SCALING CALCULATIONS WITH GIANT SYMMETRY GROUPS

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Abstract

A provisional proof of the existence of pseudo vector symmetry as mediating medium of dark matter, pseudo e-neutrinos, by scaling Planck's parameters to the giant group symmetries of Monster, Baby Monster and Fischer 24.

Introduction and calculation

The mathematics of group symmetry embraces as the greatest irreducible group symmetries the three giant group symmetries known as The Monster, Baby Monster and Fischer's of 24 dimensions. These can be used in theoretical physics to explain the relation between the three fundamental constants in physics known as the velocity of light of c, the universal constant of gravity of G and Heisenberg's uncertainty constant of h. The giant symmetries also determine the dimensions of the steady state condition as the final size of the universe or universes not observable to us due to the existence of the giant symmetries. For the complete understanding of space and time it is necessary to introduce a medium carrying the simplest symmetry in group symmetry, either the cube or the equilateral pyramid as a part of the cube.

The hypothesis is that the ultra fast and ultra light dark matter medium carries gravity. The medium consists of pseudo vector cells arranged in cubic symmetry compromising the unit vector components of acceleration and spin with as cross vector product the precession. In general these vector components are interchangeable and are surrounding the nucleons in quantum mechanical exchange. The momentum of the pseudo cells is $\frac{1}{2} c_{eff}$ due to the acceleration component giving $\frac{1}{2}\sqrt{2} c$ as the maximum end velocity, defining the point inertia for these cells. The medium is subjected to Sacharov's induction law of dark matter:

$$m_m M = m_{pl}^2 \quad \text{with} \quad m_m = h/ (m_m c) \text{ and} \quad \lambda c^2 = G M$$

The algebra calculates this law to be valid provided the medium never exceeds $\frac{1}{2} c_{eff}$.
Further is the supposition that the electron is the unit of rest mass for the medium. Consequently the whole range of parameters from Planck to electron should be considered as an symmetric inversion process between these parameters.
These are:

$m_{pl} = 5.456035 \ 10^{-8}$	$m_e = 9.109462 \ 10^{-31}$	kg	*9.109308 update*
$\lambda_{pl} = 4.051453 \ 10^{-35}$	$\lambda_e = 2.426583 \ 10^{-12}$	m	*2.426488 update*

First is the inversion equalities are shown in rel 1.1:
$$\lambda_{pl} = 1.002490 \ x \ 2\sqrt{2} \ \lambda_e^3 \tag{1.1}$$
Followed as a consequence of (1.1):
$$m_{pl} = 1.766053 \ m_e^{1/4} \quad \text{guessed} \qquad m_{pl}^4 = m_M^3 \ m_e \quad m_M^3 = C_4 \ [kg^3] \tag{1.2}$$
With $\qquad C_4 = 1.766053^4 \ = 9.727827 \qquad m_M = 2.134708 \ [kg]$

In first instance these equalities cannot be correct because the dimensions are not correct. Although by introducing the unknown mass m_M , the factor C_4 can be made dimensionless which should be a consequence of fundamental group symmetry. So m_M transforms into $\qquad m_M = 2.134708 \ m_e$ with 2.134708 a ratio. See rel 1.4 for confirmation.

Note, the update of the factor 1.002490 is about 1.002831 and it is still $(m_{pl} /m_e)^{1/4} = 286.288 \ x \ 1728$. Close to 12^5 with $1728(12^3) \ m_e$ as the inner conserved quark complex in the nucleons consisting of protons and neutrons.

The guess is that the line density (m_{pl}/λ_{pl}) in our cosmos is a constant. Then the overall mass of the universe's M_{tot} is the quadrate of L_{coh} where the coherence length is the number of black holes with a event horizon of 1 metre. Making $M_{tot} = 1.813560 \ 10^{54}$ kg and $L_{coh} = 1.346685 \ 10^{27}$ m as (m_{pl}/λ_{pl}) has the same number but in kg/m.

The irreducible symmetry number of the Monster in mathematical group theory is:
Here not expressed in integers   : $\qquad\qquad Mo = 8.08017425 \ 10^{53}$
The Baby Monster has an irreducible symmetry of $\qquad BM = 4.154206 \ 10^{33}$
The biggest symmetry group of Fischer Fi in 24 dimensions is:
The symmetry number: $\qquad Fi = 1.255206 \ 10^{24} \qquad Fi^2 = 1.575542 \ 10^{48}$

The macroscopic hypothesis
The supposition is that the overall mass of universes or multiversity of M_{tot} can be divided into ten symmetry states leaving the line density m_{pl}/λ_{pl} unchanged. In other words ten symmetric 'realities' are subjected to the same line density. The symmetry of the macroscopic phase space is likely three dimensional as a transformation for Cartesian coordinates. The definition of the pseudo vectors complies to this supposition. It means that ten symmetry 'realities' have to consist of 20 universes due to the line density condition. As an educated guess one universe consists of an end condition of anti matter and the other of matter, in normal and conjugated quality. Consequently the macroscopic phase space could host ten time universes and ten anti time universes opposing each other in which time and anti time have the same entropy .

Set up the proof using the above hypothesis. Scaling by coefficients of the known parameters
The coefficients by leaving out the power decimals, are integer driven and to be conserved:

$\quad\quad$ Mo = 8.080174 $\quad\quad\quad$ BM = 4.154718 $\quad\quad\quad$ Fi = 1.255206
$\quad\quad$ M_{tot} = 1.813560 $\quad\quad\quad$ M_{53} = 1.813560/ 10 $\quad\quad$ L_{coh} = 1.346685

All parameters must be seen as integers, even those observed. Otherwise group symmetry cannot be applied. While the pseudo vector cell can be relativistic due to ½ c_{eff} .
The known parameters are: $\quad\quad$ 3/2 = 1.5 $\quad\quad$ $m/m_o = \sqrt{4/3} = 1.154700$ $\quad\quad$ $(4/3)^{1/4} = 1.074569$

M_{tot}/Mo = 2.244457 $\quad\quad$ Mo/M_{53} = 4.455421 $\quad\quad$ BM/L_{coh}^2 = 2.290917 (as a coefficient)
1st Result, the node ratio: $\quad\quad$ 2.244457/ 2.290917 = <u>1.020700</u> $\quad\quad\quad\quad\quad\quad$ (Nd)
Compare to 1.020620 which is the inversion node. Between the equilateral and the cubic pyramid. In case the base plane of the cubic pyramid, equal to the other, goes parallel through the mass centre of the equilateral pyramid, then the five equal division as conserved nodes of the height are to be distinguished giving $\sqrt{2}/\sqrt{3}$ = 0.8164965 divided by 4 is 0.2041241. With reciprocal 4.898980 and 5/ 4.898980 = 1.020620. The cubic power of the node, volume energy in Cartesian directions, gives:
$\quad\quad$ 1.020620^3 = 1.063144 $\quad\quad$ Multiply by the internal conserved quark cell of 1728 m_e results in the rest mass close to the hydrogen atom: 1.063144 x1728 = 1837.113 m_e $\quad\quad$ actual: 1837.153.

The purpose of this scaling exercise is to find the node parameter.
Set up the coefficient parameters:
$\quad\quad$ Mo/M_{53} = 4.455421 $\quad\quad$ $(Fi)^2/Mo$ = 15.75542 /8.080174 = 1.949886
$\quad\quad$ $BM/(Fi)^2$ = 4.154718 /1.575542 = 2.637008 $\quad\quad$ $(Fi)^2/L_{coh}$ = 1.575542/ 1.346685 = 1.169941
$\quad\quad$ R_{sc} = 2.637008/ 1.169941 = 2.253967 $\quad\quad$ 2.253967/ 1.5^2 = 1/001763
$\quad\quad$ L_{coh}/Fi = 1.346685/ 1.255206 = 1.072879 then 1.074569/1.072879 = 1.001576 (R15)

Product and cross over check to minimise:
$\quad\quad$ 4.455421/ 2.253967 = 1.976702 $\quad\quad\quad\quad$ 4.154718/ 1.949886 = 2.130748
$\quad\quad$ 4.455421 x 1.949886 = 8.687563 $\quad\quad\quad$ 4.154718 x 2.253967 = 9.364597
Ratio: $\quad$ 9.364597 / 8.687563 = 1.077931 with $\quad$ 10/ 1.154700 = 8.660258
$\quad\quad$ 1.077931/ 1.074569 = 1.003128 $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad$ (R31)
Return to rel 1.2:
$\quad\quad$ C_4 = 9.727827 / 8.660258 = 1.123272 $\quad\quad$ $(2.134708 – 1)m_e = 1.134708 m_e$
Ratio: $\quad$ 1.134708/ 1.123272 = 1.010180 $\quad\quad\quad$ 1.010160^2 = <u>1.020465</u> (dev = 1.000151) (Nd)
So the 1st Nd is confirmed by the 2nd Nd. The set up for the power decimal scaling is possible.

Minimise by using the ratios 1.077931 and 1.072879 for 8.660258:
$\quad\quad$ 8.687563 /1.072879 = 8.097439 $\quad\quad\quad\quad$ 8.097439 x 1.074569 = 8.701247
$\quad\quad$ 9.364597 /1.074569 = 8.714747 $\quad$ ratio: 8.714747/ 8.701247 = 1.001551 $\quad\quad\quad$ (R15)
Confirmation of (R15)

Power decimal scaling of the parameters
$\quad\quad$ Mo/M_{53} = 4.455421 $\quad\quad$ (10^{53})
$\quad\quad$ Mo/Fi^2 = 8.080174 10^{53}/ 1.575542 10^{48} = 5.128504 10^5 $\quad\quad\quad\quad$ $1/x = 1.949886 \ 10^{-6}$

$(Fi)^2/ BM = 1.575542\ 10^{48} / 4.154718\ 10^{33} = 3.79217\ 10^{14}$ $1/x = 2.637008\ 10^{-15}$

$(Fi)^2/ L_{coh} = 1.169941\ 10^{21}$ $R_{sc} = 2.637008\ 10^{-15}/ 1.169941\ 10^{21} = 2.253967\ 10^{-36}$

$L_{coh}/ Fi = 1.346685\ 10^{27}/ 1.255206\ 10^{24} = 1.072879\ 10^3$

Product and cross over to minimise:

$4.455421 / 2.253967\ 10^{-36} = 1.976702\ 10^{36}$ $4.154718\ 10^{33} / 1.949886\ 10^{-6} = 2.130479\ 10^{39}$

$4.455421 \times 1.949886\ 10^{-6} = 8.687563\ 10^{-6}$ $4.154718\ 10^{33} \times 2.253967\ 10^{-36} = 9.364597\ 10^{-3}$

$9.364597\ 10^{-3} / 8.687563\ 10^{-6} = 1.077931\ 10^{-9}$ $9.364597\ 10^{-3} \times 1.077931\ 10^{-9} = 1.009439\ 10^{-11}$

Introduce: $1.074569\ 10^N$

     $9.364597\ 10^{-3} /1.074569\ 10^N = 8.714747\ 10^{-3-N}$

With $(8.687563\ 10^{-6} / 1.072879\ 10^3 = 8.097430\ 10^{-9})$

Then $8.097430\ 10^{-9} \times 1.074569\ 10^N = 8.701247\ 10^{N-9}$

The power decimal equation: $-3 - N - N + 9 = 0$ $N = +3$ (rel 1.3)

The power ratio for the decimals has to be one to the power of zero or a close good approximation:

Making R15: $(1.001551)^6 = 1.009342$ $\sqrt{1.009342} = 1.04660$ $1.003104^3 = 1.009342$

Confirmation of (R31)

Definition of time and the steady state initial condition for M_{tot}   (rel1.4)

Opposing symmetries determine the ratio one to the power zero or any integer to the power of zero. Consequently it embraces opposing integers or opposing continua going to infinity defining time as a direction of time. By common sense or as an educated guess the ratio between the coherence length and best packed symmetry of spheres in 24 dimensions (ref 2 overview) is $10^{27} /10^{24}$ or a factor thousand. It means that in a second not M_{tot} but the reciprocal of m_e or $1.097759\ 10^{30}$ [kg] as energy flows through a square cross section (10^6 m^2) over a length of thousand metres which is the end steady state and as initial condition. Namely, M_{tot} divided over reciprocal of m_e is $1.813560\ 10^{54}/ 1.097759$ 10^{30} is $1.652056\ 10^{24} /(Fi = 1.255206\ 10^{24}) = 1.316162/(2.134708 - 1) = 1.159912/ 1.154700 = 1.004515 = 1.001502^3$ confirming and close to square root of (R31). All in ratios according to the requirements to group symmetry as to rel 1.2 defined.

Deriving the dimensions of electron and velocity of light

The inversion ratio of I_{nv} in rel 1.3 is $1.074569\ 10^3$ from $(4/3)^{1/4}$. This ratio has to be matched to the two ratios of $BM/Fi = 3.085144\ 10^6$ and $L_{coh} /Fi = 1.072879\ 10^3$. So the cubic power of I_{nv} or the square power as cross section compared to the ratio of L_{coh} /Fi , the symmetry ratios are not allowed to exceed otherwise these convert in reciprocal numbers.

Let us in consideration of the dimensions say I_{nv} is thousand metres, the cross section is a million metre square and the energy flux passing per second is a billion cubic metres. Then one metre cubic flux passes to one metre square in a nanosecond. The reciprocal for one metre over a nanosecond is a velocity of 10^9 m/sec to be associated with the light speed. However the volume flux per sec has to be stopped by a reaction of force while the cross section does not change. The push back of the volume is over thousand metres to the initial cross section giving a 10^{12} parameter. Or with a one metre cross section and contracted to one metre resulting in the reciprocal of 10^{-12} metre for λ_e . It shows the product of $m_e c = h/\lambda_e$ relates the light speed to the electron by the uncertainty constant of h.

Scaling the ratios L_{coh} /Fi and BM/Fi to both observed parameters of electron and light speed is straight forward:

     $3.085144\ 10^6 /1.072879\ 10^3 = 2.875575\ 10^3$

Introduce $2\sqrt{2}$ from rel 1.1: $2.875575/2.828427 = \underline{1.016669}$

Take for $c = 10^9$ the reciprocal of 2.875575 divided by $\sqrt{4/3}$ giving $0.3011665\ 10^9$

     $3.011665 /2.9979258 = \underline{1.004583}$ actual $c = 2.9979258\ 10^8$ m/sec

For the electron:

$\qquad$ 3.085144 x 1.072879^2 = 3.551214 $\qquad$ divide by $(4/3)10^{-12}$ gives: 2.663411 10^{-12} m

actual λ_e = 2.4265 10^{-12} m $\qquad$ ratio $\qquad$ 1.097635 $\qquad$ cubic root $\qquad$ 1.031539 (volume)

But $\qquad$ 1.031539^2 = 1.064074 (square) $\qquad$ Neutron: 1.064074 x1728 = 1838.720

actual $\qquad$ 1838.684 m_e

Take the ratio 1.016669 and 1.004583^3 = 1.013812. Introduce the fine structure constant 1/137.036 giving the energy ratio 144/ 137.036 = 1.050818. Momentum ratio is the square root 1.025094. Both the ratio of 1.025094/ 1.013812 = 1.011128 and the product of 1.011128 x 1.016669 = 1.02798 resulting in the ratio 1.027982 / 1.025094 = 1.002817.

According to rel 1.1 the constant is 1.002831 or 1.02490. It shows that all parameters are accommodated for including $2\sqrt{2}$, volume parameter $\sqrt{2}$ coming from the reciprocal $\frac{1}{2}\sqrt{2}$.

Search for the hidden wavelength of the ultra light and fast dark matter pseudo vector cell

The product of (λ_e c) has to be independent of the group symmetry scaling numbers. It means that only the inversion coefficient of $\sqrt{4/3}$ or 4/3 comes in the scaling calculation for the mediating dark matter medium. Allows us to multiply by a 1000th metre and normalise to $\frac{1}{2}$ c_{eff} which determines the wavelength to 10^{-6} metre. The product is (λ_e c)/2 is dimensionless and should confirm the rest mass ratio of 3.813364 10^5 for the mediating cell of 1.34 eV to the electron. Now take the two not normalised (2.663411) to the observed value (2.4265) of the electron and multiply coefficient (2.9979258) of c.

$\qquad$ 3.813364/ (2.4265 x $\frac{1}{2}$c) = 1.048424 $\qquad$ (2.663411x $\frac{1}{2}$c)/ 3.813364 = 1.046764

Ratio: 1.001421 with the square power 1.002844 confirming the constant in rel 1.1

The dark matter medium refers to pseudo vector e-neutrinos. In the paired state the e-neutrino has 1.34 eV energy and the e-neutrino at c has 0.8 eV determined by the Katrin experiment https://www.katrin.kit.edu/ .

$\qquad$ Guessed confirmation (1.34 x $\sqrt{4/3}$) = 0.774 eV. Due to $\frac{1}{2}$ c_{eff} . See (ref 3).

Provisional mathematical conclusion

Proven as a first step is that by introducing an intermediate symmetry group at least three giant multi dimensional symmetries transform into each other. The follow up is to generalised the outcome over all symmetry groups which suggests not to be cumbersome because the classification of all symmetry groups is completely understood and proven. What seems to be new is that with more than one basic symmetry the irreducible group symmetries can be transformed into each other which has to be sorted out by mathematicians.

The educated guess of the Monster symmetry versus alternating symmetry groups resulting in new information for steady state distribution of say galaxies throughout our cosmos.

The discussion of the classification of the finite symmetry groups in ref 2 makes it clear that the Monster integer should have a ratio to all the alternating group symmetries based on the even integer. This ratio should for symmetry group alternation can go to N!/2 where N! could approach M_o which might involve as a guess the number of galaxies or the number of original kernels of super massive black holes. Just as a possible example.

The educated guess of the four hidden universes escaping our power of observation

The overall mass in above scaling calculations is based on the hypothesis of the ten symmetric states of energy. It could be the symmetry of 2 and the quadrate of 2 as four. The definition of the pseudo vector cells allows four independent intrinsic unit cells representing together eight states of rest mass, electron, proton and conjugated proton/electron and with the four for antimatter. Conjugation means a swap in electric charge to maintain absolute symmetry. To comply with the irreducible 24 dimensions of symmetry one is missing four universes of which the twenty by opposing symmetry are accounted for. In time symmetry it means time and anti time then suggesting the existence of conjugated time and anti time. Time symmetry also determines the reduction of 24 to 12 dimensions of which both irreducible symmetries are unique according ref 2. This symmetry aspect of time determines the

crossover inversion for both time symmetries as pairs of time and conjugated time in four directions. Then pointing to the existence of the strong- and weak force contracted in the eight states of matter of respectively the proton and the electron. In that manner the four 'missing universes' can be understood. Further the cross over exchange must be understood as a momentary axial force nullified by the dark matter medium. Consequently decoupling the dynamics of the strong or weak force from the electric charge for particles in general. The five nodes between equilateral and cubic pyramid symmetry should be reflected as the existence of the ten congruent 'realities' or realities similarly to ours. Ref 3.

The educated guess of the separation from the true continuous infinity of time and the cyclic time of infinity
In short the statement is that the giant symmetries, including all the finite group symmetries, act as a filter up to Planck's length for the continuum of electromagnetic waves expressed in time. The Monster symmetry group may have a giant permutation cycle but it includes the original initial symmetry state. Together with the alternating group symmetry even integers can be selected leaving the infinity of the primes. The filter or selection process can only be working if there exist another medium next to the potential of the energy of electromagnetic waves determining the property of maximum momentum of $\frac{1}{2}c_{eff}$ of the pseudo vector cells as well in baryonic state and as in the medium of ultra fast and light dark matter.

Thanks to the entanglement condition based on Heisenberg's uncertainty constant, the stable particles as proton and electron (four kinds of matter), the pattern of the dynamic electromagnetic waves confined in the universes, cannot be cyclic but it changes continuously by small increments, all over up to Hubble's event horizon (observation limit in redshift) never to be returning to its initial condition. The understanding is that the continuously changing electromagnetic pattern is mirrored within the event horizon of the steady state, Hubble's horizon.

Unbelievably as it is but the Monster symmetry represents the perpetual eternal engine of dark matter due to the definition of the unit cube for the pseudo vector cell, determining the cycle of time to be about 13.7 billion light years for the universes and accurate to $\Delta t = \lambda_{pl}/c = 10^{-35}/10^{-5} = 10^{-40}$ sec between the universes. It concludes that dark matter in all its appearances is indestructible and without energy dissipation. However with respect to the Monster symmetry no deviation can be allowed.

Note: The dimensions of kg and metre in rel 1.1 and 1.2 are not coming into the scaling exercises, because in other unit dimensions the same method of calculation is valid with the different coefficients to the symmetric group numbers and the given other parameters which should give in the end the same result.

Comment: In the opinion of the author, the excellent mathematical work of Thomas cannot be completed without the ideas treated in this scaling exercise perhaps as simple as it seems to be.

References:
Ref 1: "Monster Symmetry and Scalar Theory , Conformal Gravities" by M.A. Thomas
https://vixra.org/pdf/2109.0211v2.pdf
Ref 2: The book title: "Finding Moonshine – A Mathematician's Journey through Symmetry"
        By Marcus du Sautoy   Overview of the group theory for curious people.
Ref 3: Website: https://gravitation-levitation-physics.org/   Dark matter as carrier of gravity.

APPENDIX
Separation of electromagnetic energy and dark matter

Determine the electro static potential for a unit charge at a distance of one metre related to the event horizon:

$$e^2 / 2\varepsilon_o = (1.609\ 10^{-19})^2 / 2 \times 8.84\ 10^{-12} = 1.464\ 10^{-27}\ \text{Joule}$$

H atom $\quad\quad m\ c^2 = 1837.153 \times 9.109\ 10^{-31} \times 9\ 10^{16} = 1.506\ 10^{-10}\ \text{J}$

The electromagnetic to dark matter ratio: $9.7\ 10^{-18}$ or 10^{-17}. The number of hydrogen atoms drops out the ratio for a macro mass.

Assuming that the degenerated coherent dark matter of a black hole has the same manner of dynamic gravity generation, this ratio is the same anywhere in our cosmos. Dynamic gravity generation by the ultra fast dark matter medium is subjected to the event horizon in an electromagnetic sense. The dynamics involves Sacharov's law of dark matter induction for the continuous exchange of radial to angular momentum at two or three characterised frequencies. According to ref 3 it is by good understanding that any kind of atom follows the single H- atom exchange to the medium, then defining the generalised H atom to the mediating medium corrected for the binding energy of the nucleon.

The e.m separation ratio is defined as proportional to λ_{event} which goes in the limit to zero for λ_{event} to infinity. The dynamic gravity exchange is determined by the square root rule due to Sacharov's law.

Example calculate the separation ratio for Earth. $M_A = 5.9\ 10^{24}\ \text{kg} \quad\quad R_A = 6.4\ 10^6\ \text{m}$

$\quad\quad \lambda_{ev} = 4.5\ 10^{-3}\ \text{m} \quad\quad \sqrt{\lambda_{ev}} = 6.71\ \text{cm} \quad G = 6.7\ 10^{-11}\ (\text{m}^3\ /\text{kg sec}^2)$

$\quad\quad G\ M = 3.95\ 10^{14}\ \text{J} \quad\quad E_{coh} = 6.71\ 10^{-2} \times 10^{-17} = 6.71\ 10^{-19}$

$\quad\quad W = G\ M \times E_{coh} = 3.95\ 10^{14} \times 6.71\ 10^{-19} = 2.65\ 10^{-4}\ \text{J} \quad\quad t = 6.71\ 10^{-2}\ /c = 2.24\ 10^{-10}\ \text{sec}$

Power: $2.65\ 10^{-4}\ /2.24\ 10^{-10} = 1.2\ 10^6$ watt / kg divided by the R_A gives 0.2 watt/kg .

For the dynamic process the mediating mass of the medium is determined by the ratio to the H atom, $1837.153/\ 250.81 = 7.325$, making $0.2 \times 7.325 = 1.46$ watt/kg.

A person of 80 kg levitates with a steady state power of 110 watt. Other than that a group of people in deep meditation might levitate a group member, because the power is not dissipative but a resonance state.

The energy W is the escape energy for 1kg mass. The levitation energy of 1.5 watt per kg is due to counteracting the dynamic process of gravity generation at a mean frequency of about $\sqrt{\lambda_{ev}}$ of 4.46 Ghz. For reaching the steady state, somewhat of 10^4 ballistic e.m. impulse is needed. For details on levitation see ref 3. The mean frequency involves three characteristic frequencies.

The educated guess for the classification of electromagnetic coherence diversification
The past can be defined as electromagnetic coherence diversification progressing in time but the future due to dynamic gravity generation of macro masses, any star or galaxies etc ,is open or unknown.

1. Coherence diversification of the twelve universes: open eternally. Carries overall eternal creation and intelligence. Principally no dark matter communication between universes. Unknown communication between the twelve with respect to e.m. coherence diversification.
2. Open diversification coherence, evolving stars. Either 'dead' or life carrying planets.
3. Closed diversification enclosed, from within, the event horizons for the black holes:
    Small ones from one to thousand solar. Closed no communication to the external world.
    Super massive black holes from a million to hundred billion or more solar. Open

communication, instantaneous network due to the qubit state of our Cosmos.

As ref 3 makes plausible that in all likelihood black holes are hollow and have to be created by either intelligence, as planetary races, or as other entities belonging to the Past. The distinction between active super massive black holes and quiet ones is not known. Probably by common sense the active ones are temporarily not used by the intelligent races having left matter life behind them.

The electromagnetic coherence diversification represents the conservation of time historic information resulting in the final state of diversification for a race. Therefore it cannot be excluded, the unification of minds in the race, including the dead, may be the final goal for an intelligent race.

See https://universal-creation.org/

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