Science and Magnetism

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Keywords: *fragmentation of Science, contradictions of fragments, paradoxes, the principle of logarithmic relativity, elementary mathematics, relativism*

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1. Multidimensionality

Dialectics itself—the Art of Arguing with Oneself, according to Plato—means nothing more than a comprehensive examination of the Subject of Discussion, including its obvious contradictions—Paradoxes. Friedrich Engels translated Dialectics from the Spiritual World to the Material World, to the World of Properties that characterize Nature itself, i.e., to the Physics of Reality [1]. Friedrich Engels' Dialectics of Nature can be clarified and deciphered by taking into account the Principle of Logarithmic (Ordinal) Relativity—where and at what scales can and should one move from the Description of the behavior of, say, individual Particles to the Description of Fields or Waves [2]. Thus, instead of Engels' impersonal ORs, we obtain ANDs, strictly defined by the boundaries of applicability, the functional relationship of which was conceptualized by the blind mathematician Pontryagin. And thus, we will bring the Body of Science, with its Models and Theories, into strict Correspondence with the Dialectics of Nature itself. At the same time, the founders of Quantization intuitively projected the Principles of our CONSCIOUSNESS, phenomenologically – Psychiatry – onto the organization of Matter [3].

But this "instantaneous" Correspondence has a TINY Error: Nature is not static, and Science, as the highest level of Consciousness, lives and develops. In principle, the "locomotive" of Science runs behind the "locomotive" of Nature, which changes over time and runs away. But whether Science can "jump" onto the "Step" rushing past us depends on the life and development of Science, i.e., on its internal Dialectics. After all, the very development of Nature, including the emergence of LIFE, is determined, as Ilya Prigogine [4] understood, by the currents of Chaos. And the highest level of Consciousness—Science, operating on the Border of Chaos and Understanding—is itself subject to Chaotic Currents, both externally and within the body of Science. And Science, like Art, strives to harmonize the Awareness of Harmony within Nature itself. Only if Art harmonizes Images (including Music) does Science harmonize our Sensations of Nature, while eliminating, thanks to Mathematics, the jumble of Thought [5].

The goal of a comprehensive examination of the Subject of Discussion in Science is the Search for Truth, which, by definition, can only be FREE. But comprehensiveness can also be directed toward infinity, which Lenin proposed replacing with the choice of the Main Link. And the choice of Subjects of Discussion requires limitations, for "the immensity cannot be grasped." Otherwise, we will have an infinite value of purely local Judgments, which in fact form the streams of Prigogine's Chaos, only not in Nature, but in Consciousness.

But both Restrictions on FREEDOM are justified only if introduced by someone possessing a lofty flight of Thought. Therefore, to avoid Chaos in Consciousness, a Scientific Head is simply necessary. Just as an orchestra cannot play a complex piece of music without a talented conductor, and just as a stage in which people "BELIEVE" cannot be constructed without a talented director, so without a talented, true Scientist, a scientific team will merely imitate activity, but will in fact be treading water. Attempts without such a Head to impose restrictions on FREEDOM of Thought—"Ordering to Think THIS!"—are like a dam on the path of Chaos, which, when overflowing, will collapse, equating to a catastrophe for both Science and Consciousness as a whole. For example, Planck's Quantum initially denoted the minimum resonance energy, specifically, a resonant wave whose wavelength is equal to an integer fraction of the length of the wall of Planck's box. But without an understanding of this elementary thing, anything, small in size and large in energy, was classified as a Quanta. And, in doing so, they effectively built a dam in the path of a number of studies.

2. Sensation-Understanding

Perfect organoleptic human sensations, enhanced by the development of certain areas of the brain, allow not only sculptors, artists, and musicians, but also scientists, to subtly sense nature. Moreover, when perfected, they exceed many, many orders of magnitude in instrumental measurements. Thus, the sensations of Mozart, Bach, Raphael, Nikola Tesla, and Leon Theremin were many orders of magnitude more accurate than the instruments of not only their time, but also many modern ones. Similarly, Newton, one might say, based on sensations, constructed his Theory of Light from particles, which was later replaced by Huygens' wave theory, and then clumsily reinstated with the help of Einstein's Nobel Prize for the photoelectric effect. Clumsily, "thanks" to Bohr and his Principle of Compatibility of Mutually Exclusive Entities in Nature. Some time later, the blind mathematician Pontryagin "saw"—UNDERSTOOD—that Dualism in Nature requires no mutual exclusion (in Bohr's Mind). That between different functional sets, there are simply connections. So, too, the ELEMENTARY Fourier transform allows us to move from a Particle Description to a Wave Description. But mathematicians have not yet attempted to comprehend Goethe's sensations, as he described them in his book "The Theory of Color," an alternative to Newton's Theory of Light.

And the expansion of our Sensitivity orders with instruments, based on generally accessible sensations, provides a Comprehensive Understanding of the expanded Physical Reality. And this expansion is ensured by ELEMENTARY Logic, which, in fact, forms the very Body of Science—the Description of Nature and Man within it. Without this body of Science, without its Theories, Time will "erase" the UNDERSTANDING of Nature by Genius (as already happened with Tesla and Theremin), and "everything will repeat itself from the beginning." Many reasons can be found for such a vicious cycle. But looking ahead a little, we can say that the "Dualism of UNDERSTANDING" arises from the gaps in Sensations on different scales. And this "Dualism" (in the head) can be avoided by taking into account the Principle of Logarithmic (Ordinal) Relativity – the alternation of Field and Partial Descriptions.

But the formation of UNDERSTANDING of Nature itself did not come (in the History of our Civilization) immediately. Weyl once formulated it simply: "Symmetry Rules the World" [6]. He started from the Statistical Description of Nature, but Ilya Prigogine, as already noted, pointed out that Static Harmony also arises in Streams, i.e., in fact, in TIME.

And, at the same time, the struggle between Chaos and Harmony occurs at different Levels of the Organization of Matter, including at the Level of Consciousness, which is most clearly manifested in Science, which, at its core, must adhere to the Principle of Causality and Logic. And the apotheosis of this was Niels Bohr's "Principle of Complementarity of Mutually Exclusive Entities in Nature." Although it primarily characterizes Bohr's own psychological state, who mistook the schizophrenic fragments of his own consciousness for the Unified Phenomenology of Nature. Thus, by pushing aside the founders of Quantum Theory, Max Planck and Albert Einstein (including Nobel Prizes for "Quantization") and promoting Schrödinger's "Quantization," Niels Bohr set the false direction for the development of all modern Quantum Theory.

3. Recognition-Awareness

The history of Science itself is written, unfortunately, not in Ideas, but in the Faces of Scientists recognized as outstanding. And although it is written from the words of Scientists, it is primarily written by lyricists and philologists, or by fellow witnesses. That is, it is written, by and large, without UNDERSTANDING THE ESSENCE of the Physical Problem, but based on the SENSATIONS of an "observer" of the development of a scientific Idea. And this became one of the main reasons for the sharp fragmentation of the Phenomenology of Science.

Thus, at the instigation of Niels Bohr, not just recognition, but deification of the Schrödinger Equation occurred. In fact, Niels Bohr forbade AWARENESS of the fundamental aspects of Quantization, introduced by Max Planck and taken up by Einstein. So, they were awarded Nobel Prizes instead of RECOGNITION OF THE ESSENCE OF Quantization. While Einstein's Theory of Relativity brought him recognition, Landau relegated his teacher, Planck, to last place in his Logarithmic Table of the Stars in Physics. And the entire edifice of modern Quantum Theory was built on the foundation of the deified, containing the MUTUALLY EXCLUSIVE. The deified, the MUTUALLY EXCLUSIVE, contains both elementary mathematical errors and excludes the Principle of Causality. So it's not surprising that, in the conceptualizations of such a Description, the entire World arose instantaneously from a Point. After all, Einstein wisely remarked regarding the Schrödinger equation: "Some (correct) equations of Classical Physics (simply) allow rewriting in operator form." But a purely technical technique from the field of applied mathematics—the Operator Notation of Equations—was RECOGNIZED by the global scientific community as "New Thinking" in the realm of the ignorant Gorbachev's policies. Thus, Matisse, by commissioning his philologist wife to write the introductory chapter on the classical understanding of magnetism in his book "The Theory of Magnetism," essentially relegated Classical Physics to the category of insignificant History. But even to write a genuine History of Science, scientists need to UNDERSTAND the problems their predecessors attempted to solve. Only when they reach a higher level of UNDERSTANDING will they see the ERRORS of their predecessors, and the History of Science itself will reveal, on the one hand, tragedies of Science worthy of Shakespeare's pen, and on the other, a deeper understanding of the Phenomenology of the section of Science being analyzed. Thus, "quantum" theorists like Matisse, who disdainfully (why, I'll explain later) treat Classical Physics and, thus, lose touch with Reality, are profoundly wrong and, in fact, have added nothing fundamentally new to UNDERSTANDING. The Basic Formulas, constructed on the basis of a previously achieved UNDERSTANDING, are simply being stupidly used. This detailed analysis of the Basic Formulas also has some merit, but the opportunistic adaptation of conclusions to them, with the sole justification of "that's how it works from the formula," cannot in any way be considered scientific progress.

At the same time, True Scientists, like True Artists of any kind of Art, extract THEIR OWN Creativity from THEMSELVES. Grisha Perelman's refusal of a million-dollar prize was precisely due to the fact that a shadow of suspicion arose that he was passing off something NOT HIS as HIS. He rejected the Scientific Environment altogether because he simply knew ITS narrow circle and was unaware that the Homespun Truth is needed and understood not only by narrow specialists, but by EVERYONE. And this is no coincidence. As Mathematicians themselves UNDERSTAND, juggling abstract concepts in Formulas is not

the highest level of skill, even in Mathematics itself. The highest level of skill is juggling IMAGES, which Grisha has mastered to perfection. Therefore, Theoretical Physics, following the mathematical fashion, has now been completely reduced to juggling formulas and, thus, has become disconnected from Reality. Richard Feynman with his Graphs methodologically shifted toward IMAGES, but he did not dare extend this methodology to the FOUNDATIONS of Quantum Mechanics, limiting himself to the phrase: ”My path integrals, just like the Schrödinger equation, do not explain Quantum Mechanics; they are simply a simpler way to solve the Schrödinger equation.” But Creators need RECOGNITION. And it does not always come, and not always in the form recognized by the Creator himself. This leads not only to the personal tragedy of the Creator, but also leads Science away from the correct guidelines, leading it into Dead Ends [7].

4. Elementary Mathematics and Reality

Mathematics essentially teaches us to think CORRECTLY. But the statement by a prominent mathematician, ”Mathematics is the language in which the Universe speaks to man,” is an absolutism—a clear exaggeration. That Mathematics is at the very forefront of the struggle between Harmony and Chaos is undeniable. But at the same time, the infiltration of Chaos into Mathematics is also inevitable. Even a mathematician, by hitting the highest ”NOTE,” can slip into a falsetto. And since the Rules of Selection, as in Physics, are essentially nonexistent at the very forefront, to prevent Mathematics from becoming detached from Reality and completely immersed in a purely abstract Mind Game, it desperately needs an ELEMENTARY Foundation—its internal Invariants, the Principles of Mathematics, even if they are still intuitively borrowed from the Universe. Without them, Mathematics itself would easily fall out of the ”gutter” of Reality.

Grisha Perelman, like no one else, could competently reconstruct the FOUNDATIONS of Correct Thinking—ELEMENTARY Mathematics. But he, having rejected Science along with the scientific community, did not respond to my request for this in a popular science article. Therefore, I, who was introduced to the Theory of Numbers and Sets as a child by professors of Pontryagin's school, but who later moved on to Physics, must begin with some ELEMENTS of Mathematics, which are the Homespun Truth, accessible to everyone, not just narrow-minded theorists who themselves are ”lost in the woods” of the Phenomenology of Nature and have been unable to do anything better than mathematize the Creation of the World according to the Bible, which is no older than its authors.

And Phenomenology is nothing more than a CORRECT Description of an Effect, used in constructing its mathematical Description, a First Approximation, which sufficiently fully and rigorously describes the Effect being analyzed. That is, Phenomenology is a Qualitative Description of Effects in words (which was mastered to perfection by Roentgen's student, Academician Ioffe, about whom they said: ”He knows the ANSWER to any physical Question”), followed by the translation of words into a minimal set of equations that give a CORRECT Description of Basic Experiments. The equations can be very simple - algebraic (with the help of which Academician Mandelstam could describe ALL Physics [8, 9]), and differential (with the help of which Landau could describe “EVERYTHING” [10]) and even integro-differential (which Vlasov mastered perfectly [11]), but they can also be more general - symmetric (Weyl) and operator (Dirac, Heisenberg), where, in contrast to ordinary functions, Vector Special Functions are used as Arguments, usually simply Differential (as in modern Quantum Mechanics), but sometimes more complex (as, for example, in the most fashionable Abstract Theories, but constructed without a proper Analysis of the ELEMETARY Base of the Abstractions used in them, and, as is well known, “A large cabinet falls louder”).

And in general, back at the dawn of the last century, a prominent theoretical physicist declared: ”Theoretical Physics is dead, since all the equations have been solved.” The fact that he, supposedly a physicist, neglected new physical models indicates that he is simply a mathematical physicist. Moreover, a craftsman-calculator who is not on good terms with ELEMENTARY Mathematics. Thus, in my works it was shown that even for the Elementary Oscillator, Newton's canonized differential equation is incomplete [12]. And the use of a purely technical mathematical technique – traversing a singularity on the real axis along the complex plane, without understanding the meaning of Imaginary [13, 14] – completely led Quantum Theory in the wrong direction [15-17]. But this understanding of the incompleteness of the Mathematics used (back in Newton) was provided by the analysis of the properties of the Magnetic Field. To understand—to ”see” whether we've wandered ”down the wrong path” in Abstractions, it's important to consider the Methodological Principle of Logarithmic (Ordinal) Relativity. In any Dimensions of Nature's Properties, be it spatial scale (size), a period of time, or Force or Energy, it clearly manifests itself in the fact that we compare Quantities of the same Order, and when we move to a lower or higher Order, we ”see” SIMILAR Connections-Regularities of Nature's Properties. Logically, this Principle was intuitively used by the ancient Greeks when they ”saw” that granite, under the pressure of boots, wears down to invisible grains, which they called an Atom—an indivisible Particle that determines the Properties of the worn-out Material. People have repeatedly ”seen” that Waves can form from Particles. But it took de Broglie's genius to realize that not only sea waves, but also Particles, can be composed of Waves. Although this had long been demonstrated to people by the Cosmos itself, where Planets, Stars, and Galaxies are formed from the ”tiniest” Particles. And Russell had long ago explained how Solitons are formed from Waves.

This same (multi)Ordinal Relativity also follows from pure Mathematics, where the Fourier transform, taken over a limited range of variations of the Argument, formally yields an infinite set of solutions. So, ”leaving aside” the reasoning, the question of whether the repetition of the alternation of Particles seems to us.

5. The Genesis of Science

True Science is built on INVARIANTS, and it itself is INVARIANT. And this is the manifestation of the Highest Degree of Harmony. And Harmony is precisely what our world, torn by contradictions, currently lacks. But the ”powers that be” strive to subordinate Reality to the Ideas they can understand—that is, they construct the World for themselves, deliberately cutting themselves off from Invariants. Thus, unconsciously, in their declining years, they strive to take the entire World with them.

Science, like Consciousness in general, like Life itself, develops (lives) in a piecemeal, continuous manner. From birth, a normal child is determined to live and, to this end, strives to improve. At the same time, the information embedded within them at the genetic level also improves up to a certain point, but repeated rewriting of this information also leads to the loss of Basic Genetic Information, which leads to the decrepitude of the organism. But the individual Consciousnesses of people form a ”wave”—a collective Consciousness that outlasts more than one generation.

True, this unconscious ”wave,” akin to gusts of wind, can easily run into an insurmountable obstacle. Nevertheless, even at this level, the difference between a dead Artificial Intelligence and a living Consciousness is visible. Science, on the other hand, consciously forms an Invariant Collective Consciousness, which is capable of outliving many generations, barring the destruction of the entire civilization. But even within the body of Science itself, according to the Principle of Logarithmic Relativity, one can distinguish relatively short-lived ”Particles”—Local Empirical Rules and Theories—and General Phenomenological ”waves,” which determine the ”infinity” (duration) of the LIFETIME of Sciences.

6. Field Substructure

As already noted, the false development of Quantum Theory effectively led to the emergence of a Missing Research Scale—the Field Substructure. And the Field Substructure includes not only its Subparticles themselves, but also the excitations of their flows, such as waves and solitons. Thus, neglecting this, both the authors of ”Quantum” Fields and cosmologists rushed either too deeply, constructing an erroneous hierarchy of ”Elementary” Particles, including the God Particle, and attempting to capture them, or too far, interpreting, forgetting the Principle of Causality, the compression and rarefaction of Fields as Black Holes and Dark Energy. Thus, in effect, both of them replaced scientific Phenomenology with ancient Mythology. But we will not consider the Substructure of the Magnetic Field itself for now - in the second part of this work, which goes not upwards, but deeper, we will limit ourselves to a correct consideration of its manifestations, its Characterization.

7. Magnetism and Worldview

Thus, the purely relativistic effect of Magnetism, resulting from the interaction of Coulomb fields moving relative to each other, has been effectively justified until now by the Force of the Tao, which Descartes re-called ”gimlets,” and Maxwell ”rotor.” Moreover, both in terms of the alternation of Partial and Field Descriptions and in terms of the presence of a minimal set of Functions satisfying the Principles of Real Space Symmetry, strictly speaking, the Theory of Magnetism simply does not have a Phenomenology until now. Instead, it is a crude attempt to force the various manifestations of Magnetism into some set of abstract formulas. Tellingly, when Hertz, during his demonstration of the transmission of electromagnetic oscillations over a distance, was asked to explain how electromagnetic waves are formed and behave, he replied, ”Ask Maxwell for an explanation.” This is essentially how the Electrodynamics course was structured: we take Maxwell's formulas and calculate electromagnetic fields. But the problem is that Maxwell's canonized equations do not CORRECTLY (consistently, to a first approximation) describe even the simplest (single) electromagnetic wave. So, in practice, when calculating even the simplest electromagnetic devices, empirical laws are used and a host of adjustable parameters are introduced into the ”Theory” of Magnetism. This ”Theory,” as shown in my previous works, was itself initially constructed on simplified (for low speeds) Coulomb and Ampère equations, which do not take into account the relativism fundamental to the very origin of the Magnetic Field. Thus, the Theory of Magnetism, in addition to ”Quantum Theory,” has not so much clarified as obscured the worldview.

Whereas the conducted analysis of the Magnetic Field already shows the way to correcting and expanding the worldview into the realm of relativism.

As shown in the above-mentioned works on the analysis of the Magnetic Field ”in depth”:

1. To describe relativistic effects, it is sufficient to take into account the Causality Principle and fields that are stationary relative to the observer.

2. When both mass and charge move, due to the compression and extension of equipotentials, longitudinal (with respect to the direction of velocity) inertia arises [18, 19], which provides an addition to the momentum, described in a first approximation by Einstein's relativistic corrections.

3. When a charge moves, an Oersted force arises around it, orthogonal to the velocity, which is a consequence of the reactive friction of the Coulomb field of the charge against the field, which is stationary relative to the observer.

4. The friction of the fields leads to the formation of vortices, which lead to reactive resistance.

5. The orthogonal force, due to the reactive parametric connection [20], gives an addition (we'll call it transverse inertia) to the charge impulse, which we observe in the form of a back-EMF in any inductance.

But a more detailed characterization of the magnetic field ”in depth” will be given in the next work.

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A Unified Mass Theory of Elementary Fermions and Elementary Bosons

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Base on photon generation, a unified mass theory of elementary fermions and elementary bosons is postulated.

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A Unifed Mass Theory of Elementary Fermions and Elementary Bosons

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Abstract Base on photon generation , a unified mass theory of elementary fermions and elementary bosons is postulated.

Keywords: Table X, Photon Generation Charge $\mathbf{Q}(\gamma^{Q},\xi)$, Particle Mass Function $\xi(\omega)$, Color-Unit Constant ξ_0, ScalarProduct-Mass Equation, $\mathbf{Q}(\gamma^{Q},\xi)$–Running, Double Helix Structure, 4th, 5th of Fermion, Mass Spectrum

Contents

1. Introduction

After obtaining a unified mass theory of twelve elementary fermions [1], extravagant hopes naturally, subsequently what about the other six elementary bosons, $B = H, Z, W^+, W^-$ and γ, g ? ! May these six bosons be merged into the existing unified mass theory of twelve elementary fermions mentioned ?

Ahead of us, light ; Genesis of mass, light .

In this paper, we will use photon generation $\mathbf{Q}(\gamma^{\mathrm{Q}}, \xi)$, instead of zeroth generation Zth of fermion $\mathbf{Q}(\Psi(0), \xi)$ of **Table 0** [1], to make a new larger **Table X** below, in which six elementary bosons B are included. Further, all the masses of both twelve elementary fermions and six elementary bosons of Standard Model SM could be uniformly identified.

IN **Table 0,** column ($\mathbf{Q}(\Psi(0), \xi)$, $\xi(\Psi(0))$) is the zeroth zh of generation of fermion.

$$(\mathbf{Q}(\Psi(0), \xi), \ \xi(\Psi(0))) \qquad (00.1)$$

IN **Table X,** column ($\mathbf{Q}(\gamma^{\mathrm{Q}}, \xi)$, $\xi(\gamma^{\mathrm{Q}})$) is the generation of photon.

$$(\mathbf{Q}(\gamma^{\mathrm{Q}}, \xi), \ \xi(\gamma^{\mathrm{Q}})) \qquad (00.2)$$

OR

$$\mathbf{Q}(\Psi(0), \xi) = \begin{bmatrix} \mathbf{Q}(\delta(0), \xi) \\ \mathbf{Q}(\gamma(0), \xi) \\ \mathbf{Q}(\beta(0), \xi) \\ \mathbf{Q}(\alpha(0), \xi) \end{bmatrix} \Longrightarrow \mathbf{Q}(\gamma^{\mathrm{Q}}, \xi) = \begin{bmatrix} \mathbf{Q}(\gamma^{\frac{+2}{3}e}, \xi) \\ \mathbf{Q}(\gamma^{\frac{-1}{3}e}, \xi) \\ \mathbf{Q}(\gamma^{-\mathrm{e}}, \xi) \\ \mathbf{Q}(\gamma^{0\mathrm{e}}, \xi) \end{bmatrix}$$

Table 0 fermion zeroth generation
For twelve elementary fermions

Table 0 photon generation
For twelve elementary bosons and six elementary bosons

The color representation of particle ω is defined as below. And $\xi(\omega)$ is called as mass function.

$$\mathbf{Q}(\gamma^{Q}, \xi) + i\ \xi(\omega) \tag{00.3}$$

Base on ScalarProduct-Mass Equation, the mass value $M(\omega)$ of a particle ω could be obtained below

$$\mathbf{Q}^2(\gamma^{Q}, \xi) - \xi^2(\omega) = \mathbf{Q}^2(\omega) = \frac{M(\omega)}{M(e^-)} \tag{00.4}$$

Here $\omega = F,B$ fermion, boson. CHARGE of ω rely on photon generation $\mathbf{Q}(\gamma^{Q}, \xi)$ and MASS of ω relate to mass function $\xi(\omega)$.

AND $\mathbf{Q}^2(\gamma^{Q}, \xi)$ is the scalar product of $\mathbf{Q}(\gamma^{Q}, \xi)$ that comprises four members, each one of $\mathbf{Q}(\gamma^{Q}, \xi)$ with different charge: $Q(\gamma^{Q}, \xi) = (\ 0e,\ -e,\ \frac{-1e}{3}\ \ \frac{+2e}{3}\ )$ $\widetilde{Q}(\gamma^{Q}, \xi) = (\ 0e,\ +e,\ \frac{+1e}{3}\ \ \frac{-2e}{3}\ )$.

Analogy with what did for the masses of the twelves elementary fermions, NOW, the more detailed discussions for the masses of the six elementary bosons $\omega = H, Z, W^+, W^-$ and γ, g are given in the next three parts **Part A**, **Part B** and **Part C** following

Part A and **Part C** are related to four neutral bosons H, Z and $\gamma\ g$, that all with same charge, $0e$, So, both H, Z and $\gamma\ g$ belong to the common photon generation members (A.1) (C.1) and (A.2) (C.2); But accompanied by the different mass function $\xi(\omega)$: $\xi(Z), \xi(H)$ by (A.7),(A.8) and photon $\xi(\gamma)$ by (C.4), gluon $\xi(g)$ by (C.24), (C.25), ... , (C.30), (C.31). Subsequently result in bosons Z, H masssive (A.13),(A.12), and γ, g massless (C.9), (C.36). NOTICE: photon γ is just γ^{0e}.

Part B is related to two charged bosons W^-, W^+ that with different particle charge $-e, +e$, So they belong to different photon generation. W^- (B.1), W^+ (B.2); W^- accompanied by mass function $\xi(W^-)$ (B.13), $\xi(W^+)$ by (B.14). BUT at last, the two particles possess the same mass valus (B.17) (B.18).

Table X is defined as (more details see Table 2 and Table 3 Table 4 & Table 5) :

$$\underline{\underline{\textbf{Table X}}} = \underline{\textbf{Table 0}} + \underline{\textbf{Part A} + \textbf{Part B} + \textbf{Part C}} \tag{00.5}$$

Before discuss **Part A**, **Part B**, **Part C** First, glance over Table 1, the archives of elementary fermion and elementary boson below

Table1 Mass M and Color Scalar Products $\mathbf{Q}^2$ of Twelve elementary fermions q, l and six elementary bosons B

Fermion				Fermion				Boson			
q	I_3	Y	$M(q)$ Mev	l	I_3	Y	$M(l)$ Kev	B	I_3	Y	$M(B)$ Mev
t	$+5/2$	$-11/3$	$173,000.0$	υ_τ	$+5/2$	-5	$18,200.0$	W^+	$+1$	0	$80,400$
c	$+3/2$	$-5/3$	$1,280.0$	υ_μ	$+3/2$	-3	190.0	Z,H	0	0	$91,200,\ 125,000$
u	$+1/2$	$+1/3$	2.3	υ_e	$+1/2$	-1	0.002	W^-	-1	0	$80,400$
d	$-1/2$	$+1/3$	4.8	e^-	$-1/2$	-1	511.0				
s	$-3/2$	$+7/3$	95.0	μ^-	$-3/2$	$+1$	$105,700.0$	γ	0	0	0
b	$-5/2$	$+13/3$	$4,700.0$	τ^-	$-5/2$	$+3$	$1,777,000.0$	g	0	0	0
			$\mathbf{Q}^2(q)$	$\mathbf{Q}(q)$			$\mathbf{Q}^2(l)$	$\mathbf{Q}(l)$			$\mathbf{Q}^2(B)$
t	$+5/2$	$-11/3$	$338,551.859\ 099\ 8043$	$\mathbf{Q}(t)$	υ_τ	$+5/2$	-5	$35.616\ 438\ 3562$	$\mathbf{Q}(\upsilon_\tau)$	H	0	0	$244,618.395\ 303\ 3268$
c	$+3/2$	$-5/3$	$2,504.892\ 367\ 9061$	$\mathbf{Q}(c)$	υ_μ	$+3/2$	-3	$0.371\ 819\ 9609$	$\mathbf{Q}(\upsilon_\mu)$	Z	0	0	$178,473.581\ 213\ 3072$
u	$+1/2$	$+1/3$	$4.500\ 978\ 4736$	$\mathbf{Q}(u)$	υ_e	$+1/2$	-1	$0.000\ 003\ 9139$	$\mathbf{Q}(\upsilon_e)$	$W^\pm$	±1	0	$157,338.551\ 859\ 0998$
d	$-1/2$	$+1/3$	$9.393\ 346\ 3796$	$\mathbf{Q}(d)$	e^-	$-1/2$	-1	$1.000\ 000\ 0000$	$\mathbf{Q}(e^-)$				
s	$-3/2$	$+7/3$	$185.909\ 980\ 4305$	$\mathbf{Q}(s)$	μ^-	$-3/2$	$+1$	$206.849\ 315\ 0685$	$\mathbf{Q}(\mu^-)$	γ	0	0	$0.000\ 000\ 0000$
b	$-5/2$	$+13/3$	$9,197.651\ 663\ 4051$	$\mathbf{Q}(b)$	τ^-	$-5/2$	$+3$	$3,477.495\ 107\ 6321$	$\mathbf{Q}(\tau^-)$	g	0	0	$0.000\ 000\ 0000$

Decompose the color scalar products $\mathbf{Q}^2(B)$ of Six Bosons of the right column of Table1, into three demensional color space $\mathbf{Q}(B)$ following

- Boson Ground States for massive particles $B = H, Z, W^-, W^+$:

$$\mathbf{Q}(H) = (+201.915\ 161\ 76492,\ +201.915\ 161\ 76492,\ -403.830\ 323\ 50984) \quad (0.1)$$

$$\mathbf{Q}^2(H) = 244,618.\ 395\ 303\ 3228 = \frac{124{,}999.999\ 999\ 9980}{0.511} = \frac{M(H)}{0.511} \quad (0.2)$$

$$\mathbf{Q}(Z) = (+172.469\ 118\ 59486,\ +172.469\ 118\ 59486,\ -344.938\ 237\ 18972) \quad (0.3)$$

$$\mathbf{Q}^2(Z) = 178,473.581\ 213\ 3274 = \frac{91{,}200.000\ 000\ 0103}{0.511} = \frac{M(Z)}{0.511} \quad (0.4)$$

$$\mathbf{Q}(W^-) = (-161.932\ 883\ 14360,\ -163.932\ 883\ 14360,\ +322.865\ 766\ 28720) \quad (0.5)$$

$$\mathbf{Q}^2(W^-) = 157,338.551\ 8591929 = \frac{80{,}400.000\ 000\ 0476}{0.511} = \frac{M(W^-)}{0.511} \quad (0.6)$$

$$\mathbf{Q}(W^+) = (-159.932\ 883\ 14360,\ -161.932\ 883\ 14360,\ +324.865\ 766\ 28720) \quad (0.7)$$

$$\mathbf{Q}^2(W^+) = 157,338.551\ 859\ 1929 = \frac{80{,}400.000\ 000\ 0476}{0.511,} = \frac{M(W^+)}{0.511} \quad (0.8)$$

- Boson Ground States for massless photon, gluon, $B = \gamma, g$:

$$\mathbf{Q}(\gamma, g) = (0.000\ 000\ 0000,\ 0.000\ 000\ 0000,\ 0.000\ 000\ 0000) \quad (0.9)$$

$$\mathbf{Q}^2(\gamma, g) = 0.000\ 000\ 0000 = \frac{0.000\ 000\ 0000}{0.511,} = \frac{M(\gamma,g)}{0.511} \quad (0.10)$$

The above six formulas $\mathbf{Q}^2$ (0.2) (0.4) (0.6) (0.8) (0.10) will help us to use ScalarProduct-Mass Equation (00.4) (0.11) to calculate the mass $M(B)$ of the above six boson particle $\omega = B$

$$\mathbf{Q}^2(\gamma^{\mathrm{Q}}, \xi) - \boldsymbol{\xi}^2(\omega = B) = \underline{\mathbf{Q}^2(\omega = B)} = \frac{M(\omega = B)}{M(e^-)} \quad (0.11)$$

Later we will see the formulas $\mathbf{Q}^2$ (0.2) (0.4) (0.6) (0.8) (0.10) are just formulas (A.13) (A.12) (B.17) (B.18) (C.9) (C.36).

Table X Unified Mass Theory of Elementary Fermion and Elementary Boson

Boson γ^{Q}	**Fermion**	**Fermion**	**Fermion**	**Boson**	$Q(\omega)$
	1st	2nd	3rd	Force Carriers	Charge
$\gamma^{\frac{+2}{3}}$	u	c	t		$+\frac{2}{3}e$
$(\mathbf{Q}(\gamma^{\frac{+2}{3}},\xi),\ \xi(\delta(0)))$	$(\mathbf{Q}(\gamma^{\frac{+2}{3}},\xi),\ \xi(u))$	$(\mathbf{Q}(\gamma^{\frac{+2}{3}},\xi),\ \xi(c))$	$(\mathbf{Q}(\gamma^{\frac{+2}{3}},\xi),\ \xi(t))$		
$\gamma^{\frac{-2}{3}}$	$\tilde{u}$	$\tilde{c}$	$\tilde{t}$		$-\frac{2}{3}e$
$(\mathbf{Q}(\gamma^{\frac{-2}{3}},\xi),\ \xi(\bar{\delta}(0)))$	$(\mathbf{Q}(\gamma^{\frac{-2}{3}},\xi),\ \xi(\tilde{u}))$	$(\mathbf{Q}(\gamma^{\frac{-2}{3}},\xi),\ \xi(\tilde{c}))$	$\mathbf{Q}(\gamma^{\frac{-2}{3}},\xi),\ \xi(\tilde{t}))$		
$\gamma^{\frac{-1}{3}}$	d	s	b		$-\frac{1}{3}e$
$(\mathbf{Q}(\gamma^{\frac{-1}{3}},\xi),\ \xi(\gamma(0))$	$(\gamma^{\frac{-1}{3}},\xi),\ \xi(d))$	$(\gamma^{\frac{-1}{3}},\xi),\ \xi(s))$	$(\mathbf{Q}(\gamma^{\frac{-1}{3}},\xi),\ \xi(b))$		
$\gamma^{\frac{+1}{3}}$	$\tilde{d}$	$\tilde{s}$	$\tilde{b}$		$+\frac{1}{3}e$
$(\mathbf{Q}(\gamma^{\frac{+1}{3}},\ \xi(\tilde{\gamma}(0))$	$(\mathbf{Q}(\gamma^{\frac{+1}{3}},\xi),\ \xi(\tilde{d}))$	$(\mathbf{Q}(\gamma^{\frac{+1}{3}},\xi),\ \xi(\tilde{s}))$	$(\mathbf{Q}(\gamma^{\frac{+1}{3}},\xi),\ \xi(\tilde{b}))$		
γ^{-}	e	μ	τ		$-e$
$(\mathbf{Q}(\gamma^{-},\xi),\ \xi(\gamma^{-}))$	$(\mathbf{Q}(\gamma^{-},\xi),\ \xi(e^{-}))$	$(\mathbf{Q}(\gamma^{-},\xi),\ \xi(\mu^{-}))$	$(\mathbf{Q}(\gamma^{-},\xi),\ \xi(\tau^{-}))$	$(\mathbf{Q}(\gamma^{-},\xi),\ \xi(W^{-}))$	
γ^{+}	$\tilde{e}$	$\tilde{\mu}$	$\tilde{\tau}$		$+e$
$(\mathbf{Q}(\gamma^{+},\xi),\ \xi(\gamma^{+}))$	$(\mathbf{Q}(\gamma^{+},\xi),\ \xi(e^{+}))$	$(\mathbf{Q}(\gamma^{+},\xi),\ \xi(\mu^{+}))$	$(\mathbf{Q}(\gamma^{+},\xi),\ \xi(\tau^{+}))$	$(\mathbf{Q}(\gamma^{+},\xi),\ \xi(W^{+}))$	
γ^{0}	υ_e	υ_μ	υ_τ		$0e$
$(\mathbf{Q}(\gamma^{0},\xi),\ \xi(\gamma^{0}))$	$(\mathbf{Q}(\gamma^{0},\xi),\ \xi(\upsilon_e))$	$(\mathbf{Q}(\gamma^{0},\xi),\ \xi(\upsilon_\mu))$	$(\mathbf{Q}(\gamma^{0},\xi),\ \xi(\upsilon_\tau))$	$(\mathbf{Q}(\gamma^{0},\xi),\ \xi(Z,H;\gamma,g))$	
γ^{0}	$\tilde{\upsilon}_e$	$\tilde{\upsilon}_\mu$	$\tilde{\upsilon}_\tau$		$0e$
$(\mathbf{Q}(\tilde{\gamma}^{0},\xi),\ \xi(\gamma^{0}))$	$(\mathbf{Q}(\tilde{\gamma}^{0},\xi),\ \xi(\tilde{\upsilon}_e))$	$(\mathbf{Q}(\tilde{\gamma}^{0},\xi),\ \xi(\tilde{\upsilon}_\mu))$	$(\mathbf{Q}(\tilde{\gamma}^{0},\xi),\ \xi(\tilde{\upsilon}_\tau))$	$(\mathbf{Q}(\tilde{\gamma}^{0},\xi),\ \xi(Z,H;\gamma,g))$	
ZeroMass	Non-Zero-Mass	Non-Zero-Mass	Non-Zero-Mass		

Table2 Photon Generation $\mathbf{Q}(\gamma^{Q}, \xi)$ and Mass Function MF $\xi(\omega)$ of Elementary Fermion and Elementary Boson

Photon Generation $\mathbf{Q}(\gamma^{Q}, \xi)$	MF $\xi(\gamma^{Q})$	MF $\xi(F)$ Fermion 1st	MF $\xi(F)$ Fermion 2nd	MF $\xi(F)$ Fermion 3rd	MF $\xi(B)$ Force Carriers	Charge $Q(\omega)$
	$\gamma^{\frac{+2}{3}}$	u	c	t		$+\frac{2}{3}e$
$\mathbf{Q}(\gamma^{\frac{+2}{3}}, \xi)$	$\xi(\gamma^{\frac{+2}{3}})$	$\xi(u)$	$\xi(c)$	$\xi(t)$		
	$\gamma^{\frac{-2}{3}}$	$\tilde{\mathrm{u}}$	$\tilde{\mathrm{c}}$	$\tilde{\mathrm{t}}$		$-\frac{2}{3}e$
$\mathbf{Q}(\gamma^{\frac{-2}{3}}, \xi)$	$\xi(\gamma^{\frac{-2}{3}})$	$\xi(\tilde{u})$	$\xi(\tilde{c})$	$\xi(\tilde{t})$		
	$\gamma^{\frac{-1}{3}}$	d	s	b		$-\frac{1}{3}e$
$\mathbf{Q}(\gamma^{\frac{-1}{3}}, \xi)$	$\xi(\gamma^{\frac{-1}{3}})$	$\xi(d)$	$\xi(s)$	$\xi(b)$		
	$\gamma^{\frac{+1}{3}}$	$\tilde{\mathrm{d}}$	$\tilde{\mathrm{s}}$	$\tilde{\mathrm{b}}$		$+\frac{1}{3}e$
$\mathbf{Q}(\gamma^{\frac{+1}{3}}, \xi)$	$\xi(\gamma^{\frac{+1}{3}})$	$\xi(\tilde{d})$	$\xi(\tilde{s})$	$\xi(\tilde{b})$		
	γ^{-}	e	μ	τ		$-e$
$\mathbf{Q}(\gamma^{-}, \xi)$	$\xi(\gamma^{-})$	$\xi(e^{-})$	$\xi(\mu^{-})$	$\xi(\tau^{-})$	$\xi(W^{-})$	
	γ^{+}	$\tilde{\mathrm{e}}$	$\tilde{\mu}$	$\tilde{\tau}$		$+e$
$\mathbf{Q}(\gamma^{+}, \xi)$	$\xi(\gamma^{+})$	$\xi(e^{+})$	$\xi(\mu^{+})$	$\xi(\tau^{+})$	$\xi(W^{+})$	
	γ^{0}	υe	υμ	υτ		$0e$
$\mathbf{Q}(\gamma^{0}, \xi)$	$\xi(\gamma^{0})$	$\xi(\upsilon_e)$	$\xi(\upsilon_\mu)$	$\xi(\upsilon_\tau)$	$\xi(Z, H; \gamma, g)$	
	γ^{0}	$\tilde{\upsilon}$e	$\tilde{\upsilon}$μ	$\tilde{\upsilon}$τ		$0e$
$\mathbf{Q}(\tilde{\gamma}^{0}, \xi)$	$\xi(\gamma^{0})$	$\xi(\tilde{\upsilon}_e)$	$\xi(\tilde{\upsilon}_\mu)$	$\xi(\tilde{\upsilon}_\tau)$	$\xi(Z, H; \gamma, g)$	
	ZeroMass	Non-ZeroMass	Non-ZeroMass	Non-ZeroMass		

2. Part A: Unified Mass Theory of Two Dirac Neutral Mass Bosons B = H, Z B = H, Z

♦ Detailed values of $\mathbf{Q}(\gamma^0, \xi)$ of particles $B = Z, H$ bwlow

- **0** $\mathbf{Q}(\gamma^0, \xi) = (+236.539\ 654\ 85315,\ +238.539\ 654\ 85315,\ -475.079\ 309\ 70630)$ (A.1)
- **0** $\mathbf{Q}(\tilde{\gamma}^0, \xi) = (+238.539\ 654\ 85315,\ +236.539\ 654\ 85315\ -475.079\ 309\ 70630)$ (A.2)

The charges of particles $B = Z, H$ are zero

$$Q = \tfrac{1}{3}(236.53965485315 + 238.53965485315 - 475.07930970630) = 0 \quad \text{(A.3)}$$

$$Q = \tfrac{1}{3}(238.53965485315 + 236.53965485315 - 475.07930970630) = 0 \quad \text{(A.4)}$$

AND below

♦ Detailed values of mass function $\xi(B)$ of particles $B = Z, H$ below

- **1** $\xi(Z) = (+163.339\ 597\ 441044,\ +163.339\ 597\ 441044,\ -326.679\ 194\ 882088)$ (A.5)
- **2** $\xi(H) = (+125.122\ 693\ 427295,\ +125.122\ 693\ 427295,\ -250.245\ 386\ 854590)$ (A.6)

- **1** $\xi(Z) = 163.339\ 597\ 441044\ (+1,\ +1,\ -2) = 163.339\ 597\ 441044\ \xi_0$ (A.7)
- **2** $\xi(H) = 125.122\ 693\ 427295\ (+1,\ +1,\ -2) = 125.122\ 693\ 427295\ \xi_0$ (A.8)

Where ξ_0 called as Color-Unit Constant that is a three dimensional colore vector, with which $\xi(\omega)$ could be limpid. see following

$$\xi_0 = (+1,\ +1,\ -2) \quad \text{(00.6)}$$

$$\xi_0^2 = 6 \quad \text{(00.7)}$$

Expressions of the color scalar products of the above **0**, **1**, **2** are given below

- **0** $\mathbf{Q}^2(\gamma^0, \xi) = \mathbf{Q}^2(\tilde{\gamma}^0, \xi) = 338,552.525\ 766\ 5218$ (A.9)
- **1** $\xi^2(Z) = 160,078.\ 944\ 553\ 2138$ (A.10)
- **2** $\xi^2(H) = 93,934.\ 130\ 463\ 0052$ (A.11)

Finally using ScalarProduct-Mass Equation (0.11)**:** The masses of two neutral Dirac leptons Z, H are obtained by using a common color scalar product $\mathbf{Q}^2(\gamma^0, \xi)$ of photon generation of particle γ^0 and color scalar product $\xi^2(Z), \xi^2(H)$ of mass function $\xi(Z), \xi(H)$ of particles Z, H

- **1** $\mathbf{Q}^2(\gamma^0, \xi) - \xi^2(Z) =$

$$= 338,552.\ 525\ 766\ 5218 - 160,078.\ 944\ 553\ 2146 = 178,473.581\ 213\ 3072 = \frac{91,200.\ 000\ 000\ 0000}{0.511} = \frac{M(Z)}{M(e^-)}$$

$$= 338,552.\ 525\ 766\ 5218 - 160,078.\ 944\ 553\ 2138 = 178,473.581\ 213\ 3080 = \frac{91,200.\ 000\ 000\ 0004}{0.511} \quad \text{(A.12)}$$

- **2** $\mathbf{Q}^2(\gamma^0, \xi) - \xi^2(H)$

$$= 338,552.\ 525\ 766\ 5218 - 93,934.\ 130\ 463\ 1950 = 244,618.\ 395\ 303\ 3268 = \frac{125,000.000\ 000\ 0000}{0.511} = \frac{M(H)}{M(e^-)}$$

$$= 338,552.\ 525\ 766\ 5218 - 93,934.\ 130\ 463\ 0052 = 244,618.\ 395\ 303\ 5166 = \frac{125,000.000\ 000\ 0097}{0.511} \quad \text{(A.13)}$$

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3. Part B: Unified Mass Theory of Two Dirac Charged Mass Bosons B = W −, $W^+ B = W-, W+$

- Detailed values of photon generation $\mathbf{Q}(\gamma^-, \xi)$ $\mathbf{Q}(\gamma^+, \xi)$ of particle γ^- and anti-particle γ^+

- **0** $\mathbf{Q}(\gamma^-, \xi) = (+236.539\ 654\ 85315, \quad +238.539\ 654\ 85315, \quad -478.079\ 309\ 70630)$ (B.1)

- **0** $\mathbf{Q}(\gamma^+, \xi) = (+238.539\ 654\ 85315, \quad +236.539\ 654\ 85315 \quad -472.079\ 309\ 70630)$ (B.2)

The charges of particles $B = W^-, W^+$

$$Q(W^-) = \tfrac{1}{3}(236.53965485315 + 238.53965485315 - 478.07930970630) = -e \quad \text{(B.3)}$$

$$Q(W^+) = \tfrac{1}{3}(238.53965485315 + 236.53965485315 - 472.07930970630) = +e \quad \text{(B.4)}$$

And the color scalar products of (B.1) (B.2) are below

- **0** $\mathbf{Q}^2(\gamma^-, \xi) = 341,412.001\ 624\ 7596$ (B.5)

- **0** $\mathbf{Q}^2(\gamma^+, \xi) = 335,711.049\ 908\ 2840$ (B.6)

Because of requirement of final results (B.7) (B.8) below, Then having color scalar products (B.9) (B.10)

- **1** $\mathbf{Q}^2(\gamma^-, \xi) - \xi^2(W^-) =$

$$= 341,412.\ 001\ 624\ 7596 \quad - \quad 184,073.\ 449\ 765\ 6598 \quad = 157,338.551\ 859\ 0998 = \frac{80{,}400.000\ 000\ 0000}{0.511} \quad \text{(B.7)}$$

- **1** $\mathbf{Q}^2(\gamma^+, \xi) - \xi^2(W^+) =$

$$= 335,711.049\ 908\ 2840 \quad - \quad 178,372.\ 498\ 049\ 1842 \quad = 157,338.551\ 859\ 0998 = \frac{80{,}400.000\ 000\ 0000}{0.511} \quad \text{(B.8)}$$

OR

$$\xi^2(W^-) = 184,073.\ 449\ 765\ 6598 \qquad \text{(B.9)}$$

$$\xi^2(W^+) = 178,372.\ 498\ 049\ 1842 \qquad \text{(B.10)}$$

FURTHER, Discompose color scalar products (B.9) and (B.10) into their mass function (B.11) (B.13) and (B.12) B.14) below

- **1** $\xi(W^-) = (+175.153\ 955\ 97667,\ +175.153\ 955\ 97667,\ -350.307\ 911\ 95334)$ (B.11)
- **2** $\xi(W^+) = (+172.420\ 270\ 48716,\ +172.420\ 270\ 48716,\ -344.840\ 540\ 97432)$ (B.12)

OR

- **1** $\xi(W^-) = 175.153\ 955\ 97667\ (+1,\ +1,\ -2) = 175.153\ 955\ 97667\ \xi_0$ (B.13)
- **2** $\xi(W^+) = 172.420\ 270\ 48716\ (+1,\ +1,\ -2) = 172.420\ 270\ 48716\ \xi_0$ (B.14)

NOW USING (B.13) and (B.14), obtain (B.15) and (B.16); Finally the masses (B.17) and (B.18) of charged bosons W^- and W^+ are given

$$\xi^2(W^-) = 184,073.\ 449\ 765\ 6635 \qquad \text{(B.15)}$$

$$\xi^2(W^+) = 178,372.\ 498\ 049\ 1924 \qquad \text{(B.16)}$$

- **1** $\mathbf{Q}^2(\gamma^-, \xi) - \xi^2(W^-) =$

$$= 341,412.\ 001\ 624\ 7596 - 184,073.\ 449\ 765\ 6635 = 157,338.551\ 859\ 0961 = \frac{80,399.999\ 999\ 9981}{0.511} = \frac{M(W^-)}{M(e^-)} \qquad \text{(B.17)}$$

- **2** $\mathbf{Q}^2(\gamma^+, \xi) - \xi^2(W^+) =$

$$= 335,711.049\ 908\ 2840 - 178,372.\ 498\ 049\ 1924 = 157,338.551\ 859\ 0916 = \frac{80,399.999\ 999\ 9958}{0.511} = \frac{M(W^+)}{M(e^-)} \qquad \text{(B.18)}$$

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4. Part C: Unified Mass Theory of Two Dirac Neutral Massless Bosons B = , g B = gamma, g

Both Boson photon γ and Boson gluon g are massless particles. Photon γ is mediating particle in electromagnetic interation, And gluon g in strong interaction.

- Detailed values of photon generation of particles $B = \gamma, g$ bwlow

- **0** $\mathbf{Q}(\gamma^0, \xi) = (\ +236.539\ 654\ 85315,\ \ +238.539\ 654\ 85315,\ \ -475.079\ 309\ 70630\ )$ (C.1) (A.1)
- **0** $\mathbf{Q}(\tilde{\gamma}^0, \xi) = (\ +238.539\ 654\ 85315,\ \ +236.539\ 654\ 85315\ \ -475.079\ 309\ 70630\ )$ (C.2) (A.2)

- Next two paragraphs search for detailed values of mass function of particles $B = \gamma, g$ respectively

FIRST discuss mass function $\xi(\gamma)$ of photon $B = \gamma$ following:

The color representation of mass function of photon is given below

■ γ $\xi(\gamma) = (\ +237.540\ 356\ 489349,\ \ +237.540\ 356\ 489349,\ \ -475.080\ 712\ 978698\ )$ (C.3)

$= \kappa\,(\ +1,\ \ +1,\ \ -2\ ) = \kappa\,\xi_0$ (C.4)

Where

$\kappa = 237.540\ 356\ 489349$ (C.5)

From (C.4), having

$\xi^2(\gamma) = 338,552.525\ 766\ 5220$ (C.6)

Further the expressions of the color scalar products of photon generation and mass function of photon γ are given below

$$\mathbf{Q}^2(\gamma^0, \xi) = \mathbf{Q}^2(\tilde{\gamma}^0, \xi) = 338,552.525\ 766\ 5218 \quad \text{(C.7)}$$

$$\boldsymbol{\xi}^2(\gamma) = 338,552.525\ 766\ 5220 \quad \text{(C.8)}$$

Last making subtraction, using ScalarProduct-Mass Equation:

$$\left| \mathbf{Q}^2(\gamma^0, \xi) - \boldsymbol{\xi}^2(\gamma) \right| =$$

$$= \left| 338,552.5257665218 - 338,552.5257665220 \right| = 0.000\ 000\ 0002 = \frac{0.000\ 000\ 0001}{0.511} = \frac{M(\gamma)}{0.511} \approx 0 \quad \text{(C.9)}$$

(C.9) shows from photon generation (C.1) and mass function (C.4), we could obtain mass of photon γ

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SECOND discuss mass function $\boldsymbol{\xi}(g)$ of gluons $B = g$ following:

In contrast with photon γ, the pictures of color representation of mass function $\boldsymbol{\xi}(g)$ of gluon is rough to be revealed.

Because of: The gluons are consindered as the mediating particles in strong interaction, which both carry color charge and anti-color charge simultaneously. So a gluon actually is a mixture of element color and element anti-color. There are six colored gluons $R\tilde{G}, G\tilde{B}, B\tilde{R}$ & $G\tilde{R}, B\tilde{G}, R\tilde{B}$ and two color neutral gluons $R\tilde{R}, G\tilde{G}$ (see following).

In the expedition to explore the color representations of twelve elementary fermions and six elementary bosons, the color representations of photon and gluon are the rather life of hardship, we could even not write down " the real ground states of photon and gluon " But the trivial ground state, $\mathbf{Q}(\gamma) = \mathbf{Q}(g) = (0.0000000000,\ 0.0000000000,\ 0.0000000000)$!! (see: (0.9)).

■ The way to the mass function of gluons $B = g$ following:

THEN six mass function states of colored gluons

- $R\widetilde{G}$ $$\xi(gR\widetilde{G}) = \sqrt{3}\,\kappa\,(\ +1,\ \ -1,\ \ 0\ ) \qquad \text{(C.24)}$$
- $G\widetilde{B}$ $$\xi(gG\widetilde{B}) = \sqrt{3}\,\kappa\,(\ 0,\ \ +1,\ \ -1\ ) \qquad \text{(C.25)}$$
- $B\widetilde{R}$ $$\xi(gB\widetilde{R}) = \sqrt{3}\,\kappa\,(\ -1,\ \ 0,\ \ +1\ ) \qquad \text{(C.26)}$$
- $G\widetilde{R}$ $$\xi(gG\widetilde{R}) = \sqrt{3}\,\kappa\,(\ -1,\ \ +1,\ \ 0\ ) \qquad \text{(C.27)}$$
- $B\widetilde{G}$ $$\xi(gB\widetilde{G}) = \sqrt{3}\,\kappa\,(\ 0,\ \ -1,\ \ +1\ ) \qquad \text{(C.28)}$$
- $R\widetilde{B}$ $$\xi(gR\widetilde{B}) = \sqrt{3}\,\kappa\,(\ +1,\ \ 0,\ \ -1\ ) \qquad \text{(C.29)}$$

AND three mass function states of color neutral gluons

- $R\widetilde{R}$ $$\xi(gR\widetilde{R}) = \kappa\,(\ +2,\ \ -1,\ \ -1\ ) \qquad \text{(C.30)}$$
- $G\widetilde{G}$ $$\xi(gG\widetilde{G}) = \kappa\,(\ -1,\ \ +2,\ \ -1\ ) \qquad \text{(C.31)}$$
- $B\widetilde{B}$ $$\xi(gB\widetilde{B}) = \kappa\,(\ -1,\ \ -1,\ \ +2\ ) \qquad \text{(C.32)}$$

Due to the color representation of mass function of photon is given by (C,4), and compare it with (C.32)

- γ $$\xi(\gamma) = \kappa\,(\ +1,\ \ +1,\ \ -2\ ) = +\kappa\,\xi_0 \qquad \text{(C.4)}$$
- $B\widetilde{B}$ $$\xi(gB\widetilde{B}) = \kappa\,(\ -1,\ \ -1,\ \ +2\ ) = -\kappa\,\xi_0 \qquad \text{(C.32)}$$

Having

$$\xi(gB\widetilde{B}) = -\,\xi(\gamma) \qquad \text{(C.33)}$$

Last, (3.30) and (3.31) are chosen as two color neutral candidates of eight color states of boson gluon g

■ $R\widetilde{R}$ $\quad \xi(gR\widetilde{R}) = \kappa\,(+2, \; -1, \; -1)$ (C.30)

■ $G\widetilde{G}$ $\quad \xi(gG\widetilde{G}) = \kappa\,(-1, \; +2, \; -1)$ (C.31)

Because **of** the color scalar products of the eight color states of boson gluon g are the same math value below

$$\xi^2(g) \equiv \xi^2(gR\widetilde{G}) = \xi^2(gG\widetilde{B}) = \xi^2(gB\widetilde{R}) = \xi^2(gG\widetilde{R}) = \xi^2(gB\widetilde{G}) = \xi^2(gR\widetilde{B}) = \xi^2(gR\widetilde{R}) = \xi^2(gG\widetilde{G}) \quad \text{(C.34)}$$

$$= 6\,\kappa^2 = 338,552.525\;766\;5220 \quad \text{(C.35)}$$

Where $\kappa = 237.540\;356\;489349$ (C.5)

Then making subtraction, using ScalarProduct-Mass Equation:

$$\left|\ \mathbf{Q}^2(\gamma^0, \xi) - \xi^2(g)\ \right| =$$

$$= \left|\ 338,552.5257665218 - 338,552.5257665220\ \right| = 0.000\;000\;0002 = \frac{0.000\;000\;0001}{0.511} = \frac{M(g)}{0.511} \approx 0 \quad \text{(C.36)}$$

(C.36) shows from photon generation (C.1) and the eight color states ((C.24), (C.25), ... , (C.30), (C.31)) , we could obtain mass of gluon g

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Photon Generation Charge $\mathbf{Q}(\gamma^{Q},\xi)$ and Particle Mass Function $\xi(\omega)$ of Table X

♦ Photon Generation Charge $\mathbf{Q}(\gamma^{Q},\xi)$: In Part A & Part C, neutral particles H, Z & γ, g are related to charges $\mathbf{Q}(\gamma^{0e},\xi)$ & $\mathbf{Q}(\tilde{\gamma}^{0e},\xi)$ AND In Part B charged particles W^{-}, W^{+} related to charges $\mathbf{Q}(\gamma^{-e},\xi)$ and $\mathbf{Q}(\gamma^{+e},\xi)$ shown in **Table Y** below

♦ Particle Mass Function $\xi(\omega)$: H, Z & γ, g and W^{-}, W^{+} are listed in **Table3** below

For Particle:

$$\mathbf{Q}(\gamma^{Q},\xi) = \begin{bmatrix} \mathbf{Q}(\gamma^{\frac{+2}{3}e},\xi) \\ \mathbf{Q}(\gamma^{\frac{-1}{3}e},\xi) \\ \mathbf{Q}(\gamma^{-e},\xi) \\ \mathbf{Q}(\gamma^{0e},\xi) \end{bmatrix} = \begin{bmatrix} (+236.53965485315, & +238.53965485315, & -473.07930970630) \\ (+236.53965485315, & +238.53965485315, & -476.07930970630) \\ (+236.53965485315, & +238.53965485315, & -478.07930970630) \\ (+236.53965485315, & +238.53965485315, & -475.07930970630) \end{bmatrix} \quad (1.1)$$

Table 0 photon generation **Table Y1** values of photon generation (**Critical PG**)

For Anti-Particle:

$$\mathbf{Q}(\gamma^{Q},\xi) = \begin{bmatrix} \mathbf{Q}(\gamma^{\frac{-2}{3}e},\xi) \\ \mathbf{Q}(\gamma^{\frac{+1}{3}e},\xi) \\ \mathbf{Q}(\gamma^{+e},\xi) \\ \mathbf{Q}(\tilde{\gamma}^{0e},\xi) \end{bmatrix} = \begin{bmatrix} (+238.53965485315, & +236.53965485315, & -477.07930970630) \\ (+238.53965485315, & +236.53965485315, & -474.07930970630) \\ (+238.53965485315, & +236.53965485315, & -472.07930970630) \\ (+238.53965485315, & +236.53965485315, & -475.07930970630) \end{bmatrix} \quad (1.2)$$

Table 0 photon generation **Table Y1** values of photon generation (**Critical PG**)

Table3 Critical PG and **Mass Function MF** $\xi(\omega)$ **values** of Elementary Fermion and Elementary Boson (Color-Unit Constant ξ_0)

$\mathbf{Q}(\gamma^{Q},\xi)$	Photon	**Fermion**	**Fermion**	**Fermion**	**Boson**	**Boson**	**Boson**
	Generation	1st	2nd	3rd	Force Carriers	Force Carriers	Force Carriers
$\mathbf{Q}(\gamma^{\frac{+2}{3}},\xi)$	$\xi(\gamma^{\frac{+2}{3}})$	$\xi(u)$	$\xi(c)$	$\xi(t)$			
	236. 890997571510	236. 889414215465	236. 008183479106	0. 0000000000			
$\mathbf{Q}(\gamma^{\frac{-2}{3}},\xi)$	$\xi(\gamma^{\frac{-2}{3}})$	$\xi(\widetilde{u})$	$\xi(\widetilde{c})$	$\xi(\widetilde{t})$			
	238. 224230106917	238. 222655612254	237. 346375048611	18. 040896875322			
$\mathbf{Q}(\gamma^{\frac{-1}{3}},\xi)$	$\xi(\gamma^{\frac{-1}{3}})$	$\xi(d)$	$\xi(s)$	$\xi(b)$			
	237. 873805614775	237. 870514860345	237. 808667632002	234. 629506784110			
$\mathbf{Q}(\gamma^{\frac{+1}{3}},\xi)$	$\xi(\gamma^{\frac{+1}{3}})$	$\xi(\widetilde{d})$	$\xi(\widetilde{s})$	$\xi(\widetilde{b})$			
	237. 207141245477	237. 203841242341	237. 141820143797	233. 953597779454			
$\mathbf{Q}(\gamma^{-},\xi)$	$\xi(\gamma^{-})$	$\xi(e^{-})$	$\xi(\mu^{-})$	$\xi(\tau^{-})$		$\xi(W^{-})$	
	238. 541401586377	238. 541052240755	238. 469128788085	237. 323445434400		175. 15395597667	
$\mathbf{Q}(\gamma^{+},\xi)$	$\xi(\gamma^{+})$	$\xi(e^{+})$	$\xi(\mu^{+})$	$\xi(\tau^{+})$		$\xi(W^{+})$	
	236. 541416355320	236. 541064055935	236. 468532294544	235. 313108715690		172. 42027048716	
$\mathbf{Q}(\gamma^{0},\xi)$	$\xi(\gamma^{0})$	$\xi(\upsilon_e)$♣	$\xi(\upsilon_\mu)$	$\xi(\upsilon_\tau)$	$\xi(\gamma)^{*}$	$\xi(Z)$	$\xi(H)$
	237. 540356489349	237. 540356487976	237. 540226048334	237. 527861287950	237. 540356489349	163.339 597441044	125.122693427295
$\mathbf{Q}(\widetilde{\gamma}^{0},\xi)$	$\xi(\widetilde{\gamma}^{0})$	$\xi(\widetilde{\upsilon}_e)$♣	$\xi(\widetilde{\upsilon}_\mu)$	$\xi(\widetilde{\upsilon}_\tau)$	$\xi(g)^{✠✠✠}$	$\xi(Z)$	$\xi(H)$
	237. 540356489349	237. 540356487976	237. 540226048334	237. 527861287950	✠✠✠	163.339 597441044	125.122693427295
	ZeroMass	Non-ZeroMass	Non-ZeroMass	Non-ZeroMass	ZeroMass	Non-ZeroMass	Non-ZeroMass

Next, the detailed examples ($\xi(\upsilon_e)$♣ $\xi(\widetilde{\upsilon}_e)$♣ and $\xi(\gamma)^{*}$ $\xi(g)^{✠✠✠}$) of characteristic vlues of Function-$\xi(\omega)$ are given

$\xi(\upsilon_e)^{\clubsuit}$	$\xi(\gamma)^{*}$
237. 540356487976	237. 540356489349
$\xi(\widetilde{\upsilon}_e)^{\clubsuit}$	$\xi(g)^{✠✠✠}$
237. 540356487976	✠✠✠

(1.3)

$$\Downarrow \qquad \Downarrow$$

$$\xi(\upsilon_e)^{\clubsuit} = \xi(\widetilde{\upsilon}_e)^{\clubsuit} = (\ +237.\,540\ 356\ 487976,\quad +237.\,540\ 356\ 487976,\quad -475.\,080\ 712\ 975952\ )$$

$$\xi(\gamma)^{*} = (\ +237.\,540\ 356\ 489349,\quad +237.\,540\ 356\ 489349,\quad -475.\,080\ 712\ 978698\ )$$

$$\xi(g)^{✠✠✠} = \xi(g\mathrm{R}\widetilde{\mathrm{R}}) = (\ +475.\,080\ 712\ 978698,\quad -237.\,540\ 356\ 489349,\quad -237.\,540\ 356\ 489349\ )$$

$$\xi(g\mathrm{G}\widetilde{\mathrm{G}}) = (\ -237.\,540\ 356\ 489349,\quad +475.\,080\ 712\ 978698,\quad -237.\,540\ 356\ 489349\ )$$

$$\xi(g\mathrm{R}\widetilde{\mathrm{G}}) = \sqrt{3}\ (\ +237.\,540\ 356\ 489349,\quad -237.\,540\ 356\ 489349,\quad 0.\,000\ 000\ 000000\ )$$

$$\xi(g\mathrm{G}\widetilde{\mathrm{B}}) = \sqrt{3}\ (\ 0.\,000\ 000\ 000000,\quad +237.\,540\ 356\ 489349,\quad -237.\,540\ 356\ 489349\ )$$

$$\xi(g\mathrm{B}\widetilde{\mathrm{R}}) = \sqrt{3}\ (\ -237.\,540\ 356\ 489349,\quad 0.\,000\ 000\ 000000,\quad +237.\,540\ 356\ 489349\ )$$

$$\xi(g\mathrm{G}\widetilde{\mathrm{R}}) = \sqrt{3}\ (\ -237.\,540\ 356\ 489349,\quad +237.\,540\ 356\ 489349,\quad 0.\,000\ 000\ 000000\ )$$

$$\xi(g\mathrm{B}\widetilde{\mathrm{G}}) = \sqrt{3}\ (\ 0.\,000\ 000\ 000000,\quad -237.\,540\ 356\ 489349,\quad +237.\,540\ 356\ 489349\ )$$

$$\xi(g\mathrm{R}\widetilde{\mathrm{B}}) = \sqrt{3}\ (\ +237.\,540\ 356\ 489349,\quad 0.\,000\ 000\ 000000,\quad -237.\,540\ 356\ 489349\ )$$

$$\xi(\upsilon_e)^{2\clubsuit} = \xi(\widetilde{\upsilon}_e)^{2\clubsuit} = 338,552.\,525\ 762\ 6079 \qquad (1.11)\ [1]$$

$$\xi(\gamma)^{2*} = \xi(g)^{2✠✠✠} = 338,552.\,525\ 766\ 5220 \qquad (C.6)\ (C.35)$$

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Next $\mathbf{Q}(\gamma^{Q}, \xi)$–Running: increasing the values of $\mathbf{Q}(\gamma^{Q}, \xi)$ from Critical PG, (1.1) and (1.2) to (2.1) and (2.2) below

For Particle: $\mathbf{Q}(\gamma^{Q}, \xi) = \begin{bmatrix} \mathbf{Q}(\gamma^{\frac{+2}{3}e}, \xi) \\ \mathbf{Q}(\gamma^{\frac{-1}{3}e}, \xi) \\ \mathbf{Q}(\gamma^{-e}, \xi) \\ \mathbf{Q}(\gamma^{0e}, \xi) \end{bmatrix} = \begin{bmatrix} (+475.07930970630, & +475.07930970630, & -948.15861941260) \\ (+475.07930970630, & +475.07930970630, & -951.15861941260) \\ (+475.07930970630, & +475.07930970630, & -953.15861941260) \\ (+475.07930970630, & +475.07930970630, & -950.15861941260) \end{bmatrix}$ (2.1)

Table 0 photon generation **Table Y2** values of photon generation (**Running PG**)

For Anti-Particle: $\mathbf{Q}(\gamma^{Q}, \xi) = \begin{bmatrix} \mathbf{Q}(\gamma^{\frac{-2}{3}e}, \xi) \\ \mathbf{Q}(\gamma^{\frac{+1}{3}e}, \xi) \\ \mathbf{Q}(\gamma^{+e}, \xi) \\ \mathbf{Q}(\widetilde{\gamma}^{0e}, \xi) \end{bmatrix} = \begin{bmatrix} (+475.07930970630, & +475.07930970630, & -952.15861941260) \\ (+475.07930970630, & +475.07930970630, & -949.15861941260) \\ (+475.07930970630, & +475.07930970630, & -947.15861941260) \\ (+475.07930970630, & +475.07930970630, & -950.15861941260) \end{bmatrix}$ (2.2)

Table 0 photon generation **Table Y2** values of photon generation (**Running PG**)

SUBSEQUENTLY, Table Y2 instead of **Table Y1, Table4** instead of **Table3. see below**

Table4 $\mathbf{Q}(\gamma^{Q}, \xi)$–Running and Mass Function MF $\xi(\omega)$ values of Elementary Fermion and Elementary Boson (Color-Unit Constant ξ_0)

$\mathbf{Q}(\gamma^{Q}, \xi)$	Photon	**Fermion**	**Fermion**	**Fermion**	**Boson**	**Boson**	**Boson**
	Generation	1st	2nd	3rd	Force Carriers	Force Carriers	Force Carriers
$\mathbf{Q}(\gamma^{\frac{+2}{3}},\xi)$	$\xi(\gamma^{\frac{+2}{3}})$	$\xi(u)$	$\xi(c)$	$\xi(t)$			
	474. 412877247312	474. 412086624059	473. 972674356608	410. 660770281391			
$\mathbf{Q}(\gamma^{\frac{-2}{3}},\xi)$	$\xi(\gamma^{\frac{-2}{3}})$	$\xi(\widetilde{u})$	$\xi(\widetilde{c})$	$\xi(\widetilde{t})$			
	475. 746209924251	475. 745421516814	475. 307241893043	412. 200371672955			
$\mathbf{Q}(\gamma^{\frac{-1}{3}},\xi)$	$\xi(\gamma^{\frac{-1}{3}})$	$\xi(d)$	$\xi(s)$	$\xi(b)$			
	475. 412701468404	475. 411054940622	475. 380112878891	473. 797736142317			
$\mathbf{Q}(\gamma^{\frac{+1}{3}},\xi)$	$\xi(\gamma^{\frac{+1}{3}})$	$\xi(\widetilde{d})$	$\xi(\widetilde{s})$	$\xi(\widetilde{b})$			
	474. 746034883786	474. 744386043845	474. 713400528296	473. 128793981064			
$\mathbf{Q}(\gamma^{-},\xi)$	$\xi(\gamma^{-})$	$\xi(e^{-})$	$\xi(\mu^{-})$	$\xi(\tau^{-})$		$\xi(W^{-})$	
	476. 079834828600	476. 079659787898	476. 043626408948	475. 470742120363		447. 692882625925	
$\mathbf{Q}(\gamma^{+},\xi)$	$\xi(\gamma^{+})$	$\xi(e^{+})$	$\xi(\mu^{+})$	$\xi(\tau^{+})$		$\xi(W^{+})$	
	474. 079837043933	474. 079661264787	474. 043475860345	473. 468171447314		445. 565483307544	
$\mathbf{Q}(\gamma^{0},\xi)$	$\xi(\gamma^{0})$	$\xi(\upsilon_e)$♣	$\xi(\upsilon_\mu)$	$\xi(\upsilon_\tau)$	$\xi(\gamma)^{*}$	$\xi(Z)$	$\xi(H)$
	475. 079309706300	475. 079309705614	475. 079244485613	475. 073062210388	475. 079309706300	442. 667 768921716	430. 035600805864
$\mathbf{Q}(\widetilde{\gamma}^{0},\xi)$	$\xi(\widetilde{\gamma}^{0})$	$\xi(\widetilde{\upsilon}_e)$♣	$\xi(\widetilde{\upsilon}_\mu)$	$\xi(\widetilde{\upsilon}_\tau)$	$\xi(g)$✠✠✠	$\xi(Z)$	$\xi(H)$
	475. 079309706300	475. 079309705614	475. 079244485613	475. 073062210388	✠✠✠	442. 667 768921716	430. 035600805864
	ZeroMass	Non-ZeroMass	Non-ZeroMass	Non-ZeroMass	ZeroMass	Non-ZeroMass	Non-ZeroMass

Q(γ^{Q}, ξ)–Running increasing continuously following

For Particle: $\mathbf{Q}(\gamma^{Q}, \xi) = \begin{bmatrix} \mathbf{Q}(\gamma^{\frac{+2}{3}e}, \xi) \\ \mathbf{Q}(\gamma^{\frac{-1}{3}e}, \xi) \\ \mathbf{Q}(\gamma^{-e}, \xi) \\ \mathbf{Q}(\gamma^{0e}, \xi) \end{bmatrix} = \begin{bmatrix} (+950.15861941260, & +950.15861941260, & -1898.3172388252) \\ (+950.15861941260, & +950.15861941260, & -1901.3172388252) \\ (+950.15861941260, & +950.15861941260, & -1903.3172388252) \\ (+950.15861941260, & +950.15861941260, & -1900.3172388252) \end{bmatrix}$ (3.1)

Table 0 photon generation **Table Y3** values of photo generation (**Running PG**)

For Anti-Particle: $\mathbf{Q}(\gamma^{Q}, \xi) = \begin{bmatrix} \mathbf{Q}(\gamma^{\frac{-2}{3}e}, \xi) \\ \mathbf{Q}(\gamma^{\frac{+1}{3}e}, \xi) \\ \mathbf{Q}(\gamma^{+e}, \xi) \\ \mathbf{Q}(\widetilde{\gamma}^{0e}, \xi) \end{bmatrix} = \begin{bmatrix} (+950.15861941260, & +950.15861941260, & -1902.3172388252) \\ (+950.15861941260, & +950.15861941260, & -1899.3172388252) \\ (+950.15861941260, & +950.15861941260, & -1897.3172388252) \\ (+950.15861941260, & +950.15861941260, & -1900.3172388252) \end{bmatrix}$ (3.2)

Table 0 photon generation **Table Y3** values of photon generation (**Running PG**)

SUBSEQUENTLY, Table Y3 instead of **Table Y2, Table5** instead of **Table4. see below**

Table5 $\mathbf{Q}(\gamma^{Q}, \xi)$–Running and Mass Function MF $\xi(\omega)$ values of Elementary Fermion and Elementary Boson (Color-Unit Constant ξ_0)

$\mathbf{Q}(\gamma^{Q}, \xi)$	Photon	**Fermion**	**Fermion**	**Fermion**	**Boson**	**Boson**	**Boson**
	Generation	1st	2nd	3rd	Force Carriers	Force Carriers	Force Carriers
$\mathbf{Q}(\gamma^{\frac{+2}{3}},\xi)$	$\xi(\gamma^{\frac{+2}{3}})$	$\xi(u)$	$\xi(c)$	$\xi(t)$			
	949. 492069767572	949. 491674733607	949. 272199366541	919. 298580822107			
$\mathbf{Q}(\gamma^{\frac{-2}{3}},\xi)$	$\xi(\gamma^{\frac{-2}{3}})$	$\xi(\widetilde{u})$	$\xi(\widetilde{c})$	$\xi(\widetilde{t})$			
	950. 825402936807	950. 825008456794	950. 605840929154	920. 675641591529			
$\mathbf{Q}(\gamma^{\frac{-1}{3}},\xi)$	$\xi(\gamma^{\frac{-1}{3}})$	$\xi(d)$	$\xi(s)$	$\xi(b)$			
	950. 491981970565	950. 491158418953	950. 475682378879	949. 685245671655			
$\mathbf{Q}(\gamma^{\frac{+1}{3}},\xi)$	$\xi(\gamma^{\frac{+1}{3}})$	$\xi(\widetilde{d})$	$\xi(\widetilde{s})$	$\xi(\widetilde{b})$			
	949. 825315324411	949. 824491194761	949. 809004292115	949. 018012309153			
$\mathbf{Q}(\gamma^{-},\xi)$	$\xi(\gamma^{-})$	$\xi(e^{-})$	$\xi(\mu^{-})$	$\xi(\tau^{-})$		$\xi(W^{-})$	
	951. 158882249902	951. 158794637476	951. 140759507781	950. 854161669888		937. 272707010274	
$\mathbf{Q}(\gamma^{+},\xi)$	$\xi(\gamma^{+})$	$\xi(e^{+})$	$\xi(\mu^{+})$	$\xi(\tau^{+})$		$\xi(W^{+})$	
	949. 158882803734	949. 158795006698	949. 140721873942	948. 853519931973		935. 243012713122	
$\mathbf{Q}(\gamma^{0},\xi)$	$\xi(\gamma^{0})$	$\xi(\upsilon_e)$♣	$\xi(\upsilon_\mu)$	$\xi(\upsilon_\tau)$	$\xi(\gamma)$*	$\xi(Z)$	$\xi(H)$
	950. 158619412600	950. 158619412257	950. 158586802258	950. 155495680049	950. 158619412600	934. 374 552936441	928. 456606144576
$\mathbf{Q}(\widetilde{\gamma}^{0},\xi)$	$\xi(\widetilde{\gamma}^{0})$	$\xi(\widetilde{\upsilon}_e)$♣	$\xi(\widetilde{\upsilon}_\mu)$	$\xi(\widetilde{\upsilon}_\tau)$	$\xi(g)$✠✠✠	$\xi(Z)$	$\xi(H)$
	950. 158619412600	950. 158619412257	950. 158586802258	950. 155495680049	✠✠✠	934. 374 552936441	928. 456606144576
	ZeroMass	Non-ZeroMass	Non-ZeroMass	Non-ZeroMass	ZeroMass	Non-ZeroMass	Non-ZeroMass

Table Z 4th, 5th of Elementary Fermion

If $\mathbf{Q}(\gamma^{Q}, \xi)$–Running increasing continuously and approaching to **Table Z,** we seem to run out " the despairing plateau " ! Finally the firsy light of morning, Table 6. below. Further **Table 7**, Ahead of us, light **;** Genesis of mass, light **.**

For Particle**:**

$$\mathbf{Q}(\gamma^{Q}, \xi) = \begin{bmatrix} \mathbf{Q}(\gamma^{\frac{+2}{3}e}, \xi) \\ \mathbf{Q}(\gamma^{\frac{-1}{3}e}, \xi) \\ \mathbf{Q}(\gamma^{-e}, \xi) \\ \mathbf{Q}(\gamma^{0e}, \xi) \end{bmatrix} = \begin{bmatrix} (+3800.6344776504, & +3800.6344776504, & -7599.2689553008) \\ (+3800.6344776504, & +3800.6344776504, & -7602.2689553008) \\ (+3800.6344776504, & +3800.6344776504, & -7604.2689553008) \\ (+3800.6344776504, & +3800.6344776504, & -7601.2689553008) \end{bmatrix} \quad (4.1)$$

For Anti-Particle**:**

$$\mathbf{Q}(\gamma^{Q}, \xi) = \begin{bmatrix} \mathbf{Q}(\gamma^{\frac{-2}{3}e}, \xi) \\ \mathbf{Q}(\gamma^{\frac{+1}{3}e}, \xi) \\ \mathbf{Q}(\gamma^{+e}, \xi) \\ \mathbf{Q}(\tilde{\gamma}^{0e}, \xi) \end{bmatrix} = \begin{bmatrix} (+3800.6344776504, & +3800.6344776504, & -7603.2689553008) \\ (+3800.6344776504, & +3800.6344776504, & -7600.2689553008) \\ (+3800.6344776504, & +3800.6344776504, & -7598.2689553008) \\ (+3800.6344776504, & +3800.6344776504, & -7601.2689553008) \end{bmatrix} \quad (4.2)$$

Table 0 photon generation **Table Z** values of photon generation (**Light PG**)

Table6 Photon Generation $\mathbf{Q}(\gamma^{Q}, \xi)$ and Mass Function MF $\xi(\omega)$ values of Elementary Fermion

$\mathbf{Q}(\gamma^{Q}, \xi)$	Photon	**Fermion**	**Fermion**	**Fermion**	**Fermion**	**Fermion**
	Generation	1st	2nd	3rd	4th	5th
$\mathbf{Q}(\gamma^{\frac{+2}{3}},\xi)$	$\xi(\gamma^{\frac{+2}{3}})$	$\xi(u)$	$\xi(c)$	$\xi(t)$	$\xi(q_4^{\frac{+2}{3}})$	$\xi(q_5^{\frac{+2}{3}})$
	3799. 967 840 223747	3799. 967 741 517242	3799. 912 907 511620	3792. 536 127 301197	3790. 040 644 754800	3786. 324 837 743850
$\mathbf{Q}(\gamma^{\frac{-2}{3}},\xi)$	$\xi(\gamma^{\frac{-2}{3}})$	$\xi(\widetilde{u})$	$\xi(\widetilde{c})$	$\xi(\widetilde{t})$	$\xi(q_4^{\frac{-2}{3}})$	$\xi(q_5^{\frac{-2}{3}})$
	3801. 301 173 546824	3801. 301 074 874941	3801. 246 260 103013	3793. 872 072 455593	3791. 377 466 725300	3787. 662 965 515700
$\mathbf{Q}(\gamma^{\frac{-1}{3}},\xi)$	$\xi(\gamma^{\frac{-1}{3}})$	$\xi(d)$	$\xi(s)$	$\xi(b)$	$\xi(q_4^{\frac{-1}{3}})$	$\xi(q_5^{\frac{-1}{3}})$
	3800. 967 818 291814	3800. 967 612 349822	3800. 963 742 354470	3800. 766 161 413529	3800. 697 721 102900	3800. 596 995 634700
$\mathbf{Q}(\gamma^{\frac{+1}{3}},\xi)$	$\xi(\gamma^{\frac{+1}{3}})$	$\xi(\widetilde{d})$	$\xi(\widetilde{s})$	$\xi(\widetilde{b})$	$\xi(q_4^{\frac{+1}{3}})$	$\xi(q_5^{\frac{+1}{3}})$
	3800. 301 151 626429	3800. 300 945 648309	3800. 297 074 974064	3800. 099 459 370670	3800. 031 007 053400	3799. 930 263 914600
$\mathbf{Q}(\gamma^{-},\xi)$	$\xi(\gamma^{-})$	$\xi(e^{-})$	$\xi(\mu^{-})$	$\xi(\tau^{-})$	$\xi(l_4^{-})$	$\xi(l_5^{-})$
	3801. 634 543 411587	3801. 634 521 491192	3801. 630 009 190056	3801. 558 314 578680	3801. 531 408 174100	3801. 493 304 717900
$\mathbf{Q}(\gamma^{+},\xi)$	$\xi(\gamma^{+})$	$\xi(e^{+})$	$\xi(\mu^{+})$	$\xi(\tau^{+})$	$\xi(l_4^{+})$	$\xi(l_5^{+})$
	3799. 634 543 446202	3799. 634 521 514268	3799. 630 006 838006	3799. 558 274 488192	3799. 531 353 920900	3799. 493 230 407900
$\mathbf{Q}(\gamma^{0},\xi)$	$\xi(\gamma^{0})$	$\xi(\upsilon_e)$	$\xi(\upsilon_\mu)$	$\xi(\upsilon_\tau)$	$\xi(\upsilon_4^{0e})$	$\xi(\upsilon_5^{0e})$
	3800. 634 477 650400	3800. 634 477 650314	3800. 634 469 497815	3800. 633 696 718466	3800. 633 431 690300	3800. 633 041 224300
$\mathbf{Q}(\widetilde{\gamma}^{0},\xi)$	$\xi(\widetilde{\gamma}^{0})$	$\xi(\widetilde{\upsilon}_e)$	$\xi(\widetilde{\upsilon}_\mu)$	$\xi(\widetilde{\upsilon}_\tau)$	$\xi(\widetilde{\upsilon}_4)$	$\xi(\widetilde{\upsilon}_5)$
	3800. 634 477 650400	3800. 634 477 650314	3800. 634 469 497815	3800. 633 696 718466	3800. 633 431 690300	3800. 633 041 224300
	ZeroMass	Non-ZeroMass	Non-ZeroMass	Non-ZeroMass	Non-ZeroMass	Non-ZeroMass

Table7 Mass values of Photon and Mass values of Elementary Fermion Mev

Photon		**Fermion**	**Fermion**	**Fermion**		**Fermion**	**Fermion**
	Charge	1st	2nd	3rd		4th	5th
$\gamma^{\frac{+2}{3}}$	|	u	c	t	||	$q_4^{\frac{+2}{3}}$	$q_5^{\frac{+2}{3}}$
0	$\frac{+2}{3}$	2.300 000 0084	1279.999 999 9969	173000.000 000 0008	||	231015.428 381 58422	317330.416 904 2517
$\gamma^{\frac{-2}{3}}$	|	$\tilde{u}$	$\tilde{c}$	$\tilde{t}$	||	$q_4^{\frac{-2}{3}}$	$q_5^{\frac{-2}{3}}$
0	$\frac{-2}{3}$	2.999 999 9982	1280.000 000 0002	172999.999 999 9978	||	231015.486 558 1882	317330.606 538 0023
$\gamma^{\frac{-1}{3}}$	|	d	s	b	||	$q_4^{\frac{-1}{3}}$	$q_5^{\frac{-1}{3}}$
0	$\frac{-1}{3}$	4.799 999 9986	94.999 999 9844	4699.999 999 9872	||	6295.075 920 3249	8642.540 330 1016
$\gamma^{\frac{+1}{3}}$	|	$\tilde{d}$	$\tilde{s}$	$\tilde{b}$	||	$q_4^{\frac{+1}{3}}$	$q_5^{\frac{+1}{3}}$
0	$\frac{+1}{3}$	4.799 999 9981	94.999 999 9997	4700.000 000 0127	||	6295.075 897 7285	8642.540 258 2346
γ^-	|	e^-	μ^-	τ^-	||	l_4^-	l_5^-
0	−1	0.510 999 9898	105.699 999 9957	1776.999 999 9938	||	2404.217 163 7408	3292.442 021 4139
γ^+	|	e^+	μ^+	τ^+	||	l_4^+	l_5^+
0	+1	0.510 999 9969	105.699 999 9906	1776.999 999 9969	||	2404.217 150 1534	3292.441 987 5652
γ^0	|	υ_e	υ_μ	υ_τ	||	υ_4	υ_5
0	0	0.000 002 0287	0.189 999 9996	18.200 000 0020	||	24.376 609 9545	33.476 608 6728
$\tilde{\gamma}^0$	|	$\tilde{\upsilon}_e$	$\tilde{\upsilon}_\mu$	$\tilde{\upsilon}_\tau$	||	$\tilde{\upsilon}_4$	$\tilde{\upsilon}_5$
0	0	0.000 002 0287	0.189 999 9996	18.200 000 0020	||	24.376 609 9545	33.476 608 6728
ZeroMass		Non-ZeroMass	Non-ZeroMass	Non-ZeroMass		Non-ZeroMass	Non-ZeroMass

3. Epilogue

" Double Helix Structure " of elementary particle : Two so-called " Double Helix Structure ", Photon Generation PG $\mathbf{Q}(\gamma^{Q}, \xi)$ and Mass Function MF $\xi(\omega)$, of a unified mass theory of elementary fermions and elementary bosons, with which the mass-values of particles of Standard Model SM could be uniformly identified. We are amazed to see a wide variety of particle masses of SM, go so far as to be trace back to a regular digital arrangement of **Table Y1, Y2, Y3** and **Table3, 4, 5 !!**

STUNNING ! Due to **Table Z** and **Table 6**, 4th, 5th generations, **Table 7,** of elementary fermion are wondering hazily from the far horizon.

Mass Spectrum of 1st, 2nd, 3rd of Elementary Fermion

We arrange 1st, 2nd, 3rd of Elementary Fermion by THE ORDER of PARTICLE CHARGE ARITHMETIC PROGRESSION, Instead of by CURRENT PARTICLE FLAVOR.

$$\frac{M(\omega,n)}{0.511} = \mathbf{Q}^2(\omega) = \mathbf{Q}^2(\gamma^{Q}, \xi) - \xi^2(\omega) = \mathbf{Q}^2(\gamma^{Q}, \xi) - \xi^2(\omega, n, R) \quad (5.1)$$

$$n = 1, 2, 3 \quad (5.2)$$

AND $$\xi^2(\omega, n, R) = \xi^2(\upsilon_n) \pm m R_n \quad (5.3)$$

Where $\xi^2(\upsilon_n) \pm m R_n$ is Arithmetic Progression

When $\upsilon_n = \upsilon_1, \upsilon_2, \upsilon_3 = \upsilon_e, \upsilon_\mu, \upsilon_\tau$ yield $\xi^2(\upsilon_n) + m R_n$ (5.4)

$\tilde{\upsilon}_n = \tilde{\upsilon}_1, \tilde{\upsilon}_2, \tilde{\upsilon}_3 = \tilde{\upsilon}_e, \tilde{\upsilon}_\mu, \tilde{\upsilon}_\tau$ yield $\xi^2(\tilde{\upsilon}_n) - m R_n$ (5.5)

$m = 1, 2, 3, 4, 5, 6, 7$ (5.6)

AND R_n

When $n = 1,$ $R_1 = 15,190 \sim 15,211$ (5.7)

When $n = 2,$ $R_2 = 12,880 \sim 17,551$ (5.8)

When $n = 3,$ $R_3 =$? ? (5.9)

Table R1 Mass Spectrum of 1st of Elementary Fermion for Charge $Q \leqslant 0$ and $Q \geqslant 0$

Charge $Q \leqslant 0$	$\mathbf{Q}^2(\gamma^Q, \xi)$	$\xi^2(\omega^Q)$ 1st	Mass $M(\omega)$	Mass $M(\omega)$	$\xi^2(\omega^Q)$ 1st	$\mathbf{Q}^2(\gamma^Q, \xi)$	Charge $Q \geqslant 0$
−7/3	$\mathbf{Q}^2(\gamma^{-7/3}, \xi)$	$\xi^2(q^{-7/3})$			$\xi^2(q^{+7/3})$	$\mathbf{Q}^2(\gamma^{+7/3}, \xi)$	+7/3
		86775, 369. 678 830 4600	16.189 897 1767	16.189 860 5023	86562, 534. 148 153 8000		
−2	$\mathbf{Q}^2(\gamma^{-2e}, \xi)$	$\xi^2(q^{-2})$			$\xi^2(q^{+2})$	$\mathbf{Q}^2(\gamma^{+2e}, \xi)$	+2
		86760, 163. 951 681 8800	11.176 597 7794	11.176 567 7735	86577, 733. 496 813 3900		
−5/3	$\mathbf{Q}^2(\gamma^{-5/3}, \xi)$	$\xi^2(q^{-5/3})$			$\xi^2(q^{+5/3})$	$\mathbf{Q}^2(\gamma^{+5/3}, \xi)$	+5/3
		86744, 958. 224 533 3000	7.185 298 3872	7.185 275 0498	86592, 932. 845 472 9600		
−4/3	$\mathbf{Q}^2(\gamma^{-4/3}, \xi)$	$\xi^2(q^{-4/3})$			$\xi^2(q^{+4/3})$	$\mathbf{Q}^2(\gamma^{+4/3}, \xi)$	+4/3
		86729, 752. 497 383 8200	4.215 999 4498	4.215 982 3159	86608, 132. 194 132 5400		
−1	$\mathbf{Q}^2(\gamma^{-e}, \xi)$	$\xi^2(e^-)$			$\xi^2(e^+)$	$\mathbf{Q}^2(\gamma^{+e}, \xi)$	+1
		86714, 550. 209 961 3800	0.511 000 0000	0.511 000 0000	86623, 334. 982 497 7800		
−2/3	$\mathbf{Q}^2(\gamma^{-2/3}, \xi)$	$\xi^2(\widetilde{u})$			$\xi^2(u)$	$\mathbf{Q}^2(\gamma^{+2/3}, \xi)$	+2/3
		86699, 339. 171 072 2964	2.300 000 0000	2.300 000 0000	86699, 339. 171 072 2964		
−1/3	$\mathbf{Q}^2(\gamma^{-1/3}, \xi)$	$\xi^2(d)$			$\xi^2(\widetilde{d})$	$\mathbf{Q}^2(\gamma^{+1/3}, \xi)$	+1/3
		86684, 128. 740 793 8004	4.800 000 0000	4.800 000 0000	86653, 723. 664 972 6104		
0	$\mathbf{Q}^2(\gamma^0, \xi)$	$\xi^2(\upsilon_e)$			$\xi^2(\widetilde{\upsilon}_e)$	$\mathbf{Q}^2(\gamma^0, \xi)$	0
		86668, 934. 596 225 6861	0.000 002 0000	0.000 002 0000	86668, 934. 596 225 6861		
0	$\mathbf{Q}^2(\gamma^0, \xi)$	$\xi^2(\gamma^0)$			$\xi^2(\gamma^0)$	$\mathbf{Q}^2(\gamma^0, \xi)$	0
		86668, 934. 596 229 6000 $R_1 = 15, 190 \sim 15, 211$	0.000 000 0000	0.000 000 0000	86668, 934. 596 229 6000 $R_1 = 15, 190 \sim 15, 211$		

Table R2 Mass Spectrum of 1st 2nd 3rd of Elementary Fermion for Charge Q ⩽ 0

Charge Q ⩽ 0	$\mathbf{Q}^2(\gamma^{Q}, \xi)$	$\xi^2(\omega^{Q})$ 1st	$\xi^2(\omega^{Q})$ 2nd	$\mathbf{Q}^2(\gamma^{Q}, \xi)$ 3rd
−7/3	$\mathbf{Q}^2(\gamma^{-7/3}, \xi)$	$\xi^2(q^{-7/3})$	$\xi^2(q^{+7/3})$	
		86775, 369. 678 830 4600	86562, 534. 148 153 8000	
−2	$\mathbf{Q}^2(\gamma^{-2e}, \xi)$	$\xi^2(q^{-2})$	$\xi^2(q^{+2})$	
		86760, 163. 951 681 8800	86577, 733. 496 813 3900	
−5/3	$\mathbf{Q}^2(\gamma^{-5/3}, \xi)$	$\xi^2(q^{-5/3})$	$\xi^2(q^{+5/3})$	
		86744, 958. 224 533 3000	86592, 932. 845 472 9600	
−4/3	$\mathbf{Q}^2(\gamma^{-4/3}, \xi)$	$\xi^2(q^{-4/3})$	$\xi^2(q^{+4/3})$	
		86729, 752. 497 383 8200	86608, 132. 194 132 5400	
−1	$\mathbf{Q}^2(\gamma^{-e}, \xi)$	$\xi^2(e^{-})$	$\xi^2(\mu^{-})$	$\xi^2(\tau^{-})$
		86714, 550. 209 961 3800	86714, 344. 360 646 3115	86711, 073. 714 853 7479
−2/3	$\mathbf{Q}^2(\gamma^{-2/3},\xi)$	$\xi^2(\widetilde{u})$	$\xi^2(\widetilde{c})$	$\xi^2(\widetilde{t})$
		86699, 339. 171 072 2964	86696, 838. 779 682 8639	86360♦, 791. 812 950 9657
−1/3	$\mathbf{Q}^2(\gamma^{-1/3},\xi)$	$\xi^2(d)$	$\xi^2(s)$	$\xi^2(b)$
		86684, 128. 740 793 8004	86683, 952. 224 159 7495	86674, 940. 482 476 7749
0	$\mathbf{Q}^2(\gamma^{0},\xi)$	$\xi^2(\upsilon_e)$	$\xi^2(\upsilon_\mu)$	$\xi^2(\upsilon_\tau)$
		86668, 934. 596 225 6861	86668, 934. 224 409 6391	86668, 898. 979 791 2438
0	$\mathbf{Q}^2(\gamma^{0},\xi)$	$\xi^2(\gamma^{0})$	$\xi^2(\gamma^{0})$	$\xi^2(\gamma^{0})$
		86668, 934. 596 229 6000	86668, 934. 596 229 6000	86668, 934. 596 229 6000
		$R_1 =$ 15, 190~15, 211	$R_2 =$ 12, 880 ~ 17, 551	$R_3 =$? ?

Table R3 Mass Spectrum of 1st 2nd 3rd of Elementary Fermion for Charge Q ⩽ 0 Mev

Charge Q ⩽ 0	$\mathbf{Q}^2(\gamma^{Q}, \xi)$	$\xi^2(\omega^{Q})$ 1st	$\xi^2(\omega^{Q})$ 2nd	$\mathbf{Q}^2(\gamma^{Q}, \xi)$ 3rd
−7/3	$\mathbf{Q}^2(\gamma^{-7/3}, \xi)$	$\xi^2(q^{-7/3})$	$\xi^2(q^{+7/3})$	
		16.189 897 1767	1210.883 000 0610	
−2	$\mathbf{Q}^2(\gamma^{-2e}, \xi)$	$\xi^2(q^{-2})$	$\xi^2(q^{+2})$	
		11.176 597 7794	1055.620 000 0456	
−5/3	$\mathbf{Q}^2(\gamma^{-5/3}, \xi)$	$\xi^2(q^{-5/3})$	$\xi^2(q^{+5/3})$	
		7.185 298 3872	901.379 000 0353	
−4/3	$\mathbf{Q}^2(\gamma^{-4/3}, \xi)$	$\xi^2(q^{-4/3})$	$\xi^2(q^{+4/3})$	
		4.215 999 4498	748.160 000 0199	
−1	$\mathbf{Q}^2(\gamma^{-e}, \xi)$	$\xi^2(e^-)$	$\xi^2(\mu^-)$	$\xi^2(\tau^-)$
		0.511 000 0000	105.700 000 0000	1777.000 000 0000
−2/3	$\mathbf{Q}^2(\gamma^{-2/3},\xi)$	$\xi^2(\widetilde{u})$	$\xi^2(\widetilde{c})$	$\xi^2(\widetilde{t})$
		2.300 000 0000	1280.000 000 0000	173000.000 000 0000
−1/3	$\mathbf{Q}^2(\gamma^{-1/3},\xi)$	$\xi^2(d)$	$\xi^2(s)$	$\xi^2(b)$
		4.800 000 0000	95.000 000 0000	4700.000 000 0000
0	$\mathbf{Q}^2(\gamma^{0},\xi)$	$\xi^2(\upsilon_e)$	$\xi^2(\upsilon_\mu)$	$\xi^2(\upsilon_\tau)$
		0.000 002 0000	0.190 000 0000	18.200 000 0000
0	$\mathbf{Q}^2(\gamma^{0},\xi)$	$\xi^2(\gamma^0)$	$\xi^2(\gamma^0)$	$\xi^2(\gamma^0)$
		0.000 000 0000	0.000 000 0000	0.000 000 0000
		$R_1 = 15,190 \sim 15,211$	$R_2 = 12,880 \sim 17,551$	$R_3 =$? ?

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