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Existing and Unique Firework Universe and Its 3D-spiral Code

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Abstract: The discovery of normal galaxies and heavy elements at the fringes of the observable universe is one of the sources of crisis in modern cosmology. The real universe unfolding is essential for progress in all scientific fields because the origin of chemical elements and space bodies creates the fundamental framework for understanding of everything. The big bang universe is believed to come due to unknown cause from a single point, called singularity. This makes big bang picture incomplete because the laws of physics before the big bang and the universe unfolding are uncertain. Once a fundamental flaw is allowed, i.e. universe born from an uncertain cause from something that can be infinite, then deep problems follow. For example, the origin of matter-antimatter asymmetry and density fluctuations accounting for structure buildup are poorly understood. The big bang model is confused by found surprising similarity between near and most distant cosmos. In the big bang universe more than 90% of matter is of unknown nature. Spacecraft and ground geomagnetic field data indicate self-similarly evolving, 3D-spirally-faster-inward contracting and expanding magnetosphere [1, 2 and references therein]. This magnetospheric behavior confirms the self-similarly evolving, 3D-spirally-faster-inward contracting and expanding pattern of unifying interaction that creates the dynamic fractal structure of the universe [1, 2 and references therein]. The self-similarity of this structure allows obtaining its fundamental properties by analyzing one of its elements. It is shown that universe is made of 3D-spirally-faster-inward contracting and expanding dynamic fractals. They create discrete unifying force $F(r_i) = C_i / r_i^{d(r_i)}$, where $d(r_i)$ is dynamic fractal dimension and r_i is a discrete distance created from the dynamic fractal as basic matter that builds it moves 3D-spirally-faster-inward [2, 3 and references therein]. The equation of the unifying force written for different elements of the dynamic fractal universe gives Newton's law of gravitation, Coulomb's law and Heisenberg's uncertainty principle [2, 3]. **The found 3D-spiral dynamic fractal structure of the universe is confirmed with quantitative assessments of the solar wind magnetosphere coupling [1, 2, 4], calculation of the ratio between masses of the Sun and the Earth [2], assessment of fractal dimensions for observed galaxies distributions [3] and also with solution of the Olbers' paradox [2, 3 and the references therein]. Predictions for dependence of the gravitational constant on the material of the coupling bodies and their temperature are made [2, 3]. The found dynamic fractals and the unifying force they create present new fundamental framework for**

qualitative and quantitative modeling. The discovered existing and unique cyclic firework universe evolves self-similarly toward all annihilating collapse ending with expansion that creates new similar universe, made of similar dynamic fractals (i.e. patterns of unifying interaction), described with similar laws of physics. The most initial dynamic fractal builds the universe and has the largest and most dense nucleus. It collapses and begins to oscillate faster inward. So it remains always finite (singularity free), ejects and drives around smaller similar nuclei that do the same. The multi-scale nuclei interact and build the observed clumpiness of matter at cosmic and atomic scales. We see only the dense insides of the hierarchically ordered along their origin dynamic fractals that can emit or reflect much smaller ones observed as light. Every body moves around its source. The stellar nuclei move around the galactic nuclei. Atoms move around the found stellar type nuclei in the centers of stars and planets. In this way the observed rotation of space bodies is created.

The universe is made of faster-inward oscillating dynamic fractals – sources of unifying interaction. The smaller dynamic fractals are ejected from the insides of similar finite larger ones. We see only the insides which are dense enough to emit or reflect much smaller ones observed as light. The universe is round, filled with similar round bodies, e.g. galactic nuclei, stars, planets and atoms. Planets are small cooled stars. The observed universe is a cosmic cloud made of dynamic fractals seen as galaxies. It moves around its source like an atmospheric cloud that moves around the nucleus of the Earth from where the dynamic fractals seen as atoms have originated.

The universe is made of one basic matter that is dynamic fractal having a 3D-spiral code. Its multi-scale elements create what we see as space, time, galaxies, stars, atoms and light, and account for the conundrums of the near and distant space [1-4]. The universe is dynamic fractal, made of self-similarly evolving elements that have 3D-spiral code!

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The understanding of the universe is a matter of finding out how matter piles up into space bodies, atoms and whatever we see. Here will be shown the pattern of revealed basic matter piling. It happens in a way that creates one dynamic fractal unifying interaction. It accounts for the observed similarity between the near and most distant cosmos, the fractal dimensions of galaxies distributions and the ratio between the masses of the Earth and the Sun (*Savov*, 2002, 2005a). The formula of the unifying force is reduced to essential laws of classical and quantum theories, when considered at the scales of observation (*Savov*, 2002, 2005a). The all-explaining basic matter distribution is discovered dynamic fractal pattern of unifying interaction that creates new fundamental framework for qualitative and quantitative modeling of phenomena (*Savov*, 2002, 2005a). In the found self-similarly evolving, fractal like, firework universe the properties of one element considered at its scales account for all (*Savov*, 2002). This dynamic fractal element is shown in Fig. 1.

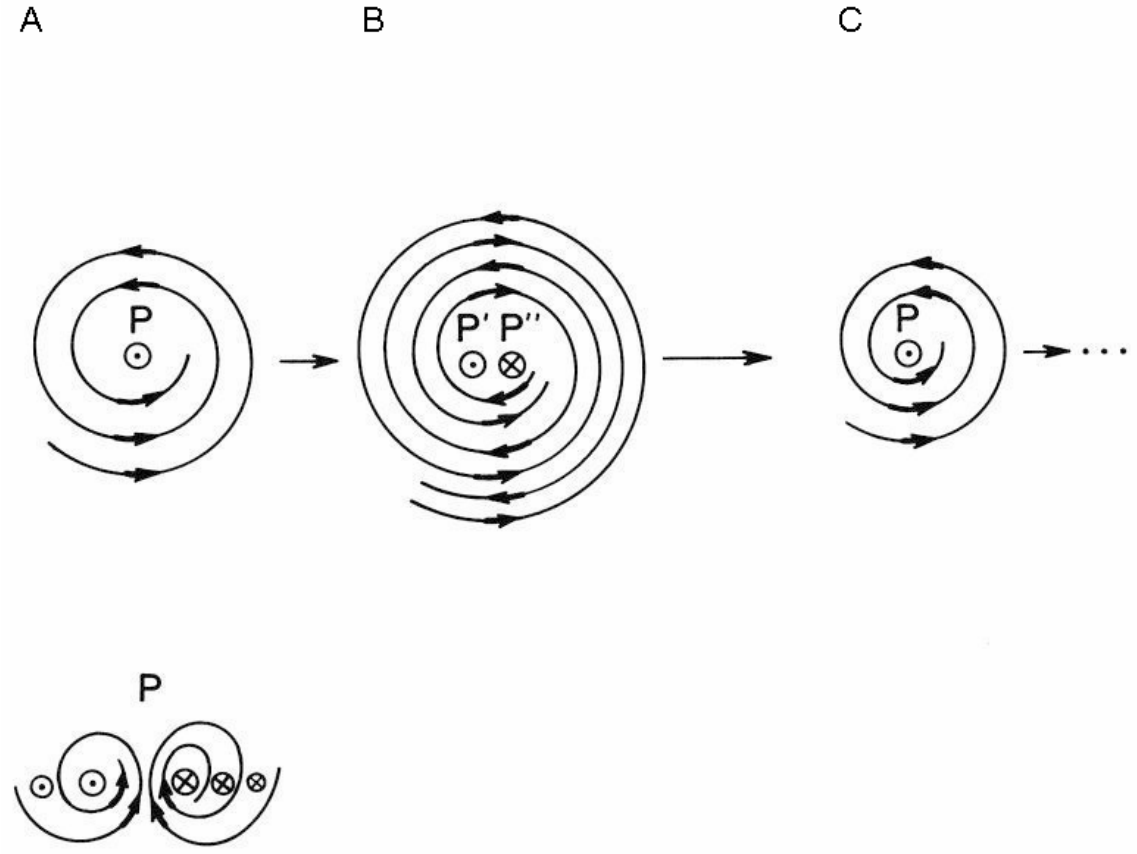

Fig. 1. Dynamic fractal of unifying interaction (basic matter) P creates universal distance *r* (scale) from its core. The basic matter moves 3D-spirally-faster-inward as shown by the inward increase of arrows in the equatorial (above) and meridian (below) cross-sections (A). Afterwards it bounces back and starts to oscillate 3D-spirally-faster-inward (the meridian cross-section is not shown in (B) and (C)). Thus it remains always finite, i.e. singularity free, in the smallest number of dimensions – 3D. Finally it collapses on its source (C). It oscillates 3D-spirally-faster-inward, accumulates its environment and ejects smaller similar ones that do the same (Fig. 3). *Thus it creates the finite, curved and discrete sources of all-building unifying interaction in one self-consistent and complete picture of firework universe that self-similarly evolves through all annihilating cycles.* It

collapses on its source (C and A) and is similarly born again (B), govern by similar laws of physics as it is shown in Figs. 2-5. (Figure from *Savov*, 1993)

The analysis of the dynamic fractal shown in Fig. 1 is equivalent to the analysis of the whole dynamic fractal structure due to its self-similar evolving.

Fig. 2. This is a magnification of the dynamic fractal unifying interaction. The basic matter that builds it moves 3D-spirally faster inward as shown by the inward increasing arrows. Thus it creates non-zero flux through every surface S and so indicates its existence. The 3D-spirally-faster-inward-moving basic matter (P and P') creates initial universal attraction that brings the dynamic fractals together. This accounts for the observed clumpiness of matter (Figs. 1-4). The secondary 3D-spiral-faster-outward motion P" (Fig. 1B) creates universal repulsion that keeps the cores of the dynamic fractals apart. We see only the cores of the dynamic fractals, which are dense enough to emit or reflect much smaller ones, observed as light, created as shown in Fig. 3. Everywhere $\nabla.P \neq 0$ holds for the 3D-spiral pattern of the velocity P of the basic matter. Anyway it shows up at the finite accuracy of measurement as zero and non-zero flux. Then it is modeled with $\nabla.P = 0$ and with $\nabla.P \neq 0$, respectively, for what are observed as magnetic and electrostatic interactions (*Savov*, 2002).

If we know what comes first and what is secondary, then we know the origin (the structure) of the bodies and so we know everything (Savov, 2002). The dynamic fractals are hierarchically ordered along their origin as shown in Figs. 3 and 4.

Nature is described with what we see as space, time, waves, particle, etc. What creates what we see is uncertain. We miss the underlying structure that creates the images in our minds. Mandelbrot's expanded notion of fractal suggests invariance under certain class of transforms for a set be fractal (*Mandelbrot,* 1983). The laws of all-building unifying interaction are scale independent and hence observer invariant. The scale dependence of the classical and quantum theories is likely to appear in the process of observation. Otherwise observer has to occupy a special place, which is somewhere between the deterministic and continuous classical and the probabilistic and discrete quantum realities. It is very likely that these two realities are generated in the process of perception of one poorly understood unified reality. A set of scale independent laws of the unifying interaction will generate a dynamic fractal like structure of reality. This 3D-spirally-faster-inward-moving structure of nature was discovered from an attempt for 3D closure of the

magnetospheric currents (*Savov*, 1991). It was later used to reveal the 3D-spiral-expansions and contractions of the Earth's magnetosphere, which account for fundamental issues of its behavior, e.g. the poorly understood field-aligned acceleration (*Savov*, 1998, 2002, 2005b).

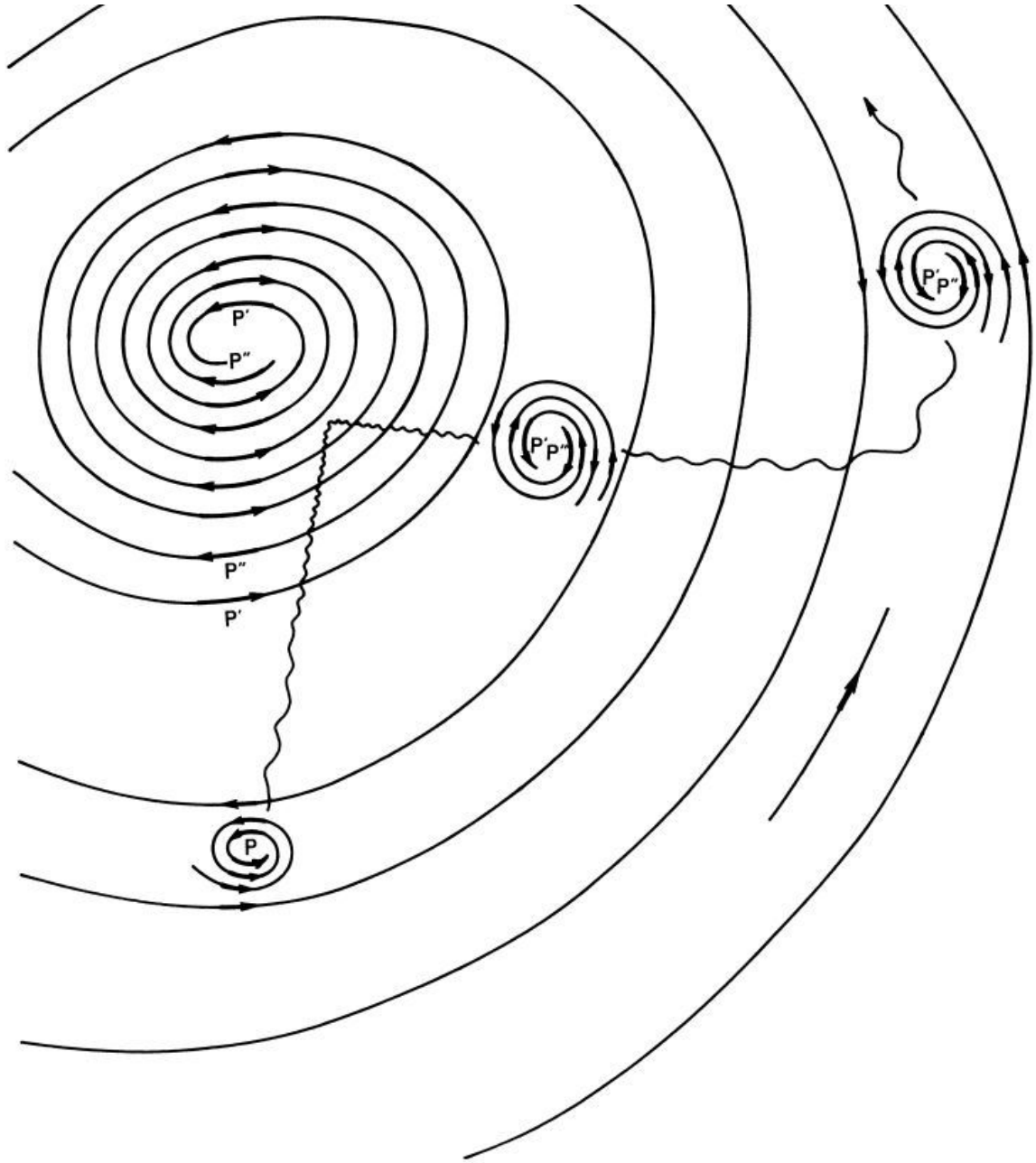

Fig. 3. The 3D-spirally-faster-inward contracting and expanding, oscillating, basic matter (Fig. 1B) generates secondary dynamic fractals of Fig. 1A type. The secondary dynamic fractal P moves 3D-spirally faster inward and falls toward the core of the initial structure, where its density increases and it starts to oscillate (Fig. 1B). Thus it is ejected from the core of the initial dynamic fractal and driven around by its outer structure. In this way initial and secondary all-building dynamic fractals (called also protobodies) are created.

The knowledge of origin, what is initial and what is secondary, tells everything. (Figure from *Savov*, 2002)

Every body moves around its source as shown in Fig.3. That is why we see stars moving around galactic nuclei, atoms moving around their sources – the discovered nuclei of stars and planets, which are cores of the stellar size dynamic fractals of Fig. 1B type. Planets and their planetary like moons are small cooled stars. Atomic and smaller size dynamic fractals, i.e. atomic nuclei, electrons and light photons, are created in the discovered nuclei of stars and planets. This keeps their interiors hot. The dynamic fractal origin of stars and atomic matter is in agreement with the finding that the bulk of the sun is made from iron and heavy elements (*Manuel and Hwaung*, 1983) because the heavy elements are likely to cluster closer to their sources if born as shown in Fig. 3. The heavy elements remain close to their source and latter are annihilated in supernova events to create observed cosmic space filled predominantly with light elements H and He. The just born firework universe was made of multi-scale bright blue stars. The smaller moved around the larger ones all moving around the hyper huge nucleus of the universe. The cooling of this firework universe created the cosmic microwave background and its structure. The cooling of the smaller stars created the planets and their planetary like moons. The explosive beginnings and ends of the stars delivered in the cosmic space predominantly light elements because the heavier elements remained closer to their sources.

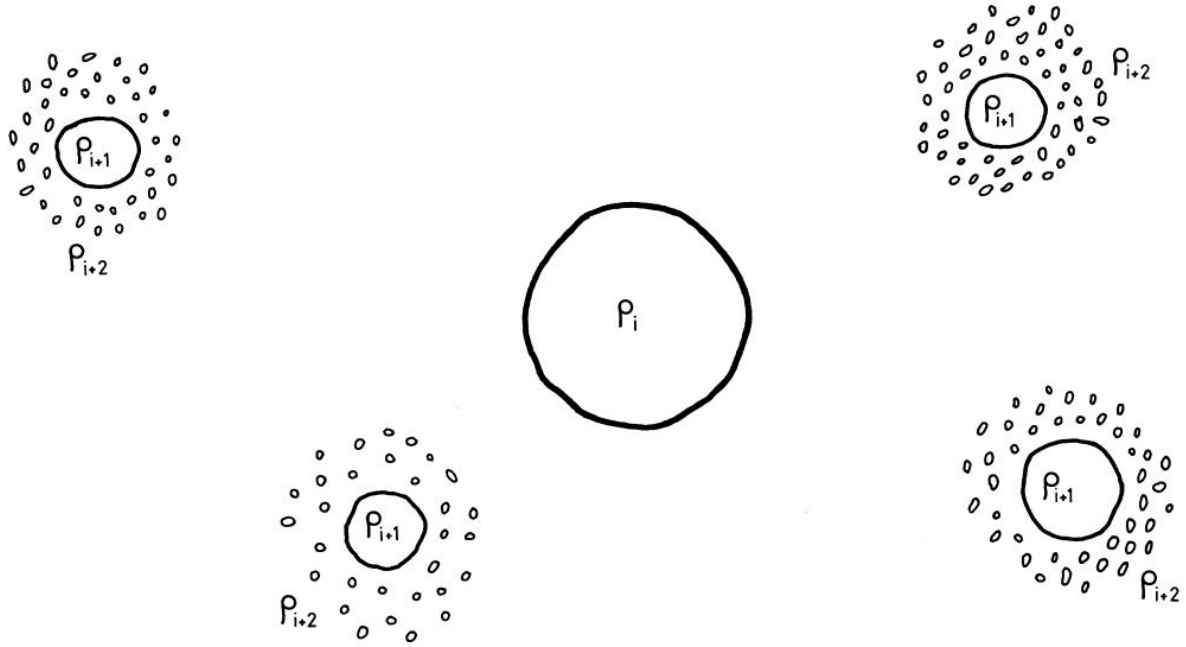

Fig. 4. Every body comes from the 3D-spirally-faster-inward-oscillating insides of its dynamic fractal source and moves around in its outer region (Figs. 1, 3). This creates a hierarchy of origin ρ_i, ρ_{i+1}, ρ_{i+2} … The hierarchy of origin begins with the most initial and hence the largest dynamic fractal of the firework universe. It 3D-spirally-faster-inward contracts, annihilates everything, and afterwards expands into a new similar firework universe (Figs. 1, 3). Thus it evolves self-similarly and is always self-consistently finite - singularity free, in the smallest number of dimensions - 3D that allow this to happen. The

cyclic firework universe evolves through collapse of the similar previous one and consequent oscillation of the most initial dynamic fractal (Fig. 1). It ejects similar ones that do the same as it is shown in Fig. 3. The created hierarchically ordered along their origin dynamic fractals interact and build the observed clumpiness of matter at atomic and cosmic scales. The dense insides of the dynamic fractals are seen as stars, planets, moons and atoms because they emit or reflect much smaller ones, known as light.

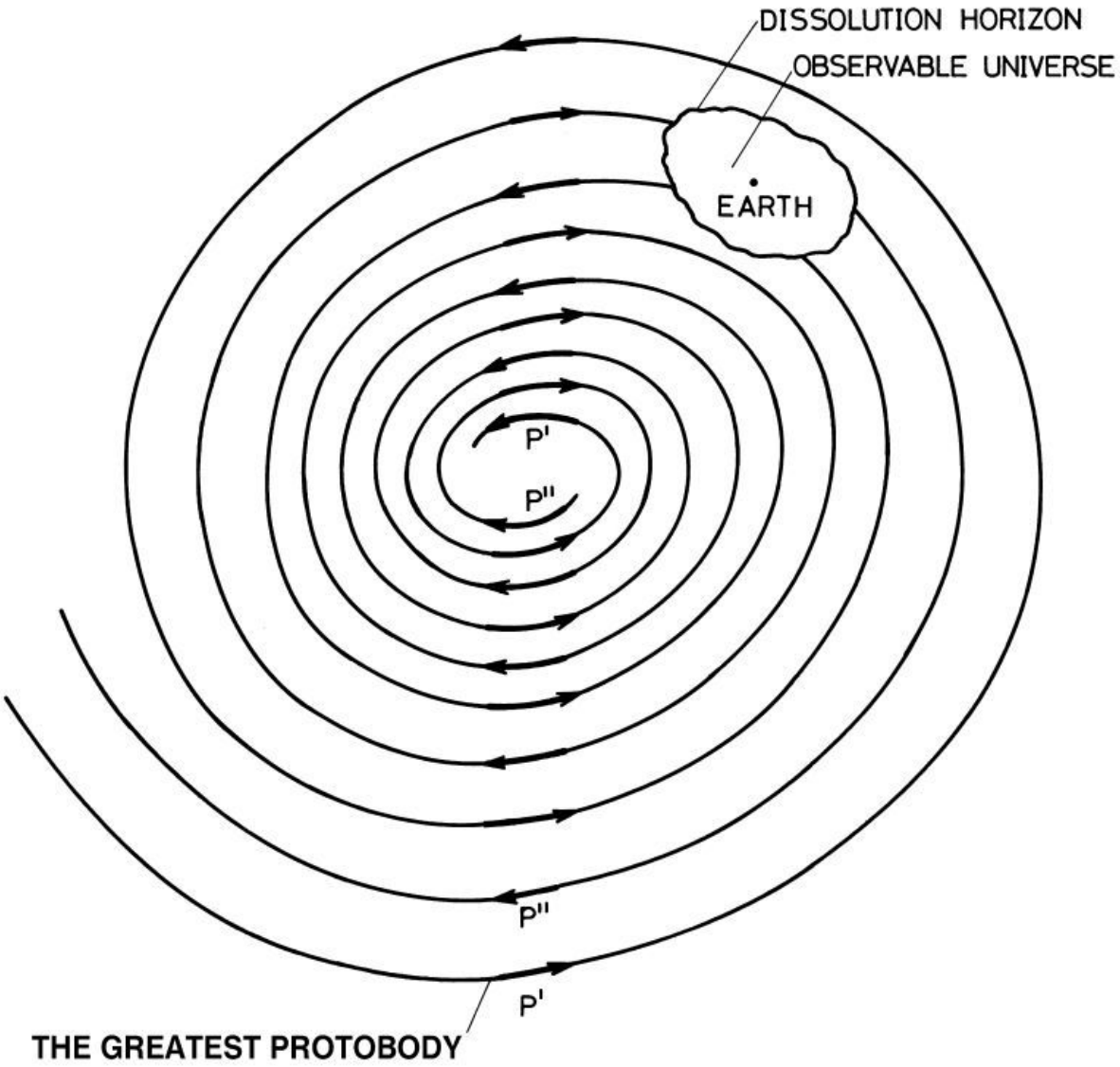

Fig. 5. The dynamic fractals are also called protobodies (*Savov*, 2002). The most initial one is called The Greatest Protobody (*Savov*, 2002). It ejects secondary ones and drives them around (Figs. 1, 3). That is why similar galaxies and same chemical elements are observed at every distance. The accessible universe is a cosmic cloud, filled with galaxies and their sources - Great Attractor type objects. The dynamic fractals of light emitted beyond the dissolution horizon, dissolve below the accuracy of observation

either due to decrease of light's intensity or due to evolving from oscillation (Fig. 1B) to contraction (Fig. 1C).

The dynamic fractals expand with aging as they contract and expand, accumulate their environment (Fig. 3), and create smaller ones around their cores (Figs. 3, 4). The expansion of the very small dynamic fractals seen as light creates the cosmic redshift. The hierarchy of origin is a hierarchy of scale in existing and unique firework universe that evolves self-similarly through everything else annihilating cycles as shown in Figs. 1-4.

The 3D-spirally-faster-inward contracting and expanding dynamic fractals are discrete and show discrete (quantum) properties at scales of their own. They can be seen as continuous motion of planets or discrete energy levels of electrons depending on their scale relative to that of the process of observation, created from discrete elements integrated in one's mind like movie frames (*Savov*, 2002). That is why electrons abide at quantum levels and planets are found at distances from the Sun, which correspond to Fibonacci numbers. Planets are huge dynamic fractals of Fig. 1B type, merged into the even much huger and similar dynamic fractals whose cores are seen as stars. Hence the distances between the Sun and the planets will take discrete values corresponding to their discrete 3D-spirally-faster-inward-oscillating dynamic fractals.

First there is one dynamic fractal element (Fig. 1A) creating a distance *r* from its core

$$N(r) = C_n r^0 = 1, \quad (1)$$

where C_n is a counting constant corresponding to the accuracy of observation. *The universal scale r is the distance from the core of the dynamic fractal created from the interaction of its elements (Fig. 1).* It can be seen as space, time, cosmic body or whatever exists, depending on its ratio to the scales of the interactions that build the process of observation (*Savov*, 1993, 2002).

The faster inward 3D-spiral motion of the dynamic fractal attracts new similar elements as it self-similarly evolves. Then $N(r)$ increases and becomes finite in the smallest number of dimensions - 3D that allow this to happen as the dynamic fractal bounces off from itself (Fig. 1B). Hence one can write

$$N(r) = C_n r^3. \quad (2)$$

Then the 3D-spirally-faster-inward-moving, i.e. falling into itself dynamic fractal structure, bounces 3D-spirally outward and starts to oscillate 3D-spirally-faster-inward. The frequency of its oscillation is

$$f(r) = 1/T(r) \text{ and } T(r) = 2\pi r/v(r) \quad (3)$$

$v(r)$ = constant = C_v defines the dynamic fractal by the velocity of its elements that create the distance *r*, $T(r)$ is the time it takes one fractal element to revolve at angle 2π into the fractal

structure at distance *r* from its core (Fig. 1). This is the distance between the center of the dynamic fractal and the fractal element moving around it. Hence

$$f(r) = C_v/2\pi r, \quad (4)$$

Equations (1-3) describe self-similarly evolving dynamic fractal. They are generalized in

$$N(r) = C_n r^{d(r)} \quad (5)$$

where $d(r) \in [0, 3]$ is the dynamic fractal dimension, created by $N(r)$ number of dynamic fractals that build the distance (universal scale) *r*. In the beginning of dynamic fractal evolving $d(r) \geq 0$ and afterwards it increases to $d(r) \leq 3$ with the increase of the number of the 3D-spirally-faster-inward accumulated fractal elements that create the universal scale *r* (Fig. 1A). The dynamic fractal dimension increases with the increase of the density of the dynamic fractals. Then the dynamic fractal starts to oscillate 3D-spirally-faster-inward with frequency $f(r)$ (Fig. 1B and Eqs. (3) and (4)). Then from Equations (3), (4) and (5) the number of fractal elements $N_o(r)$ creating the universal scale *r* in the oscillating structure is

$$N_o(r) = 2f(r)N(r) = C_n [v(r) / \pi] r^{d(r) - 1} \sim r^2 \quad (6)$$

The oscillation adds with twice the frequency $f(r)$ the number $N(r)$ of contracted fractal elements that create *r*. They fall 3D-spirally into themselves and bounce 3D-spirally outward with frequency $f(r)$. The dynamic fractal element starts to oscillate 3D-spirally-faster-inward and so "comes to life" (Fig, 1B). The distance *r* is made from 3D-spirally-faster-inward-oscillating dynamic fractal elements that are finite, discrete, unique and self-similarly evolving like every one of us.

The 3D-spiral expansions and contractions of the dynamic fractal create discrete (quantum) unifying force (Savov, 2002, 2005a), which is expressed during the 3D-spiral collapse (Fig. 1A) as

$$F(r_i) = C_i / r_i^{\,d(r_i)} \text{ for } d(r_i) \in [0, 3], \quad (7)$$

during the 3D-spiral oscillation (Fig. 1B)

$$F(r_i) = C_i / r_i^{\,d(r_i)} \text{ for } d(r_i) = 2, \quad (8)$$

where C_i is unifying force constant defined by the existence of the considered fractal structure that creates the discrete distance r_i from its core, $i = 1, 2, 3, \ldots, N$ is finite number. The unifying force is discrete (quantum) in the 3D-spirally-faster-inward oscillating dynamic fractal that builds a discrete distance r_i from its core (Fig. 1B)

$$F(r_i) = C_i = const. \quad (9)$$

Equation (9) means that the dynamic fractal (Fig. 1B) remains nearly the same at the scales of its existence. Then for given dynamic fractal it can be written

$$F(r_i) = ma(r_i) = mv^2(r_i)/r_i = const \quad (10)$$

where $v^2(r_i) = const$ and $r_i = const$ define the considered dynamic fractal by the velocity $v(r_i)$ of its basic matter at distance r_i from its core that creates the unifying force $F(r_i)$, m - called mass is resistance to acceleration of a dynamic fractal, e.g. one seen as test body, merged into the considered 3D-spirally-faster-inward-moving dynamic fractal structure that creates the unifying force $F(r_i)$ and $a(r_i)$ is the acceleration along r_i, created from the contractions and expansions considered dynamic fractal (Fig. 1B).

Every body (dynamic fractal) is driven near or further from the core of the initial dynamic fractal structure (Fig. 3) and its trajectory has smaller or larger curvature ($1/r$). Equations (7-9) show that the dynamic fractal dimension $d(r)$ increases up to 3 with density increase (Eq. (7)). Afterwards the structure begins to oscillate 3D-spirally-faster-inward and its dynamic fractal dimension drops to 2 (Eq. (8)) although its dense insides are seen as 3D-bodies.

The velocity $v(r_i)$ of the basic matter (test body driven by the basic matter) at discrete distance r_i from the core of the dynamic fractal (Fig. 1B) define the dynamic fractal. Then from Fig. 1B it can be written for given dynamic fractal

$$v(r_i) = const, \quad r_i = const, \quad v^2(r_i) \times r_i = const, \quad v(r_i) \times r_i = const \text{ and}$$

$$v^2(r_i) \times r_i = v(r_i) \times [v(r_i) \times r_i] = \Delta V(r_i)/\Delta t = const \text{ and } \Delta V(r_i) = const \times \Delta t, \quad (11)$$

the change of the volume of the dynamic fractal $\Delta V(r_i)$ is proportional to the change of time Δt. Time is equivalent to the change of the volume of dynamic fractal (Fig. 1). Hence time is a dynamic fractal showing local change in the fractal structure. Time is local originating from each 3D-spirally-faster-inward oscillating dynamic fractal element of reality. Nature is made of similar multi-scale oscillators whose frequencies increase inward and they self-organize (synchronize) to unfold (*Savov*, 2005c). The change of the dynamic fractal is fractal element, seen as time, flowing from the larger initial dynamic fractals toward the secondary ones (Fig. 3). Time flows in discrete steps toward the smaller scales (Fig. 1-3). Every secondary dynamic fractal creates change and hence time in the initial structure. In this sense stars are "drops" or moments of time for the galactic size fractals. Equation (11) connects two fractal elements seen as space and time. Hence space is also a dynamic fractal which is curved and discrete everywhere as shown in Fig. 1. It is seen as continuous at large scales perceived by integration of smaller finite ones, like movie frames, in ones brain (*Savov*, 2002). The universal scale created by the dynamic fractal allows obtaining of universal equivalence between two objects expressed in their terms, called also protobodies (*Savov*, 2002). Einstein's energy and mass equivalence is simply obtained from this universal equivalence (*Savov*, 2002). *What we see as space and time are dynamic fractals in found existing and unique dynamic fractal firework universe.*

Equation (11) gives the rate of dynamic fractal volume buildup from the motion of its parts. This rate is a constant characteristic for the considered dynamic fractal and has to be proportional to its resistance to acceleration *m* called mass

$$v^2(r_i) \times r_i = v(r_i) \times [v(r_i) \times r_i] = \Delta V(r_i)/\Delta t \sim m \qquad (12)$$

Let us write Equation (12) for the dynamic fractals of the Sun and the Earth and calculate the ratio R_{SE} between their masses. We assume that bodies are driven around with velocities proportional to the velocity of the basic matter whose motion builds the dynamic fractals as shown in Fig. 3. Then

$$R_{SE} = v^2_S(r_{iS}) \times r_{iS} / v^2_E(r_{iE}) \times r_{iE} = 3.30\times10^5, \qquad (13)$$

where $v_S(r_{iS}) = 30$ km/s the velocity of the Earth driven around by the dynamic fractal of the Sun at distance $r_{iS} = 1.459\times10^8$ km from the core of the stellar type dynamic fractal (Fig. 3), seen as the Sun, similarly for the dynamic fractal which core is seen as the Earth it is written the first space velocity is $v_E(r_{iE}) = 7.90$ km/s at $r_{iE} = 6.378$ km from the Earth's center. The calculated ratio in terms of dynamic fractals (protobodies) between the masses of the Sun and the Earth is 3.30×10^5. This is "strikingly equal to the reciprocal mass of the Earth 3.29×10^5 (*Savov*, 2002)". Hence the Sun and the Earth are stellar type dynamic fractals or in other words stellar type protobodies. The enigmatic force that pulls Pioneer spacecraft sunward (*Turyshev et al.*, 2005) is explained with inward 3D-spiral vortex of basic matter relative increase further from the Sun due to accretion of dynamic fractal elements from the parent Galactic dynamic fractal (Savov, 2005a). This creates new sunward force $F(r_i) = C_i/r_i^{d(r_i)}$, where $d(r_i) < 2$ and $r_i >> 1$ AU - astronomic unit (Eq. (7)).

Every body is ejected and moves around its source (Fig. 3). Observer in this cosmic cloud shown in Fig. 5 will find similar dynamic fractals everywhere. The surprising observations galaxies, galactic structures and heavy elements in the far distant universe (e.g., *Laurence et al.* 2005; *Ouchi et al.* 2004; *Mullis et al.* 2005; *Elston et al.*, 1994) are in agreement with dynamic fractal firework universe having 3D-spiral code (Fig. 1-5). The dynamic fractals are made of one basic matter. They simply account for the puzzling nature of dark matter because only their dense insides are visible.

The bulk of the Sun is made mostly of Fe, Ni, O, Si, S, suggesting "that fusion of hydrogen is probably not the Sun's primary energy source" (*Manuel and Hwaung*, 1983). The Sun is powered by creation of atomic size dynamic fractals in the core of the stellar type dynamic fractal, seen as the Sun (Fig. 3). Atomic matter is born in the stellar type nuclei (Figs. 1-5). The creation of new atomic matter in the centers of stars and planets heats their insides. In this way the radius of the Earth increases and the huge Pangea landmass was torn to what became modern continents. The Earth's nucleus creates atomic nuclei and powers the lava upwelling mid ocean ridge and volcanic activity. The unfolding nucleus drives slower its growing a thicker atomic shell (Fig. 3). Hence Earth's rotation around its axis will slow down. This prediction is in agreement with findings of increase of the length of day as the Earth ages (e.g. Williams, 2000). Similarly on much smaller scale the increase of the radius of the aging light coming from the distant galaxies creates the cosmic redshift (*Savov*, 2002).

The all-building 3D-spirally-faster-inward-oscillating dynamic fractals (Fig. 1B) keep their cores apart. This accounts for the mysterious cosmic repulsion that prevents dense populations of stars from merging. Stars couple like atoms but on stellar dynamic fractal scales. The galactic dynamic fractals interact similarly at their scales and create the stability of galactic clusters. The universe is dynamic fractal having 3D-spiral code. Its dynamic fractal dimension changes from 0 to 3 (Savov, 2005a). This it accounts for Olbers' paradox and the obtained fractal dimensions of observed galaxies distributions (Savov, 2005a). The fractal dimension of galaxies will decrease with the increase of scale due to creation of larger scales from smaller number of initial dynamic fractals - the sources of the galactic ones. The obtained fractal dimensions about 1 - 2 of galaxies distributions (*Labini et al., Celerier and Thieberger*, 2005) confirm the dynamic fractal firework universe. The universe is round, filled with similar round bodies. Planets are small cooled stars. The universe is dynamic fractal made of basic matter having 3D-spiral code. What we see as space, time and everything are dynamic fractals made of self-similarly evolving elements.

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