

THE TWELVE BASIC PARAMETERS OF THE UNIVERSE

- The universe repeats the same cycle of 29 steps continuously. At the end of step 29 the universe goes back to step 1 and starts the next cycle. This cycle of 29 steps is accomplished in a completely energy-neutral fashion. The cycle of the universe (**document G7**) can therefore be repeated indefinitely.
- Every step of the cycle of the universe can be described using the twelve basic parameters of the universe which will be elucidated in this document. During the cycle of the universe, these twelve parameters are always interconnected which allows each step, as well as the cycle in its entirety, to be modelled.
- The cycle of the universe is explicated qualitatively in **document G7**. There, the twelve basic parameters are quantified for each step as much as possible based on estimations.
- It is only after modelling the cycle of the universe that these twelve basic parameters can be quantified more accurately. This applies to each of the 29 steps and to the cycle as a whole.

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***1) INTRODUCTION:**

In **document G7**, the author deduced the cycle of the universe. The universe is a closed system from which no mass/matter, charge, magnetic spin or kinetic energy can escape. The universe is closed for all types of electromagnetic radiation, particle radiation and all forms of cosmic radiation. *)

Within this closed system, the universe repeats a cycle of the same 29 consecutive steps which have been described in **G7**. In the cycle of the universe, gravitation has a special role, allowing each cycle to unfold in a completely energy-neutral fashion. In this way, the universe can repeat itself indefinitely.

*) All forms of electromagnetic radiation possess the basic characteristics of mass, charge and magnetic spin, although these characteristics are extremely hard to measure directly either qualitatively or quantitatively. To a lesser extent, this also applies to particle radiation.

As a result of electric and magnetic fields present within galaxies, both types of radiation are deflected towards a particular galaxy and captured in trajectories around one of the black holes present there, particularly around the central black hole of the galaxy. Around black holes, both types of radiation are integrally combined into matter, exclusively in the form protons and electrons. See **document F1c**. This restoration of protons/electrons out of radiation prevent mass, charge, magnetic spin and kinetic energy from escaping the universe.

Gravitation is the only form of radiation lacking mass, charge and magnetic spin. Thus, gravitational radiation is not deflected by galaxies. It is the only form of radiation exiting this universe. Gravitation plays an essential role in the cycle of the universe by preventing mass/matter from escaping this universe in the form of atoms.

Because of gravitation, electric fields and magnetic fields, all forms of a) mass or matter/atoms, b) electromagnetic radiation, c) particle radiation and d) kinetic energy are prevented from escaping this universe, making it a completely closed system.

-) Constant physical quantities of the universe:

Within this completely closed system, 9 universal laws (the 9 preservation laws) as well as boundary conditions are in effect. These are explicated further in **document G4** and summarized in **scheme 1 – 1**.

Scheme 1 – 1: The constant physical quantities and values of the universe:

- 1) the total amount of mass, charge and magnetic spin in the universe is always constant,
- 2) the total number of protons is always equal to the number of electrons in the universe,
- 3) total amount of positive charge of protons + total amount negative charge of electrons = 0,
- 4) total amount of magnetic spin protons - the total amount of magnetic spin electrons = 0,
- 5) total momentum within the universe is always zero,
- 6) with every new cycle the universe starts with the same number of protons and electrons and the same amount of radial kinetic energy and transverse (tangential) kinetic energy,
- 7) every cycle of the universe goes through the same 29 steps and lasts exactly the same amount of time (**document G7**),
- 8) the minimum and maximum radius of the universe for matter, for electromagnetic radiation and for particle radiation is the same for each cycle.

***2) THE TWELVE VARIABLE PARAMETERS OF THE UNIVERSE:**

The cycle of the universe (**G7**) consists of 29 steps which can be described individually by way of twelve variable quantities listed below in **scheme 1 – 2**.

Scheme 1 – 2: The twelve variable basic parameters of the universe:

- 1) the nature of matter and the distribution of present matter between regular matter and black-hole matter,
- 2) the varieties of electromagnetic radiation and particle radiation,
- 3) the mass, charge and magnetic spin and the distribution thereof among regular matter, black-hole matter, electromagnetic radiation and particle radiation,
- 4) the physical and chemical forces that act on those varieties of matter and radiation as well as their bonds; especially the origin of those forces and the origin and effects of gravitation,
- 5) the distribution of kinetic energy among the different varieties of matter and the different varieties of (rotational) velocity,
- 6) the distribution of impulse and of momentum among the different varieties of matter and the different varieties of (rotational) velocity,
- 7) the generation of gravitational energy relative to:
 - the centre C of the universe, and later relative to successive points of rotation:
 - R1 (around the black hole central to each galaxy and of all stars within that galaxy),
 - R2 (the rotation around their axes of the two or more spiral arms present in every galaxy),
 - R3 (the rotation of each star along its own axis and of its planets),
 - R4 (the rotation of these planets and their satellites) and
 - R5 (the rotation of satellites) etc,
- 8) the development of space and the volume the universe occupies during each step,
- 9) the thickness of the first expanding and later contracting shell spherical universe,
- 10) the time elapsed since the Little Bang, the moment in time a particular step starts and ends,
- 11) the temperature of regular matter and black-hole matter,
- 12) the rate of deflection of higgs (**document F1a 2014**), neutrino's and photons (**F1b**) and particle matter cosmic radiation **F1c**) in the universe.

***3) IN-DEPTH DESCRIPTION OF THE TWELVE BASIC PARAMETERS:**

I) Varieties of complete matter:

These comprise all forms of complete matter starting with protons/electrons and encompassing:

- 1) all regular atoms, all elements/isotopes of the periodical table of elements (**F1c and F1d**) and
- 2) all regular atoms that have collapsed into atoms of a black-hole state (**F1d**).
There is no 'dark' matter present in the universe.

-) 'Dark' matter:

Using Newton's gravitational equation ($F = G \cdot m_1 \cdot m_2 / d^2$) and the laws of radiation, an enormous deficit appears on the mass/matter balance of the universe. Together with Frank Roos, the author has significantly altered Newton's law of gravitation in **documents E3 and E3-1**. Due to the nature of gravitation, not only the distance d between two objects is relevant, but also the cosine of the angle a between two objects on the spherical shell of the universe and the centre C of the universe. See **figure 36 of document G8** or **figure 3 document E3-1**.

The amended Newton's gravitational equation becomes:

$$F = G \cdot m_1 \cdot m_2 \cdot \cos a / d^2$$

Within the Milky Way galaxy, $\cos a = 1$. For gravitation between galaxies however, $\cos a < 1$.

Applying a factor of $\cos a$ consistently in Newton's Law of Gravitation, much more gravitation and concomitantly much more mass/matter and kinetic energy appears to be present than currently calculated and presumed. By adding the factor $\cos a$, the mass/matter balance of the universe is already largely in equilibrium and thus so called 'dark' matter and 'dark energy' can be reduced to an important extent. Incidentally, the gravitational constant G is not a real constant. Like almost all physical constants, it changes very slowly over time; see also **document G10**.

-) **Regular matter and black-hole matter:**

According to the author, all matter in the universe is present either as regular matter, as black-hole matter or as particle radiation. Regular- and black-hole matter are distributed more or less equally across the spherical shell of the universe.

- Regular matter encompasses all common elements of the Periodical System of Elements and their isotopes from hydrogen to nr. 92. Larger and a number of the smaller atoms are unstable. See **document C2 and document F1d**.

- Black-hole matter consists of regular atoms from the Periodical System of Elements that have collapsed from the inside due to the development of van der Waals bonds between electron pairs in the electron shells. See **figure 9 of G8 and figures 18a – 18n F1e**. The conversion of regular atoms to black-hole atoms can only occur for regular atoms with two or more electron pairs, and under conditions of high (rotational) velocity/van der Waals force combined with extremely high pressure and temperature.

The conversion of a regular atom to a black-hole atom is possible only from the element beryllium onwards.

- The elements H, He, Li and hydrogen gas have no or but one electron pair and can therefore not collapse into atoms of a black-hole state! The Periodical System of Elements of black-hole elements starts at black-hole beryllium (Be). Forces acting on black-hole atoms are discussed in **document C3** website www.uiterwijkwinkel.eu and **document F1e**.

- During supernovas, regular elements are formed with atomic numbers exceeding 110-120. During the supernova, those elements are immediately transformed further to black-hole atoms which together form one black hole, capturing all black-hole atoms.

High energy cosmic radiation is formed by radioactive decay of such unstable black-hole elements which can only occur at the outer edge of the black hole!

II) Radiation:

The following varieties of radiation can be distinguished:

- **Radiation in the form of particle matter with their accompanying forces:**

These are all varieties of particle radiation from unstable atoms and atomic nuclei, such as neutrons, particles (helium nuclei) and beta particles (fast electrons) and from all other forms of particle matter such as protons, electrons, quarks, strings and the even smaller rotary photons. See **documents F1a, F1b and F1c**.

- Radiation without matter in the form of an electromagnetic vibration with its accompanying forces:

All varieties of infrared (proton) radiation are related to the vibration of the atomic nucleus while all forms of light (electron radiation) are related to the 'shell' electron of the atom. Electromagnetic radiation consists of photons which lack the characteristics of matter but nonetheless do possess mass, charge, magnetic spin and kinetic energy although these quantities are not directly measurable because of their small size.

The trajectories of all forms of electromagnetic radiation and particle radiation in the universe are very slightly deflected by the electric and magnetic fields exhibited by galaxies with their central black holes, the many billions of stars and the locally present small black holes/neutron stars. These electric and magnetic fields have a local range of 'only' a few tens to a thousand of kilometres.

The author currently estimates the rate of deflection of electromagnetic radiation and particle radiation to be on average one degree per 10 – 40 millennia. Such a minute deflection is technically not verifiable or measurable.

This deflection causes all forms of massive electromagnetic radiation and particle radiation to be captured around one of the (central) black holes in the universe to be transformed back to matter, ultimately in the form of regular protons and regular electrons only. Black holes are essential. See **documents F1b and F1c**.

-) No gravitational lenses:

Electromagnetic radiation and the atomless forms of particle radiation are characterized by: 1) mass, 2) charge, 3) magnetic spin and 4) kinetic energy but generate no form of gravitation of their own. Gravitation, conversely, possesses no characteristics of: 1) mass, 2) charge, 3) magnetic spin or 4) kinetic energy.

Gravitation can therefore not exert any influence on the trajectories of electromagnetic radiation and particle radiation. For electromagnetic radiation, no gravitational lenses are present in the universe, only 'lenses' formed by electric and magnetic fields exhibited by central black holes as well as stars and smaller local black holes. Deflection can also occur when radiation passes through gases (hydrogen and helium) or coronas of stars or galaxies.

- Radiation lacking matter and mass; gravitation:

Gravitation is linked to the 'shell' electrons of the atom as this atom moves through the universe! Gravitation is the only form of radiation lacking matter, mass, charge, magnetic spin and kinetic energy. This is why the 'gravitation particle' or 'graviton' is impossible. This graviton cannot be found in the proton by the LHC!

Gravitation cannot be deflected by electric or magnetic fields. This makes gravitation radiation the only form of radiation in the universe that moves in a rectilinear fashion. This is why it is necessary to add a factor of $\cos a$ to Newton's law of gravitation. Gravitation is the only form of radiation to leave the universe. Gravitation radiation is unique.

III) Mass, charge and magnetic spin:

Considered over the entire cycle of the universe, the total amount of mass, charge, impulse and momentum in the universe are constants, distributed in varying measures across: 1) regular matter and black-hole matter, 2) forms of electromagnetic radiation and 3) forms of particle radiation:

As such, this distribution is one of the basic parameters of the universe.

IV) Forces acting on regular and black hole matter:

-) Only two elementary forces:

Solitary protons and electrons, apart from their mass and matter, generate but two elementary forces: 1) the elementary charge (force) and 2) the elementary magnetic spin (force). Apart from this, they possess a certain amount of kinetic energy. See **document C1 and documents F1a 2014, F1b and F1c** with **figures 12 - 15** for the spatial structure of the proton/electron and their anti forms, or the same **figures 18 a – d** with added explanation in **G8**.

All elements of the Periodical Table of Elements can be constructed using protons and electrons as their basic building blocks. The atomic nucleus contains no neutrons (one proton + one electron) as separate building blocks, only protons and 'nucleus' electrons. See **document F1d + figures 18 – 23**. In the atomic nucleus, every small 'nucleus' electron is normally bound to minimal two, much larger protons and never to only one proton. Therefore, no neutrons can exist in the atomic nucleus. Having the same magnetic spin prevents 'nucleus' protons and electrons from coming into physical contact with each other. The bond of one 'nucleus' electron to two protons causes a charge deficit and therefore all atomic nuclei across the universe are positively charged.

The surplus of electrons is located in the electron shells around the atomic nucleus. Together, the atomic nucleus and the electron shells form the atom. See **document F1d and figures 18 - 23**.

-) The remaining physical and chemical forces:

The remaining, non-elementary, physical and chemical forces on the atom present themselves only as a result of: 1) velocity and/or rotational velocity of the atom through the universe, 2) changes in velocity, 3) changes in the direction of velocity and 4) the kinetic energy connected to (rotational) velocity in the universe.

These forces are principally generated by the 'shell' electrons/electron pairs in combination with velocity/rotational velocity of the atom through the universe, which can amount to several hundreds of km/s. These very high velocities and rotational velocities not only add large amounts of kinetic energy to the atom but also to its 'shell' electrons!

(Rotational) velocity of the atom through the universe results in:

- a) deviation from the ideal trajectory of the electron/electron pair and
- b) an amount of kinetic energy 'added' to the 'shell' electron/electron pair by (rotational) velocity.
- c) an amount of kinetic energy 'added' to the atomic nucleus.

Ad a) To counter the deviation from its ideal trajectory, the 'shell' electron generates gravitation (force) radiation. The primary goal of this gravitation is to slow the (rotational) velocity of the atom/celestial body in the universe and ultimately bring these velocities down to zero.

Gravitation is the only force of the atom that is linearly related to (rotational) velocity. Gravitation is not directly related to the mass of the atomic nucleus but only indirectly through the number of 'shell' electrons of the atom and the amount of (rotational) velocity of this atom in the universe. Gravitation is a speed-related force and this also applies to the accompanying physical constant of gravitation! Gravitation energy, like gravitation itself, is variable.

Ad b) Countering and reducing the kinetic energy 'added' by (rotational) velocity results in the 'shell' electrons generating different kinds of physical and chemical forces, whose primary characteristics are that they can be used to form physical and chemical bonds. With the formation of these physical and chemical bonds, heat is released, proving that a small part of the 'added' kinetic energy is converted into heat. By engaging in these physical and chemical bonds, an electron pair is put into an energetically lower and thus more favourable orbit around one (= a physical bond) or two or more atomic nuclei (= a chemical bond). These remaining physical and chemical forces on the atom all exhibit a quadratic relationship to the velocity and rotational velocity/velocities of the atom in the universe!

(Because of its linear character, gravitation is quantitatively much smaller than the remaining forces on the atom, which are related quadratically to velocity/rotational velocity)

The author has systematically deduced all forces on regular and black-hole matter in **document C2** (the forces of regular matter), in **document C3 and F1e** (the forces of black-hole matter) and in document C4 (the forces of anti-matter). The forces on regular matter and black-hole matter are not constant values but related to (rotational) velocity and kinetic energy! This also applies to their accompanying physical constants.

The elementary charge(force) and the elementary magnetic spin(force) of the proton/electron are the only (rotational) velocity independent forces. During the cycle of the universe, these forces and their accompanying physical constants are the only real constants in the universe! See also **document G10**.

Ad c) Acceleration/deceleration and changes in the direction of velocity causes the atomic nucleus to be moved slightly from its central position within the electron shells. This causes the generation of forces within the atom with the purpose of keeping the atomic nucleus as central as possible within the electron shells.

-) Velocity vectors; effect of velocity on the forces and bonds of regular matter:

Every movement of the atom/molecule in the universe relative to the centre C of the universe generates its own vector/component on the physical and chemical forces of the atom. This applies to both the non-elementary gravitation (force) and the other, non-elementary, physical and chemical forces of the atom, whose magnitude exhibits a quadratic relation to velocity/rotational velocity.

Only the elementary charge (force) and the elementary magnetic spin(force) of the proton/electron are without velocity-vectors/force component.

In the universe, 9 to 11 different relevant (rotational) velocities (> 30 Km/s) can be found, which can be at different angles to each other. Every one of these velocities results in its own force vector and force component. All, non-elementary, physical and chemical forces of the atom are therefore made up of 9 to 9 and probably 11 force components! See **document D**.

Only similar force components can form a bond. **Vectorlaw Uiterwijk Winkel**. All physical and chemical bonds on earth are therefore, from a spatial point of view, made up of the same number of 9 – 11 different bond-components! The physical and chemical bonds that can be found in the universe are relatively complex structures as a result. For these, see the key **documents C2** (forces), **D** (structure of physical and chemical bonds).

The structure of these physical and chemical bonds can only be deduced when all movements and (rotational) velocities of the earth within the universe are known. Only then can the structure of all physical and chemical bonds be resolved into its component force- and bond-vectors!

-Forces on black-hole matter:

Black-hole atoms are collapsed regular atoms. Black-hole atoms, like regular atoms, consist completely of regular protons and regular electrons. Of the forces of black-hole atoms, only gravitation is truly relevant. See **document C3** and **F1e**.

All the 9 – 11 movements in the universe generate their own force component on the gravitation of a black hole. See **figure 1 document E3-1**. Only similar force components of gravitation can mutually attract. All gravitation components on black-hole matter and black holes are velocity-related physical values and are thus not constants!

During every step of the cycle of the universe, the following is determined:

- Have new forces come into existence or have existing forces disappeared that acted on the atoms of regular matter and/or on the atoms of black-hole matter/black holes?
- Has the number of velocities changed and, with it, the number of force components/vectors of the present forces? Have the present velocities changed quantitatively and if so, by how much?
- Which forces acting on the different varieties of electromagnetic and particle radiation are present? Only the elementary charge and magnetic spin are relevant to electromagnetic and particle radiation, other forces play no part.

V) Movements of matter in the universe + distribution of kinetic energy across matter and movements:

- Number of movements:

Within one galaxy, virtually all matter experiences approximately 6 varieties of rotational velocity, apart from the expansion velocity. Galaxies exhibit a further 5 - 6 rotational movements in relation to each other that are larger than tens of km/s. In total, almost all matter in the universe is subject to around 9 – 11 movements in relation to the center C of the universe; mostly in the form of very large-scale rotational movements. Of these, 9 - 11 are relevant with speeds larger than 30 km/s.

Every variety of movement in the universe is linked to its own form of kinetic energy and is as such also linked to its own force component on the physical and chemical forces of the atom. During every step of the cycle of the universe, the following is determined:

- The number and varieties of movement(s) on regular matter and on black-hole matter/black holes and the accompanying varieties of kinetic energy.

- The distribution of kinetic energy across the (rotational) movements of regular matter and of black-hole matter/ black holes. This distribution of movements and of kinetic energy applies to both the level of among galaxies relative to the centre C of the universe, as well as within one galaxy.
- The radial kinetic energy of regular matter and black-hole matter relative to the centre C of the universe and within one galaxy relative to the rotational centres R1 (rotation of the galaxy), R2 (rotation of the spiral arms), R3 (rotation of the solar systems) and R4 (rotation of planets) and to R5 (rotation of satellites):
- The tangential kinetic energy of regular matter and black-hole matter relative to the centre C of the universe and later within one galaxy relative to the rotation points R1 (the galaxy itself), R2 (spiral arms), R3 (stars) and R4 (planets) and to R5 (satellites):
-) By current knowledge of the author, the following is present in the universe:
 - one centre C
 - 4 – 20 billion galaxies around their rotational centre R1 *); each with 2-4 spiral arms.
 - every spiral arm has its own rotation R2,
 - every galaxy holds 150 ± 50 billion stars;
 - every star and its 2 - 10 planets rotate around their rotational centre R3,
 - every planet with its satellites rotates around its rotational centre R4,
 - those satellites rotate individually around their rotational centre R5.

Galaxies experience 5 - 8 rotational movement relative to C which are all larger than 30 Km/s.

*) Because of an average deflection of approximately 1 degree per 10 - 40 millennia on all electromagnetic radiation, it is likely that all electromagnetic but also particle radiation exhibit spiral trajectories with a radius of approximately 5 - 15 million light-years and a 'pitch' of about 3 - 5 million light-years!

This minute deflection makes it possible for electromagnetic and particle radiation to travel for about 14 billion years but have travelled only 2 - 3 billion light-years relative to the centre C of the universe. The author seriously considers the fact that we do not live in a universe that's 13,8 billion years across but one with a radius of only 2,5 – 3,0 billion light-years. The radius of this universe is a factor of 6 – 10 smaller than previously assumed.

Multiple forms of double counting of galaxies occur within the universe, making the true number significantly smaller than 4 - 20 billion. Only modelling the universe and the cycle of the universe can shed light on this.

VI) Impulse and momentum:

- The rectilinear movements of the universe from C + accompanying impulse and, when the universe contracts, towards C as well as the distribution of impulse among the different movements in the universe:
- The distribution of total momentum among the different rotation points. These are a) the cumulative rotational movements around C, the centre of the universe, among galaxies and b) the rotational movements that occur within each galaxy.

Every galaxy has its own rotation points with accompanying momentum relative to: R1 (galaxies), R2 (spiral arms), R3 (stars), R4 (planets) and R5 (satellites).

VII) Gravitation and gravitation energy

During the first phase, the universe expands in the form alternating layers of monospheres filled with loose protons and electrons. No atoms are present at this phase. Without atoms, gravitation is also non-existent!

The formation of the hydrogen atom, together with velocity, brings gravitation and thus gravitation energy back into the universe. Gravitation is not directly related to mass, only an indirectly through the 'shell' electrons of the atom and the (rotational) velocity of the atom in the universe. If an atom does not move relative to C, its gravitation is zero and its other physical and chemical forces of the atom are also zero. Gravitation energy relative to the centre of the universe C is also zero in this case!

Gravitation is radiation lacking mass, charge, magnetic spin. The trajectory of gravitation is not deflected by the electric and magnetic fields of galaxies nor by the gravitation fields of galaxies themselves. Gravitation is the only 'force' of the atom with a range as large as the universe. The gravitational field of the present universe reaches out to a distance of several tens of billions of light-years.

Gravitation is the only force of the atom linearly related to velocity and rotational velocity. The total amount of gravitation varies with the velocity/velocities of matter. This means the total amount of gravitation energy in the universe varies during the cycle of the universe! Gravitation is essential because it dictates the movements of all regular matter/atoms and of all black-hole matter/black-hole atoms in the universe.

After the atom is formed, gravitation immediately begins reducing the expansion velocity of the universe. This expansion velocity is converted to rotational velocity, visible in all galaxies in the universe. Over time, more and more expansion velocity is converted to rotational velocity and to 6 - 11 rotational movements between galaxies and within galaxies with rotational movements around the rotation points R1, R2, R3, R4, R5.

Inevitably, gravitation completely stops the expansion of the universe. This moment occurs simultaneously everywhere relative to the moment this universe started. By then, the entire galaxy and all emitted electromagnetic and particle radiation is absorbed by the central black hole through the formation of protons/electrons, hydrogen, nuclear fusion, atoms \geq beryllium, black-hole atoms. At the end of the expansion phase, rotational gravitation of central black holes initiates the contraction of the universe.

Gravitational energy always involves at least one point of reference C with additional movements relative to multiple points of reference; R1, R2, R3, R4, R5. Galaxies move relative to each other in a variety (5-8) of movements, creating a complex aggregation of movements, forms of gravitation and gravitation energies. 'Dark' energy largely consists of not yet identified forms of gravitational energy.

Only modeling the universe and the cycle of the universe can provide insight into the movements of matter with accompanying varieties of gravitation and gravitation energies.

During every step of the cycle of the universe, the following is determined:

- The varieties of gravitation and gravitation energy present during the cycle of the universe:
- The radial gravitation energy of regular matter and of black-hole matter relative to C. Gravitation is the driving force behind the decrease of expansion and (in time) contraction of the universe. Gravitation and accompanying gravitation energy are the driving force behind the cycle of the universe:
- The tangential gravitation energy of matter and black-hole matter between galaxies and relative to C, and within one galaxy relative to the rotational centres R1, R2, R3, R4, R5.
- At the scale of the universe, determining: 1) the radial kinetic energy and impulse 2) the tangential kinetic energy and momentum and 3) gravitation energy of galaxies relative to C and within galaxies relative to all R1s, R2s, R3s, R4s, R5s:

Lacking models, it is very difficult to separate and determine the forms of kinetic and gravitational energy during the 29 steps of the cycle of the universe. This can only be realized by modelling the 29 steps of the cycle of the universe as a whole.

VIII) Space as the distance between the spherical shell of the universe and the centre C of the universe:

The universe comes into being from the Little Bang black hole which, during the Little Bang, disintegrates into an equal number of protons and electrons. For more on this, see **document G6**. The author proposes a universe like a balloon with a spherical shell, in which currently 4 - 20 billion galaxies reside around one unchanging centre C of the universe. The radius of this sphere is the same everywhere at 2,5 - 3,0 billion light-years.

The radius of the spherical universe is determined by the distance of current galaxies relative to the centre C of the universe, considering electromagnetic radiation is not deflected! Outside of the spherical shell of the universe no celestial bodies are found. Only electromagnetic radiation, particle/cosmic radiation and gravitation are present.

The author proposes that all varieties of electromagnetic and particle radiation are subject to a very small deflection of about one degree per 10 - 40 millennia. This deflection is caused by the fractional parts of charge and magnetic spin of such radiation on the one hand, and by the presence of electric and magnetic fields in the universe.

In this way, electromagnetic and particle radiation do not have straight trajectories but spiral trajectories with a radius of approximately 5-10 million light-years and a 'pitch' of about 3-5 million light-years.

Because of this spiral pattern of radiation, the universe appears from earth not as a shell of a sphere, but as space, rather uniformly filled with galaxies. The light from one galaxy can reach earth from multiple paths. This causes the universe to appear to contain many more galaxies than it actually does. This minute, practically imperceptible deflection causes a completely distorted view of the universe!

Because of the deflection that indubitably occurs with all forms of electromagnetic and particle radiation, the universe may be 6 - 10 times smaller than the author proposed in the description of the cycle of the universe in **document G7**.

-) Time:

Time is the interval during which matter reaches its position on the spherical shell of the universe relative to C. (See **postulates chapter 6.5 document G7**)

-) Space; is space in the universe limited or limitless:

Space is primarily defined by the presence of matter in the form of atoms/celestial bodies and their position relative to the centre C of the universe. See document G2 on time, space and gravitation. The minimal dimensions of the universe are that of the Little Bang black hole, with a radius of around 0,05 – 0,1 billion km. All regular and black-hole matter is, in principle, located on this spherical expanding and later contracting shell of the universe around C.

Gravitation is the only form of radiation that is not deflected. For gravitation, 'space' is literally limitless. There is however little point in referring to the area outside $2,5 \pm 0,5$ billion light-years around C as 'space' and/or 'time' because any form of matter/mass, charge and magnetic spin is completely lacking. The space of the universe fades in to absolute nothing-ness with only gravitation radiation remaining.

During every step of the cycle of the universe, the following is determined:

- The (estimated) current distance of regular matter and central black holes relative to the centre C of the universe, expressed in light-years to billions of light-years, and the increase or decrease of those distances.
- The (estimated) distance of particle radiation and electromagnetic radiation relative to C and relative to the principally spherical shell of the universe in light-years to billions of light-years. Those forms of radiation were and are still emitted there.
- The increase or decrease of the distance of particle and electromagnetic radiation relative to both C and to the shell of the spherical universe from which this radiation originated.

(All forms of electromagnetic and particle radiation are, over a period of billions of years, captured in an orbit around one of the (central) black holes of the galaxies. In these orbits, all electromagnetic and particle radiation is transformed back to matter, exclusively in the form of regular protons and regular electrons. This process is described in **document F1c**.

IX) Depth of the spherical shell of the universe:

At the end of the previous universe, all matter (and radiation) of the universe was contained in one gigantic spherical Little Bang black hole with a estimated radius of 0.05 - 0,1 billion Km. This constitutes the minimum dimensions of the universe. During the growth of this Little Bang black hole, gravitation decreases until the electric repulsion between black-hole atoms is larger than the critical black-hole gravitation (Cribhgra), **figure 13 of G8**, which causes the Little Bang at the end of the contraction phase of the universe.

During this Little Bang, all black-hole atoms eventually disintegrate into an equal number of protons and electrons, and nothing else. The released protons and electrons align themselves in alternating monosphere layers. These layers expand uniformly at a velocity of around 100 – 150 Mm/s or 1/3 - 1/2 rds of the speed of

light, away from the centre C of the universe. The electrons also experience another $2/3$ rd of the speed of light within their layers around C.

During this Little Bang, the protons and electrons are all endowed with movement vectors specifically enabling the formation of the hydrogen atom later. During the Little Bang, the physical space is lacking for hydrogen formation, and the difference in velocity between protons and electrons is too great.

For hydrogen to form:

- 1) the distance between the layers of proton and electron monospheres must expand to that of within the hydrogen atom,
- 2) the speed of electrons must decrease from $2/3$ rds of the speed of light to around 2,2 Mm/s.

It takes around 5 – 10 billion years for both conditions to be met, assuming a universe with a radius of 2,5 – 3,5 billion light-years. The expansion of the universe starts with an expansion velocity of about $1/3$ – $1/2$ rds of the speed of light c and in the form of alternating layers of proton and electron monosphere layers; no atoms and thus no gravitation exists!

In the period right after the Little Bang, the radius of the Little Bang black hole, by then disintegrated into loose protons and electrons, increases substantially by a factor of many billions. The volume of the former Little Bang black hole increases to a volume with a radius of 500 – 750 light-years and by a factor of at least 10^{30-40} and possibly more. From the moment a hollow structure forms, the volume of the matter in the spherical shell stays relatively constant for a long time.

During the expansion of the universe, the breadth of this expanding spherical shell of the universe uniformly decreases over time (around 5 – 10 billion years) to several tens of meters – some kilometers! During this period, the distance between the monosphere layers of protons and electrons increases to the distance within the hydrogen atom, and the orbital velocity of the electrons decreases from $2/3$ rds of the speed of light to about 2,2 Mm/s; the orbital velocity of the electron in hydrogen atoms. See **document G7 and step 6** of the cycle of the universe.

When, out of one proton and one electron, hydrogen atoms and hydrogen gas are formed, gravitation is also brought into being. From then on, gravitation slows down the expansion of the universe, creating the 250 ± 80 billion rotation points R1 in the shell of the universe.

Gravitation and the cooling of hydrogen gas to below its saturation limit causes the hydrogen to accumulate at these rotation points R1. 4 – 20 Billion gigantic spheres of pure liquid hydrogen are formed in the shell of the universe, and the first uniform shell is divided into 4 – 20 billion similar areas with one large central hydrogen sphere.

These pure hydrogen spheres get ever larger and hotter, with temperatures rising to many millions degrees Kelvin. After turning into plasma, these hydrogen spheres all result in a hydrogen supernova explosion, forming the current central black hole of galaxies. From the expelled remnants of these 4 – 20 billion supernovae, galaxies form around the black holes, all containing approximately 150 ± 50 billion stars and their accompanying planets.

These hydrogen supernovae occurred about 20 – 25 billion years ago and coincided with the formation of central black holes and of proto-galaxies. The light from these supernovae has long ago been recaptured by the central black holes and there transformed back into matter, in the form of protons/electrons and atoms. Because the light of these hydrogen supernovae/Big Bangs has disappeared, it cannot be imaged; not even using the Hubble space telescope!

This recapture and transformation to matter of light around black holes severely limits the observation horizon of the universe. The farthest known light has travelled a distance of about 13,8 billion light-years, and in all likelihood has followed a spiral trajectory. This means that the farthest galaxies:

- a) are much closer than 13, billion light-years, ‘universe-wide’,
- b) have their light reach earth in multiple, possibly tens of spiral trajectories,
- c) manifest themselves on earth in multiple images because of these spirals.

This necessitates great caution interpreting observations from the universe.

During every step of the cycle of the universe, the following is determined and estimated:

- Current depth of the spherical shell of the universe:
- Increase or decrease of this depth:
- The radius of the shell of the universe:
- The inner- and outer radius of electromagnetic and particle radiation, emitted by regular matter and black-hole matter residing in the spherical shell of the universe.

X): Universe clock time:

For all matter, universe clock time starts with the super cold Little Bang at the centre C of the universe at $t = 0$ and ends at the end of each cycle after about 2 - 3 billion years with the occurrence of the next Little Bang.

At the next Little Bang, universe clock time starts again, for all matter, at $t = 0$. The beginning and end of universe clock time are as such inextricably linked to both the Little Bang and the centre C of the universe. The universe goes through a cycle of 30 steps. During the entire cycle, universe clock time is relative to the moment of Little Bang (component of time) and to the centre C of the universe (component of location).

Universe clock time therefore is based on three essential components:

- 1) The moment the new universe started at the Little Bang at $t = 0$,
- 2) The centre C of the universe where this Little Bang took place,
- 3) The phase of the cycle of the universe.

Time, or universe clock time, is as such not an independent physical value! See also **G2 and chapter 6.5 G8**.

All particle matter (atoms), all forms of particle and electromagnetic radiation possess mass, charge, magnetic spin and kinetic energy. For all particle matter and all forms of radiation, the same progressive relationship between 1) time, 2) location relative to C and 3) phase of the cycle of the universe.

Only under these conditions, the millions of central black holes returning to C at the end of the cycle of the universe experience no discrepancy between time and location. It is under these conditions that all matter in the universe can return to the same centre C of the universe, to form one large Little Bang black hole.

Gravitation causes:

- a) a continuous and direct relation between the positions of black holes within the shell of the universe on the one hand, and
- b) indirectly, a continuous relation of those central black holes relative to C.

In this light, Einstein was right about there being a relationship between time, space and gravitation. This relationship is, however, slightly different than he supposed. See **documents E3 and E3-1**.

During the entire cycle of the universe, all forms of matter and with it all protons and electrons possess the exact same, linearly progressive combination of universe clock time and location relative to C. Accordingly, this in all probability also applies to all forms of electromagnetic and particle radiation.

After the Little Bang, true absolute universe clock time is imperceptible; see **figure 29 of G8**.

Absolute universe clock time is best visible from C. From C, one can see all matter in the universe at exactly the same universe clock time, although light also takes many millions/billions of years to reach C. Also, it is impossible to view any object in the universe without some kind of delay.

Universe clock time cannot be determined or measured anywhere in the universe. Universe clock time can only be deduced from a mathematical model of the universe, and this will always be an approximation!

From any point in the universe but C, we perceive objects from the same absolute universe clock time with time differences which are larger when a) the point of observation is farther from C and b) the distance between observer and observed along the spherical shell of the universe becomes larger! See **figure 29 of G8**. From any point in the universe but C, time is not absolute but relative!

During every step of the cycle of the universe, the following is estimated:

-) The start- and end time of the step relative to a) the moment of Little Bang or the start of absolute universe clock time at $t = 0$ and b) the position and distance of the object relative to the centre C of the universe:

-) Duration of the short-term chemical and nuclear physical steps or moments in the cycle of the universe. A moment describes changes that occur in a manner of seconds to days:
-) Duration of long-term physical steps or periods between these chemical or nuclear physical steps. Periods describe changes and processes lasting millions, billions to sometimes trillions of years.

XI): Temperature:

At the beginning of the Little Bang, all black-hole atoms break down at the exact same time. With this simultaneous disintegration of all black-hole atoms, temperature as a physical phenomenon disappears completely from the universe. Temperature returns about 5 – 10 billion years later with the return of the hydrogen atom. In the regular atom, the atomic nucleus has ample room to vibrate. Therefore, regular atoms can have temperatures of 0 degrees Kelvin to many millions of degrees Kelvin; the plasma phase.

Black-hole atoms have electron shells that have collapsed to close to the atomic nucleus. Because the nucleus in these black-hole atoms are completely contained within these compacted shells, the atomic nuclei are almost completely prevented from vibrating.

This causes all black-hole atoms and all black holes to reside near a state of absolute zero. This also applies to black holes situated in the core of large stars, where the temperature around that black hole is many millions of degrees Kelvin!

All black holes and black-hole atoms most likely have a temperature of 2,7 degrees Kelvin. This would make the temperature of black holes equal to the background temperature of the universe. During every step of the cycle of the universe, the following is determined and estimated:

-) The temperature of regular matter/atoms relative to absolute zero at 0 degrees Kelvin. The temperature of black holes resides near zero degrees Kelvin:
-) Changes in temperature of regular matter:

XII) THE RATE OF DEFLECTION OF PHOTONS, PHOTONS AND PARTICLE MATTER IN THE UNIVERSE:

All higgs particles (the smallest massive particles), all neutrino's, photons and all particle/cosmic radiation possess electric charge and magnetic spin. All stars, black holes and galaxies emit electric and magnetic fields. With the exception of gravitation, all forms of radiation are deflected by these fields, bending their trajectories into spirals.

The question is how large these deflections are for each of these forms of radiation.

***4) DISCUSSION:**

The limiting preconditions and laws of conservation within the universe are expanded on in **document G4**, on the 9 laws of the universe. Within these laws, the 29 steps of the universe as well as the transitions between them are definable qualitatively using the twelve basic parameters of the universe described above.

In the cycle of the universe proposed by the author, each of the 29 steps flow seamlessly into the next and the reasons for and moments of transition can always be qualitatively determined. There is no form of interruption or disjunction. The extraordinary role gravitation plays causes the cycle to be completed in a completely energy-neutral fashion. See **document G7**.

The author imagines the universe as an endlessly repeating cycle of 29 steps, always completed in exactly or almost exactly the same, perfectly energy-neutral manner. Every step of the cycle, as well as the cycle as a whole can be modelled mathematically.

The problems surrounding 'dark matter' can be solved by altering Newton's law of gravitation by adding a factor of $\cos a$. See **figure 3 document E3-1**. Modelling can further dissect gravitation into the 9 – 11 relevant movements subjected on matter in the universe. This dissection of velocities is necessary because of the linkage with kinetic energy and indirectly to gravitation energy.

The 'dark energy' can be reduced by:

-) charting, through modelling, the different kinds of kinetic energies as they are distributed among radial (impulse) and transverse (momentum) and
-) separate from that, modelling gravitation energy in the universe relative to the centre C and relative to the various points of rotation within galaxies.

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