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Dark Matter and Energy in the Universe of Symmetric Physics

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Abstract: *The nature works in the symmetric {Hermitian of real time t, anti-Hermitian of imaginary time it} quantum physics that, respectively, unfolds into the {observed normal matter and energy, unobserved dark matter and energy}. This paper explores the symmetric physics with its prognostications and predictions in full agreements with the experimental observations that conflict with the prevalent understanding. The new physics explains, among many others, the big-bang mechanism that has long been considered to be the Creator's secret feat ever beyond human comprehension.*

1. Introduction

The laboratory observations indicate that a particle is always generated with the antiparticle, indicating that the Universe works in symmetric physics. On the other hand, the humans as well as the Universe seem to be constituted by 100 % of matter. Universe is assumed to be generated from a pure big-bang energy, producing the matter and antimatter in symmetry. Then how this seemingly matter asymmetric Universe is eventuated? Could the antimatter in the Universe be hiding somewhere?

Through the history, humans at first balked to stretch out their natal tenets to see the truth. For example, Galileo introduced his telescope to extend human limit of the vision, but his contemporaries looked up the sky with their bare eyes to condemn him.

Now, the emergence of the dark matter and energy [1] calls for the extension of the human cognizance in the Universe. The basic "Quantum Theory [2]" in fact reveals that the Universe is administered by the commensurate symmetric {Hermitian of observed real time "t", anti-Hermitian of unobserved imaginary time it } physics. Although humans are equipped only with the limited natal capability to observe the Universe in the asymmetric single t, the actual Universe must work in the symmetric dual directed times!

The predictions by the physics of dual times now fully agree with actual observations, but disagree those from the prevailing theories. They are--to quote a few examples—the observations of the 99.99% dark matter galaxies (see §15), the younger galaxies seemingly with less dark matters (see §10), the dark matter black holes are formed first to foster the generation of galaxies (see § 10).

The quantum entanglement phenomena here are real and prevalent--not spooky actions (see §6)--caused by the long-ranged EM interaction across the dual-time Universe. And the symmetric physics steers to the puzzling accelerating expansion of the Universe (see §5) as well as the generation of the ultrahigh energy cosmic particles (see §11).

2. Dual Time Universe

While the space is dual directed, that is in symmetric "+{x,y,z}" and "–{x,y,z}" tracks, the observed phenomena seem to progress only forward in time. This seemingly uni-directed time in the expanding big-bang Universe must be another gaffe, due to human obstination exposed in the history (see § 1)?

The particle energy has the quadratic time dimension dependence [3]. Accruing the Dirac's negative energy for the antiparticles against the positive energy for the particles, the time contingency of the fundamental interaction core modes must be in terms of dual quadratic time, i.e.,

$$[\mathbf{T}^2] \rightarrow [(+)\mathbf{t}^2, (-)\mathbf{t}^2] \rightarrow \{\mathbf{t}^2, \tau^2\}, \text{ where } \tau = i\,t \;\textbf{!} \tag{1}$$

This assuages in operational linear dual time,

$$[T] \rightarrow \{t, it\} \rightarrow \{t, \tau\} \tag{2}$$

This symmetric linear dual time $\{t, \tau\}$ is not an idle speculation. According to Bohm [2], it is the foundation of the {(observable) Hermitian--(nonobservable) anti-Hermitian} symmetric Quantum

Physics, where the τ–zone (aH) entities become non-observable to the t-zone (H) instrumentations, befittingly simulating the dark matter and energy.

Denoting attractive and repulsive forces by {→←} and {← →}, the physical attributes of the dual time{t, τ} physics act in the disparate linear EM charge interactions of [4, 5],

{(+) ←→(+), (-)← →(-), (+)→← (-) } (3)

in the observed t-zone Universe, while

{(+)→←(+) , (-)→←(-), (+)←→ (-)} (4)

in the unobserved τ–zone Universe. The EM forces of Eq. (4) in the τ–zone and of Eq. (3) in the t-zone are thus entirely opposite directed, becoming mutually oblivious!

The EM interaction forces and energy in the Universes in terms of Eqs. (3 and 4), would spawn the symmetric {t, τ} dual times (see §4 & §6), which the general relativity does not accommodate, limiting its application. The particle evolution and durability become divergent, leading (see §5 and §8) to the disparate content ratio of the τ–zone {unobservable dark matter and energy} and the t-zone {observed normal matter and energy} (see §9).

The portion of matter and antimatter created and then annihilated in the big-bang must have generated a great deal of repulsive EM radiation force, initially spurring the dual time zones apart. The t-zone matter in time turned neutral [see Eq. (3)], leaving the minor EM energy as CMB (see §5). On the other hand, the τ–zone matter not only remains charged [see Eq. (4)] to continue producing the dark EM energy (see §5) to magnify it with time (see §7, §8, & §10).

The recent analysis [6] has proven that the dark matter is in fact the electrically charged particles that interact by yet unknown EM force [6]. This novel nature of the electrically charged dark matter in fact is the consequence of the symmetric physics in this paper [see Eq.(4) along with Eq. (3)], and the theoretical and their experimental verifications are now fully clear (see §5 & §8), explaining all the mysterious observations, encompassing the accelerating expansion of. the Universe and the origin of the ultra-high energy cosmic particles (see §9).

3. Dirac and Feynman Antiparticles

Mathematics has been found to be the basic tool that describes the Universe, and the legitimate mathematical prospects cannot be ignored based on the reach of connate human capacities. And the covert imaginary unit "i" has been shown to administer the transformation from the observed t-zone H Universe into the unobserved τ-zone aH Universe of dark matter and energy [see Eq. (2)]. It is then likely that the τ-zone linear time is transferred back to the t-zone linear time through the same imaginary factor "i" transformation as shown in Fig. 1.

The quantum field theory inspired Feynman for the pursuit of the negative time transit for the antiparticle. But it has never been clear what it really meant to move backward in time. The great physicists in the history—Dirac (of negative energy) and Feynman (of negative time)--were unaware that they were actually dealing with the dual-time symmetry that emanates from the symmetric {Hermitian, anti-Hermitian} physics of the Universe.

Observed H-Universe ← (i) → Unobserved aH-Universe

t →→→ i t = τ

(t-zone) (τ - zone)

$- t = i^2 t = i\tau$ ←←← τ

Fig1. *Feynman's negative time*

4. The Partitioned Dual-time Universe

During the "Bang!" of the big-bang, the basal quarks and antiquarks are produced in contact in symmetry, and their active annihilation in quantum entanglement via uncertainty principle could initiate the separation of the dual {t, τ}-zone Universe apart. But the primary normal matter baryons and the dark matter baryons molding in QQD (see §6) would separate without annihilation.

Life on Earth (and elsewhere, if any) owes to this dual time separation of {matter, antimatter} (see §7 & §8). But, due to the exclusive human awareness in the observable single t-zone Universe, the EM charged dark matter and its energy became entirely unfathomable mise'en-scene.

To open the wormhole, it is shown that both the negative and positive energy domains are required to be linked together [7]. It is seen that the positive energy t-zone and the (Dirac's) negative energy τ-zone meet in Fig. 2, providing the long-searched context for the wormhole along the dual-time boundary (see §7).

The weak gravity's inverse square law may break down at very small distance [8]. Thus, the astronomers do not yet understand this simple question of how the stars form [9]. This problem is actually very simple in the symmetric Universe. The charged (dark) τ-zone matters would be quickly crammed by the strong τ-zone EM forces of $\alpha_{em} \approx 10^{42} \alpha_{gravity}$ (see Eq. 4), first installing the dark matter black holes that spread throughout the Universe (see §10), and its gravity attracts the ambient neutral t-zone matter

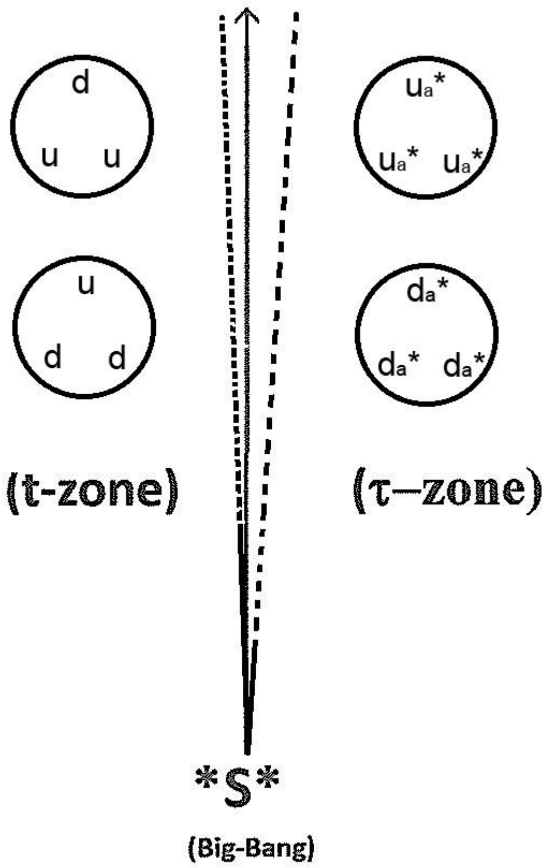

Fig2. *The foundational baryon states in the symmetric Universe with the wormhole brim*

It is likely that the gravitational force that pour forth from the quickly and densely forming (dark) τ-zone black holes then may pull, exerting inescapably strapping gravity force to the (normal) t-zone ambient matter, forming the stars and galaxies. Nearby dark black holes may generate the binary stars and in time the galaxies (see §14).

The space-time curvature of the singularities may approach infinite, generating the impetus for the dual {t, τ} time Universe according to two distinct dispositions:

1) The universal and ubiquitous dual {t, τ} time from the big-bang singularity that had been casted over the entire particle-antiparticle Universes.
2) The localized dual {t*, τ*} time from the black hole singularity cores that are distributed throughout the Universe.

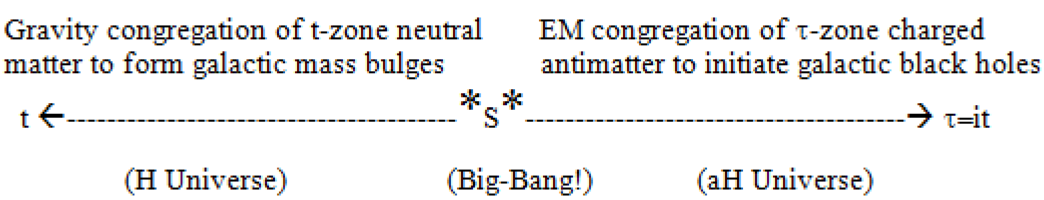

Fig3. *Matter asymmetry in the Universe across the dual time boundary*

5. THE ACCELERATED EXPANSION OF THE UNIVERSE

It is determined [10] that the EM pulse can propagate freely in the plasma medium at close speed of light and keeps its profile and shape unchanged. Thus, while the t-zone matter is neutralized [see Eq. (3)], its EM radiation tarrying as O(2.5%) CMB (see Eq. 38C), the charged τ–zone matter remains as plasma medium [see Eq. (4)] and keep its EM radiation freely propagates through the τ-zone medium and has—along the dark energies from the other sources (see §10)--accumulated as the profuse dark energy at the currently observed O(70%) in the Universe.

The Einstein's theory of general relativity [being developed and true in the t-zone Universe, not in the prevailing dual symmetric {t, τ}-zone Universe], suggests that the prevalent dense energy may generate a very strong gravity. The result here is very chaotic, suggesting that the standard model of the Universe fails, the dark energy just jostling [11].

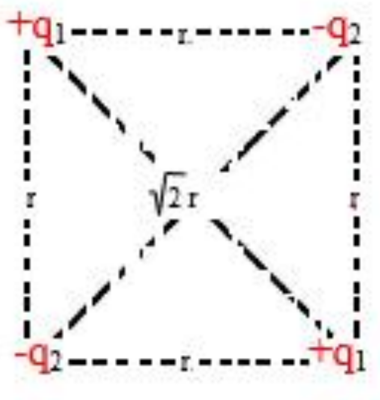

Fig4. *Charge Distributions of* $\{+q_1, -q_2, +q_1, -q_2\}$

With the convention of {attractive, repulsive} forces in {-,+} values, the (loal) EM forces $F_{EM}\{(t,\tau), M\}$ are determined according to Eqs. (3, 4) as function of $M = q_2/q_1$ for the most likely statistical charge distribution at the very early Universe in Fig. 4 to be

$$F_{EM}\{t, M\} = +(q_1^2/2r^2)\{(1-M)^2 - 6M\} \quad (5A)$$

$$F_{EM}\{\tau, M\} = -(q_1^2/2r^2)\{(1-M)^2 - 6M\} \quad (5B)$$

Because of the distinct difference between the Eq. (3) and Eq. (4), the M dependences of Eqs. (5A) and (5B) would also be equally contrasting.

The Eq. (5A) gives in the t-zone,

$$F_{EM}\{t, M=0\} = +(q_1/r)^2/2 \quad (6A)$$

… {repulsive by Eq (3) with (q_1=q and q_2=0), or (q_1=0, q_2=q)}.

and that t-zone matter may only briefly hesitate the congregation under the weak gravity.

Then $F_{EM}\{t, M\}$ quickly turns negative (attractive)

$$F_{EM}\{t, M=1,2,..7\} = -3(q_1/r)^2, -(11/2)(q_1/r)^2 \ldots\ldots -3(q_1/r)^2 \quad . \quad (6B)$$

and the t-zone matter congregate to be fully neutralized in the early $0 < M < 8$ domain.

For the τ–zone Universe, ,

$$F_{EM}\{\tau, M=0\} = -(q_1^2/2r^2) \quad \ldots\ldots.. \quad \text{(attractive)} \quad (7A)$$

with (q_1=q and q_2 =0), or, also (q_1=0, q_2 =q). Because of Eq. (4), the dark matters remain permanently charged, and the effective M remaining near zero, the same τ–zone charges keep congregating to heavier charged masses (see §10), eventually to form charged black holes. On the other hand,

$$F_{EM}\{\tau, M=1,2,..7\} = +3(q_1/r)^2, +(11/2)(q_1/r)^2 \ldots\ldots +3(q_1/r)^2 \ . \quad (7B)$$

This repulsive $F_{EM}\{\tau, 1=< M < 8)$ forces of the dark τ–zone matter in Eq. (7B) is time and scale dependent, emerging slowly and eventually cause the observed (yet so far unexplained) accelerating expansion of the Universe.

The $F_{EM}\{\tau, M >= 8)$ becomes again negative (attractive). This might mean

that—with appropriate transformations—the Universe could eventually become contracting. Could the Universe become oscillating between the expansions and contractions toward a stable state?

6. Quantum Quark Dynamics (QQD)

Because of the inordinately disparate nature of strong interaction, the experimentally determined fine structure constant "137" that characterize the strong interaction strength has long been beyond human comprehension. The great Richard Feynman lamented "Nobody knows. It ("137") is one of the greatest damn mysteries of physics: a magic number that comes to us with no understanding by man. You might say that the Hand of the God wrote that number, and we don't know how He pushed His pencil" [12].

The fundamental particles in the Universe, the quarks, have EM charges in "(+,-) n/3" where n = {1,2}, and thus the basic composite particles, the baryons, are constituted by 3 quarks to establish the integer charges. Thus the baryon matter particles {p,n} in the t-zone are made of the foundational {uud} and {udd} quarks.

This mystery of "137" has been solved [13] by introducing the ultra-short ranged Quantum Quark Dynamics (QQD) with the tightly encased quark charges of $\{q_1,q_2,q_3\}$ in

$$F(QQD)_{(t,\tau)\{q1\,q2q3\}} \approx 3/\{1/[q_1,q_2,q_3]^2\}. \quad (8A)$$

The QQD force for the proton{u,u,d} in the t-zone gives,

$$F(QQD)_{t,\{+2/3,+2/3,-1/3)} \approx 136.6875 \;= P_u \quad (8B)$$

which is a remarkable revelation of the long searched origin of "137" of the strong interaction that generate the QQD.

The QQD force implied by Eq. (8B) indicates that the attractive QQD bound quark force might become very large and implode, instead binding tighter as in the atomic states. And the possible formation of the stable baryon states requires following 2 step EM restraints:

I) The baryon states initiate from the attractive short ranged QQD force, determining their configurations with their respective foundational EM charge of $F_{EM.}$
II) The state with EM charge of F_{EM} might be unstable, even implode. If the reconfigurations of their core quark EM charge, $C_{EM,}$ can help the state to evade the QQD implosion, they recast their structures in quantum entanglement via asymptotic freedom.

The baryon {both visible and dark} states thus carry 2 identity EM charges, and begins with the EM bound foundational states with $F_{EM} = C_{EM}$ (see §8) that may not necessarily be implosion stable. Thus the prevailing quark bound states both of the normal and dark matters are required to convert into the states that can evade the QQD implosions trough the restructuring C_{EM}.

This is a profoundly important new contrivance active both in the {t, τ} symmetry quark physics. Now, not only due to the Pauli principle, but also the rules "I "above reject the formation of the baryon states {uuu} and {ddd} states in te t-zone according to Eq.(3) by

$$\{u(+2/3)\leftarrow\rightarrow u(+2/3)\leftarrow\rightarrow u(+2/3)\} \text{ and } \{d(-1/3)\leftarrow\rightarrow d(-1/3)\leftarrow\rightarrow d(-1/3)\}\ , \quad (9)$$

where {→←} and {←→} indicating the attractive and repulsive forces.

But the two neighboring {uud} and {udd}states become the foundational bound {p,n} states:

$$u(+2/3) \rightarrow\leftarrow d(-1/3) \rightarrow\leftarrow u(+2/3) \text{ of proton charge } F_{p,EM} = C_{p,EM} = +1. \quad (10A)$$

$$d(-1/3) \rightarrow\leftarrow u(+2/3) \rightarrow\leftarrow d(-1/3) \text{ of neutron charge } F_{n,EM} = C_{n,EM} = 0. \quad (10B)$$

This proton {uud} and neutron {udd} structures are well confirmed, but the quark dynamics in the {p,n} is not at all understood. In fact, the accepted orthodox hypothesis is that the nucleons{p,n}are generated by the interactions of zillions of {gluons, quarks, antiquarks} that zip around near the speed of light, banging each other and appearing and disappearing inside the nucleons [14]. Consequently, the QCD supposedly in action there create quandaries that even the super-computer cannot untangle, rather than solving them. Nature rejects such a hodgepodge. Einstein warned that "If you cannot explain it simply, you don't understand it well enough."

With $\{M_u, M_d\}$ as the bound {u,d} states in {p,n} baryons, the observations indicates

$M_p \approx (2 M_u + M_d) \approx M_n \approx (M_u + 2 M_d) \approx 939$ MeV. (11A).

This means

$(M_u = P_u m_u) \approx (M_d = P_d m_d)$, with

$P_d \approx (m_u / m_d) P_u$. (11B)

This may indicate that the change in the basic elementary particle masses are evolved by the variations in their compression [5].

On the other hand, $m_u \approx 2.4$ MeV and $m_d \approx 4.6$ MeV, $2m_u + m_d \approx 9.4$ MeV and $m_u + 2m_d \approx 11.6$ MeV, thus giving $(2m_u + m_d)/(m_u + 2m_d) \approx 0.81$ with

$2m_u + m_d << M_p$ and $m_u + 2m_d << M_n$,

also are incredulously disparate from the observed $M_{p,}(uud) \approx M_n(udd)$ of Eq. (11A).

The surprising tip-off that explicate the problem here comes from the quark QQD force of Eq. (8A) for the neutron{udd},

$F(QQD)udd \approx F(QQD)_{\{+2/3,-1/3,-1/3\}} \approx 4F(QQD)_{\{+2/3,+2/3,-1/3\}} \approx 4\,F(QQD)p$ (12)

This seems to suggest $M_n \approx 4M_p$, betraying the observed $M_n \approx M_p$ of Eq. (11A).

But wait! The real verdict can be practical and sagacious to the point, and it rather ingenuously indicates that the quark QQD binding mechanism is **not** the "Potential Contrivance" well established in the atomic and gravitational physics, where the stronger the force the more stable the state is!

It is in fact no marvel to fathom that the attractive QQD_{udd} here is not only much greater than QQD_{uud} in Eq. (12), but also its overall core EM charge $C_{EM} = 0$ [see Eq. (10B)] for the {udd} state would not generate extricating (t-zone) repulsive force between the quarks in {udd}. The{udd} state thus may suffer the QQD implosion.

On the other hand, the attractive QQD force for the{uud} is not only comparably low F(QQD)p ≈ (¼)F(QQD)udd in Eq. (12), but also its overall core charge $C_{EM} = +1$ [see Eq.(3)] is repulsive, to help evade the ever menacing QQD implosion.

Thus, to evade the QQD implosion, a reconfiguration of

{udd} of $F_{EM} = C_{EM} = 0$ →→→ {uud} of $F_{EM} = 0$ and $C_{EM} = +1$, (13)

is required with the same neutral $F_{EM} = 0$, but the C_{EM} changing from 0 to +1. This is possible, being embraced by the asymptotic freedom in quantum entanglement (see §6),

$\{udd\} \rightarrow\rightarrow \{udd; u,u_a\} \rightarrow\rightarrow \{uud; d,u_a\} \rightarrow\rightarrow \{uud\}$ + virtual (pions$^-$, W$^-$...}, (14)

in the virtual restructuring to give the observed $M_n \approx M_p$ of Eq. (11A).

This is a surprise, enabling to reject the ongoing pretentious (authoritative but false) conventional rattling about the formation of the {p,n}stated above [14]. It is essential to ascertain here that the foundational EM charges of the states {udd} in the transformation in {udd} →→ {uud} in Eq. (14) remains the same neutral $F_{EM} = 0$.

In fact, this turns out to be correct physics is consistently confirmed with exactly the same reconfiguration processes being active for the dark matter particles to generate their stable particles (see §8). This convolution may even be prevalent; the collisions of neutrons have been observed to generate, for instance, the electrons in the crystal that act as the quasi-particles, so-called Majorana fermions [13].

It is now clear that the multi-quark QQD force, as indicated by Eq. (12) may easily produce an excessively strong attractive force and, unless the EM force mediates to moderate its effect as ruled by the requirement "I & II" above, it would implode! This multi-quark QQD implosion phenomenon is not an insipid speculation; it's intrepid evidence has in fact been experimentally observed with the

EM{$\gamma\gamma$ } resonance at the 750 GeV state [15]. It may further go on into the high multifold chain implosions to generate the QQD big-bang explosion [5] that has been attributed to be the Creator's fete, ever beyond human grasp.

7. QUANTUM ENTANGLEMENT

The strong interaction of the short-confined-range QQD (mostly without quantum entanglement across the dual time zone boundary) is insular, largely acting separately to establish the seemly matter asymmetry in the Universe [see §4].

But the space of the dual-time Universes is flat and continuous, and the EM, although weaker than the singular QQD, is long-ranged. Thus, the {t, τ} EM force would stretch across the dual space-time barrier and not only quantum entangle particles in the both sides according to Eqs. (3 and 4) on demand, but also selectively help evade the QQD implosion to form the stable baryons in the Universe (see §5).

It has in fact been realized [16] that any 2 particles may interact, sometimes shedding their individual probability and becoming a more complicated probability function in quantum entanglement across the {t, τ}-zone boundary. For example, the quark $\{u,u_a\}$ and $\{d,d_a\}$ pairs may be pulled together by the long ranged EM force to quantum entangle in quantum uncertainty and QQD annihilated in the t-zone with decay time $(dt)_{u,ua}$, that is,

$$u(+2/3) \rightarrow\leftarrow u_a(-2/3) \text{ and } d(-1/3) \rightarrow\leftarrow d_a(+1/3) \quad (15)$$

The quantum entanglement here is essential for the annihilation.

The light weight electron-positron pair—bereft of the QQD—would also EM quantum entangle

in the t-zone

$$e(-1) \rightarrow\leftarrow e_a(+1) \quad (16)$$

to be annihilated into photons.

Two electron pair become attractive in the τ-zone, but cannot be annihilated with total charge = -2,

$$e(-1) \rightarrow\leftarrow e(-1) . \quad (17)$$

Together, they may penetrate into the t-zone in the quantum entanglement, and may become repulsive

$$e(-1) \leftarrow\rightarrow e(-1). \quad (18)$$

The 2 zero mass photons from Eq. (16) and 2 electrons of low mass in Eqs. (17 and 18) that chance the quantum entangling across the {t, τ} time boundaries, would dovetail to be driven away through the wormhole passage [7] along the positive-negative energy boundary (see Fig. 2 and §4). But they may remain connected in the quantum entanglement to a great distance, explaining the Einstein's spooky action at distance [16].

This quantum entanglement across the dual time zone may also be revealed in the double-slit observations. The electrons passing through the double-slits—that is covered by the layers of low atomic number materials that are illuminated to determine which slit the electrons are passing through—may quantum entangle [see Eqs.(17 & 18] with the electrons excreted from the slit hole being provoked by the imposed observational instrumentations [17].

The physics of the electron quantum entanglements may intertwine with the various complex double-slit interactions in the dual time Universe. The seeming confusions in the double-slit experiments must be caused by the feats of the unfamiliar complex dual-time physics that cannot be cogitated solely in the t-zone Universe.

Back in the "Bang" of big-bang with the still overlapping dual {t, τ}-zone times, the $\{u\, d_a\}$ and $\{u_a\, d\}$ pairs may quantum entangle in the τ-zone, that is,

$$u(+2/3) \rightarrow\leftarrow d_a(+1/3) \text{ and } u_a(-2/3) \rightarrow\leftarrow d(-1/3). \quad (19)$$

They would be spurred to form the {+, -} π–mesons and decay into

$$\{u\, d_a\} \rightarrow \pi^+ \rightarrow \mu_a^{\,+} + \nu_\mu \text{ and } e_a^{\,+} + \nu_e \text{ and} \quad (20)$$

$$\{u_a\, d\} \rightarrow \pi^- \rightarrow \mu^- + \nu_{\mu,a} \text{ and } e^- + \nu_{e,a} . \quad (21)$$

These processes would take place profusely in the exploding big-bang, explaining the observed ample cosmic neutrinos in less than a second after the explosion [18].

8. THE FOUNDATIONAL DARK MATTERS (SEE FIG. 2) IN THE τ-ZONE UNIVERSE

The EM quantum entanglement in asymptotic freedom may also arise with the laboratory $\{p, p_a\}$ production and annihilation phenomena. While the insular QQD interaction in the t-zone [see Eq. 10B & 10A],

d(-1/3)→←u(+2/3)→←d(-1/3) and d(-1/3)→←u(+2/3)→←d(-1/3) (22)

generate the foundational neutron and proton, it was shown that the ever-assertive asymptotic freedom in quantum entanglement would reconfigure the neutron mass to the proton mass [see Eqs. (13 and 14)].

The counterpart antineutron and antiproton in the τ-zone that are made of antiquark elements of {p,n}, that is,

d_a (+1/3)←→u_a (-2/3)←→d_a (+1/3) for the contingent antineutron, n_a(?) (23)

u_a (-2/3)←→d_a (+1/3)←→u_a (-2/3) for the contingent antiproton, p_a(?) (24).

in the τ–zone are not possible due the EM repulsive forces in the τ-zone., but may impart themselves with the foundation states $\{d_a, d_a, d_a\}$ and $\{u_a, u_a, u_a\}$ [see Eqs. (25) and 26)]. The masses of the states would differ by, $m[n_a(?)] > m(n)$ and $m[p_a(?)] > m(p)$.

The antiproton p_a has actually been observed, and the observed $m(p_a)$ is no different from m(p), being identical to elven decimal place [19]. Thus the anti-quark components in $\{p_a, n_a\}$ must directly quantum entangle with quark components in {p,n} according to Eq. (15) to be annihilated, while the quark components in $\{p_a$ (?), n_a (?)} do not quantum entangle with {p,n} and shun their annihilation. In fact,

the $\{p_a$ (?), n_a (?)} of Eq. (24, 23) are the actual foundational QQD administered dark matter components as shown in Eq. (27). This remarkable fact has only recently verified by the joint FermiLab/SLac observation [20], and the question of "Matter Asymmetry" has become the "Skewed Matter Asymmetry Problem."

The foundational τ-zone anti-baryon formations by 3 antiquarks thus would require τ-zone EM attractions of the $\{u_a u_a u_a\}$and $\{d_a d_a d_a\}$ states according to Eq. (4):

d_a (+1/3)→←d_a(+1/3) →←d_a(+1/3) for the n_a with foundational $F_{\tau,EM}$ = +1 (25)

u_a (-2/3) →←u_a (-2/3)→←u_a (-2/3) for the p_a, with foundational $F_{\tau,EM}$ = -2 (26)

These foundational EM charges of $F_{\tau,EM}$ = +1of Eq. (25) and $F_{\tau,EM}$ = -2 of Eq. (26) are correct

counterparts of the F_p = +1 and F_n = 0 of the baryons,{p,n}, in the t-zone [see Eqs. (10A) & (10B)].

8. THE CHARGED DARK MATTER

The stability destination of the τ-zone baryons forming under the EM administration of Eq. (4)—is the opposite direction to those of the t-zone physics of Eq. (3)—with the (same) attractive EM charged states promoting the QQD implosions (see § 6). With F_{EM} = -2 from the left, and F_{EM} = +1 from the right (compare with Eq. (13) in the t-zone) this provides the τ-zone durability directions along with their changing core EM charge C_{EM} by,

$\{u_a u_a u_a; C_{EM}=-2\}$→→$\{u_a u_a d_a; C_{EM}=-1\}$→→**$\{u_a d_a d_a; C_{EM}=0\}$**←←$\{d_a d_a d_a; C_{EM}=+1\}$ (27)

(…………. of F_{EM} = -2……………..) (..of F_{EM} = +1..)

As propounded earlier (see §5) with t-zone physics, the foundational EM charges in Eq. (27) for the τ-zone transition $\{u_a u_a u_a\}$ →→ $\{u_a d_a d_a\}$ shall remain F_{EM} = -2, while F_{EM} = +1 for the transition $\{d_a d_a d_a\}$ →→ $\{u_a d_a d_a\}$ transition. This confirms that all the dark matter are charged either in F_{EM} = "+1" or "- 2 " (see §10).

The foundational F_{EM} = -2 states with C_{EM} = {-2, -1, +1) congregations from the left, and the

F_{EM} = +1 with C_{EM} = {+1} from the right in Eq. (27), provide additional attractive τ -zone EM force [see Eq. (4)], promoting the QQD implosions. On the other hand, the $\{\mathbf{u_a d_a d_a}$; $\mathbf{C_{EM} = 0}\}$ with $\mathbf{C_{EM}}$ = 0 could evade the QQD implosion, and generate the stable dark matter baryon.

The establishment of the stable 3-quark proton in the t-zone Universe according to simple Eq. (14) and the 3-quark dark baryons in the τ-zone Universe according to Eq (27) thus unveils the required foundation of particle physics to evade multi-quark QQD implosions.

The $d_a(+1/2)$ and $u_a(-2/3)$ quarks are the spin = ½ fermions, and would subject to Pauli's exclusion principle. This problem was already extensively discussed in the t-zone physics [11]: the 3 quarks out of {u,d} quark aggregations in the t-zone Universe could form 4 different {uuu, uud, udd, ddd} combination states. Because of the exclusion principle, however, the ground spin = ½ {uuu, ddd} states are forbidden, and only the {uud, udd} ground states are allowed to form the spin = 1/2 {p and n} states at the same mass level of 940 MeV [see Eq. (13)].

However, with their excitation into the spin = 3/2 states, the {(uuu)*, (ddd)*} states along the {(uud)*, (udd)*} are allowed to form as the Delta state of mass 1,232 MeV, shifting their mass [13] from the ground (spin =1/2) state to the excited (spin = 3/2)* state by a factor of

$$R_s \approx 1{,}232 \text{ MeV} / 940 \text{ MeV} \approx 1.3 \qquad (28)$$

The same restraints would also apply the foundational $\{3\, d_a\}$ and $\{3u_a\}$states.

Proceeding from the foundational antibaryon states [see Eqs (25 and 26)],

$F(QQD)_{\{3d^*a\}} \approx 2^4 R_s F(QQD)_p$ and $F(QQD)_{\{3u^*a\}} \approx 2^{-2} R_s F(QQD)_p$, which give

$$m_{\{3d^*a\}} \approx 2^4 R_s m_p \approx 19{,}552 \text{ MeV, and} \qquad (29)$$

$$m_{\{3u^*a\}} \approx 2^{-2} R_s m_p \approx 306 \text{ MeV, to give} \qquad (30)$$

$$m_{\{3d^*a\}} + m_{\{3u^*a\}} \approx 19{,}858 \text{ MeV, against} \qquad (31)$$

$$m_n + m_p \approx 1{,}876 \text{ MeV.} \qquad (32)$$

The proposed transition of Eq. (27) would prompt the QQD mass settlement to

$$m_{(da,da,ua)} \approx 4\, m_{p,n}\,. \qquad (33)$$

Following the durability route of Eq. (27), the Eqs .(28 and 33) posit,

$$m_{(3d^*a,\, 3u^*a)} \rightarrow R_s\, m_{(2da,ua)} \rightarrow (1.3 \times 4)\, m_{p,n} \approx R_m\, m_{p,n} \qquad (34)$$

to give the mass multiplication factor

$$R_m \approx 5.2 \qquad (35)$$

This agrees with (Dark baryon matter mass content)/Normal baryon matter mass content) ≈ 5.2 that has been observed in the Universe. This reaffirms the validity of Eq. (13) and (27), confirming the possible big-bang explosion trough the unsteady QQD high multifold chain implosions [5, 20], establishing the seemly matter asymmetry in the Universe. .

Backed by the physics and observations of Eqs., (3 and 4) and Eqs. (14 and 27), this agreement indicates that the τ-zone physics for the dark matter in this paper is in fact correct.

The $R_m \approx 5.2$ of Eq. (35) now gives,

$$E^*_{dm} \approx m_{(3d^*a)} + m_{(3u^*a)} \rightarrow R_m (m_p + m_n) \approx 9{,}755 \text{ MeV} \qquad (36)$$

in approximate agreement with observation [21].

The total τ-zone energy $m_{\{n^*a + p^*a\}}$ of Eq. (31), after imparting the dark matter mass of E^*_{dm} of Eq. (36), provides the dark energy of,

$$E_{de} \approx m_{\{3d^*a + 3u^*a\}} - E^*_{\tau,dm} \approx 10{,}103 \text{ GeV}\,. \qquad (37)$$

This alone gives the initial dark energy of

$$E_{de}/m_{dm} \approx 1.04. \qquad (38A)$$

Together with other additional productions of dark energy (see §10), the freely propagating dark energy in the charged dark matter medium could eventuate toward the current O(70 %) content in the Universe.

The unusually large EM charge of $C(3u_a)_{EM}$ = -2 for the foundational ($3u_a$) might bypass the middle states in Eq.(27) directly landing on the {$u_a d_a d_m$} state in quantum entanglement with mass of

$m_{direct}(u_a d_a d_a) \approx R_m m_n \approx$ 5,143 Mev.

This may increase the initial dark energy to

$E_{de} \approx 1.53\ m_{dm}$ (→41 %) from the 1.04 m_{dm} (→ 28 %) (38B).

This could provide a more initial dark energy production toward the current O(70 %) observed value (see §10).

Eqs. (12 & 13) indicate that the trans configuration of {udd} → (uud} loses mass energy to EM energy by

$\delta E_{em} \approx 4\ M_n - M_p \approx 3 \times 939$ MeV ≈ 2,817 MeV.

In the earlier stage, protons prevail 6 to 1 over neutrons in the Universe, and the actual energy loss would be

δE_{em} → 2,817 MeV/6 ≈ 470 MeV.

Because the normal (visible) matter is only 5 % in the Universe, the estimated EM energy loss in the big-bang Universe would then be

(5 %) (470 MeV/939 MeV) ≈ 2.5 % (i.e., 50% of 5 %). (38C)

This is remarkably close to the observed value {22] --the missing 50 % of the normal (visible) * matter content 5 %.

Correct respective verdict of the τ-zone EM energy by Eq. (38B) and the t-zone EM energy by

Eq. (38C), unquestionably support the geminating QQD dynamics for the τ-zone matter by Eqs.(27) and t-zone matter by Eq. (14), leading to the Big-bang explosion dynamics as straight as proposed in this paper.

The EM attractive τ–zone force grows as the charged (τ–zone) matter amass (see, Fig. 4), eventually to develop into the large dark black hole cores. Meanwhile, the influence of the EM congregations of the τ-zone foundational {$3u^*_a$} states with charge F_{EM} = -2 would have a positron swarm (see §13) around the dark matter cores.

Moreover, the τ-zone base for the foundational {$3d^*_a$} and {$3u^*_a$} antibaryon states with their foundational electric charges of F_{EM} = +1 and F_{EM} =-2 (see Eqs. 25 and 26) could help lead to different forms of galaxies. The collisions between the newly forming black holes would further modify the matter configurations.

9. DARK MATTER BLACK HOLES FIRST

The τ-zone physics (although not observed from the t-zone Universe) is real and the same charges—as shown in Eq. (4)—are attractive, while the opposite charges repulsive each other. Thus, the τ–zone matter cannot be neutralized. In fact, the dark matter electric charges are increased, congregating separately (see Fig. 5).

As more and more same charges attract and amass with time, eventually (incited by some jolts) the attractive (and separate) EM confined **τ**–zone charge congregates {d_+, d-} may collapse to form the microscopic QQD hardcore {d_+*, d-*} and proceed toward the dark matter black holes. These collapses emit and supplement the existing repulsive dark energy as shown in Fig. 6.

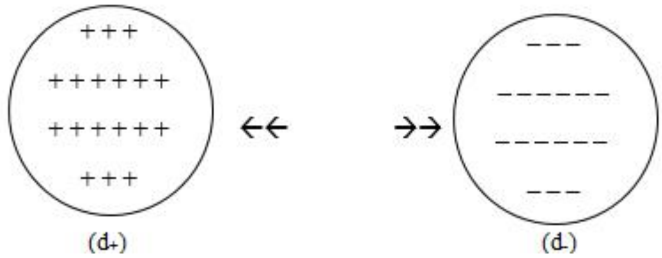

Fig 5. *The charge congregations {d_+, d_-} in the τ-zone Universe*

Due to the ratio of the interaction constants as large as $\alpha_{em}/\alpha_{gr} \rightarrow O(10^{42})$, the EM charged hard cores—the unobserved τ-zone black hole singularities—may become inconspicuous, sporadically floating by. In fact, the germinal dark matter black holes have now been judged to be so microscopic that they would be very hard to be detected [23].

As also predicted in this paper, the black holes were actually born without stellar parents from the beginning of time [24,25], providing straightly correct answer to the question of "Which Comes First, Black Holes or Galaxies?" They are spread nip-and-pick in the Universe.

An over-and-above prospect here is that the small τ–zone un-observed charge congregations in space may twirl and twist in the resultant non-observant (τ–zone) EM field to also generate the quantum bootjacking of τ–zone dark energy in the quasi-hydrogenic tact of

$$E_{(Z+,\ Z-)} \rightarrow 2\pi^2\mu\ [(\mathbf{z}_+ e\ \ \mathbf{z}_- e)^2]/(h^2 n^2), \quad (39)$$

where μ represents the reduced mass [4]. These further elevate dark energy content of the Universe! [1].

The (non-observable) τ-zone energy created in the collapsing dark matter (see Fig. 6) initially would expel the star forming local t-zone matter, at places resulting in the dim galaxies with scarce stars, not because of the lack of dark matter, but because the attraction force of the dark matter is countered by the repulsive dark energy force, diminishing the resultant pulling force (also see §12).

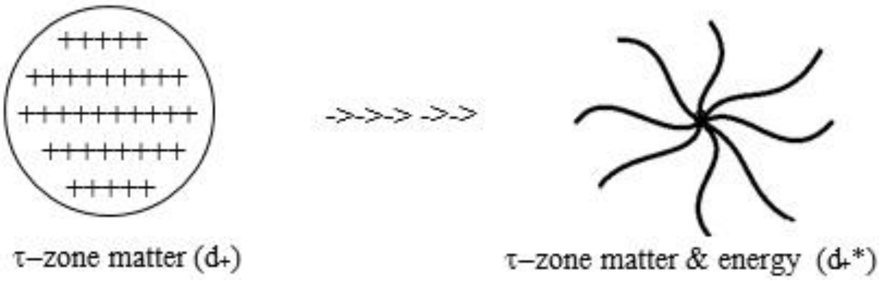

Fig 6. *The τ–zone matter (d_+) collapse into the QQD dark matter and energy (d_+*) (not in scale)*

10. Ultra-High Energy Cosmic Particles

The fascinating question here is the observed, yet so far unable to identify their sources as well as mechanism of the ultra-high energy cosmic particles [26], This even led some to propose the new physic [27]. On the other hand, the picture of the dual (t, τ}-time Universe here perfectly fits and explains the conundrums. For examples, the t-zone electrons and the τ–zone positrons may interact in quantum entanglement [see Eq. (16)], and annihilate to generate the observed profuse extremely high energy photons [26]. Similarly, a proton can be energized to an ultra-high energy through the quantum entanglement interactions with the strong EM forces of the heavily charged dark matter black holes.

11. Time And Scale Dependent Forces Of The Dark Matter And Energy

The possible dark matter force is time and scale dependent (see §5). Moreover, the repulsive τ- zone dark energy is abundantly produced from the dark matter collapse (see Fig. 6.). The attractive force by the dark matter is thus effectively countered by the repulsive dark energy as if there was a reduced dark matter out there. This is confirmed with the recent observation where the τ–zone dark matter seemed to be reduced to let out the diminished galactic rotation curves just few billion years after the big-bang [28].

The similar multitudinous behaviors of dark matter and energy in different times with their contrasting distributions in the galaxy cluster collisions have also been observed in the Abell 520 (earlier at 2.4 billion years ago more as individual galaxies) and the Bullet Cluster (later at 1.4 billion years ago more as galaxy cluster) [29]. In contrast to the straightforwardly attractive gravity of the normal neutral matter in the t-zone Universe, the behaviors of the dark matter (and energy) in the τ–zone Universe are thus multifaceted and susceptible to distinctively contrasting behaviors with time and space. These time and scale dependent revelations of the dark matter and energy have been confusing even to provoke alternative theory to resolve the discomposure in terms of the single-time Universe.

12. Dark Matter Is Not Totally Dark

With the τ∗ time spontaneously arising with the dark matter black hole singularity cores, the dual-time t*-zone would accompany it, and {t*→t} zone radiation (be it relatively very weak in quantum uncertainty) may also be produced and leaked out of the non-interacting τ∗-zone black hole volume. There have in fact been observational verifications that dark matter actually may not be completely dark [30].

It has also been demonstrated that, as the passing t-zone energy penetrates through the τ∗–zone (dark) black hole, the dual {t*,τ∗} time singularity core interaction intervene, and garners a minor part of the t-zone energy into the τ∗–zone energy. The τ∗ -zone energy so produced is non-observable, might be leading to the confusions for the antecedent of the “Fifth Force Conjecture” [31].

The large scale affliction by the nearby galaxies (or the stars) may promote the protractive (τ-zone) charge collapse of Fig. 5, producing the repulsive dark energy that would excrete the provincial t-zone gas to create the Local Hot Bubbles. Along the prevalent hot t-zone gas so produced, the collapsing (τ∗ -zone) dark matter black holes with dual (t*, τ∗} time singularity cores themselves could also generate the perceptive (t*→t)-zone energy—in addition to the cogent (non-observable τ∗-zone) dark energy—implementing the observed cosmic x-rays [32], expectedly concentrated in the center and weaker and diffuse on the edge.

Thus, unlike the t-zone matter, the (τ -zone) dark matter does not simply pull to gather the ambient masses. Instead, its overall attractive strength changes, depending on the stages of development. This unpretentiously solve, for example, the riddle of the “Cuspy Halo [33].”

13. Observational Confirmation of the Dual-time Universe

It takes only a few selective (out of surprisingly great many) examples of recent experimental observations—which absolutely reject the ongoing single t-time physics—to decidedly confirm the Universe of symmetric dual-time physics proposed in this paper.

The τ-zone EM force would quickly affect the charged ambient τ-zone matter, first to form the microscopic $\{d_+, d_-, d_+^*, d_-^*\}$ congregations according to Eq. (4), then aggregating into the black holes of increasingly larger masses, $D_{1,2;+,-}$, as shown in Fig. 7 (not in scale) for illustrative purpose.

The problem of how the star begun to form has been a major challenge in modern astrophysics. It has long been assumed that the star formation happened when the t-zone dust cloud begun to contract under its own (negligibly weak) gravitational force in the rapidly expanding Universe.

In that early Universe when the dust clouds were in the distended state, however, there were various electrical charges that prevailed, even though the atoms over all were technically neutral in the t-zone Universe. The gravity here is not only much weaker than EM by $\alpha_{gravity} \approx 10^{-41}\,\alpha_{EM}$ (see §7), but also its inverse square law might even breaking down at very small distance [9]. Then, how does the gravitational force overcome the initial unsettling EM force between the nuclei shown in Eq. (6A)?

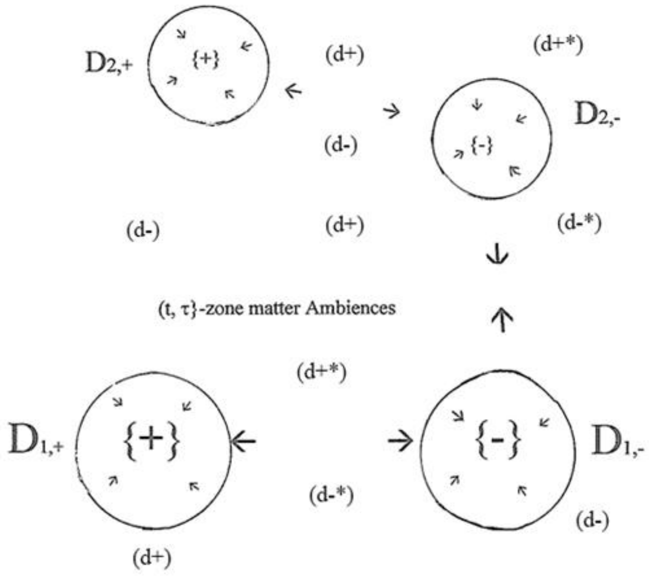

Fig7. *Dark Matter Black Holes for Galaxy and Star Formation (not to scale)*

14. THE GUILELESS TRUTH

It is now clear that the greatly stronger τ–zone EM force manages the primordial Universe, and charged τ-zone matters first began to congregate, rapidly increasing its masses (see §10). The greatly weaker gravity is active in both {t, τ} Universes, but—only as the charged τ-zone black holes became massive enough, they would also begin to forcefully pull both the ambient {t, τ}-zone matters.

This solves the long held "chicken or egg" question, and the processes have in fact been observed [24] that the massive black holes formed first, and they—with their great mass--can collect masses to form the host galaxies. This not only explains why galaxies hosting large black holes have more stars, also moving on to generate the astounding 10 million recently observed black holes in the Milky Way Galaxy. Also the supernova cored with the dark matter black holes can explore repeatedly to explain the recent mysterious observation [34].

The large scale gravity collections of the t-zone ambient neutral matter by the now indomitably heavy $D_{1,2;+,-}$ dark matter black holes thus (see Fig. 7) would continue to form the galaxies and stars around them [35,36,37]. In the tumult of contraction, the t-zone electrons may in the quantum entanglement annihilate with the black hole positron [see §7 & 8].

This could generate the observed colossal number (10^{43}/second) of 1.02 MeV gamma radiation from the supernova, the 40-year-old mystery [38, 39]. Occasionally, two dark matter black holes, for example the mutually attractive $D_{1;-}$ and $D_{2;-}$ in Fig. 7, might be trawled nip-and-tuck, forming the observed binary black holes [40].

The gravitational collapses of the high density normal t-zone) ambient matter into the dark matter black hole cores may generate the neutron stars. Due to $\alpha_{EM} \approx 10^{+42} \alpha_{gravity}$, (see §4), the collapses to the neutron stars as well as the collisions among the neutron stars with the greatly denser and harder dark matter black hole cores may generate the r-processes that forge heavy elements--gold, platinum, uranium and most other elements heavier than iron [41].

Like the t-zone matter spreading throughout the Universe to form galaxies, the small dark matter black hole ambience [5] would spread in semblances of the CMB Cold Spots. The embryonic dark matter black holes $D_{1,2;+,-}$ separately marshal the prevalent τ-zone matter ambience $\{d_{1,2;+,-}, d^*_{1,2;+,-}\}$ black holes could generate the observed dark matter galaxies. The pulling by the strong EM force here may continue to amass the 99.99% dark matter galaxy as heavy as the 1 billion solar masses [42]. These new observations cannot occur in the only t-zone matter Universe, unequivocally confirm the symmetric dual-time Universe.

The galaxy and star initiative dark matter black holes $\{D_+, D_-; d_+, d_-\}$ may occasionally triple line up as $\{D_+, d_+, D_+\}$ or $\{D_+, d_-, D_+\}$, as shown in Fig.8. They then may move on to generate the observed triple connected galaxies [43]. Various combinations of unobservable τ–zone black holes could also collect observable t-zone matters around them, and generate other strange galactic phenomena.

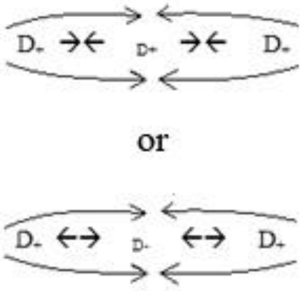

Fig8. *Origination of Connected Dual Galaxies*

15. Conclusion

The physics works in symmetry, and this paper accordingly ascribe the Universe to the symmetric {observable Hermitian, unobservable anti-Hermitian} quantum theory [2]. The puzzling dark matter and energy then inevitably arise as the invisible antimatter counterparts of the visible matter and energy.

All the observations are now consistent with this novel symmetric quantum theory. And, while the bound states in atomic and gravitation physics are established by the potential energy between the constituent particles, only the limited case of three quarks and antiquarks are stably bound in QQD to form the stable baryons, only when they can evade the portentous QQD implosions. This explains why the observed dark matter content is 5.2 time of the observed normal matter content in the Universe, also explaining the origins of {70% dark energy, 23 % of dark matter, 4.5% of the observed matter and its missing part of about half of its energy 2.5 %} .

The multi-quark QQD interaction in the instant space and time may proceed to produce the chain implosions that generate the Big-Bang explosion that has long been attributed to be the Creator's secret feat that is ever beyond the human comprehension. But, unlike the compact laboratory production and annihilation of the quark-antiquark interaction in the instant quantum entanglement, most of the normal matter baryons (made of quarks) and dark antimatter baryons (made of anti-quarks) QQD interacting in

the open space are out of the quantum entanglement, and are unable to interact to be annihilated. Because of the invisible dark matter to human, this leads to the seemingly matter asymmetric Universe,

The asymmetric time Universe is proven to be utterly untenable, and its consequences disagree with the experimental observations. It is the high time that the world joins in the open-minded collaborations of this advancement, and ends the vain discomfitures that cause the ongoing wastes of precious resources.

Acknowledgement

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