

**- STRUCTURE MATHEMATIC MODEL CYCLE OF THE UNIVERSE,  
- PHYSICAL, CHEMICAL AND NUCLEAR TIPPING POINTS MODEL  
- QUANTIFICATION UNIVERSE & ENERGY-NEUTRAL CYCLE:**

**\* 0) SUMMARY:**

- ) The universe endlessly passes exactly the same cycle again and again. Overall that cycle of the universe is settled energy-neutral. The universe as whole acts like a perpetuum mobile! That cycle consists of 29 physical, chemical and nuclear physical steps/ tipping points. The universe starting one point **center C** all sided the same actually is: 1) a universe-spherical-shell/ USS as well 2) a 100% closed system for all kinds of mass, matter, energy and for all kinds of EM, particle and all forms of cosmic radiation.
- ) One whole cycle includes **13 long physical steps** and **16 short chemical and nuclear steps/ tipping points**. Extraordinaire: in each cycle **step 29** is exactly the same again as **step 1**. Thus **step 29** in each cycle is **step 1** of the next cycle of the universe! So the universe in itself acts like an endlessly ongoing perpetuum mobile!
- ) Each of those *13 long physical steps* in the cycle begins and ends with 1 - 4 short chemical and/ or nuclear steps; in total *16 tipping points* in the cycle of the universe.
- ) These *16 tipping points* in that model of the universe adjusted that universe to return to **step 1** at the end of each same, energy-neutral, cycle of the universe/ USS. Therefore the universe & cycle can be modeled mathematically. Through that model the universe & its cycle can be qualified as well quantified in detail from the first to the last second!
- ) This energy-neutral cycle requires a different view on: a) the universe as a universe-spherical-shell, b) gravitation and c) associated gravitational energy (= 'dark' energy).
- ) That mathematical model solves the problems regarding surrounding:
  - "dark" matter (= universe/ USS which contains much more gravitation) and
  - "dark" energy (= USS + an enormous amount of unrecognized gravitational energy).
- ) The *13 physical phases* in this mathematical model must then be calibrated via *try and error* in such a way that **step 29** again exactly equates to **step 1** of the cycle in terms of mass, matter and energy. A universe with narrow limits for the amounts of: 1) mass, 2) matter, 3) energy, 4) gravitational energy, 5) space, 6) time / universe-clock-time/ UCT.
- ) Through that model both the entire past of this universe as well the entire future of the universe can be quantified in detail. Then will be known within how much mass, matter, energy, time and space resides in the universe and such a cycle is possible.

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\*) Thanks to the substantive comments by **Franklin Roos**,

\*\*) The beautiful figures in the documents quoted by **Adarshi Yadava**,

\*\*\*) Copyrights; see **document A6** [www.uiterwijkwinkel.eu](http://www.uiterwijkwinkel.eu) .

## \*1) INTRODUCTION:

### -) General:

The universe is based on a 100% closed system for: a) mass (photons / neutrinos, cosmic rays), b) matter (ordinary and black hole matter / atoms) and c) for kinetic energy.

In documents **G7 (text)**, **G8** (> 150 figures) and **G12 & figures** [www.uitewijkwinkel.eu](http://www.uitewijkwinkel.eu) , the author deduced the energy-neutral cycle of the universe that repeats itself endlessly in **29 steps** and in a period of about 35 – 50 trillion ( $10^{12}$ ) years! So space and time are finite! Anno 2021 the author describes this cycle of the universe only qualitatively. The author is searching Universities & Scientific Institutes for mathematically modelling and quantifying the universe & its cycle.

*Extremely curious* in this cycle is that **step 1** of each cycle is exactly the same as the last **step 29** of this cycle. This cycle of the universe endlessly unwinds itself energy-neutral driven for the *initial expansion* by the electrical and magnetically spring tension inside and between mono-layers of protons and electrons. **Document G6 & figures 1 - 30 document G8.**

The universe starts as universe-spherical-shell/ USS. The first about 10 billion years this USS expands as mono-layers of single protons/ electrons at about the speed of light. Thus without any inflation as well without atoms and thus without gravity. **Documents E3 (text), E3-1 (figures) and E3-2 (structure gravity).**

After about 10 billion years protons and electrons form hydrogen atoms/ molecules. Now the universe/ USS has a radius of about 9 - 10 billion light years. With hydrogen atoms/ molecules gravity and gravitational energy arise. An enormous amount of gravitational energy is added to the cycle of the universe. This gravitational energy is 100% free of charge and equals the “dark” energy in the universe/ USS!

Starting that moment gravity slows down the expansion of the USS. After about 500 billion years the expansion of the universe/ USS will stop. Now finally due to gravity this USS contracts again. This free of charge added gravitational energy (= "dark" energy) is now used ensuring a very controlled contraction of the universe/ universe-spherical-shell/ USS. A super soft Crunch instead of a Big Crunch! That cycle repeats itself exactly the same; endlessly. Literally to infinity like a perpetuum mobile. **Document G16.**

The quantitative filling of the universe and its fixed cycle of 29 steps/ phases is only possible after mathematical modeling of this universe & its cycle.

### -) Universe / universe-spherical-shell/ USS is 100% closed system:

Starting from one point, **center C** universe, that universe must now in fact be a thin universe-spherical-shell/ USS with a radius of approximately 10 - 12 billion light years. That universe-spherical-shell is now occupied with billions of more or less the same **spiral (S) galaxies** and **elliptical (E) galaxies** divided over the USS into 4 - 20 million identical clusters each containing 4 - 6 thousand or may be more same **spiral (S) galaxies** and **elliptical (E) galaxies**. Within the center of those clusters, larger so-called **elliptical or M galaxies** have already been formed due to collisions in the meantime between galaxies.

Only in that, one galaxy, thin universe-spherical-shell/ USS extremely low concentrations of hydrogen and helium are present.

These gases are necessary and indispensable as an “ether” for conducting all forms of EM radiation, all forms of particle radiation and all forms of cosmic radiation except gravity and time/ universe-clock-time/ UCT. In this thin USS space and time/ UCT are perfectly curved without generating gravity!

That just one galaxy thin, universe-spherical-shell/ USS is surrounded by an *inner region* and an *outer region* with an absolute 100% vacuum into which no form of radiation with waves, particles, matter and kinetic energy can penetrate! Exclusively gravity and universe-clock-time/ UCT can. Both are without any form of waves, particles and energy. Thus UCT and gravity aren't limited by the speed of light  $c$ !

All EM radiation and cosmic particle radiation can only move in this thin universe-sphere-shell/ balloon. So all mass, matter and energy as well all billions of galaxies are 100% jailed within this USS!

This universe-spherical-shell/ USS therefore forms a 100% closed system for all phenomena with waves, mass, matter and energy:

- a) all radiation based on waves and particles of mass (neutrinos and photons),
- b) all matter [matter = mass (constructions of photons / neutrinos) +  $\frac{1}{2} mc^2$  kinetic rotational / angular energy],
- c) all free kinetic energy in the form of photons and neutrinos and
- d) for shock waves of (gravitational) energy as observed by **LIGO / VIRGO**.

Those shock waves of gravitational energy can only be transmitted through that “ether” of H, H<sub>2</sub> and He gasses exclusively present inside this one galaxy thin/ thick USS. Therefore the universe/ USS is based on closing balances for mass, matter and kinetic energy. **Document G12 & figures 36a – 36r G8/ G12.**

**-) Universe only open to gravity and universe-clock-time/ UCT:**

The universe-spherical-shell is only 100% open to: 1) gravity and 2) the universe-clock-time/ UCT. Gravity and universe-clock-time/ UCT are the only physical phenomena without: 1) waves, 2) particles, 3) mass / matter and 4) without kinetic energy!

These "leakage" exceptions currently now include only *gravity* and *time/ universe-clock-time*.

So *gravity* and *universe-clock-time* aren't bound to the limits in the theory of relativity and aren't limited by the speed of light  $c$ . *Gravity and UCT* move and spreads with *infinite speed*! Both leave the universe / the universe-spherical-shell immediately the very same moment! Both disappear into that absolutely empty outdoor vacuum space. Gravity and time both haven't any mass, matter and kinetic energy. Therefore this “leakage” has no consequences for the balances of the universe / universe-spherical-shell for mass, matter and energy!

**Note:** the universe-spherical-shell/ USS however is 100% closed system for shockwaves of gravitational energy as measured by **LIGO/ VIRGO**! (LIGO/VIRGO don't measure gravity!)

**-) The universe / universe-spherical-shell goes through a fixed energy-neutral cycle consisting of 29 steps:**

The universe cycle consists of **29 steps** and is divided into:

**-) 13 long physical-energetic steps,**

Each of these steps takes millions to many billions up to trillions of alternated years.

Those physical steps are separated from each other by:

**-) 16 short chemical and nuclear steps/ tipping points** that occur universe wide at the very same moment. Each of these *16 short steps/ tipping points* takes just seconds to a few hours at the most seize. During these chemical/ nuclear steps the physical/ chemical forces change by arising or disappearing.

So at each step this mathematical model of the cycle of the universe has to be adapted as well!

**-) Steps are strictly separated from each other by physical, chemical and nuclear physical changes; a kind of tipping point:**

These *29 events/ phases/ steps* are separated from each other by clearly naming and describing only one or a few: 1) purely physical steps, 2) chemical steps or 3) nuclear steps. Overall, those *29 steps* together form one orderly sequence and one coherent and predictable unfolding whole in such a structure that **step 1** is exactly the same as **step 29!** Incredible!

**-) At each step, model universe must be adjusted / adapted:**

At each of those tipping points, the starting points of the mathematical model of the universe / universe-spherical-shell/ USS must be adapted and adjusted. **Document G15** describes in outline how that cycle of the universe can be modeled mathematically. Via that mathematical model, the universe and its cycle can be qualified as well quantified for any arbitrary moment in the past as well as for any arbitrary moment in the future of the universe / universe-spherical-shell/ USS. So from the first second to the very last second of this cycle!

Important the outcome also determines as well within which *quantitative limits* such a universe model is possible. These step-by-step changes are further elaborated in this **document G15** and described in more detail.

## \* 2) NON VARIABLE FIXED UNITS / PARAMETERS UNIVERSE & UNIVERSE CYCLE:

The universe is based on *nine Laws of the universe* (document G3) [www.uiterwijkwinkel.eu](http://www.uiterwijkwinkel.eu) and is a 100% closed system for all forms of waves, mass, matter and energy. That universe / universe-spherical-shell/ USS endlessly goes through the same energy-neutral cycle of **29 steps**.

The universe / universe-spherical-shell and cycle are based on:

-) a number of *17 fixed and constant quantities* elaborated in **Scheme 2 - 1** active at the level of the universe and

-) a number of *12 variable quantities active* at atomic and subatomic level elaborated in **chapter 3 and Scheme 3 - 1:**

### Scheme 2 -1: THE CONSTANT FIXED QUANTITIES AND VALUES OF THE UNIVERSE:

#### -A) The universe macroscopically:

-1) The universe is based on *nine Laws of the universe*. These nine laws of the universe are formulated in **document G3**. The most important are:

-) The universe now in fact is a universe-spherical-shell/ USS. This USS is a 100% closed system for all forms of mass, matter and kinetic energy present within that universe-spherical-shell,

-) This universe endlessly goes through the same energy-neutral cycle of **29 steps** as a perpetuum mobile,

-) The driving force of the universe cycle relies on electrical & magnetically forces between protons and electrons arranged in mono-layers after the "Little Bang" (**document G6 & figures 1 – 30 G8**) causing the expansion of the universe/ USS.

Gravity slowed down the expansion during the last 40 billion years and will completely slow down further for the next 350 - 450 billion years. Then gravity causes this universe-spherical-shell to contract again towards **center C** of the universe,

-) The universe has a **fixed center C**,

-) The exact same linearly advancing universe-clock-time/ UCT always and everywhere applies,

-) That universe-clock-time/ UCT cannot be measured directly and can only be derived by mathematical modelling the cycle of the universe,

-) That thin universe-spherical-shell/ USS expands everywhere with the same speed with respect to **center C**; the same is true for the contraction of the universe/ USS,

-) That expansion speed of the USS is slowed down by gravity. The kinetic energy released in this process causes galaxies to rotate faster and faster on their axis causing more gravity,

-) Everywhere within that universe-spherical-shell during nuclear fusion heavier atoms are formed from hydrogen that are imperatively ordered in accordance with the elements of the periodic table,

-) The same periodic table applies everywhere in the universe-spherical-shell/ USS and thus the same physical / chemical forces and bonds apply throughout the whole universe,

-) Therefore everywhere within that universe-sphere-shell the same physical laws apply as on planet Earth.

**-2) Furthermore, viewed macroscopically, that universe is based on:**

a) An equal number of protons and electrons. (1 neutron = 1 proton + 1 electron) These protons / electrons have, in addition to the characteristic matter (matter = mass +  $\frac{1}{2} mc^2$  internal rotational/ angular energy) and external kinetic energy, only two constant elementary forces which arises already the Higgs, snare, string level and which are speed independent:  
1) Elemental electric charge,  
2) Elemental magnetic spin and  
b) These loose protons and electrons do not generate gravity of their own.  
Gravity is generated exclusively by atoms and specifically by the "shell"-electrons of atoms / matter due to velocities/ speeds of the atom in the universe. **Documents E3 , E3-1, E3-2**

**-3) The total amount of mass, charge and spin in the universe is always constant.**

Mass cannot be converted into energy / photons via  $E = mc^2$ . Mass, charge and spin are not equivalent to energy, as **Einstein** stated. Mass, charge and spin are the result of the 3 rotations/ angular speeds of elemental Higgs, strings, snares around their 3 axes. These 3 rotations causing three distortions that result in:

- ) two elementary super-symmetrical Higgs, strings, snares of the proton and
- ) two elementary super-symmetrical Higgs, strings, snares of the electron.

As a *protest* against those 3 distortions these 4 Higgs, strings, snares generate:

- a) elementary mass or anti-mass,
- b) elemental positive or negative electric charge and
- c) elementary parallel or anti-parallel spin.

Elaborated in **Document F1a 2014 & Figures 1 - 6.**

*Fundamental:* That mass and anti-mass present in Higgs particles, strings and snares cannot annihilate! Thus **Einstein's**  $E = mc^2$  isn't true for  $m = \text{mass/ anti mass!}$  Thus  $E \neq mc^2!$

**Einstein's**  $E = mc^2$  is only true and possible in case of annihilation equivalent matter / antimatter!

**-4) Transition mass ↔ matter:**

From those Higgs particles, strings, snares can be built just neutrinos and photons of the proton and those of the electron. These first level particles consists as many Higgs particles, strings, snares with mass as particles anti mass. So the net measured mass of neutrino's and photons overall becomes zero. **Document F1b & figures.**

Mass is present in these neutrinos and photons, but overall zero and thus not directly measurable!

In **document F1c & figures** this not measurable *mass* in photons is transformed into *measurable second level of matter or antimatter* of protons/ electrons by adding  $E = \frac{1}{2} mc^2$  to (internal) kinetic rotational energy!

Matter = mass (photons/ neutrino's) + added internal  $\frac{1}{2} mc^2$  angular energy!

The formula  $E = 2 \times \frac{1}{2} mc^2 = mc^2$  only applies in case of annihilation equivalent matter/ antimatter! So **Einstein's** famous formula  $E = mc^2$  only applies to  $m = \text{matter/ antimatter}$  and doesn't applies for  $m = \text{mass!}$

During annihilation, matter / antimatter breaks down into photons of infrared and / or those of light. Within those photons, during annihilation all mass present remains 100% intact! Within photons, as much all mass as anti-mass is still present. **Document F1b & Figures 1 - 6.**

**-5) In the universe within the USS this transition mass (present in photons) → matter (protons / electrons) takes 13.8 billion years to complete:**

Within a period of 13.8 billion years, all photons and neutrino's present within the universe spherical-shell/ USS with *mass* are transformed back into *matter* in the form of exclusively normal protons and electrons only by adding  $E = \frac{1}{2} mc^2$  rotational/ angular energy.

**Document F1c & figures.**

Starting protons and electrons only the simplest atom can be constructed in the form of a hydrogen H atom. **Document F1d & figures.** So all photons and neutrinos older than 13.8 billion years, and all information attached to them, disappear completely as a result of that transition from *mass* → *matter* in the form of protons/ electrons and hydrogen/ new stars!

For that reason, we can only observe 13.8 billion (light)years of the universe and look back 13.8 billion years back in time and into the curved universe-spherical-shell/ USS. Inside that perfectly curved universe-spherical-shell, however, past, time and space extend much further. Without mathematical proved model now estimated about 40 – 50 billion lightyears instead of that now possible 13.8 billion (light)years. **Figure 36i G8 / document G12**

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**-6) At the beginning and at the end of each cycle is the total number of protons and electrons in the universe again equal to each other.**

The universe as a whole can be regarded as uncharged. The number of protons / electrons is currently estimated at approximately  $10^{80}$ -  $10^{85}$  may be more. Total amount of positive charge of protons  $10^{80}$  to  $10^{85}$  or more. Total amount of negative charge of electrons  $10^{80}$  to  $10^{85}$  may be more. The universe overall is electrically neutral!

Be aware the *Laws of thermodynamics* are just active starting the moment protons and electrons form the *hydrogen atoms/ molecules*! These Laws aren't active during the first about 10 billion years after the Little Bang! **Documents G6 and G16.**

The first period of 10 billion years of our universe only an equivalent number of protons/ electrons are present. The atom was absent and so were the *Laws thermodynamics*! This very long period atoms as well temperature, gravity/ gravitational energy and physically and chemically forces were absent as well.

**-7) In nuclear fusion, starting hydrogen, only the elements of the periodic system to form:**

Through nuclear fusion of hydrogen in stars and during supernova explosions universe wide only the elements of the periodic table can be formed starting hydrogen. These atoms are constructed with:

- a) just protons/ electrons as building blocks and
- b) sub-electron shells filled for energetic reasons with 2 or 8 electrons or 1 - 4 electron pairs arranged as a tetrahedron of maximal 4 electron pairs.

Universe wide the constructions of the elements periodic table are exactly the same.

Elaborated in **document F1d & figures.**

Due to speed in the universe/ kinetic energy these "shell"-electrons of those elements and elements generate 4 types of forces:

- a) gravity,
- b) 2 physical forces,
- c) 2 chemical forces with which bonds can be formed and
- d) mechanical forces from the interaction of electron shells ↔ with atomic nuclei.

This period with atoms the *Laws of thermodynamics* are active as well all other atom related *Laws of nature*.

Gravitational, physical and chemical forces are generated from the "shell"-electrons of atoms due to velocity / kinetic energy. These forces includes 3 types.

**Type 1** is generated from the single "shell" electron (1) of atoms,

**Type 2** is generated from the "shell" electron pair (2),

**Type 3** generated out of the sub-electron shells (3) containing a maximum of 8 electrons or 4 electron pairs.

### **-8) Force and Binding components all linked to specific speeds:**

All atoms in the universe are currently subjected to 9 - 11 different (rotation/ angular) speeds. Each of those 9 - 11 speeds of the atom in the universe results in the generation of its own force- and bonding-component related to that speed.

Of those 9 - 11 same speeds are:

- ) 4 - 5 of the same speeds present within clusters of 4 – 6 thousand or more galaxies. Within all 4 - 20 million clusters the same speeds relative to **center C** are present,
- ) 5 - 6 of the same speeds are present within all individual galaxies compared to the central black hole present in the center of each of those billions of galaxies and thus indirectly also 5 - 6 movements relative to the **center C** universe.

All atoms in the universe-spherical-shell are now subjected to 9 - 11 different speeds. Within each cluster, these speeds are always the same, with the same size everywhere in all clusters. Due to change in speed and the number of speeds, the 9 - 11 speed (not space related!) components of physical and chemical forces and bonds change quantitatively very slowly over time. See **chapter 3**. (The universe/ USS as whole is just 3D starting **center C**).

### **-9) Total amount of spin protons - the amount of spin electrons = 0,**

In the universe as whole there isn't any net spin.

## **- B) Energy-neutral cycle of the Universe in 29 steps:**

### **-10) With every new cycle the universe starts:**

- a) with the same number of protons/ electrons,
- b) with the same amount of radial kinetic energy and
- c) the same amount of transverse (tangential) kinetic energy,
- d) the same amount of electrical and magnetic energy that is expressed in the "primordial sphere" as spring tension.
- e) and thus with the same amount of kinetic energy immediately after the explosion of the "primordial sphere".

**-11) Every cycle of the universe always goes through the same 29 steps:**

Each cycle takes exactly the same time to the second. **Documents G7 (text) & G8 (figures)** [www.uiterwijkwinkel.eu](http://www.uiterwijkwinkel.eu) . The duration of one cycle is now estimated at 35 - 50 trillion ( $10^{12}$ ) years (**document G7**), The maximum duration of the universe clock time!  
Just like space this universe-clock-time/ UCT is finite and not infinite!

**-12) Minimum and maximum radius of the universe:**

The minimal radius of the universe will be a sphere filled with black hole atoms with radius approximately 25 - 50 million km. The maximum size of the universe/ USS will be a universe / universe-spherical-shell with a maximum radius of about 10 - 12 billion light years and in the form of 4 - 20 million *central cluster of black holes/ CCBH*  
For all cycles that minimum and maximum radius of the universe-spherical-shell/ USS for matter, electromagnetic radiation and particle radiation are always the same size.

**-13) Further improvement of LIGO techniques:**

**LIGO** techniques are essentially based on the observation and measurement of *shock waves* of (gravitational) energy freed at mainly collisions of blackholes. These **LIGO** techniques have a current "depth of view" of approximately 6 - 8 billion light years. Anno 2021 even less "depth of view" than that of light (13.8 billion lightyears).

These **LIGO** gravitation techniques are rather recent and undoubtedly can be improved considerably; estimated a hundred-thousand fold. Then it becomes possible to observe and measure the first *shockwaves of gravitational energy*. The oldest shock waves in the universe date from about 30 – 35 billion years ago.

In the long term it will be technically possible looking “back” in the history of the universe / the universe-spherical-shell up to a maximum of approximately 30 – 35 billion (light) years. Thus billions of years before the moment the Big Bangs galaxies occurred and galaxies started.

**-14) The first part of the universe cycle is and will remain technically invisible forever:**

The first technically invisible period of the universe spans about 20 - 35 billion light years. In any case, this first, *Berry period*, cannot be made/ obtained technically.  
Through deduction, the author has managed to fully deduce and describe that period and what happened. This first period can also be modeled mathematically and thus quantified. See **document G6, G7, G8 and G12** [www.uiterwijkwinkel.eu](http://www.uiterwijkwinkel.eu) .

**-C) Universe is shaped like a universe-spherical-shell/ USS with 4 - 20 million uniform clusters of galaxies:**

**-15) Start from fixed center C:**

Starting uniformly from one point, **center C** universe, that universe now has to be a thin universe-spherical-shell/ USS, which is divided into approximately 4 - 20 million almost identical clusters of galaxies, each filled with approximately 4 - 6 thousand may be more galaxies.

**-16) All millions of clusters with several thousand galaxies are equivalent:**

Within each cluster there is an equal amount of mass, matter, kinetic energy (rotating clockwise or counterclockwise) as well as equal kinetic energy and momentum clockwise or counterclockwise.

Seen over the entire universe-sphere-shell/ USS, the total momentum however is equal to zero. The universe-sphere-shell as a whole does not rotate and is absolutely stationary with respect to **center C**.

**-17) All galaxy clusters strive for maximum angular momentum conservation:**

Within all clusters of 4 - 6 thousand or more galaxies, however, the angular momentum is  $\neq 0$ . In fact, within all clusters all angular moments present in clockwise / counter-clockwise direction are saved and maintained as much as possible. The angular momentum of those 4 – 20 million clusters in the USS however is zero!

This rotational/ angular kinetic energy inside these clusters is needed to continuously slow down the gravitational acceleration of the universe-spherical-shell during the contraction of this USS towards **center C** to a fairly constant contraction speed of approximately 100 - 150 km/s. That universe-spherical-shell/ USS shrinkage ends super-soft *Little Bang* instead of with a *Big Crunch*!

### \* 3) THE TWELVE VARIABLE PARAMETERS OF THE UNIVERSE:

In **chapter 2** the fixed constant quantities of the *universe as a whole* are discussed.

Within the universe cycle there are *12 variable quantities / parameters* of the universe active at *atomic/ subatomic level*, which in **chapter 3** are now described in more detail. The universe endlessly goes through exactly the same overall energy-neutral cycle of 29 steps / phases like a perpetuum mobile.

**Step 1** equals **step 29** of the cycle. **Step 29** the same moment is **step 1** of the next cycle of the universe. The cycle of the universe is described in documents (**G7, G14, G15 text**), **G8 (figures)** and is made up of 29 steps:

- ) **16 short momentary steps/ tipping points** lasting from less than a second to minutes and
- ) **13 long physical steps** that take millions to many billions and even many trillions of years.

Those long physical steps are separated from each other by one or two short steps/ tipping points at each start as well at the end of each physical step. These *tipping points* are changes at the atomic level as arising forces and bindings universe wide the very same moment. Some changes in the rules!

Together these *29 steps* form one whole cycle of the universe. Each of those 13 physical/ energetic steps/ phases can be modeled mathematically on the basis of these 12 variable quantities/ atomic parameters named in the **Scheme 3 - 1** below:

#### **Scheme 3 - 1: THE TWELF VARIABLE BASIC PARAMETERS OF THE UNIVERSE AT (SUB)ATOMIC LEVEL:**

- I) Different forms of radiation:
- II) Transition from mass → matter by adding  $E = \frac{1}{2} mc^2$  internal rotational energy/ angular momentum:
- III) The nature of matter from protons / electrons and of atoms:
- IV) Forces present on ordinary matter / atoms and black hole matter / atoms:
  - IV-1) Forces of ordinary atoms divided into 9 - 11 velocity / kinetic energy vectors: Vector law by Uiterwijk Winkel:
  - IV-2) Forces of black hole atoms / matter; only gravity is present and relevant:
- V) Distribution of kinetic energy over the different forms of matter and different forms of linear speed and rotational/ angular speeds:
- VI) Distribution of momentum and angular momentum over the different forms of matter and the different forms of (rotational) speed,
- VII) Development of gravitational energy with respect to the center C of the universe, and later with respect to the 8 – 10 rotation points inside the USS:
- VIII) Development of space as distance / radius of the universe-spherical-shell/ USS to center C of the universe:
- IX) Thickness of the first expanding and later shrinking universe-spherical shell/ USS:
- X) Time/ universe-clock-time/ UCT elapsed since the super cold Little Bang. The time/ UCT at the start and at end of every conscious step:
- XI) Temperature of ordinary matter and temperature of black hole matter:
- XII) Degree of deflection of neutrinos, photons and particle matter (cosmic rays) in the universe; 100% reflection of these particles within the universe-spherical-shell:

## **Ad I) Different forms of radiation:**

**Ia) Electromagnetic EM radiation in the form of:** a) photons and neutrinos of the infrared (proton related) and b) photons and neutrinos of light (electron related):

Ad a) All forms of infrared radiation are related to the vibration of the atomic nucleus within their electron-“shells”.

Ad b) All forms of light are related to the "shell"-electrons of the atom.

All forms of electromagnetic EM radiation consists of wave movements of neutrinos or those of photons with a mass that cannot be measured on the outside of these neutrino's/ photons. These neutrino's and photons are without the characteristic of matter.

All forms of EM radiation travel as wave motions and are based on particles with a mass, charge which cannot be directly measured on the outside. They have a magnetic spin and have a measurable amount of kinetic energy. **Documents F1a, F1b and F1c.**

These EM particles are made up of as many Higgs particles/ strings/ snares as anti Higgs particles/ strings/ snares. These particles do have a net magnetic spin. This EM radiation however can travel: a) exclusively by waves and b) exclusively via a conducting medium/ “ether” in the form of atoms/ molecules. In the universe/ USS that “ether” consists out of extremely low concentrations of H, H<sub>2</sub> and He gas/ plasma. These EM radiations are transmitted from atom to atom. Because of the mandatory coupling of EM radiation to a conduction medium/ ‘ether’, that EM radiation can travel at a maximum speed of light c. Within the universe all *EM and cosmic radiation move exclusively within that one galaxy thin universe-spherical-shell/ USS!* EM and cosmic radiation cannot travel through the absolute 100% vacuum areas present both sides of that thin USS. (Only gravity and time/ universe-clock-time penetrate these absolute 100% vacuum areas with infinite speed).

During the movement through the universe-sphere-shell, all EM radiation, insofar as it is not deflected, is reflected by these vacuum areas back towards and into the universe-spherical-shell/ USS.

### **-) EM radiation cannot travel via an absolute vacuum and exclusively via H, H<sub>2</sub> and He present in the universe-spherical-shell/ USS:**

EM radiation can only travel via matter in the universe, especially via atoms/ plasma of hydrogen and helium. No form of EM radiation can travel through that absolutely 100% vacuum spaces present on either side of this universe-spherical-shell/ USS. All EM radiation is and therefore remains 100% trapped within this universe-sphere-shell and can only move there!

The reflection of all electromagnetic radiation causes a deflection of an average of approximately 1 degree every 10 - 40 millennia. As a result of this deflection/ reflection, all forms of electromagnetic radiation (and particle radiation) are forced moving within this rather thin USS. Between the galaxies this USS is at least some tens – hundreds of kilometers thin and filled with some molecules pure hydrogen/cm<sup>3</sup>. Almost an absolute vacuum but not 100%! Distances between the billions of galaxies inside the USS are some millions of lightyears.

Only at the location of all galaxies, this "ether" of the USS swells up to several thousand light years thick. Because of this deflection, "lens formation" occurs, which means that within the universe / USS multiple forms of double counting of galaxies are possible.

The actual number of real present galaxies could therefore possibly come to less than 4 - 20 billion. **Document G12** illustrates we can just observe  $1/3^{\text{th}}$  of the whole universe/ USS.

Large parts of the USS are invisible!

Modeling of the universe and of the universe cycle clarifies the amount of matter and kinetic energy within which this energy-neutral cycle of the universe is possible.

**Ib) Cosmic rays; in the form of protons, electrons, particles of atoms and atomic nuclei:**

These forms of radiation are also all based on waves, but now real particles of matter (protons, electrons, neutrons, atomic nuclei) with a measurable amount of mass, matter (= mass +  $\frac{1}{2} mc^2$  angular kinetic energy), kinetic energy, electric charge and magnetic spin. All forms of cosmic particle radiation can also only travel through such a conduction medium |"ether"| of hydrogen and helium atoms only present within the USS.

Like all EM radiation/ waves, all forms of cosmic radiation can move at a maximum speed of light  $c$  and only through that 100% closed universe-spherical-shell/ USS. All cosmic radiation is and remains 100% trapped within this universe-spherical-shell/ USS.

**Ic) Shock waves of gravitational energy are without particles / matter and also bound to transport via hydrogen and helium:**

Collisions between celestial bodies are accompanied by shock waves of gravitational energy. These shock waves move without particles via a transfer from atom to atom (H, H<sub>2</sub> and He) like sound and light.

This transport of energy is also only possible via the hydrogen and helium which are just present in the rather thin universe-spherical-shell/ USS. Those shock waves move limited by the speed of light  $c$ . These shock waves cannot penetrate into the absolute vacuum areas both sides this universe-spherical-shell. Therefore these shockwaves also remain 100% trapped and concentrated within the universe-spherical-shell! Contraire to gravity that spreads all around through the whole universe!

*Contraire to gravity* these *gravitational shock waves*, measured by **LIGO**, remain "concentrated" and well "conserved" within this thin universe-spherical-shell/ USS. Therefore these shockwaves are technically quantitatively measurable even after a billions of years journey through the USS!

**Id) Gravity and time/ universe-clock-time/ UCT:**

Gravity and the universe clock time/ UCT are the only physical phenomena without any form of: a) particles, b) waves and c) kinetic energy. As a result, gravity and time/ UCT are not tied to transport via atoms as transport medium/ "ether". Gravity and universe-clock-time (UCT) are therefore not bound to remain within: a) the H / He present in the universe-sphere-shell and b) and bound to the speed of light  $c$ .

Consequences: 1) Gravity and universe-clock-time/ UCT move on all sides and 2) with infinitely speed through the absolute vacuum universe on either sides of the USS.

Gravity and time leave that universe-spherical-shell the same moment both are generated. That leaving the universe-spherical-shell hasn't any consequences for the mass, matter and energy balances of the universe/ USS.

Negative consequences: Gravity and universe-clock-time cannot be measured directly. So **LIGO** does not perceive gravitational waves but *only these gravitational shock waves!*

The universe-clock-time/ UCT can only be determined by deriving a mathematical model of the cycle of the universe and processes in the universe-spherical-shell!

Gravitation is linked to gravitational energy! In 2021 that energy is missing in the energy balances of the universe! “Dark” energy in fact is gravitational energy!

## **Ad II) Transition from mass → matter by adding $E = \frac{1}{2} mc^2$ internal rotational energy/ angular momentum:**

Will neutrinos, photons and cosmic radiation survive forever within the universe-spherical-shell/ USS?

No; that is not the case! All photons, all neutrinos and all cosmic radiation through their mass, charge and spin are reconstructed into just *four* larger and stable structures of matter/ antimatter within a period of many (13.8) billions of years.

That only 4 possible structures concern;

-) one basic structure of the proton and one basic structure of the anti-proton,

-) one basic structure of the electron and one basic structure of the anti-electron/ positron.

Those 4 basic structures of the (anti) proton/ (anti) electron rotate either clockwise or anti-clockwise. They just have the characteristics of: 1) mass, 2) electric charge, 3) magnetic spin and 4) kinetic energy. **Documents F1b & figures and F1c & figures.**

Those only four possible basic structures of matter / antimatter are composed of 3 *quarks* but still don't have the characteristic of matter or antimatter. Within the universe-spherical-shell almost exclusively the basic structures of the *proton* and those of the *electron* are formed; one clockwise the other anticlockwise! However these anti-protons and positrons aren't formed! Exclusively protons and electrons. **F1c & figures.**

### **-) Transfer mass → matter:**

These only 2 possible basic structures of the proton / electron acquire the property of matter / antimatter only by adding via  $E = \frac{1}{2} mc^2$  to internal rotational energy / angular momentum.

**Matter = mass +  $\frac{1}{2} mc^2$  internal rotational energy/ angular momentum.**

### **-) In universe only protons/ electrons are formed; that process takes 13.8 billion years:**

In the universe, however, from photons, neutrinos and cosmic radiation/ particles of the proton/ electron exclusively an equivalent number of protons and electrons are to be reconstructed. **Document F1c & figures.**

Within the universe-spherical-shell this process formation of a) proto-protons/ proto-electrons b) the addition of  $E = \frac{1}{2} mc^2$  rotational energy and 3) the transformation of mass → matter takes no less than 13.8 billion years! During this long period of (re)construction we observe these particles as cosmic radiation!

In the intervening period, over many billions of years,  $E = \frac{1}{2} mc^2$  of rotational energy / angular momentum is added extremely slowly to all forms of EM and to all forms of particle cosmic radiation present within the universe-spherical-shell/ USS.

Those basic constructions of the proton/ electron ultimately result in the formation within the USS of only ordinary protons, electrons and of hydrogen atoms. During that 13.8 billion years the mass of protons / electrons besides mass has been transferred into a combination of mass and matter which possess only two elementary forces: 1) electric charge and 2) magnetic spin. **Document F1c & figures. \\**

*Such loose protons / electrons do not generate gravity!*

Those protons and electrons ultimately result in only the simplest hydrogen atom / molecule.

**-) Event horizon 2021 universe/ USS is limited to a maximum of 13.8 billion light years:**  
By transforming all EM radiation and particle radiation into matter (protons/ electrons), the event horizon from Earth on the universe and within the, all-over uniform, universe-spherical-shell is limited to "just" 13.8 billion light years seen only through that USS.

We can observe only 13.8 billion light years through that curved universe-spherical-shell with a radius of 10 - 12 billion light years. In reality, this perfectly curved space of the USS extends much further (about 35 – 40 billion lightyears) than we can observe from Earth. That universe/ universe-spherical-shell therefore also contains much more matter, kinetic energy and gravitational energy we can observe now from planet Earth.

**-) Protons / electrons are the only 2 basic building blocks of the atom:**

1 Neutron = 1 proton + 1 electron. So protons and electrons are the only basic building blocks of all ordinary atoms starting element H (**Document F1d & figures common atoms**) as well of all black hole atoms (**Document F1e & figures blackhole atoms**) starting black hole element/ atom Be.

**-) No "dark" matter present in the universe/ USS; much more gravity is present:**

Based on **Newton's** current gravitational formula ( $F = G.m1.m2 / d^2$ ) and the Laws of radiation, it appears that an enormous shortage occurs in the mass or matter balance of the universe.

In **documents E3 (text), E3-1 (figures) and E3-2 (structure gravity as speed-components)**, the author, in collaboration with **Franklin Roos**, has radically amended **Newton's** Laws of Gravitation.

Due to the nature of gravitation and the shape of the universe-spherical-shell, not only the mutual direct distance  $d$  is relevant, but also the *cosine of the angle  $\alpha$*  that two objects in the universe sphere shell have with respect to the **center C** of the universe must be added. By adding this factor  $\cos \alpha$ , there is naturally much more gravity in the universe/ USS than is currently (2021) Scientifically calculated and assumed. So correspondingly much more matter / atoms and kinetic energy is present. **Figure 36 of document G8 or figure 3 document E3-1.**

There are several (9 - 11) different forms/speed related components of gravitation as well and correspondingly 9 - 11 forms/ components of gravitational energy! In 2021 this gravitation and gravitational forms of energy aren't taken in account by **Science and Scientific literature!**

**-) Because of the perfectly round USS, adding factor  $\cos \alpha$  to gravitational formulas Newton and Einstein is mandatory:**

The modified Newtonian gravitational formula then becomes in a simplified state:

$F = G.m1.m2.\cos \alpha / d^2$ . Within the Milky Way galaxy,  $\cos \alpha = 1.00000$  and no correction is needed!

For the gravitation between galaxies, however,  $\cos \alpha < 1$ . When that factor  $\cos \alpha$  is consistently applied in **Newton's Law of Gravitation** and that formulas by **Einstein**, the universe- spherical-shell shows much more gravitation and therefore correspondingly much more mass / matter and thus kinetic energy to be present than currently is calculated by Science and is assumed starting the nowadays accepted Big Bang theory.

By adding the factor  $\cos \alpha$ , the mass or matter balance of the universe can already be made largely correct and thus the so-called “dark” matter can be significantly reduced. This also reduces the amount of "dark energy" due to the spherical/ balloon structure of the universe.

**-) Gravitational constant G:**

Gravity is not an elementary force, but a speed-related force generated by all "shell"-electrons of the atom as effect of speeds of the atom in the universe. As a result gravity is composed in 9 – 11 different speed-components all quantitatively speed related.

The gravitational constant *G is not a real constant and composed out of 9 – 11 different speed-components as well.* Gravity as well gravitational energy and the gravitational constant are rather complex!

The gravitational constant, like almost all other natural constants, changes extremely slowly over time with the velocities / kinetic energy of atoms in the universe; see **document G10**.

**-) All galaxies naturally rotate much faster around their axis and thus generate more gravity:**

In the next approximately 350 - 450 billion years gravity will slow down the expansion of this perfectly curved universe-spherical-shell/ USS further and further towards zero. This gravitational slowing down of the expansion speed of the universe/ USS however has already started since about 30 - 40 billion years ago. That moment single protons and electrons formed the hydrogen atom/ molecule and gravity/ gravitational energy was generated.

The energy released by slowing down the expansion speed of the universe-spherical-shell is converted into the rotational speed of all nowadays in the USS present galaxies! As a result, all galaxies not only rotate around their axis and much faster than expected, based on the 13.8 billion years in the Big Bang theory. As a result these 4 – 5 angular speeds of galaxies within their cluster all galaxies generate much more gravity and gravitational energy expected.

This much higher level of gravity inside galaxies holds these galaxies together without any “dark” matter! **Document G12 & figures 36a – 36r**.

**-) No gravitational lenses:**

All electromagnetic (EM) radiation and the subatomic cosmic particle radiation are based on: 1) waves, 2) mass, 3) electric charge, 4) magnetic spin and 5) energy. None of these forms of EM radiation and of these non-atomic cosmic radiation by themselves generate any form of gravitation!

So all EM and all *non-atomic* cosmic radiation are completely insensitive for gravity emitted by celestial bodies and blackholes, So these forms of radiation cannot be curved by the gravity of stars, planets or blackholes. That curvatons are only possible due to present H, H<sub>2</sub>, He gases and electric/ magnetic fields.

No interaction is possible between gravitation from celestial bodies and the path of photons within the universe-spherical-shell/ USS! Gravity is incapable influencing the path of electromagnetic radiation nor the path of particle cosmic radiation as long as atoms aren't involved! (Exclusively atoms/ blackhole atoms generate gravity)

For electromagnetic EM radiation, no “gravitational” lenses are present in the universe.

These "lenses" are formed by:

- a) electric and magnetic fields emanating from the central black holes galaxies but also from stars and small local black holes,

- b) diffraction of radiation when passing through minute concentrations of H, H<sub>2</sub> and He gases around local blackholes, and passage of the coronas of stars and those of galaxies.
  - c) locally occurring concentration differences in H, H<sub>2</sub> and He within the universe-spherical-shell during interactions between stars and black holes and during and after collisions between stars and between galaxies.
  - d) the bounce of photons against both absolute 100% vacuum spaces present on either side of the universe-spherical-shell photons and cosmic radiation cannot penetrate.
- As a result, multiple images of the same underlying galaxy can be captured on Earth!

### **Ad III) The nature of matter from protons / electrons and of atoms:**

The mass, charge and magnetic spin and their distribution over ordinary matter/ atoms, black-hole matter/ blackhole atoms, electromagnetic radiation and particle radiation:

a) Ordinary matter / elements periodic table built from hydrogen made up of ordinary protons and electrons. (1 neutron = 1 proton + 1 electron). See **documents F1a 2014, F1b and F1c & figures 15 a - d** for the spatial structure of the proton/ electron and their anti-forms as constructions of 3 quarks or the same **figures 18 a - d** & explanation in **document G8**.

b) Protons and electrons generate only *two elementary forces*: 1) the *electric force* and 2) the *magnetic spin force*. Those protons/ electrons have a  $\frac{1}{2} mc^2$  internal angular kinetic energy. Single protons and electrons with their mass and matter don't generate gravitation by themselves! Gravity is only generated in case protons/ electrons together form 1) an atom and 2) the orbit of their "shell"-electrons is distorted by speed of the atom in the universe.

c) During nuclear fusion from hydrogen, universe-wide, only the elements of the periodic table are forcibly formed + same forces: 1) two forms of gravitation, 2) two different chemical forces and 3) two different physical forces resulting in the phase states: plasma, gas, liquid and solid.

d) Black hole matter/ black hole atoms. These blackhole atoms are ordinary atoms whose electron shells have collapsed close towards the atomic nucleus. This transformation common atoms → black hole atoms only occur under 1) extreme pressure and 2) atoms with at least two electron pairs speeds starting beryllium. So all blackhole atoms are filled with blackhole atoms  $\geq$  Be. **Document F1e & figures**. All black hole atoms are also constructed with exclusively ordinary protons and electrons.

By themselves black hole atoms generate only one form of gravity which is related to the single "shell"-electrons of blackhole atoms. (For the record: there are different forms of gravitation related to single "shell"-electrons and "shell"-electron pairs. (**Document F1d** [www.uitervijkwinkel.eu](http://www.uitervijkwinkel.eu)).

These "shell" electrons of black hole atoms rotate around their nucleus at approximately the speed of light. Therefore "shell" electrons blackhole atoms cannot generate any physical nor any chemical forces and cannot form bonds related to the electron pair. **Document F1e & figures blackhole atoms**.

e) With black hole atoms no physical phase states and black hole molecules are possible.

f) Between black hole atoms there is an enormous electric and magnetic force mutual electrical repulsion emanating from the electron shells / cloud just like in a normal gas. Only enough gravity is able suppressing this electrical and magnetic repulsion between blackhole atoms.

g) Particle radiation in the form of individual neutrons, protons, electrons, atomic nuclei, etc.

#### **Ad a) Ordinary matter:**

According to the author, all matter in the universe is actually present as ordinary matter, as black-hole matter/ atoms and in the form of particle radiation. The forms of ordinary and black-hole matter are more or less evenly distributed over the entire universe-spherical-shell/ USS as big and thin balloon of billions of galaxies. All elements of the periodic table can be put together/ formed on the basis of single protons and electrons, the only two basic building blocks of the atom.

#### **-) No neutrons in the atomic nucleus:**

In the atomic nucleus no neutrons (1 neutron = 1 proton + 1 electron) occur as separate building blocks. The atomic nucleus is exclusively built with protons and "nucleus" electrons. See **document F1d + accompanying figures 18 - 23**.

In the atomic nucleus, every small "nucleus/ core" electron is bound by default to at least two, much larger, protons and never bound to just one proton (that would be a core "neutron"). Only inside the helium nucleus /  $\alpha$  particle, that "nucleus" electron hangs in between 3 protons! That basic central construction of He/  $\alpha$  particle is still present in the center of all atomic nuclei of the periodic table  $>$  He. Inside the atomic nucleus neutrons are absolute impossible as particle!

The equal spin of protons and "core"-electrons prevents any real physical contact between these protons / "core" electrons in the atomic nucleus! This results in a extremely strong and stabile atom-nucleus based on very strong electric bindings and "weak" but equal strong magnetic repulsions! So the universe is based on just 1) elementary charge and 2) magnetic spin!

The binding of one "nucleus" electron to normally two protons results in a charge shortage in the atomic nucleus. The surplus of electrons is located in the "electron shells" around the atomic nucleus. See **document F1d & figures 18 - 23**.

#### **-) All ordinary matter universe ordered conform the elements of the periodic table starting H:**

This matter includes all common elements of the periodic table and their isotopes starting hydrogen/ H/ protons & electrons. Everything beyond the element lead is unstable/ radioactive. During nuclear fusion during supernova explosions, for energetic reasons, only the elements of the periodic table, as known on Earth, can be formed universally and nothing else.

The even bigger atoms  $>$  nr. 92 and some of the smaller atoms are unstable. They stabilize by nuclear splitting into two smaller atoms or by emitting 1)  $\alpha$  particles, 2) single protons and 3) single electrons. Emitted neutrons (n) are just 1 proton combined + 1 electron emitted one after the other forming a neutron at the outside of the atom nucleus. Inside the atomic nucleus neutrons are completely absent!

For the forces on the ordinary atoms see **document C2** and **document F1d & figures**.

**Ad b) Black-hole matter arranged according to elements black hole atoms starting Be:**

- Black-hole matter are originally ordinary atoms whose electron shells have collapsed under extreme pressure as well from the inside due to the forming of physical bonds between pairs of "shell"-electrons. Due to those physically bonds the electron-shells/ clouds collapse towards close and directly around the atomic nucleus.

The collapse of the electron shells/ clouds of ordinary atoms of the periodic table is due to the formation of **Vander Waal** bonds / **London** bonds between the *electron pairs* present in these electron shells/ clouds of electrons.

For that finally collapsing at least *two pairs of electrons* are required. The collapse of electron-shells atoms can only occur under extremely high pressure and thus (angular) speeds of these atoms in the USS. Blackhole atoms possible starting the element beryllium / Be. These electron shells collapse into one close to the atomic nucleus as a "shell"-electrons / cloud around it. Now these nucleus cannot really vibrate anymore. So blackhole atoms are very cold with a temperature of just 2.7 kelvin. Those "shell" electrons move at tremendous speed and at the speed of light  $c$  around their atomic nucleus. (These "shell"-electrons cannot absorb any energy/ photons)

- Black hole atoms are made up entirely of ordinary protons and ordinary electrons.

- In fact, of the forces of black hole atoms, only gravity is relevant. **Document C3** and **document F1e & figures**. All gravitational components on black-hole matter and black holes are velocity-related quantities and aren't constant quantities! **Figure 9 document G8 and Figures 18a - 18n document F1e.**

- The collapse of the electron shells/ clouds from ordinary atoms to black-hole atoms can only take place from ordinary atoms with:

- 1) at least two or more electron pairs starting Be,
- 2) a high (rotational/ ) speed and therefore an enormous **Vander Waals/ London** force,
- 3) an extremely high pressure (temperature).

The transition from an ordinary atom into a black-hole atom is only possible starting the element beryllium/ Be.

- The elements H, He, Li and hydrogen gas have no or only one electron pair. Therefore these atoms H, He and Li cannot collapse into atoms in a blackhole state! The periodic table of black-hole elements therefore only starts from the black-hole element beryllium (Be).

For the forces on black-hole atoms see **document C3** website and **document F1e & figures blackhole atoms**.

- During supernovae, ordinary elements are formed through nuclear fusion to far above nr. 110 to 120. During the supernova and due to the enormous speed and pressure these elements are immediately transformed into unstable black-hole atoms. These blackhole atoms together due to their gravity form one blackhole in which those completely unstable black-hole atoms are immediately locked and jailed together.

-) The high-energy cosmic radiation in the universe is created by the radioactive decay of such unstable black-hole elements. That decay can only take place at the very outermost mono-atomic outer edge of these black holes!

Due to the enormous rotational/angular speed of all types of blackholes, distortions occur.

Convection currents also occur within all types of black holes/ compressed celestial objects.

So these outermost mono-atomic outer edges of all types of blackholes are constantly refreshed/ renewed!

**-) During each step of the universe cycle we consider:**

The distribution of the total constant quantities to: 1) mass (photons & neutrinos), 2) matter (ordinary and black hole atoms), 3) electric charge and magnetic spin, 4) impulse and 5) angular momentum of the universe divided into:

- a) loose protons / electrons,
- b) ordinary matter / atoms periodic table starting H,
- c) black hole matter, black hole atoms starting Be,
- d) forms of electromagnetic radiation (photons / neutrinos) and
- e) forms of particle radiation (protons, electrons, (neutrons =  $1p + 1e$ ), atoms, atomic nuclei, fragments of atomic nuclei such as  $\alpha$  particles):

This distribution of matter and energy thus forms one of the basic parameters of the universe.

**Ad IV) Forces present on ordinary matter / atoms and black hole matter / atoms:**

**-) Universe is based on only two elementary forces:**

At the very lowest level of matter, the four two by two super symmetrical Higgs particles, strings and snares only generate: 1) mass, 2) electric charge and 3) magnetic spin, **Document F1a 2014 & figures.**

Starting those four Higgs, strings and snares, only a) protons and b) electrons can be formed universe wide with properties: 1) mass, 2) matter, 3) electric charge, 4) magnetic spin, 5) fixed  $\frac{1}{2} mc^2$  internal kinetic energy and 6) external kinetic energy. **Document F1c & figures.**

These protons and electrons generate only two elementary forces in addition to matter: **1) electric charge and 2) magnetic spin.** They also have a certain speed and amount of external kinetic energy. Those two elementary forces universe wide are always constant and quantitatively independent of the speed of the proton/ electron/ atom in the universe!

*Protons and electrons with their mass and matter do not generate any form of gravity by themselves! Gravity is only generated in case: a) protons and electrons together form an atom and b) that atom is subjected to speed in the universe and within the USS. Therefore gravity isn't an elementary force! See **documents E3 (text), E3-1 (figures gravity) and E3-2 (structure gravity as components of speed in the universe).***

**-) The other non-elementary physical and chemical forces on atoms:**

The other, non-elementary, gravity, physical, chemical and mechanical forces first arise at the atom as a result of:

- 1) speed and the rotational/ angular speeds of the atom in the universe \*)
- 2) changes in speed,
- 3) changes in the direction of speed and due to
- 4) the kinetic energy associated with (rotational) speed in the universe.

\*) Gravity and the physical and chemical forces are generated by the "shell" electrons / electron pairs of the atom in combination with the speed / rotational/ angular speeds of the atom in the universe, which can amount to many tens to hundreds of km/s.

The enormous velocities and rotational speeds of the atom in the universe add a great deal of kinetic energy not only to the atomic nucleus as well to all of the "shell"/ "cloud" electrons of the atom! Because of that by velocities "added" kinetic energy these "shell"/ "cloud" electrons can no longer go through their wished perfectly round orbit around the atomic nucleus as those "shell" electrons want and always strive to do.

**-) The (rotational) speed / angular momentum of the atom in the universe results in:**

- a) A deviation from the ideal orbit of the electron / electron pair,**
- b) An amount of kinetic energy that is applied to the "shell" by that (rotational) speed electron/ electron pair has been "added" and**
- c) An amount of "added" kinetic energy to the atomic nucleus.**

**Ad a) Gravity:**

To counteract the deviation from the ideal orbit of the "shell"-electron around the atomic nucleus, these "shell"-electrons generates gravitational (force) "radiation". Gravity however is without: 1) waves, 2) particles (gravitons don't exist), 3) energy and spreads with infinite speed all around.

The primary purpose of gravity the mutually attractive gravitation is to bring about collisions between all present celestial bodies in the USS. In such collisions, speed/ kinetic energy of both celestial bodies is converted into emitted heat/ photons. The (rotational) speed of the atom/ celestial body in the universe is slowed down and thus its gravity and gravitational energy.

All the "shell"/ "cloud" electrons involved in such collisions now move into a energetically more favorable orbit with less deviation!

Each form of speed generates its own gravitational vector/ component specifically linked to that speed of the atom in the universe/ USS. There are currently 9 - 11 different speeds and thus 9 – 11 different components of gravity (and gravitational energy) in the universe/ USS. The basis of Quantum Gravity! This is further explained in **IV-1** .

**-) Gravitation has the ultimate goals:**

To eventually reduce all speeds of common and blackhole atoms in the universe to zero and 2) to bring back all matter and energy towards **center C** of the universe.

Gravity is the only force of the atom that is linearly related to (rotational) speed. Gravity is not directly related to the mass of the atomic nucleus, but only indirectly via the number of "shell" electrons of the atom and the size (rotation) speed of that atom in the universe!

Elaborated in **documents E3, E3-1 and E3-2** [www.uitewijkwinkel.eu](http://www.uitewijkwinkel.eu) .

Gravity spreads without 1) waves, 2) particles and 3) energy and thus with infinite speed through the universe. Gravity spreads all over the whole universe. That's why gravity is such a *extremely weak force*. (All atoms in the universe however constantly communicate due this infinite speed of extremely weak gravity!)

Gravity generated by atoms however is a speed-related force. This also applies to the corresponding natural constant of gravitation **G**! The amount of gravitational energy is, just like gravity itself, a speeds variable quantity in the universe.

### **Ad b) Counteracting and reducing the "added" kinetic energy:**

In addition to gravitation this by (rotational) speeds added kinetic energy results in generating: 1) two physical forces and 2) two chemical forces.

The basic characteristic of these forces is they can form physical and chemical bonds.

Thereby standard releasing an amount of binding heat. This is direct evidence that some of this "added" kinetic energy/ speed of the atom in the universe has been converted into heat/ photons.

By entering into such physical and chemical bonds, the electron pair involved indirectly enters an energetic lower and thus in a more favorable orbit around the atomic nucleus (= a physical binding/ bond) or around two or more atomic nuclei (= a chemical binding/ bond).

These other 2 physical and 2 chemical forces of the atom are *linearly related to kinetic energy* and thus *quadratically related to the speed / rotation speed* of the atom in the universe!

(Due to its: 1) linear nature and 2) spreading all over the whole universe, gravitation quantitatively is extremely smaller in magnitude than the other physical and chemical forces of the atom. Those forces are 1) quadratically related to speed / rotational speed and 2) aren't spread all over the universe!)

Each form of velocity/ kinetic energy within the USS generates its own force- and binding vector/ component that is specifically linked to one of those 9 - 11 velocities of the atom in the universe as well inside the USS. In the universe now all atoms are subjected to 9 - 11 different speeds / components of kinetic energy. This forms the basis of Quantum Mechanics! This is further explained in **IV-1**.

The author has systematically deduced all forces on ordinary matter and black-hole matter in:  
- **document C2 and F1d & figures (the 12 forces of ordinary matter)**,  
- **document C3 and F1e & figures (the 7 forces of black-hole matter/ atoms)** and in  
- **document C4 (the forces of antimatter/ anti-hydrogen)**.

Gravitation, physical and chemical forces on ordinary matter and black-hole matter (only gravity) aren't constant quantities but are (rotational) speed and kinetic energy related quantities! That also applies to their corresponding natural constants!

The *elementary charge (force)* and the *elementary magnetic spin (force)* of the proton / electron are the only two forces which are (rotation) speed independent! Throughout the universe cycle these are the only truly constant forces in the universe and so are their constants of nature! See **document G10**.

### **Ad c) The mechanical forces:**

During acceleration/ deceleration and when changing the direction of velocity, the atomic nucleus becomes somewhat a-central within its surrounding electron shells. This results in the generation of two mechanical forces within the atom that are aimed at keeping the atom core as central as possible within the electron shells.

### **Table 3 - 2: The 12 fundamental forces of the elements of the periodic table:**

-) The 12 fundamental forces on matter and the elements periodic table:  
The dissolving force / binding and the absorption force / binding are now regarded as sub-forms of the **Van der Waals / London** force / binding and no longer as separate forces / bonds. This reduces the number of distinct forces. For the elements of the periodic table the author now names a total of *12 different fundamental forces* consisting of:

- ) 2 elementary (e) forces proton / electron; electric charge and magnetic spin.
- ) 1 sub-elementary force of the atom, the centripetal force between atomic nucleus / "shell" - electron,
- ) 2 mechanical forces of the atom,
- ) 1 gravitational force from the "shell" electrons of the atom,
- ) 2 physical forces from the "shell" electrons of the atom,
- ) 2 chemical forces from the "shell" electrons of the atom,
- ) 2 temperature-related forces.

### Table 3 - 3: The 12 fundamental forces on elements of the periodic table:

#### a) The elementary, velocity independent, forces of the proton / electron:

- |   |                |
|---|----------------|
| 1a) the elementary charge force proton:                   | (+ Lef p + 1), |
| 2a) the elementary magnetic spin force rotating proton:   | (+ Mef p + 1), |
| 1b) the elementary charge force electron:                 | (+ Lef e -1),  |
| 2b) the elementary magnetic spin force rotating electron: | (+ Mef e +1),  |

#### b) The basic sub-elemental force of the atom:

- |  |            |
|--|------------|
| 3) the centripetal force keeps the shell electron (e) in a curved orbit around the atomic nucleus: | (+ Cpf e), |
|--|------------|

#### c1) The mechanical velocity forces of the atomic nucleus:

- |   |                         |
|---|-------------------------|
| 4) the acceleration / deceleration force of the atomic nucleus (a): | (+ Vf a +) / (+ Vf a-), |
| 5) the centrifugal force of the atomic nucleus (a):                 | (+ Cf a),               |

#### c2) The basic (velocity) forces of the shell electron (1) / shell electron pair (2):

- |   |                 |
|---|-----------------|
| 6a) gravity of the shell electron (1):          | (+ G1f) type 1, |
| 6b) gravitation of the shell electron pair (2): | (+ G2f) type 2, |

#### c3) Physical / chemical basis (kinetic energy) forces ‘shell’ electron (1) type 1 / electron pair (2) type 2:

- |   |                    |
|---|--------------------|
| 7) chemically covalent radical force by the “shell”-electron (1):   | (+ R1cf), type 1,  |
| 8) (bio) chemical covalent charge force by the electron pair (2):   | (+ L2cf), type 2,  |
| 9) physical <b>Vander Waals / London</b> force by the electron pairs (2):   | (+ W2f), type 2,   |
| 9a) atoms / molecules + flexible (fl) <b>Vander Waals</b> bond / liquid:  | (+ W2flb), type 2, |
| 9b) atoms / molecules + fixed (fi) <b>Vander Waals</b> bond / solid:  | (+ W2fib), type 2, |
| 9c) atoms / molecules + <b>Vander Waals/ London</b> force without <b>Vander Waals/ London</b> bond are gas or plasma: | (+ W2gf), type 3,  |

Interactions between **Vander Waals/ London** forces and forms of **Vander Waals** bindings:

- |   |           |
|---|-----------|
| 9d) dissolving (D) atoms / molecules in liquid: dissolving force electron pair (2): | (+ W2Db), |
| 9e) absorb (A) atoms / molecules of solid: absorption force electro. pair (2):      | (+ W2Ab), |

#### c4) The basic (kinetic energy) force of outer electron shell atom: type 3:

- |   |                    |
|---|--------------------|
| 10a) charge force electron (1) / electron pair (2):                   | (+ L1k) / (+ L2k), |
| 10b) dissolving charged particles / ions in water via charge binding: | (+ L1b) / (+ L2b), |

#### d) The basic (temperature) forces:

- |   |             |
|---|-------------|
| 11) light force (photons neutrinos) single electron (1):        | (+ Q1k),    |
| 12) infrared force (photons) atomic nucleus (a) and the proton: | (+ Qir ak). |

#### Explanation Table 3 – 2 and Table 3 – 3 forces normal atoms:

1) **Tables 3 - 2** and **Table 3 - 3** are simplified versions of the tables in **documents C1, C2 and C3** and **document F1d** [www.uitewijkwinkel.eu](http://www.uitewijkwinkel.eu) . Those tables still have to be adjusted and updated there.

2) The total system of these 12 physical and chemical forces / bonds is based on only two of the *same elementary charge* and *magnetic spin forces* of the proton and that of the electron. Those elementary forces already arise at the Higgs/ string/ snare level next to mass/ anti-mass.

**Documents F1a 2014 & figures and F1c** on [www.uitewijkwinkel.eu](http://www.uitewijkwinkel.eu) .

The centripetal force by the “shell”-electron (Cpf e) is first mentioned at the atom.

3) All other physical and chemical forces arise only when there is an atom. Those forces are derivatives of these two elementary forces created as a result of kinetic energy and the speed / acceleration of the atom in the universe with respect to the **center C** of the universe.

**Documents F1d & figures, C1, C2 and C3 as well E3, E3-1 and E3-2 for gravity.**

During the universe cycle, these 12 forces appear piece by piece and also disappear again.

Gravitation as very last of the atom related forces.

4) The ordinary proton and the ordinary electron are the only two stable basic building blocks of both ordinary matter and black hole matter. On the basis of the elementary attractive charge forces of the proton/ electron and their mutual repulsion via the magnetic spin force, all atoms and 92 stable elements of the periodic table can be built up. The construction of these atoms occurs *step by step* in nuclear fusion by adding: 1) one proton to the atom-core or 2) one electron to the atom-core or 3) one electron to the “shell”-electrons.

All stable black-hole atoms and unstable higher atoms > nr 92 in black holes are constructed by only protons as well “core”-electrons and “shell” electrons. (1 neutron = 1 proton + 1 electron).

5) The forces indicated under *c1*) arise from a change in speed of atoms / molecules and a change of direction in speed (angular speed).

6) All ordinary atoms are subject to: a) the expansion speed of about 400 – 450 km/s and b) the 8 - 10 forms of rotation speed of the atom in question in the universe with respect to the absolute **center** and **zero point C** of the universe.

7) The *chemical covalent charge force* / bond concerns all chemical reactions involving reactions with electron pairs. This includes almost all *biochemical reactions* and individual reaction steps present within them.

8) At the temperature forces referred to under *d*), such a vector structure and link to speeds of the atom in the universe are lacking for the time being.

9) In **documents F1d / C2** [www.uitewijkwinkel.eu](http://www.uitewijkwinkel.eu) , the author also deduced the other forces of the atom. For these other non-fundamental forces on the atom see the relevant documents with forces.

**Table 3 - 4: The 7 fundamental forces of *black hole atoms* / black holes:**

**a) The elementary forces of the proton / electron:**

- 1a) the elementary charge force proton: (+ Lef p + 1),
- 2a) the elementary magnetic spin force rotating proton: (+ Mef p + 1),
- 1b) the elementary charge force electron: (+ Lef e-1),
- 2b) the elementary magnetic spin force rotating electron: (+ Mef e + 1),

**b) The basic sub-elemental force of the atom:**

- 3) the centripetal force keeps the shell electron (e) in a curved orbit around the atomic nucleus: (+ Cpf e),

**c1) The mechanical velocity forces of the atomic nucleus:**

- 4) the acceleration / deceleration force of the atomic nucleus (a): (+ Vf a +) / (+ Vf a-),
- 5) the centrifugal force of the atomic nucleus (a): (+ Cf a),

**c2) The basic (velocity) forces of the shell electron (1):**

- 6) gravity of the "shell" electron (1): (+ G1k) type 1,

**d) The basic (temperature) forces:**

- 7) infrared power (photons) atomic nucleus (a) and the proton limited to 2.7 kelvin: (+ Qir af).

**Explanation Table 3 – 4 forces *blackhole atoms*:**

1) **Table 3 - 4** is a simplified version of the tables in **document F1e** [www.uiterwijkwinkel.eu](http://www.uiterwijkwinkel.eu)  
Black hole atoms are only possible starting beryllium / Be.

2) The total system of these 7 forces / bonds of black hole atoms is basically based on only the same two elementary forces: 1) electric charge and 2) magnetic spin of the proton and those of the electron. The black hole atom is the centripetal force that keeps the electron in orbit around the nucleus.

3) Gravitation first arises when there are black hole atoms  $\geq$  Be and speed of those atoms in the universe and angular speeds. See **documents E3, E3-1 and E3-2 for gravity**. Gravity is caused by the speed of black hole atoms and change in direction in speed (angular speed).

4) The "shell"-electrons of black hole atoms rotate at near the speed of light around their nuclei. These "shell" electrons only generate gravity and don't generate any other physical or chemical force.

5) All black hole atoms are subject to: a) the expansion speed/ momentum and b) the 8 - 10 forms of rotational speed / angular momentum of the relevant atom in the universe with respect to the absolute center and **zero point C/ center C** of the universe.  
Only the same gravitation components common matter and blackhole matter attract each other mutually! Different gravitational components neglect each other.

6) The central blackholes of galaxies (CBHG) just undergo 1 – 5 angular speeds within their cluster consisting out of 4 – 6 thousand may be more galaxies.

#### **IV-1) Forces of ordinary atoms divided now into 9 - 11 velocity / kinetic energy vectors: Vector law by Uiterwijk Winkel:**

All gravitational, physical and chemical forces mentioned in **table 3 - 2** under c2), c3) and c4) are exclusively generated on the atom by the “shell” electrons of the atom as a result of: 1) the expansion velocity / momentum and 2) the 8 - 10 forms of rotational speed / angular momentum of the relevant atom in the universe with respect to the absolute **center C and absolute zero point C** of the universe. This also applies to gravity.

Every speed / rotational speed in the universe generates its own specific force vector / component associated with that speed for all forces mentioned under c2), c3) and c4). All chemical and physical forces mentioned under c2), c3) and c4) are built up on Earth from as many and the same force / speed vectors as the number of movements / accelerations that the earth undergoes in the universe and within the universe-spherical-shell/ USS with respect to the **center C**.

This also applies to all other objects and all types of black holes in the universe and the number of movements thereof with respect to the **center C** of the universe! The number of different speeds of the earth in the universe and that of the Earth itself is now approximately 9 - 11 relevant speeds; all > 20 - 30 km/s. Those 9 - 11 relevant movements result in 9 - 11 different deviations in the orbits of all “shell” electrons and everywhere in the same 9 - 11 force vectors at all the forces mentioned under c2), c3) and c4).

The same number of rotational speeds and the same quantitative magnitude of those speeds with respect to **center C** and with respect to the 8 - 10 rotational speeds within the universe-spherical-shell are present both within each cluster of galaxies and within each galaxy everywhere within the universe-spherical-shell with **C** in the center of this USS.

Those 9 - 11 force vectors are universe-wide equal in nature and composition as they are quantitatively equal as well. None of those 9 - 11 speeds in the universe / universe-spherical-shell is constant! Mathematically modelling!

All 9 - 11 speeds change quantitatively very slowly during the cycle of the universe. Forces, and in particular their force vectors/ components, also disappear again during collisions between celestial bodies.

The forces mentioned under c2), c3) and c4) in **Table 3-2** and their 9 - 11 force and bond vectors are therefore not constant either. These forces and their 9 - 11 binding components also change very slowly during the unwinding of the universe cycle.

*Effects for Quantum-gravity as well Quantum-mechanics! Document G11.*

#### **-) The constants of nature linked to forces also change very slowly over time:**

These extremely slow changes also apply to the constants of nature linked to **Table 3-2**, which are also composed of 9 - 11 underlying variable speed-related sub-constants!

#### **-) By equal forces, only equal (velocity) vectors mutually attract each other and are able forming bindings/ bond; Vector law by Uiterwijk Winkel:**

With the physical and chemical forces mentioned under c2), c3) and c4), only the same forces with the same velocity vector / force vector attract each other. Only identical vectors of the same force can form one physical or chemical binding/ bond.

Force vectors of the same force related to different velocity vectors are completely indifferent to each other. Different speed components/ vectors of the same force cannot form mutual bonds! This is expressed in the **Vector/ component Law** by **Uiterwijk Winkel**.

Only the same forces and the same velocity vectors/ components of: a) gravity, b) the 2 physical forces and c) the 2 chemical forces, mentioned under c2), c3) and c4), attract each other!

These forces can form 9 - 11 specific physical and chemical binding vectors. Physical or chemical bonds between atoms thus consist of 9 - 11 underlying bond components.

Thus physical and chemical bonds/ bindings are a reflection of all movements of the atom in the universe and within the universe-spherical-shell/ USS!

#### **-) Binding heat:**

During the formation of these physical and chemical bonds consisting of 9 - 11 sub-bonds/ bindings standard binding heat is released. This 9 – 11 dimensional binding energy is the prove/ sign that the amount of "added" kinetic energy of these "shell"-electrons has decreased!

Now these bond-forming electron-pair has moved into an energetically more favorable orbit! Each sub-bond/binding contributes its own characteristic portion to the total bond/ binding. *In fact this is the foundation of Quantum Mechanics.* (You need to know these 9 – 11 speeds of atoms quantitatively. That's just possible after mathematical modelling the cycle of the universe. **Document G15**)

#### **-) Construction of gravitation, physical and chemical forces / bonds from 9 - 11 velocity vectors / components:**

- Gravity: Gravity is made up of as many gravitational vectors as the number of movements that the earth undergoes in the universe. That number is currently between 9 - 11 relevant speeds. These speeds are all > approximately 20 - 30 km/sec. Only equal gravitational vectors mutually attract each other. Different vectors/ components are completely indifferent to each other.

*This division of gravity to 9 - 11 speed-vectors/ -components is the basis of quantum gravity and division of gravitational energy / "dark" energy into 9 – 11 different components of gravitational energy.*

#### **- Structure of physical and chemical forces / bonds:**

The two chemical and two physical bonds mentioned under c2), c3) and c4) **Table 3-2** are made up of the same 9 - 11 force and bonding vectors as the number of 9 - 11 movements that planet Earth undergoes in the universe, all larger approx. 20 - 30 km / sec.

All physical and chemical bonds on Earth therefore consists of as many separate bond vectors/ components (now nine - eleven speeds; mostly rotational/ angular speeds within the USS) as the number of movements and speeds of planet Earth in the universe relative/ USS to the **center C** of the universe.

A direct relationship exists between astrophysics and quantum mechanics as well quantum gravity. **Documents G10, G11, G13, G15.**

All physical and chemical bonds elsewhere in the universe/ universe-spherical-shell locally are based on the same basic structure of 9 - 11 force-/ bond-vectors/ components. This results in a fundamentally different view on and approach to all forms of physical and chemical bonds currently common and accepted in **Science**.

**-) For each individual atom it is clear where center C is located and to which 8 - 10 rotation speeds that atom is subjected within the universe-sphere-shell:**

Through those 9 - 11 deviations in the orbits of its "shell" electrons and thereby generated 9 - 11 force-/ bond-vectors and the quantitative size of those different force-/ bond-vectors every individual atom in the universe "knows" in principle exactly where that specific atom is:

- 1) in the universe with respect to the **center C** and with what expansion speed,
- 2) the actual expansion speed of the USS itself and
- 3) at what set of 8 - 10 rotational/ angular speeds that atom moves within the USS relative to the **center C** of the universe and rotational points within the cluster of galaxies!

That is extremely curious!

Suppose the current number of 9 – 11 speeds of the Earth / atom in the universe/USS relative to **center C** are both qualitatively and quantitatively determined. Now all physical and chemical forces and their bindings/ bonds can be decomposed into their 9 – 11 force- and bonding-components. Then quantum gravity as well quantum mechanics can be fully completed quantitatively!

**-) Deriving those 9 - 11 speeds of all atoms in the universe is extremely difficult:**

Astrophysics can solve the problems of quantum mechanics by deriving all current speeds of the earth in the universe and filling them in quantitatively. For this quantification a *mathematical model* of the universe cycle and of the universe has to be developed.

Such a model is indispensable and necessary! Via such mathematical model all movements of the Earth in the universe in principle can be deduced both qualitatively as well quantitatively.

**This can be done as well by deriving:**

- a) the structure of every physical and chemical bond on Earth; an extremely difficult job.
- b) in case one could bring the "shell" electron of a hydrogen atom, helium or of a lithium atom in a perfectly circular orbit around the atomic nucleus. This isn't easy as well!

Then the effects of those 9 - 11 movements of the Earth in the universe/ USS each > 20 - 30 km/s and those movements of the Earth itself must be fully compensated! (Technically may be possible via 9 - 11 different lasers)

For the time being, *mathematical modeling of the universe cycle* and especially the current part of that cycle offers the best prospects. This modeling can be realized fairly quickly within a period of 1 - 2 years. For the structure of bonds and divestitures see **document D1** to be finalized.

**IV-2) To split forces into vectors present on black hole atoms / matter;**

**At black hole atoms, only gravity is relevant:**

At black hole atoms / black holes, every speed / rotational speed in the universe also generates its own specific gravitational vector/ component that is specific related to one of those 9 – 11 speeds. From black holes one should derive its location within the cluster and its velocities within the universe-sphere-shell with respect to the **center C**.

However, the number of speeds of these central black holes in the Universe/ USS and within galaxies is less than those speeds of planet Earth in the universe/ USS.

That number of movements of black holes is 7 - 9 pieces or less; each > 20 - 30 km/s. Those 7 - 9 relevant motions result in 7 - 9 corresponding gravitational force vectors of small local black holes.

In fact, the *central black holes of galaxies* undergo as little as 1 – 5 different rotational speeds within the USS relative **center C** depending on their position within the cluster of 4 - 6 thousand galaxies.

Each of the 2 - 9 movements in the universe also generates its own gravitational component of the black hole, of which its own rotation/ angular speed by far is quantitatively the most important.

Here, too, only similar force components of gravity mutually attract each other in accordance with the **Vector Law by Uiterwijk Winkel**. Gravitational vectors of different velocity vectors of black holes are indifferent to each other. The gravitational composition is rather complex. So is the raster of gravitational forces within the USS.

**- Interaction gravity ordinary matter / atoms ↔ gravitational black holes / atoms:**

In ordinary and black hole matter, only corresponding gravitational vectors attract each other. All celestial bodies (normal and black holes) only attract each other through the same corresponding gravitational components! The universe has the structure of a universe-sphere-shell/ USS with **C** in the center.

Within all estimated 4 – 20 millions of clusters each containing 4 - 6 thousand or more galaxies, those 2 - 9 gravitational vectors of black holes are not only the same in nature, composition, but also quantitatively the same everywhere within the USS even the parts we cannot observe at Earth.

Within the USS, those 2 - 9 black hole speeds also change very slowly quantitatively over time/ universe-clock-time/ UCT. With that, those gravitational components also change very slowly during the universe cycle; everywhere always quantitatively the same. To this end, a mathematical model of the universe cycle and of the universe must be drawn up.

This also affects the distribution and construction of the amount of gravitational energy (= "dark" energy) in the universe/ the universe-spherical-shell.

**-) Temperature forces:**

In blackholes the nuclei of black hole atoms have hardly any space left over for vibration. Black hole atoms and black holes have a standard temperature of just 2.7 Kelvin. Black holes and compressed celestial bodies therefore almost completely lack the temperature forces.

**During each step of the universe cycle we consider:**

- Did new forces arise during the conscious step in the universe cycle or did existing forces disappear on the atoms of ordinary matter and / or on atoms of black-hole matter / black holes?

- Have changes occurred in the number of speeds and thus in the number of force components/ vectors of the forces present? Have the available velocities changed quantitatively and with them the associated force vectors and binding components? If so, to what extent?

- Which forces are present on the different forms of electromagnetic radiation and on the different forms of particle radiation.

- Which electromagnetic radiation and particle radiation, only the elementary charge and the magnetic spin are relevant and other forces do not play any role?

## **V) Distribution of the kinetic energy over the different forms of matter and the different forms of linear speed and rotational speed:**

- The radial kinetic energy / momentum of ordinary matter and of black-hole matter relative to the **center C** of the universe: This concerns only one speed universe-wide and exclusively the expansion velocity  $v_{\text{exp}}$ / momentum that the universe-spherical-shell/ USS has with respect to **center C**.

### **-) Development of rotational speeds/ tangential speeds/ angular momentum at the expense of the expansion velocity $v_{\text{exp}}$ / momentum of the universe-spherical-shell:**

Since the formation of the hydrogen/ H atom/ molecule and the hydrogen atom associated gravity, the expansion speed of the universe-spherical-shell and all atoms present there is increasingly slowed relative **center C**.

That energy is largely converted into forms of rotational speed angular momentum and a small part into gravitational energy with respect to **center C**.

These rotations start at the atomic level and eventually increase to rotations with the collection of a maximum of clusters each filled with 4 – 6 thousand or more galaxies. These nearly identical, 4 – 20 million, clusters of galaxies form the largest and thus maximum astronomical unit.

Within the universe-spherical-shell, a total of another 10 - 12 different rotational speeds have been developed to date. (Through collisions in the past between stars and galaxies, some of those rotational speeds may have already been disappeared).

### **-) The tangential movements / kinetic energy / angular momentum within each cluster of 4 – 6 thousand or more galaxies:**

Within the almost identical clusters of 4 – 6 thousand galaxies, the galaxies present are mutually subjected to 1 - 5 rotational / tangential movements / angular momentum, all greater than tens of km/s and sometimes hundreds of km/s.

-) **RC1**: rotation of central black hole in the center of each galaxy,

-) **RC2**: rotation of dozens of galaxies around one rotation point,

-) **RC3**: rotation of hundreds of galaxies around one rotation point,

-) **RC4**: rotation of entire cluster of 4 - 6 thousand galaxies around one central cluster black hole; one of the so-called M systems.

At the level of clusters, all atoms in the universe-spherical-shell are now subject to a total of 1 - 4 possibly even 5 tangential velocities/ angular moments.

### **-) The tangential movements / kinetic energy / angular moments within each galaxy:**

Within each galaxy all almost matter undergoes, in addition to the expansion speed, approximately 6 - 7 forms of rotation / tangential movements with associated angular moments with respect to the rotation points:

-) **R1**: the central black hole of the galaxy itself,

-) **R2**: rotation within the spiral arms of the galaxy,

-) **R3**: rotation of the spiral arms and solar systems and black holes around them the central black hole galaxy,

-) **R4**: local rotations of groups of solar systems and black holes within **R3**,

-) **R5**: the solar system's own rotation and local black hole itself,

-) **R6**: the rotation of planets around star/ black hole and

-) **R7**: the own rotation of those satellites:

At the level of galaxies, all atoms in the universe-sphere-shell/ USS are now also subject to a total of 6 - 7 tangential velocities / angular moments.

**-) Universe-spherical-shell/ USS wide all atoms are subject to roughly the same 9 - 11 speeds:**

In total, almost all matter and all atoms in the universe are subject to one expansion speed with a total of approximately 9 - 11 movements, mainly in the form of large-scale rotational movements / angular moments within the cluster of galaxies. Of those movements, 9 - 11 are relevant at speeds greater than 20 - 30 km/s.

**-) Each speed generates its own force / binding component:**

Every form of (rotational) movement in the universe is linked to its own form of kinetic energy and is therefore linked to its own force component on a) the gravitation and b) on the physical / chemical forces / bonds of that atom.

**-) According to current insights, the universe/ USS:**

- has one fixed **center C**; in an area of 8 – 10 billions of lightyears around without any form of matter and energy. Only gravity and universe-clock-time/ UCT are present there.
- has 4 - 20 million clusters each filled with 4 - 6 thousand or possibly even more galaxies,
- in total 4 - 20 billion galaxies around their central blackhole and rotational **center R1**. Most galaxies have 2 – 4 spiral arms. Each of those 2 - 4 spiral arms has its own **rotation R2**,
- a smaller number of galaxies are compact elliptical galaxies. (Less stars and much larger central blackhole)
- all galaxies universe wide contain the same amount of matter and kinetic energy and  $200 \pm 50$  billion stars,
- every star / black hole rotates around the central black hole of the galaxy **R3**,
- local groups of stars rotate around own center **R4**,
- each star and its 1 - 10 planets rotate around its own center of rotation **R5**,
- each planet with its satellites rotates around its own center of rotation; a star **R6**,
- those satellites rotate, each for themselves, around its own center of rotation **R7**.

The galaxies mutually undergo 4 - 5 rotational movements/ angular moments within the universe-spherical-shell and with respect to **center C** each larger 30 km/s.

**-) Developments in the universe-spherical-shell/ USS in the next 350 - 450 billion years:**

The universe now has reached **phase 23** of the universe cycle of 29 steps. **Step/ phase 23** will take another 350 - 450 billion years to complete. During that long period, all matter and all kinetic energy will be trapped in the *central black hole of the cluster (CCBH)*.

Gravity puts an end to the expansion of the universe/ universe-spherical-shell and provides a finite maximum expansion of approximately 10 - 12 billion light years perfectly round and thin balloon of now galaxies around **center C**.

Then due to collisions all expansion speed and all angular speeds inside the USS are converted into one rotation speed of this *central cluster black hole (CCBH)*. The universe is and will always be a *100% completely closed system* for all phenomena with: waves, particles, mass, matter and energy.

In the meantime, gravity also causes collisions between celestial bodies. With that, those 9 - 11 angular/ rotational speeds and associated angular moments will disappear again. During these collisions kinetic rotational energy/ momentum (absorbed photons) is converted into heat (and free photons).

Within the universe-spherical-shell/ USS, all free energy/ photons are re-formed into protons/ electrons and hydrogen within a period of 13.8 billion years. By forming stars and supernovas, that hydrogen is converted back into higher elements that are acceptable for black holes starting element Be. (H, He and Li are refused by blackholes)

As a result of these collisions, in all clusters, within the next 350 – 450 billion years all matter and kinetic energy accumulates in just one remaining central cluster black hole/ CCBH at the end of the expansion of the universe-spherical-shell/ USS. Ultimately only one tangential rotational/ angular speed / angular momentum will remain out of these now present 9 – 11 speeds.

Then all expansion velocity of the universe-spherical-shell within all clusters has been converted into angular momentum as well.

**During each step in the universe cycle is considered:**

- The number and forms of movements on ordinary matter and on black hole matter/ black holes and the associated forms of kinetic energy:

- The distribution of that kinetic energy over the 9 - 11 (rotational) movements of ordinary matter and of the black-hole matter/ black holes. This distribution of these movements and of kinetic energy applies both at the level of the galaxies relative to the **center C** of the universe and movements/ energy within one galaxy:

- Following the process reducing those 9 – 11 movements in just one angular speed:

**VI) Distribution of momentum and angular momentum over the different forms of matter and the different forms of (rotational) speed,**

- **The linear movement / expansion speed / momentum in the universe-spherical-shell|:** Everywhere within the universe-sphere-shell this movement is linearly directed from **center C**. With time, this rectilinear movement is increasingly converted into rotations/ angular momentum and divided over 8 - 10 forms of rotations / angular moments. It concerns the distribution of the momentum over the different rotational movements of the rotations mentioned under **V** within each cluster together with the rotations within galaxies:

- **The distribution of the total angular momentum over the various rotation points.**  
These are:

a) **The momentum coupled to the expansion speed  $v_{exp}$  of the universe-sphere-shell:**  
This concerns just one straight speed.

b) **The 1 - 5 rotation/ angular speeds of galaxies within each cluster of 4 -6 thousand galaxies:**

Each speed about hundreds to about 2 – 3 thousand km/s and associated angular momentums of galaxies within the *cluster* of galaxies within the universe-sphere-shell and of the different galaxies mutually:

- ) **RC1**: rotation/ angular speed of central cluster black hole (CCBH) in the center of the cluster clockwise or anticlockwise,
- ) **RC2**: rotation/ angular speed of all 4 – 6 thousand galaxies present inside these clusters clockwise or anti-clockwise,
- ) **RC3**: rotation/ angular speed of hundreds of galaxies around one rotation M point and large elliptical galaxies,
- ) **RC4**: rotation/ angular speed of dozens of galaxies around one rotation M point,
- ) **RC5**: rotation/ angular speed of small satellite galaxies around one bigger galaxy.

**c) The rotational/ tangential/ angular movements occurring *within* each galaxy:**

These about 7 speeds only develop after the Big Bangs of the galaxies that occurred about 20 – 25 billion years ago. Within all galaxies now about 6 - 7 own points of rotation/ angular speeds are present with corresponding angular moments with respect to:

- ) **R1**: rotation/ angular speed of the central black hole of the galaxy itself,
- ) **R2**: rotation/ angular speed of the spiral arms,
- ) **R3**: rotation/ angular speed of the solar systems and local black holes around the central black hole galaxy,
- ) **R4**: rotations/ angular speed of local groups of solar systems and local present black holes,
- ) **R5**: rotation/ angular speed of each solar system and black hole itself,
- ) **R6**: rotation/ angular speed of planets around stars and of
- ) **R7**: rotation/ angular speed of satellites.

Now all atoms on planet earth are subjected may be to about 13 different speeds within the USS! *Be aware not all atoms in the universe are subjected to these 13 different speeds.* This number of speeds can vary from about 2 – 13 different mostly (angular) speeds.

**During each step in the universe cycle is considered:**

- The distribution of the kinetic energy / angular momentum over the 11 - 13 (rotational) movements of ordinary matter and of the black-hole matter/ black holes. This distribution of these movements and of kinetic energy/ angular momentum applies both at the level of the galaxies relative to the **center C** of the universe and within one galaxy:

**VII) Development of gravitational energy with respect to the center C of the universe, and later with respect to the following rotation points:**

During the first period of 10 billion years or more, the universe & the universe-spherical-shell expands uniformly with respect to **center C** in the form of mono-spherical layers of alternating loose protons and loose electrons. That long period the atom is missing. Those billions of years, gravity and gravitational energy are completely absent as well!

After 10 - 15 billion expansion of the universe spherical shell at 0.7 - 0.95 speed of light  $c$ , without atoms and therefore without gravitation, each proton captures its own "shell"-electron and hydrogen is formed.

With the formation of the hydrogen atom in combination with speed, both gravity and the associated gravitational energy come back into the universe/ universe-spherical-shell. The universe/ universe-sphere-shell has already expanded over a distance of many (10 – 12) billions of light years relative to **center C** without this having cost any form of energy! So expansion occurred completely free of charge!

At the moment of formation of the H atom/ molecule, a *gigantic amount of real gravitational energy* relative to **center C** is added to the universe and cycle of the universe. This gravitational energy is real and added **completely free of charge. Document G16.** That gravitational energy is the sought-after "dark" energy and missing energy in balances of the universe.

From that moment on, gravity slows down the expansion speed  $v_{\text{exp}}$  of the universe-spherical-shell/ USS. The energy released during this process is converted into rotations of curbs within the universe-spherical-shell. Those rotations develop on 10 – 12 levels of angular speeds from atoms to the level of clusters of 3 - 4 thousand galaxies.

-) at cluster level **RC1, RC2, RC3, RC4, RC5** and

-) at galaxy level:

**R1** = rotation around the central black hole of each galaxy and of all stars within that galaxy,

**R2** = rotation about their axis of the two or more spiral arms present in each galaxy,

**R3** = rotation of the solar system and black hole around the central black hole galaxy),

**R4** = local rotations of solar systems and black holes around R4),

**R5** = rotation of the solar system and black hole individually,

**R6** = rotation of planets around star,

**R7** = rotation of satellites around planet:

-) **Gravity and gravitational energy:**

Gravity hasn't any direct relationship with mass! Only an indirect relationship via the "shell" electrons of the atom and a direct relationship with the (rotational/ angular) speeds of the atom in the universe/ universe-spherical-shell.

In case the atom stands *absolutely still* in the universe with respect to **center C** then its gravity is zero. Then the other physical and chemical forces of the atom are zero as well. The gravitational energy with respect to **center C** of the universe / universe-sphere-shell will be zero!

-) **Properties gravity:**

Gravity is radiation without any form of: 1) waves, 2) mass, 3) particles, 4) electric charge, 5) magnetic spin and 6) energy. Thus, the trajectory of gravitation cannot be deflected by the electric and magnetic fields of galaxies nor by the gravitational fields of galaxies themselves. Gravity moves with infinite speed through and out of the atom / universe.

Gravity is the only "force" of the atom with a range to the scale of the universe and beyond. Gravity is the only force of the atom that is *linearly* related to speed and rotational/ angular speed of the atom. Gravity is amazing!

The total amount of gravity in the universe also varies with speed/ angular velocities/ kinetic energy of matter/ atoms relative **center C**. The amount of generated gravitational energy in the universe varies during the cycle of the universe! Gravity is essential because it spreads with infinite speed through the universe and controls the movements of all ordinary matter / atoms and of all black-hole matter/ black-hole atoms in the universe.

-) **Gravity turns expansion speed universe/ USS into rotational/angular speed of galaxies:**

After the formation of the H atom, some 40 – 50 billion years ago, gravity immediately sets the deceleration input of the expansion speed of the universe/ the universe-spherical-shell.

Gravity now transforms the expansion speed of the universe-spherical-shell/ USS into rotational/ angular speed/ energy of and inside galaxies. That angular speed/ energy is visible in all galaxies and there present celestial bodies in the universe.

Now the reduction expansion speed of the universe/ universe-spherical-shell is converted into 8 - 12 rotational/ angular movements both between the galaxies and within the galaxies with rotational/angular movements around the rotation points:

- ) at cluster level: angular speeds **RC1, RC2, RC3, RC4, RC5** inside the USS,
- ) at the level of each galaxy: **R1, R2, R3, R4, R5, R5, R6, R7** inside the USS.
- ) expansion speed of the USS itself:  $v_{exp}$

With the expansion speed a total of approximately 9 - 12 different speeds.

**-) Speed vectors; effect of speed on the forces and bonds of ordinary matter:**

Every movement of the atom / molecule in the universe relative to the **center C** of the universe and within the universe sphere shell generates its own gravitational vector/ component and component of gravitational energy. In total now 9 - 12 forms of gravitational energy.

**-) Gravity further slows down the expansion of the universe-sphere-shell:**

Gravitation in any case ultimately brings the expansion of the universe to a complete standstill and that happens everywhere simultaneously with respect to the moment of the start of this universe.

The entire galaxy and all previously emitted electromagnetic (EM) radiation and particle radiation has in the meantime been absorbed into the central black hole again through the formation of successively: protons/ electrons → hydrogen → nuclear fusion stars → atoms ≥ beryllium → ending in blackholes as black-hole atoms.

At the end of the expansion, the rotational gravitation of the central cluster black holes (CCBH) initiates the contraction of the universe.

Gravitational energy always involves at least one reference point:

- ) **center C**,

with additional (rotational) movements relative to multiple reference points inside each cluster of 4 – 6 thousand galaxies;

- ) at cluster level **RC1, RC2, RC3, RC4, RC5** and
- ) at the level of each galaxy **R1, R2, R3, R4, R5, R5, R6 and R7**.

As a result, there is a fairly complex structure in the forms of gravity and forms of gravitational energy.

**-) "Dark" matter = much more gravity present in the universe/ USS:**

In the universe much more gravity is present Science now is aware. That surplus of gravity equals "dark" matter.

**-) "Dark" energy = extremely more gravitational energy present in the USS:**

The "dark" energy consists largely of these as yet unrecognized forms of 11 – 12 forms of gravitational energy. The movements of matter with accompanying forms of gravitation and gravitational energy can only be obtained through mathematical modeling of the cycle of the universe.

**-) During each step of the universe cycle is considered:**

- The different forms of gravitation, gravitational components and components of gravitational energy during the universe cycle:
- The radial gravitational energy of ordinary matter and that of black-hole matter relative to **C**.

Gravity is the driving force behind the slowing of the expansion of the USS and gravity causes the universe/ universe-sphere-shell to contract again. This gravitation and associated gravitational energy are the driving forces behind the universe cycle and in particular the contraction of the universe-spherical-shell.

**-) Gravitational energy:**

- The tangential gravitational energy of matter and black-hole matter between galaxies at cluster level **RC1, RC2, RC3, RC4, RC5** and at the level of each galaxy **R1, R2, R3, R4, R5, R5, R6 and R7** with respect to **C** and within one galaxy.

The tracking on the scale of the universe / universe-spherical-shell of:

- 1) the radial kinetic energy and momentum,
- 2) the tangential kinetic energy / angular momentum and
- 3) the gravitational energies of the galaxies between themselves **RC1, RC2, RC3, RC4, RC5** with respect to **center C** and within clusters and within the galaxies themselves with respect to all **R1's, R2's, R3's, R4's, R5's, R6's and R7's**.

Without mathematical modeling it is extremely difficult to follow those forms of kinetic energy and those forms of gravitational energy separately during the 29 steps of the universe cycle. This can only be achieved by fully modeling the 29 steps and the universe cycle as a whole.

**VIII) Development of space as distance / radius of the universe-spherical-shell/ USS relative center C of the universe:**

The universe originated and formed from one Little Bang black hole that disintegrates into an equivalent number of protons and electrons during the Little Bang. **Document G6 & figures 1 - 30 G8.**

The universe as a thin universe-spherical-shell is now divided into about 4 - 20 million identical clusters, each filled with 4 - 6 thousand or more galaxies and contain the same amount of kinetic energy clockwise or counterclockwise. That thin perfectly curved universe-spherical-shell/ balloon is positioned around one fixed **center C** of the universe. That USS/ balloon now has an all-round equal radius of 10 - 12 billion light years with respect to **center C**.

**-) Gravity slows down the expansion speed of the universe-sphere-shell towards zero in the next 350 - 450 billion years:**

Gravity is generated by the "shell"-electrons of atoms and by velocity/ kinetic energy of those atoms within that universe-spherical-shell/ USS. Gravity slows down the expansion speed of the universe sphere shell further and further towards zero the next 350 – 450 billion years.

The energy released during this process is converted into rotational speed/ angular momentum, causing galaxies to rotate faster and faster on their axis.

Gravity is not bound to remain within the universe-spherical-shell. Gravitation is transmitted without waves on all sides with infinite speed, also via the 100% absolute vacuum space

present on both sides of this one galaxy thin universe-spherical-shell. That's why gravity is such a weak force! Gravitation is the only form of "radiation" that is not deflected by mass, matter, energy, gasses etc.

**-) Due to gravitation in the USS, the radius of the universe spherical shell increases slower and slower:**

The radius of the universe spherical-shell is determined by the distance of the present galaxies in this spherical shape from the **center C** of the universe. This universe-spherical-shell space itself is almost absolutely empty/ vacuum but not 100%. Both on the inside as on the outside of this USS an absolute 100% vacuum is present there. With big consequences.

All other forms of electromagnetic and particle/ cosmic radiation present in the universe can only move: a) by wave motions and 2) only through the H and He atoms/ molecules and their electric and magnetic fields as "ether" only present within the universe-spherical-shell. Those forms of EM and cosmic radiation cannot enter such 100% vacuum areas of the universe. Except gravity and time/ UCT all other forms of radiation are reflected by those absolute 100% vacuum spaces on either side of the USS!

**-) Swinging movements of radiation without spiral shape:**

Electromagnetic radiation and particle radiation do not pass through purely straight curved lines within the universe-spherical-shell, but rather curved pendulum movements with an amplitude of approximately 5 - 10 million light years. **Figures 76 & 77 document G8.** Because of this pendulum shape and through that reflection against both vacuum spaces, we do not perceive the universe from Earth as a spherical-shell.

We cannot observe the universe through those two vacuum spaces on either side of the universe-spherical-shell/ USS. We just observe the universe through the hydrogen and helium present as "ether" in the USS.

At planet Earth this results in a fairly uniformly filled universe consisting by virtually projected galaxies. These virtual images are supplied from the universe-spherical-shell. See **document G12 & figures 36a - 36r**. The on Earth observed deep universe is totally virtual!

**-) On Earth, multiple images of the same galaxy are received:**

The light from one galaxy billions of light years away can only reach the Earth through the universe-spherical-shell and through all kinds of reflections and thus detours. The universe therefore apparently also contains many more galaxies than are actually present within the universe-spherical-shell!

That small, virtually unmeasurable, deflection and the reflection of light from the universe-spherical-shell against the absolute vacuum spaces results on Earth in an imaginary and also completely distorted virtual image of the universe or the universe-spherical-shell! **Document G12 & figures 36a- 36r G12/G8.**

Due to the deflections and reflections of all electromagnetic radiation and of all particle/ cosmic radiation, the radius of the universe-spherical-shell is now approximately 10 - 12 billion light years, may be more.

Looking through that curved thin uniform constructed USS and "ether" of H and He the universe is 35 - 40 billion lightyears deep. Just 13.8 billion of lightyears of this curved USS or about 1/3<sup>th</sup> is observable.

In future with 100 – 1,000 x improved **LIGO/VIRGO** techniques that event horizon of the USS will reach up to a maximum of about 30 billion lightyears or about 2/3<sup>th</sup>! Anyhow not 100%.

The universe/ the universe-spherical-shell however is considerably larger than the author assumed in the description of the universe cycle from 2017 in **documents G7 and E3-1**.

**-) Time/ universe-clock-time/ UCT:**

Time/ the universe clock time (UCT) is the period of time it takes for matter to reach its position within the universe-spherical-shell relative to **center C**. The *postulates of time* are elaborated in **chapter 6.5 document G7**.

**-) Space; the space of the universe is limited/ finite and not infinite:**

The space universe/ universe-spherical-shell is primarily determined by the presence of matter in the form of atoms/ celestial bodies and their positions within that thin, locally flat, universe-spherical- shell relative to **center C** of the universe. **Document G2 with time/ UCT, space and gravity**.

The minimum size of the universe is reached with the *Little Bang black hole* with a radius of about 50 - 100 million km or more. For matter, the currently assumed maximum expansion relative to **center C** is a USS/ balloon with a radius of approximately 10 - 12 billion light years. So the universe/ USS isn't infinite! Only the outside of the USS is infinite. (But since there isn't any matter nor energy physically seen there isn't any space!)

Only for gravity and time/ UCT is the "space" literally infinite! However, it is pointless to talk about time/ the universe clock time and space outside the maximum 10 - 12 billion light years of the universe sphere shell around **center C and 35 – 50 trillion of years to complete one complete cycle of the universe**.

In that vacuum outer space, every form of matter/ mass, charge, magnetic spin and kinetic energy is absent 100%. Therefore there isn't any reference framework. There are only gravitational "rays" without waves from the universe and time/ UCT present. So the space of the universe/ USS ends in absolute nothingness and an absolute 100% vacuum.

**-) During each step of the universe cycle we consider:**

- The (estimated) actual distance that ordinary matter and the central black holes occupy with respect to the **center 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 all cosmic particle radiation and of all electromagnetic (EM) radiation within the universe-spherical-shell with respect to **center C** in light years to billions of light years. Those forms of radiation were and still are radiated there and remain 100% and jailed within the universe-spherical-shell.

- The increase or decrease in the distance of particle radiation and that of electromagnetic radiation, both with respect to **center C** and with respect to the universe-spherical-shell from which that radiation originates.

All forms of electromagnetic radiation and forms of particle radiation are transformed back into matter over a period of 13.8 billion years. Exclusively transformed into ordinary protons and ordinary electrons ending in hydrogen atoms/ molecules and new stars. This process of reconstructing energy into matter (atoms) is described in **documents F1b & figures, F1c & figures and F1d & figures**.

## **IX) Thickness of the first expanding and later shrinking universe-spherical shell/ USS:**

In **step 28** of the universe cycle and the end of the preceding cycle, all 4 - 20 *million central cluster black holes/ CCBH* merge into one gigantic perfectly round, not anymore rotating, spherical *Little Bang black hole/ LBBH* with an estimated radius of 0.05 - 0.1 billion km. At the end of each cycle of the universe gravity has collected all mass, matter and energy of the universe and jailed this mass, matter and energy in this LBBH! This is also the minimum dimension of the universe for matter and its kinetic energy.

During that fusion of those 4 – 20 million CCBH's into one LBBH (**phases 27 & 28 cycle of the universe document G7**), the last remaining contraction speed USS decreases towards zero!

As a result the completely loss of speed, the generated gravity by this *Little Bang black hole/ LBBH* decreases further and further towards zero as well! At the very last moment of contraction USS, the gravity of that LBBH even decreases so far the mutual electrical repulsion between the present black-hole atoms becomes greater than the *Critical black-hole gravity (Cribhgra)*, **Figure 13, 14 and 15 of G8**.

*Cribgra equals the amount of gravity of 5 – 10x the gravity of our sun!* (By the way a rather small amount of gravity is needed for the stability of blackholes!) Crossing that Cribgra limit this *Little Bang black hole* breaks up into single unstable blackhole atoms now breaking up farther into single protons and single electrons.

The contraction of the universe ends by default in a super cold at 0 Kelvin settled Little Bang. **Document G6 & figures 1 – 30 G8**. During that Little Bang, all black-hole atoms disintegrate in 4 extremely short steps *directly* into an equivalent number of *ordinary protons and electrons* and nothing else. (No transformation into energy! Anyhow no  $E = mc^2$ !)

The released matter in the form of protons/ electrons arrange themselves after this super cold Little Bang in mono-spherical layers that are alternately one proton and one electron thick. Within those mono-layers of protons/ electrons a tremendous electric spring tension and magnetically spring tension is present.

As a result of that spring tension, those mono-layers of protons/ electrons remove themselves layer by layer from all sides from the outside of the former 'Little Bang black hole'. That expansion speed is exactly equal from the **center C** and estimated 0.7 - 0.95 of the speed of light  $c$ .

That first expansion of the universe occurs within the speed of light and therefore *without any inflation!* That peeling of this former "LBBH" of mono-layers protons/ electrons is done layer by layer and takes approximately 1,300 - 1,500 years before a hollow inner space around **C** is created. Only after that moment a universe-spherical-shell/ USS arises.

All electrons in their spherical layers move at 0.7 - 0.95  $c$  from **center C** and also undergo an equal tangential speed of approximately  $2/3^{\text{rd}}$  the speed of light  $c$  around **center C** within their own spherical layers. (Total speed of these electrons  $<$  speed of light  $c$ )

**-) Protons and electrons start at the correct motions resulting in hydrogen:**

In this Little Bang, the protons and electrons mutually receive exactly the correct directions of motions for the formation the hydrogen atom; approximately 10 billion years later may be even more. During the Little Bang itself lacks the physical space for the formation of the hydrogen atom and thus the formation of gravity and gravitational energy.

(This also applies to the Big Bang theory! The first 10 billions of years atoms and gravity must be absent 100%! In case the Big Bang result in atoms/ gravity this Big Bang would result directly into a gigantic blackhole! Any kind of expanding universe would be impossible!)

In addition to lack of space, there is also a much too great difference in speeds between the released protons and electrons. To be able to form hydrogen:

- 1) the distance between the mono-spherical layers of protons and electrons increase to that now present in the hydrogen atom,
- 2) the speed of the electrons must decrease from 2/3rd of the speed of light  $c$  to approximately 2.2 Mm/s.

Both processes together take about 10 billion years or more and only possible as a universe-spherical-shell with a radius becoming about 10 - 12 billion light years. The expansion of the universe starts with an expansion speed of approximately 0.7 - 0.95 of the speed of light  $c$ .

Anyway the first 10 - 15 billion years or more in the form of mono-spherical layers of protons and electrons *without atoms* and therefore also *without gravity and without any gravitational energy!* This period without atoms the **Laws thermodynamics** are absent as well! **Document G16.**

**-) First swell up "Little Bang black hole" before a universe-spherical-shell is formed:**

Peeling off the former "Little Bang" black hole into mono-layers of protons / electrons within the speed of light takes approximately 1,300 - 1,500 years! During that period, the radius of the "Little Bang black hole" disintegrated into mono-layers loose protons/ electrons initially increases significantly to a perfectly round sphere with a radius of approximately 1,000 - 1,300 light years. The volume of that former "Little Bang" black hole will increase by a factor of at least about  $10^{30}$  -  $10^{40}$  and possibly even more.

This volume reaches its maximum when a hollow inner space is formed and then remains more or less constant. After that, this universe-spherical-shell becomes thinner. In billions of years expanding and slowly swelling more and more space is created between these mono-layers of protons/ electrons and also within these mono-layers themselves.

Protons and electrons in their mono-layers are getting apart further and further. This causes an enormous (after) local equal swelling of the USS. During the expansion of the universe, the thickness of this uniformly expanding universe-spherical-shell then finally decreases in time (about 10 billion years or more) to an all-round equal thickness of several tens - hundreds of kilometers!

In that period without atoms and gravitation, the mutual distance between the mono-spherical layers of protons and electrons increases to the distance now present in the hydrogen atom.

**-) The speed of the electrons:**

The electrons start with an orbital speed of approximately 2/3rd the speed of light  $c$ . Due to the transfer of this energy to the protons, this tangential speed decreases over many billions of years to approximately 1.6 - 2.2 Mm/s. That is the rotation speed of the electron in hydrogen atoms. This transfer of energy results in a small increase in the expansion speed. **Document G7 and step 6 of the cycle of the universe.**

**-) With hydrogen, gravity and gravitational energy return in the universe:**

With the formation of hydrogen, gravity and gravitational energy as well physical and chemical forces were also created. Gravitation/ gravity is generated by the "shell"-electrons of the atom and arises as a result of the movement/ speed of that atom in the universe/ USS!  
**Documents E3 (text), E3-1 (figures) and E3-2 (component structure of gravity).**

Gravity and time/ UCT are the only forms of "radiation" without: a) waves, b) particles, c) mass, d) matter, e) charge, f) spin and g) kinetic energy. Gravity (and time/ UCT) aren't bound to the speed of light. Therefore gravity and time/ UCT spread with infinite speed! Gravity and time/ UCT are continuously generated and leave the universe at the very same moment.

The gravitational particle or "graviton" does not exist and isn't even possible.

Gravity is not deflected by electric, magnetic or other gravitational fields. Gravity is the only form of "radiation" in the universe that travels purely in a straight line all around their origin. For that reason a *factor  $\cos \alpha$*  must be added to **Newton's** law of gravity and **Einstein's** formulas. **Figure 36 document G8 explains the origin of  $\cos \alpha$ .**

Gravitational radiation and time/ UCT are the only forms of radiation that leave the universe without any consequences for the mass, matter and energy balances of the universe!

Gravitational radiation is unique and is and will remain completely elusive to *Science*. This does not apply to gravitational energy / "dark" energy.

**-) Gravitational energy = "dark" energy:**

With the formation of hydrogen, some 10 – 15 billion years after the start/ Little Bang and about 40 - 50 billion years ago, hydrogen and gravity were created. Simultaneously an enormous amount of gravitational energy/ "dark" energy was created out of nothing/ blue of the sky. **Document G7, G8 and G16.**

Since that moment gravity/ gravitation has slowed down the expansion of the universe-spherical-shell. This gravity creates many trillions ( $10^{12}$ ) of first rotation points **R0** and about  $250 \pm 50$  billion rotation points **R1** inside the universe-spherical-shell. These **R1's** form the core of all futural galaxies.

**-) Condensation of hydrogen:**

Due to gravitation and the cooling of the hydrogen gas by expansion towards below its condensation point, the first liquid hydrogen accumulates in these tens of trillions rotating points **R0** and billions of rotation points **R1**. This accumulation results in 4 - 20 billion may be more gigantic pure hydrogen spheres **R1** in the perfectly round universe spherical-shell/ USS/ balloon.

This universe-spherical-shell is divided into 4 - 20 billion or more uniform areas containing one centrally located hydrogen sphere and 4 – 6 thousand **R1** hydrogen spheres around.

These billions of identical pure hydrogen spheres are getting bigger and hotter over time, with the temperature due to collisions rising to many millions of Kelvin. These ultimately pure hydrogen plasma-shaped spheres all culminate in the same hydrogen supernova explosion/ Big Bangs, forming the galaxy's current *central black hole* and the *2 - 4 spiral arms*.

All spiral and elliptical galaxies start the very same moment with their own superhot Big Bang. The elliptical M galaxies start may be some millions of years earlier!

**Figures 42 (S) – 54 (S) show the Big Bangs of spiral galaxies and 42 (E) – 52 (E) the Big Bangs of elliptical (E) galaxies & explanation document G8.**

These hydrogen supernovae, with almost the same start of all galaxies, already took place about 20 - 25 billion ago and together with the formation of the central black holes and with the formation of the 2 - 4 spiral arms of these prototypes **spiral galaxies (S)** or without spiral arms as **elliptical galaxies (E)**

From the blown away remnants of these 4 - 20 billion supernovae, a single galaxy with its 2 - 4 spiral arms is later formed around each central black hole. All galaxies contain approximately  $250 \pm 50$  billion stars and 1 – 10 associated planets.

All **spiral (S) and elliptical (E) galaxies** started already about 20 - 25 billion years ago with their own hydrogen supernovae/ Big Bang. These **(S) and (E) galaxies** started the same moment together with the formation of their *central black hole* and the formation of the 2 - 4 spiral arms only spiral galaxies. In **elliptical E galaxies** these spiral arms are missing. The central blackholes of these **elliptical (E) of (M) galaxies** are much may be 100x – 1.000x heavier.

**-) Within the USS all radiation within 13.8 billion years is reconstructed into new protons/ electrons and new hydrogen / stars**

Within the universe-spherical-shell, all radiation emitted by those hydrogen supernovae, within 13.8 billion of years will be transformed into new matter in the form of protons/ electrons and into new hydrogen gas finally resulting in the formation of new stars. So all light and all information about these Big Bangs of galaxies/ hydrogen supernovae of galaxies now has been completely disappeared.

As a result, those hydrogen supernovas/ Big Bangs can no longer be perceived; not even with **Hubble** or futural **James Webb!** Observations of shockwaves of gravitational energy up to about 30 billion years ago will be possible with the futural, improved, **Einstein!**

**-) View from Earth on the Universe and within the universe-spherical-shell is limited to a maximum of 13.8 billion light years:**

From Earth, this converting photons back to matter greatly limits the event horizon on the universe. The furthest known light has traveled a (light length) distance of approximately 13.8 billion light years. That light probably traversed that distance in the form of a pendulum within the USS. **Figures 76a – 77c document G8.**

As a result, the most distant galaxies:

- a) "Universe wide" a factor 2 - 3 times less distant than 13.8 billion light years,
- b) The light reaches the Earth through multiple pendulum-shaped paths. On earth that results in a multiple virtual images of the same object.

This requires great caution when interpreting observations from the universe.

**-) During each step of the universe cycle is viewed and estimated:**

- Current thickness of the universe-spherical-shell/ USS:

- Increase or decrease in thickness USS:

- The radius of the universe-spherical-shell with respect to **center C**:

The outer and inner radius of the universe-spherical-shell near galaxies and between galaxies.

All electromagnetic and particle cosmic radiation emitted by ordinary matter or by black-hole matter must remain for 100% within that universe-spherical-shell/ USS. At the location of these billions of galaxies, the USS swells up to several thousand light years thick due to both vortexes starting the central blackhole of the galaxy.

Between the galaxies, this USS varies from tens – hundreds of km thick.

**X) Time/ universe-clock-time/ UCT elapsed since the super cold Little Bang. The time of the start and end of the conscious step:**

The universe-clock-time/ UCT starts with the Little Bang at the **center C** of the universe for all matter (protons and electrons) at  $t = 0$ . During the cycle of the universe this UCT remains universe wide exactly the same for all the present protons, electrons, all common and all blackhole atoms.

At the end of each cycle, the universe clock time ends approximately 35 - 50 trillion ( $10^{12}$ ) years later for all protons, electrons and atoms again exactly simultaneously at the next super cold Little Bang.

**The universe-clock-time/ UCT has a maximum:**

Time is finite and therefore isn't infinite! At the next cycle of the universe this universe-clock-time starts again at  $t = 0$ . The universe endlessly goes through the same fixed cycle of 29 steps in exactly the same time frame of now estimated 35 – 50 trillion ( $10^{12}$ ) of years. The beginning and end of the universe-clock-time are by default linked to: a) the Little Bang as start and end of each cycle and b) to **center C** of the universe.

During the entire cycle the maximum universe-clock-time is always exactly the same everywhere with respect to:

1) The moment the Little Bang (start  $t = 0$  and end point = zero point  $t = 0$  of the next cycle universe)

2) The **center C** of the universe (absolute zero point of a 3D space universe"/ USS and

3) During the progression/ settlement of the cycle of the universe changes everywhere occur exactly the same moment/ UCT.

This universe-clock-time is developing only one forwards direction to the universe cycle linked quantity. See **document G2 and chapter 6.5 of G8**. For all particles of matter (protons, electrons, atoms/ molecules) and all forms of EM and cosmic radiation, within the universe-sphere-shell universe wide always holds exactly the same linear relationship between the universe-clock-time/ UCT and the location of matter and radiation with respect to **center C**.

Everywhere inside the USS the same relation and progress in the cycle of the universe and UCT. Everywhere in the universe/ USS always exactly the same UCT is present.

- Only under these preconditions not any difference in universe-clock-time ever occur during the billions of central cluster of black holes (CCBH) returning to **center C**. At the end of each universe cycle no difference occurs in universe-clock-time/ UCT and place with respect to **center C**.

- Only under those boundary conditions does all matter and kinetic energy from the universe arrive at exactly the same moment/ UCT again at the same **center C** of the universe to form just one large stationary *Little Bang black hole* there.

**Einstein** had seen this relationship between curved space and curved time well. Gravity however hasn't any relation with this curvature of space and time! Physical gravity is generated by the "shell"-electrons of atoms due to speed of the atom in the universe. The physical origin of *gravity/ gravitation* is elaborated in **documents E3, E 3-1 and E3-2**.

This absolute universe-clock-time/ UCT can hypothetically best be observed from **center C**. From **C** all matter in the universe is always seen in exactly the same universe-clock-time.

The universe/ USS is a 100% closed system for all mass, matter and energy. All photons are trapped within this USS and continue forced only to move within that USS. Photons cannot enter or bridge that 100% absolute vacuum space between **C** and the universe-spherical-shell/ USS. Photons cannot reach **center C**. Everything is just theoretical as well.

However, seen from **C**, the light from the universe-spherical-shell would also take millions to many billions of years before the **center C** is reached. That instant observation can only be done hypothetical assuming *infinite* speed of light!

**-) How we observe the universe/ USS?:**

Since all photons are 100% trapped moving through the universe-spherical-shell/ USS, we observe the universe exclusively through that rather thin; one galaxy thin/ thick, universe-spherical-shell. This is elaborated in **document G12 & figures 36a - 36r and figure 29 of G8**

**-) Universe-clock-time/ UCT can only be determined by mathematical modeling:**

Viewed from any point in the universe other than **C**, time is no longer absolute but increasingly relative! Nowhere in the universe can this real universe clock time be observed, nor can this universe clock time be measured or determined directly.

The universe clock time can only be derived from a mathematical model representing the universe/ USS and cycle of the universe. Even through such mathematical model UCT can only derived approximate and with an accuracy of a thousand – a million years!

**-) For each of the 29 steps in the mathematical model, the following must be estimated:**

a) The time/ UCT of the start and end of the step relative to:

- 1) the moment of the Little Bang and start of the absolute universe-clock-time at  $t = 0$  seconds and
- 2) the position and distance of the universe-spherical-shell from the **center C** of the universe:
- 3) the position and distance of objects within the still perfectly curved universe-spherical-shell relative **center C** of the universe.

-) Start, end point and duration of the 13 *long physical steps or periods* between these 16 short chemical or nuclear-fusion *steps/ moments/ tipping points*. Periods are changes and processes that take millions, billions and sometimes trillions of years:

-) Each of those 13 long-lasting *physical steps/ periods* begins and will end with short-lasting *chemical and nuclear physical steps/ moments* in the cycle of the universe. These 16 short-term physical, chemical and nuclear physical changes/ moments and *tipping points* take place within a period of seconds, minutes, hours and necessities to adjust the starting points of the next physical *step/ period* in the model of this universe cycle.

### **XI) Temperature of ordinary matter and temperature of black hole matter:**

At the start of the Little Bang, all black hole atoms *at 0 Kelvin* disintegrate exactly simultaneously. With the simultaneous disintegration of all black-hole atoms into protons/ electrons. Without atoms in the universe the physical phenomenon of temperature completely disappears as well. Temperature equals absolute zero during the first about 10 billion years of the next universe.

Temperature does not return until about 10 or more billion years later every proton catches its own “shell”-electron and hydrogen returns. In line with the return of the hydrogen atom as well return of gravitation and physical/ chemical forces of the atom.

Within the electron shells of ordinary atoms the atomic nucleus has a lot of space available to vibrate. The ordinary atoms can therefore occupy a temperature of 0 Kelvin to many millions of kelvin and thus the state of a plasma.

In black-hole atoms, however the electron shells of normal atoms have been collapsed towards close to the nucleus of the atom. In black-hole atoms, all atomic nuclei are completely wedged within these electron shells. Black hole atomic nuclei can hardly vibrate anymore. The vibration of black hole atomic nuclei is therefore limited to only about 2.7 Kelvin. By default, black hole atoms and black holes are close to absolute zero temperature!

This is true even if such a black hole is present in the core of extremely large stars and the temperature around that black hole is many millions of Kelvin!

The temperature of all types of black holes can by default be equated with the background temperature of the universe/ the universe-spherical-shell. In both vacuum spaces on either side of the universe-spherical-shell there are no atoms and therefore no temperature is present. Their temperature is equivalent to 0 Kelvin!

### **-) During the universe cycle, each step is viewed and estimated:**

- ) The temperature of ordinary matter / atoms with respect to absolute zero 0 kelvin.
- ) The temperature of black holes is standard close to 2.7 Kelvin:

### **XII) Degree of deflection of neutrinos, photons and particle matter (cosmic rays) in the universe; 100% reflection within the universe-spherical-shell:**

Except: 1) gravitation and 2) time/ universe clock time/ UCT, all other forms of EM and cosmic radiation are based on *waves* of:

- a) Higgs particles, strings, snares (the smallest particles with mass, electric charge and spin),
- b) neutrinos/ photons
- c) sub-atomic and atomic particle radiation/ cosmic radiation.

These forms of radiation all represent a certain amount of: 1) mass 2) matter, 3) electric charge, 4) magnetic spin and 5) kinetic energy transported by waves through an “ether” of electric/ magnetically fields emitted by atoms only present inside the USS.

All these particles with mass/ matter are bound to a displacement with a maximum speed of light and transport via an “ether” of H, H<sub>2</sub> and He atoms. These “ether” atoms/ molecules are only present in the universe-spherical-shell/ USS. These atoms and their fields are required to conduct photons and all other forms of EM radiation and those of cosmic particle radiation through the USS.

Except gravitation and time all other forms of EM and cosmic radiation are deflected 100% by those absolute 100% vacuum fields/ spaces. That hydrogen/ helium gasses/ plasma's bent and reflected all other forms of radiation in such a way that they are forced to remain 100% within that universe-spherical-shell/ USS and thus cannot penetrate these 100% absolute vacuum areas/ spaces present either sides this USS.

Except gravity and time/ UCT all other forms of radiation are forced to move forwards only within the USS. This universe-spherical-shell in fact is a 100% closed system for all phenomena with mass, matter and energy. Therefore the universe/ USS as a whole is a 100% closed system.

Now the twelve variable parameters/ turning points in the universe cycle have been derived.

#### **\* 4) PURPOSE: MODEL & QUANTIFY THE UNIVERSE AND ITS CYCLE:**

With this document, the author aims to achieve the following goals:

- 1) Convincing **Science and Scientific Institutes** that the Universe & energy-neutral cycle can be modeled mathematically.
- 2) With that mathematical model the universe/ the universe-sphere-shell/ USS & cycle of the universe can be quantified from the first up to the very last second of each cycle.
- 3) The Sciences actually pick up and work out that mathematical modeling of the universe & cycle.
- 4) That through that model the boundary conditions / macro parameters of the universe & cycle can be quantified. The amount of 1) mass, 2) matter (atoms), 3) kinetic energy, 4) gravitational energy, 5) space/ radius USS, 6) time/ UCT such energy-neutral cycle is possible.
- 5) This also results in a universe/ universe-spherical-shell/ USS with closing balances for mass, matter and energy. Without any form of "dark" matter and without any form of "dark" energy.
- 6) To provide mathematical modelers a kind of manual for each step in the cycle of the universe in 29 steps. In this document for every of these 29 single steps is elaborated the aspects that must be taken in account when setting up that mathematical model of the universe & its cycle.

**Document G15** shows the changes/ tipping points at the beginning as well at the end of each of these 13 physical steps.

## \* 5) DESCRIPTION PER STEP OF THE OCCURRING CHANGE(S) / TIPPING POINTS DURING THE CYCLE OF THE UNIVERSE:

For details see **document G7 & over 150 figures in document G8** [www.uitewijkwinkel.eu](http://www.uitewijkwinkel.eu)

-) End **phase 29** preceding universe / universe cycle equals **tipping point 1** of this cycle. **Phase 29** however exactly equals **phase 1** of that past cycle as well is **phase 1** of the next following cycle of the universe:

-) The universe / universe-spherical-shell / USS forms a 100% closed system for all physical phenomena that are based on:

a) wave motions, b) on particles with a quantity of mass that can be measured or not, c) electric charge, d) magnetic spin and e) kinetic energy as well f) shock waves of gravitational energy.

-) The universe is only open to: 1) gravity and 2) time/ the universe clock time / UCT. Only these two physical phenomena aren't based on: a) waves, b) mass, c) matter, d) electric charge nor e) magnetic spin and f) are without any kind of kinetic energy!

-) In the final phase of the preceding universe, gravity has gathered and merged all mass, matter and all kinetic energy in the universe together in the perfect round, not anymore rotating, Little Bang black hole (LBBH) filled with only *black hole atoms*  $\geq$  Be. Neutrino's and photons are completely absent as well single protons/ electrons and ordinary atoms! The *Laws of Thermodynamics* are still active. **Document G16.**

-) After all, those black hole atoms mutually repel each other electrical, just like in gas. Within all types of black holes there an enormous electrical spring tension / energy is present between these black hole atoms! Therefore all types of black holes in fact are extremely unstable!

In black holes that enormous electrical and extremely explosive spring tension is only held in check and can be suppressed by gravity. To remain stable black holes must generate enough gravity by their own.

-) The last part of the hollow space in that LBBH eventually fills up completely. Gravity held together and jailed these repelling black hole atoms together inside this Little Bang black hole (LBBH).

Now all contraction speed disappears and *all gravity* disappears as well. Due to that loss of gravity now that LBBH becomes unstable.

-) That *critical black hole gravity (Cribhgra)* of the LBBH is rather small and is just about 5 - 10 times the amount of gravity generated by our current sun. This stability limit *Cribhgra* of black holes / all compact celestial bodies therefore is relative extremely low!

-) The fixed **center C** universe is always exactly in the center of that *Little Bang black hole* filled with black hole atoms. That *Little Bang black hole* / LBBH is without any form of movement and has a radius of now estimated about 25 - 50 million km may be possibly even (much) more.

-) The universe is based on an equivalent number of protons and electrons and is uncharged overall. Currently without mathematical model estimated to be approximately  $10^{80}$ - $10^{90}$  protons / electrons.

-) In that Little Bang black hole formed at the end of this universe cycle, the black hole atoms present in it are almost completely stand still with respect to **center C** and thus the atomic nuclei of these black hole atoms. The "shell" electrons of these black hole atoms move in rather perfect orbits around their atomic nuclei at an angular speed of approximately 0.95 - 0.99 the speed of light  $c$ . With the loss of contraction speed, those "shell" electrons in the LBBH generate less and less gravity as this Little Bang black hole nears its completion.

-) The free kinetic energy of the universe is then attached to these "shell" electrons moving at approximately the speed of light  $c$  around their nuclei. The rest of the energy is the previously mentioned spring tension between black hole atoms. This free transferable kinetic energy is just present on half of the electrons as "shell"-electrons of blackhole atoms:  $E = \frac{1}{2} \cdot \frac{1}{2} mc^2$  electrons.

-) Ratio of "core" electron black hole atoms : "shell" electron black hole atoms in LBBH = roughly 1 : 1.

-) No free kinetic energy/ photons are attached to the protons and "nuclear/ core" electrons present inside nuclei of black hole atoms.

-) Inside those atomic nuclei there is a lot of internally bound kinetic energy in the form of:  
a) *Matter* of protons and that of "core" electrons: (Matter = mass +  $E = \frac{1}{2} m \cdot c^2$  angular speed),  
b) Charge bonds between "core" protons and "core" electrons,  
c) Spin repulsion between "core" electrons and "core" protons.  
d) Black hole atoms are extremely cold with a temperature of only about 2.7 Kelvin.

-) Due to the displacement of black hole atoms, the shrinking speed Little Bang black hole (LBBH) decreases further and further. As a result, the gravity of this LBBH also decreases further and further.

-) At the end of the preceding universe, the last remnant of the gravitational energy also disappears. Only at the very last moment of the contraction does the *Little Bang black hole* / LBBH approach the Critical black hole gravity Cribhgra. Cribhgra = equivalent the amount of gravity generated by 5 – 10 stars like our current sun.

-) The contraction of the universe-spherical-shell/ USS then ends completely. The last remaining contraction gravity disappears and LBBH is crossing Cribhgra. Now the internal electric spring tension becomes larger than the required amount of gravity. The gigantic Little Bang black hole becomes unstable and then disintegrates into separate black hole atoms.

-) Without the protection of the gravity by the LBBH, these black hole atoms are unstable on their own as well. All black hole atoms then disintegrate further into an equivalent number of normal protons and electrons. **Phases 1 – 4** cycle of the universe.

-) The universe forms a 100% closed system with in principle a fixed maximum number of protons, electrons and fixed amount of kinetic energy / photons of light / the electron and that of infrared / the proton. During the universe cycle, however, part of the protons / electrons can be converted into photons and neutrinos. Those are temporally forms of matter transferred into free energy!

-) The number of protons and electrons can therefore vary during this cycle. There is always exactly the same number of protons / electrons present at the beginning and at the end of each cycle. Photons and neutrinos can also be converted back into protons, electrons and new hydrogen atoms/ molecules. This process takes 13.8 billion years.

### **Required formulas phase 29 forging cycle of the universe:**

1.1) Decrease shrinkage rate and associated shrinkage gravity *Little Bang black hole* (LBBH) until the point of the *Critical black hole gravity / Cribhgra* is reached. Determine quantitative size of Cribhgra decrease in the final phase of the formation of the Little Bang black hole with a radius of 50 - 100 million km may be more.

1.2) *Cribhgra* is equal to the gravity of approximately 5 – 10 stars the size of our sun.

1.3) The Little Bang does not occurs until *Cribhgra* is undershot and takes place starting at 2.6 Kelvin. As the black hole atom disintegrates, the physical phenomenon of temperature disappears completely. The temperature of that Little Bang black hole disappears and becomes equivalent to 0 Kelvin. This Little Bang is super cold without any form of temperature!.

1.4) Assume a universe based on an unknown, but equivalent, number of protons and electrons. The universe overall is uncharged. This does not apply to magnetic spin.

1.5) Assume a constant and to be determined fixed basic amount of kinetic energy in the form of photons of light or the electron and photons of infrared or the proton.

### **-) Phase 1 universe cycle: *Moment 1 / Tipping point 1:***

***Cribhgra* is reached about 50 – 65 billion ( $10^9$ ) years ago. Now the electric spring tension between blackhole atoms inside LBBH becomes larger than the present gravity. *Little Bang black hole/ LBBH* becomes unstable:**

-) Start Little Bang (0 kelvin) at the moment the hollow space around **center C** is almost completely filled and the contraction speed LBBH and thus gravity approaches zero.

-) At the very last moment of the former universe the gravity LBBH reaches the *Critical black hole gravity / Cribhgra*. The electric spring tension between the black hole atoms present then becomes greater than the gravity that until then held together these repelling black hole atoms jailed inside this LBBH.

-) Gravitation moves on all sides at an infinite speed through and within that LBBH.

-) The Little Bang black hole with a radius of 50 - 100 million km therefore reaches Cribhgra everywhere *exactly* at the very same moment. This LBBH becomes unstable everywhere exactly at the same moment  $t = 0$  sec because gravity spreads with infinite speed! All black hole atoms present in the LBBH therefore become unstable exactly at the very same moment.

**Figures 13, 14, 17 Document G8 [www.uitewijkwinkel.eu](http://www.uitewijkwinkel.eu).**

### **Required formulas / quantities phase / moment 1:**

1.6) No new formulas. Assume number of protons = number of electrons universe = n.  
 $n = 10^{80} - 10^{90}$  protons and electrons.

1.7) Quantify electrical spring tension between the black hole atoms present at the moment of this super cold Little Bang. Those black hole atoms repelling each other represent a quantity of kinetic energy. That energy does not consist of photons.

**-) Phase 1a universe cycle: *Moment 1a / Tipping point 1a:***

**All 'shell' electrons moving with  $c$  leave their atomic nuclei:**

- ) Below *Cribhgra*, the mutual electric and magnetic repulsion between black hole atoms within the LBBH eventually overcomes the gravity that held these black hole atoms together until then and kept them trapped/ jailed inside the black hole/ LBBH.
- ) Former LBBH disintegrates everywhere exactly simultaneously into different black hole atoms  $\geq Be$ . Without protection by gravity, all black hole atoms  $\geq Be$  are completely unstable as well. Those black hole atoms then disintegrate further into an equivalent number of protons and electrons exactly simultaneously because:
  - a) all "shell" electrons, moving at approximately the speed of light, leave their atomic nucleus,
  - b) now only bare, positively charged, atomic nuclei of protons and nuclear electrons remain.
- ) With the disappearance of those black hole atoms  $\geq Be$ , all gravity, all remaining gravitational energy and temperature disappear. With that disintegration of blackhole atoms the *Laws of thermodynamics* and all other atom-related Laws of Nature disappear as well! The new universe starts without the *Laws of thermodynamics*.
- ) Gravity and gravitational energy and all other atom related forces remain absent as long as the atom is absent.
- ) Temperature drops from 2.7 Kelvin to an equivalent of 0 Kelvin!
- ) All other physical and chemical forces of the atom were already absent.
- ) Only the elementary forces of protons / electrons and their kinetic energy remain. These are: 1) elementary electric charge, 2) magnetic spin, 3) mass and 4) matter.
- ) Kinetic energy = photons attached to those protons and electrons that provide speed and thus kinetic energy.
- ) The expansion on the outside of the former LBBH has not yet started.
- ) Estimated duration  $\ll 10^{-3}$  seconds.

**Required formulas / quantities phase 1a / moment / tipping point 1a:**

- 1.8) Distribution of the number of  $n$  electrons in  $a.n\%$  of "shell" electrons and  $b.n\%$  of "core" electrons present in atomic nuclei; with  $a + b = 100\%$ , (1 neutron in the atomic nucleus = 1 p + 1 nucleus e-)
- 1.9) Start transverse velocity "shell" electrons black hole atoms is estimated at  $0.9 - 0.99$  speed of light  $c$ .
- 1.10) Electrical spring tension between black hole atoms.
- 1.11) Duration **moment 1a**:  $\ll 10^{-3}$  second.
- 1.12) Atoms are absent! *Laws of thermodynamics* and all other atom-related laws of nature are disabled and absent as well!

**-) Phase 2 universe cycle: *Moment 2 / Tipping point 2:***

**All "shell" electrons collide with atomic nuclei and split them into loose protons and loose "nucleus/ core" electrons:**

- ) Those  $a.n\%$  'shell' electrons moving at approximately the speed of light collide with the stationary neighboring atomic nuclei and split these stationary atomic nuclei into separate protons and  $b\%$  of separate 'nucleus' electrons with respect to **center C**.

- ) This is at the expense of the kinetic energy of this a% of n "shell" electrons.
- ) The atom and therefore temperature are absent. During the Little Bang, the temperature is equivalent 0 Kelvin.
- ) Atomic nuclei repel each other because their positive electric charge.
- ) The expansion on the outside of the former LBBH hasn't yet started.
- ) Estimated duration  $\ll 10^{-3}$  seconds.
- ) With the atom also disappear: a) gravitation, b) gravitational energy, c) temperature d) the *Laws of thermodynamics* and e) all other atom-related Laws of Nature!
- ) Gravity and gravitational energy and all other atom related forces remain absent as long as the atom is absent!!
- ) So energy can be created! Not any kinetic energy; but gravitational energy!

### **Required formulas / quantities phase 2 / moment 2 / tipping point 2:**

- 2.1) Due to the collisions and the splitting of atomic nuclei, the speed of the now free electrons decreases from an average of  $0.9^{\text{th}}$  -  $0.99^{\text{th}}$  c to approximately  $2/3^{\text{th}}$  c. The protons released from atomic nuclei still stand still relative to **center C**.
- 2.2) Expansion on the outside of the former LBBH hasn't yet started.
- 2.3) Universe overall contains equivalent number of loose protons and loose electrons.
- 2.4) Active forces: a) elementary charge force, b) elementary magnetic spin force.
- 2.5) Electric spring tension and magnetic spring tension between protons and between electrons. Attraction between protons and electrons combined with mutual repulsion via magnetic spin.
- 2.6) External kinetic energy electrons:  $(a + b) \cdot n \cdot \text{mass of electrons} \cdot v^2$  ( $v = \text{approx. } 2/3 \text{ c}$ )
- 2.7) Universe consists of n protons and n electrons where  $n = 10^{80} - 10^{85}$  may be more,
- 2.8) These n protons are matter and contain  $E = n \cdot \frac{1}{2} m \text{ proton} \cdot c^2$  of *internal* rotational energy. This energy is not visible or recognizable on the outside of the proton.
- 2.9) These n electrons are matter and contain  $E = n \cdot \frac{1}{2} m \text{ electron} \cdot c^2$  of internal rotational energy. This energy is not visible or recognizable on the outside of the electron.
- 2.10) Duration moment 2:  $< 10^{-3}$  seconds.
- 2.11) Now atoms are absent! *Laws of thermodynamics* and all other atom-related laws of nature are disabled and inactive as long as the atom is absent!

### **3) Phase 3 universe cycle: Moment 3 / Tipping point 3:**

**All electrons get the same speed of approximately  $2/3^{\text{rd}}$  c around center C of the universe:**

- ) Via collisions of the free electrons against the released "core" electrons, these are accelerated to an estimated average speed of approximately  $\frac{2}{3}$  of the speed of light c and distributed evenly over all directions and orbits around **center C**. **Figure 22 G8**.
- ) The black hole atom as such has completely disappeared.
- ) With the atom its gravity, gravitational energy and all other atom related forces and Laws have also completely disappeared. Only the elementary charge and spin of protons and electrons remain.
- ) The Little Bang occurs at an equivalent of 0 Kelvin. So the new and next universe starts up super cold equivalently.
- ) Not yet a start of expansion on the outside of the former LBBH.
- ) Temperature absent and is equivalent to 0 Kelvin.
- ) Estimated duration  $\ll 10^{-3}$  seconds.

### **Required formulas / quantities phase 3 / moment/ tipping point 3:**

- 3.1) Distribution a% "shell" electrons ↔ b% "core" electrons
- 3.2) Kinetic energy: a% shell electrons x (0.9c - 0.99c) velocity + b% x 0 / a + b → an average velocity of all electrons present of approximately 2/3 c.
- 3.3) Active forces: a) elementary charge force, b) elementary magnetic spin force.
- 3.4) Electrical spring tension between protons and the spring tension between electrons. Electrical attraction between protons and electrons mutually combined with mutual repulsion between protons/ electrons through their equal magnetic spin.
- 3.5) Protons are don't move with respect to **center C**. External kinetic energy of protons:  $E = n \cdot \text{mass of protons} \cdot 0^2 = 0$ .
- 3.6) Electrons move 2/3 c. Electron external kinetic energy:  $E = n \cdot \text{mass of electrons} \cdot (2/3 c)^2$
- 3.7) Internal kinetic energy n protons:  $E = n \cdot \frac{1}{2} m \text{ protons} \cdot c^2$  rotational/ angular energy.
- 3.8) Internal kinetic energy n electrons:  $E = n \cdot \frac{1}{2} m \text{ electrons} \cdot c^2$  rotational/ angular energy.
- 3.9) Duration **moment 3**:  $\ll 10^{-3}$  seconds.
- 3.10) Atoms are absent! *Laws of thermodynamics* and all other atom-related laws of nature are disabled and inactive as long as the atom is absent!

### **-) Phase 4 universe cycle: Moment 4 / Tipping point 4:**

#### **Due to their elementary forces all protons and electrons arrange themselves into mono-layers of 1 proton / 1 electron thick:**

- ) Via their elementary electric charge and magnetic spin and the spring tension present, all protons and electrons shunt themselves into mono-layers of alternately one proton and one electron thick. The former LBBH is transformed into a perfect spherical structure with 1: 1: 1: 1: 1 spherical shell shaped mono-layers of alternating protons and electrons around **center C**. Within that universe-spherical-shell only protons and electrons are present with their elementary electric charge and elementary magnetic spin. This results in a tremendous electric spring tension and magnetic repulsion due to the equal magnetic spin of these protons / electrons.
- ) Those spherical mono-layers consist of:
  - a) still stagnant protons and
  - b) mono-layers of electrons rotating rapidly with approximately 2/3 c around **center C** in all directions. **Figures 19 and 24 Document G8.**
- ) Active forces presence: only mass, matter, electric charge, magnetic spin and kinetic energy and electric and magnetic spring tension.
- ) The atom, gravity, gravitational energy and other atom related physical and chemical forces are absent, Gravitational energy universe = 0 and will remain zero the next about 10 billion years as long as the atom and thus gravity is absent!
- ) Within the LBBH and those mono-layers of protons and electrons an enormous electric and magnetic mutual repulsion / spring tension is present.
- ) This enormous electric and magnetic spring tension triggers the expansion of these mono-layers from the outside of the former LBBH and peels off this "LBBH" by mono-layers of protons and mono-layer of electrons. See **Figures 28 and 30 document G8.**
- ) The atom is absent and therefore temperature is absent as well. Temperature now is equivalent to 0 Kelvin.
- ) Gravity and gravitational energy are both completely absent as well.
- ) The expansion on the outside of former Little Bang black hole / LBBH starts.
- ) Duration **moment 4**:  $\ll 10^{-3}$  seconds.

-) Atoms are absent! *Laws of thermodynamics* and all other atom-related laws of nature are disabled and inactive as long as the atom is absent!

#### **Required formulas / quantities phase 4 / moment / tipping point 4:**

4.1) Expansion speed of mono-spherical shell layers of protons / electrons starts with approximately 0.9 - 0.99 x speed of light  $c$  may be less. This expansion speed determines both the amount of radial and the amount of tangential kinetic energy on protons/ electrons at the start of the expansion of this universe.

4.2) Start kinetic energy expansion of protons:  $E = n \cdot \frac{1}{2} m_{\text{proton}} \cdot v^2$ . ( $v = \text{about } 0.9c$ )

4.3) Start kinetic energy expansion of electrons:  $E = n \cdot \frac{1}{2} m_{\text{electron}} \cdot v^2$ . ( $v = \text{about } 0.9c + 2/3c$ )

4.4) Active forces: a) elementary charge force, b) elementary magnetic spin force and c) the spring tension within those mono-sphere shells of protons / electrons and between these mono-layers of protons/ electrons.

4.5) Kinetic energy electrons:  $n \cdot m_{\text{electron}} \cdot v^2$ . ( $v = \text{about } 2/3c$ )

4.6) Kinetic energy  $n$  protons:  $E = n \cdot \frac{1}{2} m_{\text{proton}} \cdot c^2$  internal rotational/ angular energy.

4.7) Kinetic energy  $n$  electrons:  $E = n \cdot \frac{1}{2} m_{\text{electron}} \cdot c^2$  internal rotational/ angular energy.

4.8) Estimated time duration moment 4:  $<10^{-3}$  seconds.

4.9) Atoms are absent! *Laws of thermodynamics* and all other atom-related laws of nature are disabled!

Every cycle of the universe starts with the same amount of kinetic energy and spring tension. Note that the expansion of the universe starts without atoms and therefore also without gravity and gravitational energy.

During the first about 10 billions of years, the universe expands as a universe-spherical-shell/ USS completely unimpeded without any form of resistance. After all, there is an absolute 100% vacuum around that former "LBBH"!

If gravity is absent, gravitational energy is completely absent as well. This expansion is not at the expense of the expansion speed, while gravitational energy is indeed built up completely free of charge with respect to **center C**! That energy is effected free of charge the moment when gravity and gravitational energy return. This occurs with the forming of the H atom.

#### **-) Phase 5 universe cycle: *Physical period 1*:**

-) Start all sided smooth start expansion of universe from former "Little Bang black hole" / "LBBH" in the form of almost infinite mono-layers of protons / electrons expanding in an absolute vacuum. And thus expansion without any form of resistance.

This expanding at a maximum speed of light arises from the electrical spring tension within these mono-layers of protons/ electrons themselves. This expansion does not require internal energy! The released protons / electrons only generate charge and spin. Atoms are absent and thus gravity as well!

-) **Period 1** starts from **center C** and the former "Little Bang black hole" that is peeled off layer by layer via mono-layers of 1 proton and 1 electron thick alternately. This **period 1** ends with the formation of the hollow 100% vacuum inner space and with the transition from a spherical shape into that of a universe-spherical-shell/ USS.

-) It takes about 1,300 - 1,500 years to peel off the perfectly spherical former "Little Bang black hole" in mono-layers  $p^+$  and mono-layers  $e^-$ . The expansion speed of those mono-layers of protons/ electrons is constant and amounts to approximately 0.9c - 0.99c may be less.

Universe starts without any form of inflation and resistance!

- ) The universe / "LBBH" will expand during this **period 1** into a perfectly round expanding sphere with mono-layers  $p^+ / e^-$  with a radius of approximately 1,200 - 1,450 light years.
- ) Only then does a hollow absolute 100% vacuum interior space arise with **center C** always exactly in the center. **Figure 30 Document G8.**
- ) Duration of peeling / swelling this former LBBH and expansion speed are unknown.
- ) Expansion takes place without atoms and therefore also without any gravity and gravitational energy!
- ) Expansion takes place completely unhindered in an absolute vacuum outer space of the universe and is not slowed down in any way of resistance from within.
- ) After the cold Little Bang and during **period 1**, the temperature is absent and equivalent to 0 Kelvin! So equivalent super cold. See **figures 17 - 30 Document G8.**
- ) At the end of **period 1**, the volume of the sphere with mono-layers of protons / electrons is approximately  $4 - 5 \times 10^{42} \text{ km}^3$ .
- ) **Phase 5 / period 1** cycle ends when a perfectly round interior space around **center C** arises.

#### **Required formulas / quantities phase 5 / period 1:**

- 5.1) Expansion velocity of expansion of mono-spherical layers of protons/ electrons and of all protons.
- 5.2) Electrons undergo expansion and one curved velocities encompassing all directions within the universe-spherical-shell within their mono-sphere shells. Indicate as  $v(r1)$  and  $v(r2)$ . Elaborated in **Figure 23 G8.**
- 5.3) Decrease over time of the electrical and magnetic spring tension within those mono-layers of  $p^+ / e^-$ . Maximum expansion speed is close to the speed of light  $c$ , may be less.
- 5.4) Peeling time and expansion rate of expansion / swelling former "Little Bang black hole" is unknown.
- 5.5) Achieved expansion former "LBBH" sphere mono-layers of protons / electrons until that hollow inner space is formed. Calculate volume.
- 5.6) Active forces: a) elementary charge force, b) elementary magnetic spin force and electrical spring tension within those mono-sphere shells of protons / electrons.
- 5.7) Estimated duration of **period 1**: approximately 1,300 - 1,500 years
- 5.8) Atoms are absent! *Laws of thermodynamics* and all other atom-related laws of nature are disabled!

#### **-) Phase 6 universe cycle: *Physical period 2*:**

##### **Start of universe-sphere-shell and formation of an *absolute vacuum inner space* of the universe:**

- ) At an expansion speed of against the speed of light, **Phase 5, period 1** passes into **phase 6 period 2** without any physical, chemical and nuclear physical changes.
- ) This moment has not been mentioned separately and in fact marks the end of this super cold Little Bang and swelling of the former LBBH. **Figure 30 Document G8.**
- ) **Phase 6** starts with the creation of a hollow 100% vacuum inner space and will end with the formation of the hydrogen atom. **Phase 6** cycle takes approximately 10 billion years or more.
- ) **Phase 6 / period 2** is without atoms. During this entire period, gravity and therefore gravitational energy are completely absent.
- ) In this period, a free build-up of gravitational energy occurs. That gravitational energy is realized free of charge when protons and electrons together form the hydrogen atom. (With the hydrogen atom, gravity and gravitational energy return into the universe).
- ) Expansion rate constant at  $0.9c - 0.99c$  or less. Period without any inflation!

- ) From the creation of the hollow inner space, the thickness of the universe-spherical-shell/ USS decreases further and further.
- ) Over the next 10 billion years or more, due to expansion of the USS the distances between these mono-layers of protons/ electrons will slowly increase, as will the distance between the protons and electrons within their mono-spherical layers.
- ) As a result, post-swelling takes place by a factor of  $10^6$  to  $10^8$  and possibly even (much) more. The thickness of the USS decreases only extremely slowly. The volume by a factor of  $10^6$  to  $10^8$  or more.
- ) The transverse spring tension allows the universe-spherical-shell to expand further and further unimpeded relative to **center C**. Thanks to the absence of atom and therefore absence of gravitation, this perfectly round universe-spherical-shell/ USS unhindered reaches a radius of approximately 10 billion light years!
- ) During a period of about 10 billion years or more at constant speed, an extremely slow transfer of the transverse energy from the electrons to the protons occurs. The expansion speed of the mono-layers of protons / electrons therefore increases marginally by only about 1 Mm/s.
- ) Seen in time, the thickness of the universe-spherical-shell/ USS decreases from about 1,300 light-years to a few tens / hundreds of kilometers due to the expansion of this USS.
- ) The mutual distance between and within those mono-layers of protons and electrons must increase very slowly in these 10 billion years of **period 2** to the distance of the proton/ electron present in hydrogen atom. This whole **period 2** the atom itself is still completely absent!
- ) Only in that case, universe-wide, each proton can simultaneously capture its own 'shell' electron. That moment the simplest hydrogen atom can be formed.
- ) The transverse speed of the electrons has then decreased from approximately  $\frac{2}{3} c$  to the speed of the "shell" electrons in the hydrogen atom, which is approximately 1.6 - 2 thousand km/s.
- ) At the end of **phase 6 / period 2** cycle, the universe still is a perfectly round universe-spherical-shell with a radius of approximately 10 - 12 billion light years and a thickness of a few to tens – hundreds of kilometers and with **center C** exactly in the middle of that thin universe-sphere-shell/ USS/ balloon.

### **Required formulas / quantities phase 6 / physical period 2:**

- 6.1) Duration **phase 6** with swelling universe-spherical-shell + expansion speed.
- 6.2) In that **period 2** the expansion reached with respect to universe-spherical-shell as well with respect to **center C** and thickness of universe-spherical-shell/ USS.
- 6.3) Degree of mono-layers of protons / electrons after swelling, so slowly that only after about 10 billion years or more there will be:
  - a) as much space between these layers of protons and electrons as present inside the hydrogen atom,
  - b) sufficient distance has also been formed within these mono-layers of protons and those of the electrons themselves that the hydrogen atom can be formed.
 (The formation of the H atom and immediately afterwards the formation of the hydrogen molecule are accompanied by profound physical and chemical changes in the USS!)
- 6.4) Active forces only: a) elementary charge force, b) elementary magnetic spin force and the spring tension decreasing with time within those mono-spherical-shells of protons / electrons. Expansion speed remains the same and is close near the speed of light  $c$ .
- 6.5) Velocity increase distances between protons and electrons and moment they reach distances and velocities as in the H atom.
- 6.6) Duration of **period 2**: approximately 10 billion years and possibly even more.

6.7) Atoms are absent! *Laws of thermodynamics* and all other atom-related laws of nature are disabled!

**-) Phase 7 universe cycle: *Moment 5 / Tipping point 5:***

**Formation of hydrogen atoms and thus the creation of gravity and gravitational energy (= dark energy):**

-) During the first about 10 billion years or more expansion of the universe-spherical-shell at the speed of light, both:

a) the distances between protons and electrons *within these mono-layers* of protons / electrons increase to those present between protons and electrons in the hydrogen atom.

b) the distances between the mono-layers of protons and electrons also increase to those present in the hydrogen atom.

c) the speed of the electron reduces to the speed of the "shell"-electron in hydrogen atoms.

By transferring energy from the electrons to the protons, the tangential speed of the electrons decreases from approximately  $2/3 c$  to approximately 1.6 - 2 thousand km/s, just like now present inside the H atom.

-) At that moment, those distances and speeds are such that each proton captures its own "shell"-electron. That moment only the simplest hydrogen atom can be formed.

-) The formation of the H atom occurs exactly simultaneously in the whole universe-spherical-shell/ USS however already *some 40 – 50 billion years ago!*

-) The formation of the H atom results in the *centripetal force*. That force keeps the "shell" electron in a fixed orbit around the proton.

-) With that hydrogen atom and speed of the H atom in the universe, both gravitation and gravitational energy with respect to **center C** return in the universe/ the universe-spherical-shell. **Documents E3, E3-1 and E3-2** describes the *physical origin* of gravity. **Document F1d** the origin of other physical, chemical and mechanical forces on the atom.

Some of these physical and chemical forces become active at the creation of this H atom.

-) With the H atom the *Laws of thermodynamics* and all other atom related *Laws of nature* become active and enabled again!

-) Now a gigantic amount of gravitational energy relative **center C** is added to the universe cycle and completely free of charge. See **Figure 79 III G8**. That gravitational energy is the by **Science** sought after "dark" energy!

-) That generation of free energy is contrary to the current *Laws of thermodynamics* are therefore contrary to the current and accepted insights and visions within **Science!**

-) Elaborated in **document G16 website**.

-) Gravitation from the H atom ensures that the expansion of the universe / the universe-spherical-shell will be slowed since about 40 – 50 billion of years and will be further and further slowed down over the next 350 - 450 billion years towards zero! Eventually this expansion USS comes to a standstill. This braking is done via a hyperbolic line.

-) After that maximum expansion of the universe-spherical-shell of about 12 billion lightyears over approximately 350 - 450 billion years, that gravitation also causes the universe-spherical-shell to shrink **towards center C again**. So the universe/ USS is finite and not infinite!

-) Thanks to the infinitely great speed / communication via gravitation, all matter and energy of the universe returns at the very same moment at **center C again**.

(During that completely controlled contraction of the universe / universe-spherical-shell, this gravitational energy added *free of charge* to the universe cycle is fully utilized again braking the acceleration of the contraction of this USS towards a constant contraction speed of about 100 – 150 km/s)

- ) Furthermore, the "shell" electron of hydrogen generates the chemical covalent radical force.
- ) The phenomenon of temperature also returns in the universe and this short moment amounts to 0 kelvin. **Figure 34 Document G8.**

**Required formulas / quantities phase 7 / moment / tipping point 5:**

7.1) No new formulas. Change in the starting points of the universe model as a result of the introduction of new active forces such as gravitation, the centripetal force and the chemically covalent radical force.

7.2) By gravitation and by adding a tremendous amount of gravitational energy, free of charge, the *energy balance* of the model of the universe / universe-spherical-shell changes radically. Now a large invisible amount/surplus of gravitational energy is present missing 2021 on the energy balances of the universe. This gravitational energy in fast is the so called "dark" energy.

7.3) Active forces: a) elementary charge force, b) elementary magnetic spin force, c) centripetal force, d) gravity (1) of the single 'shell' electron, e) the chemical covalent radical force (1) single 'shell' electron and f) temperature. The spring tension now has completely disappeared and transferred into electrical spring tension between atoms/ (= gas pressure).

7.4) Every form of speed of the atom in the universe generates its own vector/ component on that gravity-force and that chemical covalent radical force. The number of these vectors/ components in these atomic forces is equal to the number of *different speeds* of the atom in the universe relative **center C** as well *angular speeds* within the universe-spherical-shell/ USS.

7.5) Duration **moment 5:**  $\ll 10^{-3}$  seconds universe-clock-time/ UCT.

7.6) Atoms are back! *Laws of thermodynamics* and all other atom-related laws of nature are switched on again from now on! Those Laws only apply to systems with atoms.

**-) Phase 8 universe cycle: Moment 6 / Tipping point 6:**

**Formation of hydrogen molecule H<sub>2</sub>:**

-) Two hydrogen radicals H each with a single "shell" electron react directly further to an uncharged hydrogen molecule. That electron pair results in binding heat which is released.

-) These H<sub>2</sub> molecules generate a special form of gravity that is linked to the electron pair (+ G2k).

-) That electron pair also generates the *physical Van der Waals/ London force*. The mutual repulsion of the electron shells of hydrogen generates the gas force.

**Required formulas / quantities phase 8 and moment 6 / tipping point 6:**

8.1) No new formulas. Changing the principles of the universe model with regard to the active forces present.

8.2) Due the formation of the electron pair, the model of the universe/ universe-spherical-shell is expanded with the *Vander Waals/ London force* and thus with the phase states: gas/ plasma, liquid and solid!

8.3) Active forces: a) elementary charge force, b) elementary magnetic spin force, c) centripetal force "shell"-electrons, d) gravitational single 'shell' electron (1) and gravitation of the electron pair (2), e) the chemically covalent radical single force 'shell' electron (1) and that of the electron pair (2), f) temperature and g) the physical Vander Waals/ London force (2).

8.4) The spring tension has disappeared and has completely passed into the gas force / electrical repulsion of atoms.

8.5) Duration **moment 6**:  $<10^{-3}$  second universe-clock-time/ UCT.

8.6) Atoms/ atomic structures are present again! *Laws of thermodynamics* and all other atom-related laws of nature are active and switched on as well as all other atom-related laws of nature! Great changes!

### **-) Phase 9 universe cycle: *Moment 7 / Tipping point 7*:**

#### **Hydrogen passes into a hot hydrogen plasma:**

-) Due to the release of binding heat, the hydrogen molecule immediately transforms into the single hydrogen plasma. Due to heat this thin, tens of kilometers thick, universe-spherical-shell swells on both sides at tens of km/s.

-) Due to the transition in a plasma, the hydrogen molecule disappears again and with it the electron pair. The chemically covalent bonds in hydrogen are broken. The Vander Waals/ London force as well as the gravitation of the electron pair (2) disappear again.

-) Because of the transition to plasma, the construction of the hydrogen atom also partly disappears. The "shell"-electrons in the *hydrogen plasma* now swing from atomic nucleus to atomic nucleus, passing through only part of a total orbit around the atomic nucleus (the proton). In doing so, they also always generate part of the gravity and part of the chemical covalent radical force.

-) The gas pressure consists of mutual electrical repulsion between the plasma hydrogen atoms. (= more or less analogous to the spring tension).

-) *Laws of thermodynamics* and all other atom-related laws of nature are still switched on again and active!

#### **Required formulas / quantities for phase 9 and moment 7 / tipping point 7:**

9.1) No new formulas. Changing the starting points of the universe model with regard to the active forces present. A number of forces temporarily disappear and only return after the hydrogen plasma has cooled down to hydrogen gas again. This cooling can only occur through the swelling of the universe-spherical-shell itself not by transferring photons into new protons/ electrons. (That transformation is just possible after the formation/ Big Bangs of the galaxies in **phase 16** of the cycle of the universe **document G7 & figures 42 (S) – 54 (S) G8.**)

9.2) Determining the loss of gravitational / gravitational energy as a result of the transition from hydrogen to hydrogen in a plasma state.

9.3) Active forces reduced to: a) elementary charge force, b) elementary magnetic spin force, c) centripetal force, d) gravitational single 'shell' electron (1), e) the chemical covalent radical force single 'shell' electron ( 1) and f) temperature.

9.4) Every form of speed in the universe and within the USS generates its own vector / component on gravity, the chemical covalent radical force and at the *Vander Waals/ London force*. Vector Law by **Berry Uiterwijk Winkel**.

9.5) Electrical repulsion between plasma-shaped H atoms causes the start of the swelling of the universe-spherical-shell/ USS on both sides in a pure vacuum at a few tens of km/s. This swelling allows this universe-spherical-shell to cool down again.

9.6) Duration **moment 7**:  $<10^{-3}$  seconds universe clock time.

9.7) *Laws of thermodynamics* and all other atom-related laws of nature switched on again!

### -) **Phase 10 universe cycle: *Period 3*:**

#### **Cooling all hydrogen plasma to atomic H and H<sub>2</sub> gas:**

- ) Billions of years after the start, as a spherical-shell expanding, the universe still consists of only pure hydrogen. These plasma-shaped H atoms repel each other and the USS on both sides swells with tens of km/s in both absolutely 100% vacuum spaces present on either side of this universe-spherical-shell.
- ) Due to the swelling of the universe-spherical-shell, the hydrogen plasma cools down during **period 3** again. This takes about 100 million to 1 billion years, cooling down the H plasma to ordinary hydrogen atoms and eventually to hydrogen molecules.
- ) Due to the swelling / expanding of the universe-spherical-shell itself, it cools down further and further. This cooling cannot be done by emitting photons within the USS. This cooling cannot be done faster because all photons always remain 100% confined/ jailed within this universe-spherical-shell.
- ) This cooling can only be achieved by swelling the USS. During that **period 3**, the universe-sphere-shell/ USS expands explosively at a few dozen km/s.
- ) This **period 3** therefore takes a lot of time. During this period, the universe-spherical-shell is filled with pure hydrogen only.
- ) That swelling temporary generates its own form of gravity that counteracts and slows down this swelling of the USS. **Figures 32 and 34 Document G8 and documents E3, E3-1, E3-2 and E4.**
- ) This also applies to the expansion of the universe-spherical-shell as a whole relative to **center C**. This results in two different velocity components of gravitation.
- ) Gravitation (1) slows down: a) the expansion speed of the universe-spherical-shell as a whole as well by b) the swelling of the universe-spherical-shell itself.
- ) Kinetic energy released when slowing down the expansion speed cannot be converted into heat! In addition to gravitational energy relative **center C**, this released energy is largely transformed into rotational speed/ angular speed of the hydrogen present within the universe-spherical-shell/ USS. All hydrogen atoms / molecules start to rotate on their axis and generate velocity related gravitational components/ vectors and at higher and higher levels.
- ) Because of that gravity, those H atoms / molecules mutually attract each other.
- ) That mutual attraction starts at the atomic level and continues up to the level of clusters of future galaxies.
- ) That slowing down of the expansion speed results within the universe sphere shell in 7 - 8 different levels of rotational movements / angular velocity within the universe-spherical-shell on an ever increasing scale and up to the maximum level of the 4 – 20 millions of identical clusters of galaxies.
- ) This slowing down of the expansion speed by gravity results in the formation of:
  - a) 4 to 20 million equal facet / cluster areas each with the amount of hydrogen enough for 4 - 6 thousand or even many more future galaxies (**R1**) and
  - b) all clusters with the same rotation / angular speeds clockwise or counterclockwise.
- ) Within each cluster up to 4 - 5 rotational/ angular movements will arise around the central rotation center **RC1** of that facet/ cluster area.
- ) Within each future galaxy (**R1**) there are no additional rotation/ angular speeds yet.

#### **Required formulas / quantities phase 10 / period 3:**

10.1) Determining temporary loss of gravity during the transition from hydrogen gas to a plasma state and its effects on the expansion velocity of the universe-spherical-shell.

10.2) Formulas hyperbolic decrease expansion speed USS and the gravitation (1) and gravitational energy linked to that speed with respect to **center C**. Within the universe-spherical-shell the local rotation is clockwise or counter-clockwise.

10.3) Formation of many millions of equivalent clusters with rotation both clockwise or counterclockwise. The universe-spherical-shell is then probably subdivided into approximately 4 - 20 million or more clusters with an identical structure and with a either clockwise or anti-clockwise rotation.

10.4) Formula hyperbolic decrease due to gravitation of the swelling of the universe-spherical-shell itself and of the associated gravity of the single "shell" electron (1) and the amount of gravity associated gravitational energy.

10.5) Gradient decrease in expansion velocity of the universe-spherical-shell/ USS as a result of gravity in that USS. In addition, a separate gravitational component occurs, linked to the swelling of the USS itself.

10.6) The partial atomic shape present in the H plasma still generates gravity and slows down the expansion of the universe-spherical-shell. In addition to potential/ gravitational energy relative to **center C**, for the rest that energy is converted into angular velocity/ velocities of these **R0's** and **R1's**.

Increase in radius of USS itself during **phase 10 / period 3**.

10.7) Converting expansion velocity / energy into 6 - 8 forms of rotation/ angular velocity within the USS with an increasing radius up to the level of a cluster with a radius of many tens of light years. Those different speeds are present within the universe-spherical-shell.

10.8) Within each cluster there are ultimately 6 - 8 forms of speed that are linked to 6 - 8 forms of gravitation and gravitational energy clockwise or counterclockwise.

10.9) Start converting gravitational energy with respect to **center C** to forms of gravitational energy within the universe-spherical-shell!

10.10) Active forces: a) elementary electric charge force, b) elementary magnetic spin force, c) centripetal force, d) gravitational single 'shell' electron (1), e) the chemical covalent radical force single 'shell' electron (1) and f) temperature.

10.11) Every form of speed in the universe and within every cluster of the universe sphere shell generates its own vector on gravity, the chemically covalent radical force and on the *Vander Waals/ London force / bond*.

10.12) Electrical repulsion between plasma-shaped H atoms causes the universe-spherical-shell itself to swell at tens of km/s. What is the residual pressure during **period 3** within the USS and how does that pressure change in time? Effects of this in relation to the swelling of the USS.

10.13) Duration of **period 3**: 100 million - 1 billion years.

### **-) Phase 11 universe cycle: *Moment 8 / Tipping point 8*:**

#### **End formation of hydrogen molecules:**

-) At the end of **period 3**, all plasma-shaped hydrogen changed back into normal hydrogen atoms immediately followed by the formation of the hydrogen molecule. With the hydrogen molecule and the electron pair, the *Vander Waals force/ London force (2)*, gravity (2) and the electrical repulsion (= gas force) return as active forces within the universe-spherical-shell.

See **documents F1c and F1d**.

-) As a result of the slowing down of the expansion velocity, the angular velocity of the hydrogen gas within the universe-spherical-shell increases again.

-) The radius of the **R0** rotation regions around trillions of larger rotation points **R1** increases to approximately 10 - 50 million km. Gravitation will accumulate more and more hydrogen gas around every **R1/** (and futural galaxies). Each cluster comprises approximately 4 - 6 thousand such **R1** areas or more.

-) In time, an enormous sphere of 100% pure hydrogen will be formed around each **R1**, which will later in **phase 16** result in one Big Bang and the formation of one galaxy either with **spiral (S) arms galaxies** or **elliptical (E) galaxies** without spiral arms .

**Required formulas / parameters moment 8 / tipping point 8:**

11.1) No new formulas. However, adaptation of the system of active physical, chemical forces and energetic starting points due to the formation of the electron pair.

11.2) Determining the current expansion speed and distance USS relative to **center C** and thickness USS.

11.3) Determining the actual amount of gravity and the 6 - 8 different forms of (angular) speed and 6 - 8 forms of (angular) gravity. Gravity is a speed-related force of the atom. Determine the amount of gravitational-linked 6 - 8 forms of gravitational energy with respect to **center C** and within the USS itself.

11.4) Actual expansion speed of USS with respect to **center C** and the speed swelling USS itself.

11.5) Determine on the 7 - 8 levels of rotation areas / angular speeds within each of these clusters clockwise or counter clockwise. And related amount of kinetic energy. Clusters are mirror image identical.

11.6) Determining the levels of gravity associated with these 7 - 8 levels of the associated 6 - 8 forms of gravitational energy present within each cluster.

11.7) Number of identical clusters USS is unknown. Equivalent number of galaxy clusters within USS with angular speed clockwise or counterclockwise. The USS as whole doesn't rotate, The angular speed USS as whole is absolute zero!

11.8) Thickness of the universe-spherical-shell. All matter in the universe is present in the form of only ordinary hydrogen atoms/ molecules.

11.9) Active forces: a) elementary charge force, b) elementary magnetic spin force, c) centripetal force, d) gravitational single 'shell' electron (1) and electron pair (2), e) the chemical covalent radical force single 'shell' electron (1), f) the Vander Waals/ London force (2) and g) temperature. The (bio) -chemical charge force / binding (2) is still lacking.

11.10) Each form of speed generates its own vector/ component on: gravitation, the chemical covalent radical force and on the Vander Waals/ London force.

11.11) Electrical repulsion within the hydrogen (= the gas force hydrogen) causes the universe-spherical-shell itself to swell at tens of km/s.

11.12) Duration **moment 8**:  $< 10^{-3}$  sec.

**-) Phase 12 universe cycle: *Period 4*:**

**Temperature of pure hydrogen decreases to its condensation point:**

-) The universe-spherical-shell is still only filled with pure hydrogen gas. During this **period 4** that hydrogen gas cools down to the condensation point of hydrogen at about 20 Kelvin. In the next step, hydrogen condenses into a liquid where it loses its gas pressure.

-) Gravity slows down the expansion of the universe-spherical-shell with respect to **center C** more and more, but slower in time.

-) The USS with hydrogen gas still swells as a result of the mutual repulsion / entropy between hydrogen molecules. Gravitation does cause the hydrogen to accumulate as a gas around the rotation points **R0** and **R1**. This will only really happen on a large scale when hydrogen has cooled to its *condensation point* at approximately 20 kelvin.

-) Increase in this **period 4** of both the number of rotation levels and of all rotation speeds.

- ) As a result of swelling USS, the temperature of hydrogen drops to the condensation point of hydrogen, which is approximately 20 Kelvin. The gas phase of hydrogen takes estimated about two billion years to complete.
- ) During condensation, the hydrogen forms flexible *Vander Waals / London* bonds and turns into a liquid. The "gas force"/ entropy disappears. Gravitation now ensures accumulation and concentration of hydrogen in all rotation points present and in particular in the rotation points **R0** and **R1**. All hundreds of billions of rotation points **R1** currently present will result in one galaxy in the future.
- ) Each of the 4 - 20 million equal cluster regions is estimated to contain about 4 - 6 thousand or more such germination points of galaxies **R1**.
- ) During that period, gravity further slows down the expansion velocity of the USS hyperbolic and converts this energy into the angular velocity of the hydrogen gas and especially at these **R0's** and **R1's**.

#### **Required formulas / quantities Phase 12 / Physical period 4:**

- 12.1) Period starts with hot hydrogen gas and ends with super cold gas that is about to condense.
- 12.2) Adjustment of formulas because physical, chemical and energetic principles in the have changed because the electron pair and associated forces are back in the universe-spherical-shell. Determining the time/ universe-clock-time at the start and end of **the period 4**.
- 12.3) Determining expansion speed at the beginning and end of **period 4** and distance USS relative **to center C** and thickness USS.
- 12.4) Determining the amount of gravity and increase in the 6 - 8 forms of gravity.
- 12.5) Determining the amount of gravitational-coupled 6 - 8 and more forms of gravitational energy with respect to **center C** and that within the HBS itself.
- 12.6) Current expansion speed USS relative to **center C** at the beginning and end of **period 4** and degree of swelling USS itself and swelling speed.
- 12.7) Determine on the 5 - 7 levels from within each cluster the rotation speeds clockwise or counterclockwise. And of the related amount of kinetic energy. Clusters are mirror image identical.
- 12.8) Thickness of the universe-spherical-shell.
- 12.9) All matter in the universe is present in the form of ordinary hydrogen only.
- 12.10) Active forces: a) elementary charge force, b) elementary magnetic spin force, c) centripetal force, d) gravitational single 'shell' electron (1) and electron pair (2), e) chemical covalent radical force single 'shell'-electron (1), f) the Vander Waals / London force (2) and g) temperature.
- 12.11) Each form of speed generates its *own vector/ component* on gravity (1) / (2), the chemical covalent radical force and on the Vander Waals / London force (2).
- 12.12) Electric repulsion (gas force / entropy) causes an increasingly slower swelling of the universe-sphere-shell at km/s.
- 12.13) Duration of **period 4**: 100 million - 1 billion years.

## **-) Phase 13 universe cycle: *Moment 9 / tipping point 9:***

### **Start condensation hydrogen:**

-) Due to the swelling of the still expanding universe-spherical-shell, the hydrogen present cools down universe wide to the condensation point of hydrogen.

-) This condensation of hydrogen starts everywhere at the same time within the universe-spherical-shell and especially in all billions of rotation points **R1**. Gravitation has brought the rotating hydrogen gas together there and the gravity / concentration of the hydrogen increased further and further. The gas pressure is highest on those billions of **R1**'s.

-) Condensation of hydrogen starts here first and results in flexible Vander Waals / London bonds and in a transition from gas to liquid. This is accompanied by a loss of gas pressure/ entropy.

-) This condensation releases heat (photons). That heat / photons must first be processed through the swelling of the universe sphere shell. This condensation process is therefore very slow, but it is progressing steadily.

-) **Moment 9** marks the start condensation of hydrogen forms the starting point with the formation of large ever faster, otherwise identical, rotating spheres with liquid hydrogen **R0**'s and **R1**. In time, one galaxy will develop from each of these super-large hydrogen spheres **R1** in phase 16 cycle of the universe.

### **Required formulas / parameters moment 9 / tipping point 9:**

13.1) No new formulas. However, adjustment of physical, chemical and energetic principles. The universe-spherical-shell is super cold (approximately 20 kelvin) and will now contain liquid hydrogen in addition to gaseous hydrogen.

13.2) Determining expansion speed and distance USS with respect to **center C** and thickness USS. Determining the amount of gravity and 5 - 7 forms of gravity. (Gravity is a velocity-related force of the atom as well as the gravitational energy coupled to gravity).

13.3) Determining the amount of gravitational-linked 5 - 7 forms of gravitational energy with respect to **center C** and within the USS itself.

13.4) Actual expansion speed of USS relative to **center C** and the swelling USS itself.

13.5) Determine on the 6 - 7 levels of rotation areas / angular speeds within each of these clusters clockwise or counterclockwise. And related amount of kinetic energy.

13.6) Determining the 6 - 7 levels of gravitational energy within each cluster,

13.7) Determining the number of rotation points **R0** and **R1** / number of pre-galaxies **R1** per cluster.

13.8) Number of identical clusters present within USS is unknown. Equivalent number of galaxy clusters within USS with clockwise and counterclockwise rotation.

13.9) Thickness of the universe-sphere-shell/ USS.

13.10) All matter universe is still present in the form of just ordinary hydrogen / H<sub>2</sub>.

13.11) Active forces: a) elementary charge force, b) elementary magnetic spin force, c) centripetal force, d) gravitational single 'shell' electron (1) and electron pair (2), e) the chemical covalent radical force single 'shell' electron (1), f) the Vander Waals / London force (2) and g) temperature.

13.12) Each form of speed generates its own vector/ component on gravity (1) / (2), the chemically covalent radical force (1) and on the Vander Waals / London force (2).

13.13) With condensation, the electrical repulsion (gas force/ entropy) is increasingly weakened. The swelling universe spherical shell will decrease from tens of km/s → zero.

13.14) This complete cooling and condensation of hydrogen is actually a new period. The author has now made it part of **phase 14 / period 5**.

13.15) Duration **moment 8**: <10<sup>-3</sup> sec. (Complete condensation of hydrogen itself takes tens of millions of years)

## -) Phase 14 universe cycle: Period 5:

**Period with complete condensation of hydrogen/ H<sub>2</sub>; gravitation > gas pressure hydrogen:**

- ) Within a few billion years, all hydrogen present in that universe-spherical-shell cools down to such an extent that the still pure hydrogen condenses completely again into liquid hydrogen. Gravity then becomes greater than the gas pressure in that hydrogen.
- ) The energy released during that cooling can only be converted into swelling of the universe spherical-shell/ USS and an increase in the angular velocity within the entire rotational area of trillions **R0**'s and that of the many billions of **R1**'s.
- ) In the meantime, gravity accumulates that cooled hydrogen more and more in all rotation points **R1**, causing the angular velocity and gravitation in those rotation points **R1** to increase as well as the angular speed of the hydrogen on its way to those rotation points.
- ) Because of gravitation, those smaller spheres with pure hydrogen rotating around **R1** mutually attract each other. Accumulation of hydrogen in the may be even trillions of rotation points **R1** that are present in the still expanding and expanding universe-sphere-shell. Gravitation in the universe-sphere-shell slows down that expansion further and further.
- ) In all rotation points **R1** an enormous, identical, hydrogen spheres **R1** with hydrogen sphere with first liquid and later plasma-shaped hydrogen develops. Millions of smaller secondary spheres of liquid hydrogen **R0** form around all **R1**'s in the plane of the universe-spherical-shell. They are very slowly but surely attracted to those **R1**'s through gravitation and through a spiral movement.
- Due to collisions of these **R0** with those **R1**'s, they continue to grow into large, identical, hydrogen spheres present in the universe-spherical-shell/ USS. These **R1**'s are getting bigger and rotating faster on their axis. As a result, they also generate more and more rotation / angular gravity.
- ) Through these collisions, these now gigantic spheres are getting hotter and only the hydrogen in those spheres **R1** gets back into the state of a gas and eventually plasma.
- ) Gravity keeps that gas / plasma hydrogen together. The remaining hydrogen remains liquid and cold.
- ) Later in **period 5**, all **R1**'s universe-wide result in one superhot identical spheres of hydrogen with pure hydrogen which in **phase 16** simultaneously turns into a superhot *Big Bang* and start one and each galaxy. This **period 5** takes approximately 12 - 14 billion years.
- ) Around most of the large **R1**'s hydrogen spheres 2 - 4 smaller and slightly cooler hydrogen spheres / **Roemers** form. Those **Roemers** rotate in the local plane of the universe-spherical-shell around those **R1**'s. In the Big Bangs in **phase 16**, these result in the *spiral (S) galaxies*. Figures 42 (S) - 54 (S) G8.
- ) A much smaller number of **R1**'s develop without those **Roemers**. These hydrogen spheres **R1** have the same amount of hydrogen and are transformed into *elliptical (E) galaxies* at the *Big Bangs* in **phase 16**. In fact, they are flat and round galaxies that we look at an angle. We observe those round galaxies as elliptical galaxies. Figures 42 (E) - 52 (E) G8.
- ) Universe-spherical-shell is now further divided into about 4 - 20 million identical clusters each filled with 4 - 6 thousand or more central hydrogen spheres **R1** and 5 - 7 levels of rotational speeds. Fusion of hydrogen spheres results in the formation of 4 - 6 thousand or more **R1**'s / pre-galaxies per cluster.
- ) All **R1**'s / pre-galaxies of *spiral (S)* or *elliptical (E) type* are more or less identical. Within those clusters, all **R1**'s have a clockwise or a counterclockwise rotation.
- ) As a result of gravitation, the expansion speed of the universe-spherical-shell is slowed down further and further. The energy released in this process is converted into rotation/

angular speed and 6 - 7 levels of rotation at all **R1's**. That is why all present-day galaxies rotate on their axis so quickly. **Figures 37 - 42 Document G8.**

-) Formation of many trillions of uniform hydrogen spheres **R1** of the *type (S) or (E)* that each have 6 - 7 levels with different angular velocities and thus 7 - 8 gravitational components per "shell" electron.

-) Within each cluster, above the level of the **R1's**, there are 4 - 5 rotation levels with different angular speeds.

#### **Required formulas / quantities Phase 14 / Physical period 5:**

14.1) Adjustment of formulas because physical, chemical and energetic principles in the have changed because hydrogen gas is temporarily completely converted into liquid hydrogen.

14.2) Determining the time at the start and end of **phase 14 / period 5**.

14.3) **Period 5** starts with hydrogen near the gas condensation point and ends with the complete condensation of hydrogen. As a result, the gas pressure of the hydrogen gas falls further and further and eventually even almost completely disappears. This complete condensation of hydrogen can take billions of years because in **period 5** photons cannot yet be reformed into protons, electrons and new hydrogen.

14.4) Determining the expansion speed at the beginning and end of **period 5** and the distance of the universe-spherical-shell/ USS relative to **center C** and the thickness of this USS.

14.5) Determining the amount of gravity and increase in the 6 - 8 forms of gravity.

Determining the amount of gravitational-linked 6 - 8 and more forms of gravitational energy with respect to **center C** and within the USS itself.

14.6) Decrease in expansion speed USS in **period 5** with respect to **center C** at the beginning and end of **period 5** and slowing down degree of swelling of the universe-spherical-shell/ USS itself and the decrease in the swelling speed of the universe-sphere/ USS itself. In this period there may even have been the shrinking of the universe-spherical-shell at the locations of these **R1's**.

14.7) Determine the 6 - 8 levels of angular velocity within each cluster clockwise or counterclockwise. And of the related amount of kinetic energy.

14.8) These clusters consist of **R1's (S) and R1's (E)** and are more or less identical in mirror image.

14.9) Determining the 6 - 8 levels of gravitational energy within each cluster.

14.10) Determining the decrease in the thickness of the universe sphere shell as a result of condensation of hydrogen.

14.11) All matter in the universe is still present in the form of ordinary hydrogen only.

14.12) Active forces: a) elementary charge force, b) elementary magnetic spin force, c) centripetal force, d) gravitational single 'shell'-electron (1) and electron-pair (2), e) the chemical covalent radical force single 'shell' electron (1), f) the Vander Waals / London force (2) and flexible Van der Waal bond and g) temperature.

14.12) Every form of (angular) velocity generates its *own vector/ component* on gravity (1) / (2), the chemical covalent radical force and on the Vander Waals / London force (2) and Vander Waals bond.

14.13) Due to condensation, the electrical repulsion (gas force) between the gaseous hydrogen molecules decreases further and further. This causes the universe-spherical-shell to expand more and more slowly, down to 0 m/s. Now entropy stops completely!

14.14) Duration of **period 5** and complete condensation of hydrogen: 100 million - 1 billion years.

## -) **Phase 15 universe cycle: Period 6:**

### **Forming gigantic identical spheres of pure hydrogen that simultaneously end with a superhot *Big Bangs* in phase 16:**

- ) In the universe-spherical-shell now all hydrogen has become liquid. Entropy and gas pressure have disappeared almost completely! Gravity causes an increasing accumulation of hydrogen in both small, large/ very large spheres **R1** with liquid hydrogen surrounded by many thousands of **R0**'s.
  - ) Gravity in the liquid hydrogen and in the spheres **R1** is now resulting in the formation of billions - trillions of large spheres **R1** consisting only pure hydrogen. Due to these **R0** collisions, these **R1** spheres are getting bigger and get an increasing pressure and temperature.
  - ) As a result of these collisions, the spheres **R1** also become increasingly hotter and eventually extremely hot with a temperature rising to tens of millions of degrees Kelvin.
- 
- ) In addition, in **spiral (S) systems** gravity ensures the formation of 2 – 4 smaller sub spheres of hydrogen/ **Roemers around these R1's** within this super cold universe-spherical-shell. Those smaller liquid hydrogen spheres form and continue to grow in size.
  - ) All matter is still present as 100% pure hydrogen. Partly in;
    - a: identical large spheres increasingly hotter **spiral (S) hydrogen R1** with **2 - 4 Roemers** resulting in *spiral (S) galaxies* and in
    - b: identical large spheres increasingly hotter **R1 hydrogen without Roemers** resulting in *elliptical (E) galaxies*.
  - ) At the end of this **period 6 in phase 16**, each **R1** will result in the formation of one entire galaxy. A *spiral (S) galaxy* or an *elliptical (E) galaxy* without spiral arms.
  - ) The universe sphere shell will then have reached a radius of somewhere around 10 billion light years. That USS is then divided into 4 - 20 million identical cluster areas.
  - ) In each of those 4 - 20 million clusters with 4 - 6 thousand or more gigantic identical hydrogen spheres **R1 Spiral (S)** and **R1 Elliptical (E)** develop with another 5 - 6 angular velocities in addition to the expansion speed within the cluster. **Figure 41 Document G8.**
  - ) Of those 4 - 20 million identical clusters, only 1/3 is observable from Earth. About 2/3 of the universe-spherical-shell is behind the *13.8 billion light-year event horizon* and is therefore not observable from Earth. *In the future with the new "Einstein" the event horizon through the USS will increase towards about 30 billion lightyears!*
  - ) That fairly thin universe-spherical-shell/ USS is filled with extremely low concentrations of hydrogen (with only a few molecules of hydrogen/  $\text{cm}^3$ ) together comprising about 4 - 20 billion large hydrogen spheres **R1**.
  - ) All EM radiation and cosmic particle radiation can only travel via that transport medium/ ether of hydrogen and helium only present within that universe-spherical-shell/ USS.
  - ) Probably there are many more galaxies within the universe-spherical-shell. That number can only be determined after mathematical modeling of the universe cycle and the model-based quantification of the amount of mass, matter, energy, time and space on which this universe is based.
  - ) The virtually empty and super cold spaces in the USS around these **R1's** all have a radius of approximately 1 - 3 million light years.
  - ) All spheres **R1** undergo 4 - 6 angular velocities and thus generate 4 – 6 forms of gravitational components and 4 – 6 components of gravitational energy. **Figure 41 Document G8.**
  - ) During the growth of these spheres **R1 spiral (S) galaxies with Roemers and elliptical (E) galaxies without Roemers**) they get hotter and reach several tens of millions of kelvin.

- ) Gravity slows down the expansion speed of the universe-spherical-shell causing these **R1's** to rotate faster and faster about their axis with time. Those rotation axes are more or less perpendicular to the local plane of the universe-spherical-shell.
- ) Within the plane of rotation of that central main sphere **R1** often at least two but usually 4 smaller and less hot secondary spheres / **Roemers** of pure hydrogen develop. Those **Roemers** rotate in a flat plane around the **central sphere R1** which is much larger and hotter and generates more gravity. **See figures 44 - 47 Document G8.**
- ) All **spheres R1 spiral (S)** and **all spheres R1 elliptical (E)** have the same size but may differ in temperature.
- ) In **phase 16**, nuclear fusion starts more or less simultaneously in all trillions of **R1's**. Nuclear fusion does not occur in the smaller and less hot secondary spheres/ **Roemers**.
- ) All **R1's** almost simultaneously flow into one spiral (S) galaxy or elliptical (E) galaxy.

-) **Phases 7 - 15** and **periods 1 - 6** take at least approximately 20 - 25 billion years to complete.

-) These **periods 1 - 6** are no longer visible. All photons from those periods have now been reformed into protons, electrons and new hydrogen atoms/ molecules and stars. All information from **periods 1 - 6** has been completely converted into matter and has therefore disappeared and been lost. **Document F1c.**

(With improved **LIGO** techniques and the futural **Einstein**, both based on shockwaves of gravitational energy, the last 5 - 10 billion years of this period can be made visible. That case the universe can be observed up to about 30 billion (light)years far and ago)

#### **Required formulas / quantities Phase 15 / Physical period 6:**

- 15.1) Determining time at the beginning and end of **phase 15 / period 6**. **Period 6** starts completely liquid hydrogen at the condensation point and ends with the super hot Big Bangs and the start of the galaxies. **Period 6** can take 15 - 20 billion years.
- 15.2) Adjustment of formulas because physical, chemical and energetic principles have been changed. All hydrogen gas has been converted into liquid hydrogen and largely concentrated in those **R1's**.
- 15.3) In the hydrogen spheres **R1**, liquid hydrogen becomes gas again and eventually millions of degrees of hot plasma. Gravity controls the gas pressure present in these hydrogen spheres. The environment of those **R1's** is super cold at about 20 kelvin.
- 15.4) Determining the decrease in expansion speed at the beginning and end of **period 6** and the distance USS with respect to **center C** and thickness of this USS. Determine conversion of expansion velocity / energy into angular velocity / energy of the **R1's**.
- 15.5) Determining the amount of gravity and increase in the 6 - 8 forms of gravity. Determine the amount of gravitational-coupled 6 - 8 and more forms of gravitational energy with respect to **center C** and within the **USS** itself with respect to *the centers of rotation* present within each cluster. (Is there a conservation of gravitational energy during this period?)
- 15.6) Decrease in USS expansion speed in **period 6** compared to **center C** at the beginning and end of **period 6** and possibly even contraction of the USS itself and contraction speed.
- 15.7) Determine on the 7 - 9 levels from within each cluster the rotational speeds clockwise or counterclockwise. And of the related amount of kinetic energy. Clusters are mirror image identical.
- 15.8) Determining the 7 - 9 levels of gravitational energy within each cluster and gravitational energy relative to **center C**.
- 15.9) Determining the thickness of the universe-spherical-shell.

- 15.10) Determining the size of the **2 - 4 Roemers** in relation to the size of their centrally located **R1**. These **Roemers** themselves also rotate slowly about their axis which is perpendicular to the plane of the local USS.
- 15.11) All matter universe is still present in the form of just ordinary hydrogen.
- 15.12) Active forces: a) elementary charge force, b) elementary magnetic spin force, c) centripetal force, d) gravitational single 'shell' electron (1) and electron pair (2), e) the chemical covalent radical force single 'shell' electron (1), f) the Vander Waals / London force (2) and flexible Van der Waal bond and g) temperature.
- 15.13) Each form of speed in the universe and within the USS generates its own vector/ component on gravity (1) / (2), the chemical covalent radical force and on the Vander Waals / London force (2) and Vander Waals bond.
- 15.14) Due to condensation, the electrical repulsion (gas force) between the gaseous hydrogen molecules decreases further and further.
- 15.15) The temperature and tension within those trillions of **R1**'s is increasing all the time. That tension is suppressed by the ever-increasing gravity.
- 15.16) All **spiral (S) R1**'s and all **elliptical (E) R1**'s in **phase 16** simultaneously lead to a spontaneous nuclear fusion explosion of hydrogen and the presence of protons and electrons only.
- The **elliptical (E) R1**'s explode may be 1 – 2 million of years earlier than the **spiral (S) R1**'s.

### **-) Phase 16 universe cycle: *Moment 10 / Tipping point 10:***

#### **The simultaneous occurrence of billions of *Big Bangs* & simultaneous start of all galaxies:**

- ) In all 4 - 20 billion identical hydrogen plasma spheres the pressure and temperature eventually rises to such an extent that nuclear fusion starts spontaneously or almost simultaneously. This results in one superhot Big Bang for **all hydrogen(E) and (S) spheres R1**. That nuclear fusion process immediately gets out of hand. Each superhot Big Bangs marks the start of one **(S) galaxy** with (spiral arms) or without spiral arms (**elliptical (E) galaxy**).
- ) The explosions of the *elliptical ( E) galaxies* may occur some earlier than those of the *spiral-arm (S) galaxies*. For the time being, a simultaneous start is assumed.
- ) In those identical 4 - 20 trillion ( $10^{12}$ ) identical hydrogen **(E) and (S) spheres R1** starts nuclear fusion simultaneously within minutes. All with their own identical *Big Bang*. In those Big Bangs both the central black hole is formed and the formation of the 2 - 4 spiral arms starts as **spiral (S) galaxies** or *without spiral arms elliptical (E) galaxies*.
- ) See **Figures 42 (S) – 54 (S) G8** for galaxies with *spiral arms (S)* and **Figures 42 (E) – 52 (E)** for *elliptical galaxies (E)*.
- ) These Big Bangs take place more or less simultaneously:
  - a) at least about 20 to 25 billion years after the start of this universe with a super cold Little Bang and
  - b) at least approximately 20 - 25 billion years ago (13.8 + 7 billion).
- ) The current universe is then at least 40 - 45 billion years old and probably already about 50 - 65 billion years old. This age will eventually become apparent after the mathematical modeling the cycle of the universe cycle.
- ) These 4 to 20 trillion superhot *Big Bangs* of the galaxies are no longer visible. All the energy released in the form of photons and cosmic rays was reformed within a period of 13.8 billion years into protons, electrons and new hydrogen and new stars. All photon-based information around the start of these **(S) and (E) galaxies** has disappeared and transformed into protons, electrons and hydrogen/ stars.

- ) All electromagnetic (EM) radiation and all cosmic radiation and all information based thereon disappear completely within a period of 13.8 billion years!
  - ) Fortunately, in the future, these Big Bangs can be detected via shockwaves of gravitational energy that are observed and measured via **LIGO / VIRGO and futural Einstein techniques**.
  - ) For this, these **LIGO** techniques must be improved by a factor of approximately one hundred to a thousand fold! That's a matter of time.
  - ) Using **LIGO / VIRGO** techniques, collisions can be made "visible" up to approximately 30 - 35 billion years ago. Until the era leading up to these *Big Bangs* of the galaxies.
- Figures document G8 nr. 48 (S)- 50 (S) / G8 nr. 48 (E) – 50 (E).**

**-) Phase 16a universe cycle: *Moment 10a / tipping point 10a:***

**Start nuclear fusion central spheres of spiral (S) galaxies and elliptical (E) galaxies:**

- ) During nuclear fusion starting hydrogen and protons/ electrons only higher elements of the periodic table can be formed from the hydrogen present.
- ) In nuclear fusion, the formation of all atoms of the periodic table takes place step-by-step via:

a) adding one proton to the atomic nucleus or placing:

b) one electron either at the nucleus or c) placement as a "shell"-electron.

This step-by-step nuclear fusion process is further elaborated in **document F1d & figures**.

- ) In that document it appears that, for energetic reasons, only the elements of the periodic table are formed from hydrogen / protons and electrons. In *atomic nuclei neutrons are impossible!*

In principle, all atoms with all their isotopes, whether stable or not, up to possibly far above **No. 92**. On earth a large number of those atoms up to **No. 120** have already been artificially made in particle accelerators.

- ) That spontaneous nuclear fusion of hydrogen only takes place in the central sphere **R1 A**; not in the **Roemers** of the spiral (S) galaxies.

-) The central part of **R1 A Spiral** and **R1 A Elliptical** is transformed step by step via nuclear fusion from hydrogen (**document F1d**) into elements  $\geq$  Be and even to **no. 120** and higher. To the outside, there are shells with increasingly lower atomic numbers. Most of the hydrogen present in the outer rim of these **R1's with Roemers (S)** and **without Roemers (E)** does not fuse. In total, approximately 15% will merge in the spiral (S) galaxies. For the elliptical (E) galaxies this is higher, estimated against 30 - 40%.

- ) Due to the formation of higher elements with electron pairs, the number of physical, chemical and mechanical forces increases to a maximum of 12. **Document F1d & figures**.

-) During those Big Bangs, "shell"-electrons of hydrogen fuse with their atomic nucleus, which therefore consists exclusively of protons and electrons.

-) As a result of that nuclear fusion, an amount of gravitation and associated gravitational energy of those central spheres **R1 A+B (S)** decreases by approximately 15% and that of **R1 A + B (E)** by approximately 30 - 40%!

-) Due to this loss of gravity of **R1's A + B's**, the gravitational equilibrium is broken between the **central sphere R1 A** and the **2 - 4 rotating Roemers** around it. Those 2 - 4 **Roemers** are thrown away in the plane of the universe-spherical-shell. Each **Roemer** results in the formation of one spiral arm of the galaxy. **Figures 51 (S) – 53 (S) Document G8**.

-) In the elliptical galaxies those **Roemers** are missing. No development of spiral arms here. These galaxies remain a kind of compact fried egg because of their rotation.

### **Required formulas / quantities Phase 16a and Moment 10a / Tipping point 10a:**

- 16.1) Determine pressure and temperature at which this spontaneous nuclear fusion of pure hydrogen in the core of **R1's (S)** and that of **R1's (E)** starts. This applies to both the *spiral galaxies (S) and the elliptical (E) galaxies*. Which may also start 0.1 – 1 million of years earlier.
- 16.2) Dividing **R1's (S)** and **R1's (E)** into spherical-shell zones for each element / isotope of the periodic table one,
- 16.3) Determine which part of the **central sphere R1 (S) and R1 (E)** will fuse the hydrogen and in which part no nuclear fusion occurs and therefore remains as hydrogen.
- 16.4) Indicate per zone and therefore per element / isotope how much energy is released when the elements / isotopes are formed  $\leq$  Fe.
- 16.5) Indicate for each zone / element / isotope how much additional energy is needed for the formation of elements/ isotopes  $\geq$  Fe and up to number 120 or higher.
- 16.6) Determine which part of the "shell"-electrons present before the *Big Bang* have been fused with the atomic nuclei. After all, these "shell"-electrons have also lost their ability to generate gravity and thus the corresponding amount of gravitational energy!
- 16.7) Determining the course of the pressure within **R1's (S)** and **R1's (E)**, which determines which part of the fused outer area in those **R1's** will be blown away and which part of **R1** collapses under the influence of gravity to the central black hole of the **spiral (S) galaxy or elliptical (E) galaxy**.
- 16.8) Determining the rotation / angular speed of these **R1's (S)** and **R1's (E)**.
- 16.9) Determining 5 - 8 movements of atoms in the universe and the gravitational components generated thereby.
- 16.10) Duration  $<10^{-3}$  sec.

### **-) Phase 16b universe cycle: Moment 10b / Tipping point 10b:**

#### **Transformation ordinary atoms $\geq$ Be to black hole atoms / black hole:**

- ) The ordinary atoms formed in the core of all **R1's** immediately transform into black hole atoms (**document F1e & figures**) that together form the rapidly rotating central black hole of the galaxy. That central black hole of the galaxy is mainly made up of *completely unstable black hole atoms*  $> 92$  to element No. 120 and higher.
- ) Under extremely high pressure and the formation of **Vander Waals/ London** bonds within the electron-shells, the vast majority of the elements of the periodic table  $\geq$  Be up to  $>$  nr. 120 just formed in **phase 16a** will collapse to close to and almost immediately around their atomic nucleus. The just formed ordinary atoms shrivel almost completely and transform into the state of massive black hole atoms. **F1e & figures blackhole atoms**.
- ) This transformation from ordinary atoms into black hole atoms can only take place under extremely high pressure and angular speed and only at ordinary atoms starting beryllium/ Be.
- ) Because of the collapse of the electron-shells /-clouds from ordinary atoms to black hole atoms, a kind of vacuum/ under pressure is created within that nuclear fusion explosion during that Big Bang it selves.
- ) The *atoms of the elements H, He and Li* cannot form these for collapsing required *Vander Waals / London bonds* within their shell-electrons. The electron shells of H, He and Li cannot collapse until close to the atomic nucleus!
- ) The atoms of the elements H, He and Li are therefore also not acceptable for inclusion in a black hole. (Due to gravity these atoms stick to the outside of the black hole until they have fused to element Be and higher and therefore become acceptable in time)
- ) With black hole atoms, the atomic nuclei have virtually no space left to vibrate. So black hole atoms and all types of black holes are therefore super cold by default at a temperature of

approximately 2.7 kelvin. (The H, He and Li present around the black hole, on the other hand, can be very hot)

- ) Duration of formation of black hole atoms  $<10^{-3}$  sec. The formation of the central black hole takes minutes to several hours.
- ) Because of the released energy, the loose "shell"-electrons of black hole atoms rotate at the speed of light around their nucleus. These "shell"-electrons cannot form electron pairs, nor absorb or emit photons. These "shell"-electrons can no longer change orbit.
- ) The "shell"-electrons of black hole atoms can only generate gravity related to the single electron! Only the velocity components that belong to the movements of the galaxy within the 4 - 6 thousand galaxies that make up the cluster. All 4 - 20 million clusters are identical.
- ) During those Big Bangs, however, most of the hydrogen in **R1's (S) spiral** (approximately 85%) is completely withdrawn from nuclear fusion. For the **R1's (E) elliptical**, this will be approximately 65%.
- ) This hydrogen and the outer part of the fusion region containing all atoms / isotopes up to 92 and higher are explosively blown away.
- ) So we are made up of Big Bang dust and not star dust! **Figures 49 (S) - 50 (S) and 49 (E) – 50 (E) Document G8.**

#### **Required formulas / quantities Phase 16b / Moment / tipping point 10b:**

Transition ordinary atoms to black hole atoms:

- 16.11) Determine which part of the fusion area of **R1 A (S)** and that of **R1 A (E)** collapses into the central black hole and which part of the fusion area is blown away on all sides together with the unfused hydrogen. Due to the enormous rotation/ angular speed, that material is mainly thrown away in the local plane of the universe-spherical-shell/ USS.
- 16.12) Determine speed of collapse of black hole atoms to one **central black hole (S) / (E)**.
- 16.13) Determining the angular velocity of that **central black hole (S) and (E)**.
- 16.14) Determination of angular velocity generated gravity.
- 16.15) Determination of explosion and expansion rate of unfused hydrogen and the outer part of the fusion area of **R1 (S)** and of **R1 (E)**.
- 16.16) Determination of the amount of "left"-overs during the formation of those central black hole galaxies with **spiral arms (S)** and those near the central black hole **elliptical (E) galaxies**.
- 16.17) Those "left-overs" are carried off through the formation of both vortexes to some thousands of light years. How far those vortices extend and what angular velocity they have.
- 16.18) With what forms of radiation and particles are these vortexes filled?
- 16.19) Determining the increase in rotational gravity of the constructed central black hole.
- 16.20) Determine the distribution of the remaining gravity over the then present 4 - 6 different speeds of the central black hole within the cluster of galaxies within the universe sphere / the universe.
- 16.21) Duration  $<10^{-3}$  sec. Central black hole galaxy formation in several hours.

#### **-) Phase 16c universe cycle: Moment 10c / Tipping point 10c:**

##### **Effects Big Bangs:**

- ) In the **R1's (E)** about 30 - 40% may be even more of the gravity disappears as a result of nuclear fusion. Nuclear fusion in **R1's (S)** causes much less gravity to disappear; estimated at about 15% of the gravity.

- ) That loss of gravity in **R1** breaks the existing equilibrium between these **R1's** and the 2 - 4 accompanying **Roemers**, causing these **Roemers** to be hurled into the plane of the local plane universe-spherical-shell/ USS.
- ) The increase in the rotational speed of the central black hole results in an increase in the amount of rotational gravitation. That is a different component of gravity than that present in the spiral arms currently under construction and is less sensitive to it. (Only gravitation of equal velocity components mutually attract each other).
- ) The outer shell of the fusion area mainly contains elements lower than iron, but also a zone with elements up to *No. 92*.
- ) That outer layer with mainly lower elements < Fe, unfused hydrogen, is thrown away together with the 2 - 4 **Roemers** and explosively blown away, especially the plane of the local universe-spherical-shell. **Figures 50 (S) - 53 (S) / 50 (E) - 53 (E) G8.**
- ) Due to the released heat / photons from the nuclear fusion, in **spiral (S) galaxies** those ejected **Roemers** evaporate completely. The gravitation of these **Roemers** deflects the orbits of the hydrogen and of these higher elements in the direction of these **Roemers** and thus in the direction of the local universe-spherical-shell. In elliptical galaxies t
- ) From each of those 2 - 4 **Roemers** one spiral arm is formed. It contains a lot of plasma-like hydrogen together with a mix of all higher elements / isotopes. Because of the enormous temperature all in the form of a plasma.
- ) That plasma state may temporarily result in generating some less gravity!
- ) The orbits of all matter and elements that have been shot out of the universe-spherical-shell/ USS are slowed down by gravitation and deflected towards the universe-sphere-shell and are absorbed into it again. Gravity keeps all matter and energy locked up in the universe-spherical-shell, so that the universe is and remains a 100% closed system.
- ) Due to the loss of gravity, the expansion speed of the universe-sphere-shell decreases less quickly than before. Part of the gravitational energy universe spherical shell has also disappeared.

#### **Required formulas / quantities Phase 16c and Moment / Tipping point 10c:**

- 16.22) Determine direction and base velocity distance of the **Roemers** with respect to **R1 A** in relation to the explosion and remaining gravity.
- 16.23) Determination of residual gravity and deflection in paths of blown matter. measure of which part of the fusion area of **R1 A** collapses to the central black hole and which part of the fusion area **R1 B** is blown away on all sides together with the unfused hydrogen **R1 C**.
- 16.24) Determining the amount of energy needed for the evaporation of these **Roemers** and the final removal rate of these **Roemers**.
- 16.25) Determine the explosion and expansion rate of the rest of **R1's (S)** and **R1's (E)** within the universe-spherical-shell.
- 16.26) Determine the distribution of gravity over the then present 6 - 8 different velocities of plasmas of atoms outside the black hole in the universe.
- 16.27) Do plasmas generate as much gravity per "shell"-electron as with an ordinary atom? Is there a correction factor?
- 16.28) Duration: <math>10^{-3}</math> sec - hours.

## -) **Phase 17 universe cycle: Period 7:**

### **All metal plasmas become atoms / molecules again except hydrogen and helium:**

-) Formation of galaxies around the central black hole, which has now formed within minutes / hours, rapidly rotating around its axis. The energy released by these *Big Bangs* remains 100% confined within the universe-spherical-shell/ USS. Two vortexes form on either side of the central black hole, eventually reaching a length of several thousand light years. **See Document G12 & figures 36a - 36r G8 / G12.**

-) Via both vortexes all matter, EM radiation and particle radiation is removed which isn't accepted by the, just formed, central black hole **R1 A** of the galaxy. This concerns photons, loose protons, electrons, neutrons, H, He and Li atoms.

-) The energy released from this Big Bang remains 100% confined within the universe-spherical-shell/ USS. That energy allows the ejected **Roemers** to evaporate completely into a hydrogen plasma. Within the universe-spherical-shell, this hydrogen plasma is mixed with the blown-off plasma-shaped hydrogen together with the outer part of the fusion region with all atoms of the periodic table.

-) The gravity of those 2 - 4 **Roemers** remains largely intact. That gravitation causes the direction of movement of the material / atoms to be ejected from all sides of those Big Bangs and pulls all this matter back to the universe-spherical-shell/ USS.

-) One spiral arm is formed from each **Roemer**. In total formation of 2 - 4 spiral arms of the galaxy. Those 2-4 arms curl around the central black hole of the futural galaxy.

-) Within all the constituent galaxies **R1 A** and their 2 - 4 spiral arms, gravity starts accumulation of matter in billions of larger clumps of higher elements (these will be the cores of future stars) with 1 - 10 smaller clumps of matter surrounding around it that will form the cores of the futural planets and gas planets. That's all Big Bang dust!

-) In the **elliptical (E) galaxies**, gravity ensures that the ejected matter remains around the central black hole. These will be much more globular galaxies without spiral arms.

-) In both types of galaxies, the released photons and cosmic rays remain 100% confined within the one galaxy thick universe-spherical-shell/ USS.

-) Cooling can now also take place by transforming these photons of light and infrared and cosmic rays into protons, electrons and into new hydrogen. However, that process takes approximately 13.8 billion years. It therefore also takes approximately 13.8 billion years before the photons and neutrinos emitted by these Big Bangs have disappeared again and the universe / universe-spherical-shell can start to cool down.

-) This **period 7** takes at least approximately 14 billion years. Much longer than the author previously had assumed.

-) It then also takes about 500 million years before the plasma has cooled down to ordinary atoms and the universe / USS is again partly (except H and He) filled with ordinary atoms and with these central black holes of **spiral (S) galaxies** and **elliptical (E) galaxies**.

-) On cooling, plasmas of elements higher than H/ He first become non-Newtonian pasty liquids and then partly solid. The plasma of atoms. H/ He becomes gas with ordinary atoms, radicals and molecules and partly liquid/ solid.

-) Formation through gravitation of the large solid cores of stars with rotating around 1 - 10 smaller cores that will later result in (gas) planets. During this period, the formation of moons around those protoplanets may also have started. **Figures 52 - 55 G8.**

-) Gravity slows down the expansion of the universe sphere shell further and further. The energy released is converted into an increase in the rotation / angular velocity of the starting galaxies **R1's (S) and R1's (E)** and all objects present within those galaxies.

-) In the **spiral (S) galaxies**, those 2 - 4 spiral arms curl around the central black hole of the galaxy.

- ) After those Big Bangs of the **(S) and (E) galaxies**, all celestial bodies then contain highly radioactive material. The central black holes of those **(S) and (E) galaxies** in particular is full of unstable material/ blackhole atoms. Those atoms can stabilize with great difficulty only in the mono-atomic outermost layers of these central blackholes.
- ) Everywhere outside those central black holes, unstable atoms stabilize via: a) nuclear fission, b) emissions of neutrons ( $1p + 1e$ ), c)  $\alpha$  particles (He nuclei) and d) gamma radiation, etc.
- ) The *central black holes* of the **(S) and (E) galaxies** can only stabilize themselves through emissions of high-energy cosmic rays. This stabilization can only take place in the very outermost mono-atomic layer of this central black hole and only if these particles have an extremely high kinetic energy of  $10^{20} - 10^{22}$  eV.
- ) That stabilization of unstable atomic nuclei on the outside can only occur in case convection currents occur within those central black holes. Such convection currents of black hole matter occur as a result of their enormous angular velocity resulting in deformation / flattening of those central black holes like a discus.
- ) This stabilization process is still ongoing in the present and will continue in the distant future. That stabilization of black hole curbs will only stop at the end of the current **step 23** and only in the next 350 - 450 billions of years.
- ) The central black hole also almost immediately starts to devour the galaxy under construction. Those black holes only accept elements  $\geq$  Be. The elements H, He and Li are refused and remain glued around that central black hole by gravity.
- ) During the transition from ordinary atoms  $\geq$  Be into black hole atoms, all kinds of remnants of the atom remain that are removed via both vortexes. There, those leftovers are re-formed into protons, electrons, new hydrogen and new stars.
- ) The elements H, He and Li cannot transform into black hole atoms and are thus rejected as well as photons, neutrinos, neutrons and cosmic particle radiation.
- ) H, He and Li hang around the central black hole of the galaxy and must first be transformed there through nuclear fusion to Be and higher elements periodic table. This nuclear fusion process is visible in all centers of galaxies.
- ) **Phase 17 / period 7** can no longer be observed. All the photons emitted at that time have now disappeared and transformed back into protons, electrons and new hydrogen/ stars!
- ) This period, the Big Bangs themselves and the period preceding them can in principle be made visible via **LIGO/ VIRGO techniques** and via the shock waves of gravitational energy observed and measured there.
- ) To this end, the accuracy of those techniques still needs to be improved by a factor of approximately 100 - 1,000 x. A matter of time and patience.
- ) With those improved **LIGO / VIRGO techniques / Einstein** it is possible to look back in the universe-clock-time / UCT up to a maximum of 30 - 35 billion (light)years ago. So far before these Big Bangs and starts of the **(S) and (E) galaxies!**

### **Required formulas / quantities Phase 17 / Period 7:**

#### **-) Universe-Spherical-Shell:**

- 17.1) Determining the duration of **period 7** in billions of years.
- 17.2) Determining the expansion speed of the universe-sphere-shell at the start and the end of this **period 7**.
- 17.3) Determining the distance to **center C** in light years at the start and end of **period 7** decrease in expansion *speed* and course in that decrease.

17.4) Determining how much expansion energy has been converted into gravitational energy and how much of that energy is converted and present in rotation / angular velocity / energy and in the components of gravitation and of gravitational energy associated with this angular velocity / velocities.

17.5) Number of rotation / angular speeds within galaxy clusters. Increase in these rotation / angular velocities of galaxies within the universe-spherical-shell/ USS.

**-) Central black holes galaxies:**

17.6) Determining the increase in size of the central black hole at the start and end of **period 7**.

17.7) Determining how many velocities that central black hole galaxy (CBHG)/ **R1 A** is subject to within the universe and within the local cluster / universe-sphere-shell? The universe-spherical-shell is made up of 4 - 20 million identical clusters and **equal numbers of (S) and equal number of (E) galaxies.**

17.8) Determining the increase in angular velocity of those central black holes as a result of slowing down of the expansion velocity and of their rotation / angular gravity and their forms of rotational gravity within their cluster.

17.9) Determining the decrease in expansion speed and the associated gravity and gravitational energy (= dark energy) with respect to **center C**.

17.10) Determine the nature and amount of "left"-overs of matter contained in the central black hole. These "left" overs are transported through both vortexes during the formation and subsequent growth of this central black hole. What is their shape? How far do those vortices extend? How do those "left"-overs rotate within these vortexes and how long?

17.11) How do those vortices develop and how far do they extend. What angular velocity do these vortexes have and what is their structure. How much material is disposed of as "left"-overs and especially immediately after these Big Bangs.

17.12) Within how much time will those "left"-overs be re-formed into protons, electrons and new hydrogen. Both vortices extend for several thousands of light years. May be 5 – 10 thousand lightyears.

17.13) Determine the distribution of gravitation and gravitational energy over the then present 4 - 6 different speeds of the central black hole within the cluster of galaxies within the universe-sphere-shell / universe.

**-) Rest of the galaxies:**

17.14) Determine the degree of removal of the **Roemers** from the central blackhole galaxy/ CBHG/ **R1 A** in relation to the force of the Big Bang explosion and the deceleration by gravity in both the 2 - 4 spiral arms and in the central black hole of the galaxy. That applies to both the coming **spiral (S) and elliptical (E) galaxies!**

17.15) Determining the macro shape of the spiral arms in relation to the present gravity and deflection in paths of blown matter. Determine degree of curling around the central black hole.

17.16) Determine which part of the nuclear fusion region of **R1** in the **(S) and (E) galaxies** was able to escape the gravity of that central black hole. These central black holes of the **elliptical (E) galaxies** are much (may be a thousand times) larger than those of the **spiral (S) galaxies.**

17.17) Due to gravitation, that highly radioactive matter in the form of plasmas begins to accumulate in billions of large plasma-shaped spheres and smaller sub-spheres. (About 90 - 95% or more of those ejected higher elements from the fusion region **R1 B** now present in the cores of futural stars; about 5 - 10% or less are found in the cores of futural planets/ moons)

17.18) Around those large spheres and with them concentrated gravity, most of the hydrogen and Big Bang helium plasma / gas accumulates later on. These later result in the cores of stars. Much smaller sub-spheres rotate around those spheres / cores of stars and result in the formation of (gas)planets.

17.19) Through gravitation, most of the abundant hydrogen and helium plasma accumulates around those central large spheres/ futural stars. Only a small part of the hydrogen/ helium ends up around those (gas) planets. In a large number of cases, binary stars will be formed.

17.19) Determine angular velocity of all velocities of those nuclei of pre-stars and of pre-planets.

17.20) Determining the decrease in expansion velocity of the universe-spherical-shell and increase in the rotation/ angular velocities within that universe-spherical-shell/ USS and its effects on the distribution of gravitation and gravitational energies within each *cluster* consisting of 4 - 6 thousand or more galaxies under construction.

17.21) How much of the EM radiation and particle cosmic radiation discharged via both vortexes has been re-formed into protons, electrons and new hydrogen/ new stars? From that hydrogen new stars are formed that are located some thousands of light years outside the plane of the galaxy but still inside the USS .

### **-) Phase 18 universe cycle: Period 8:**

#### **Cooling plasmas from hydrogen and helium to gas:**

-) All remaining hydrogen and helium in the spiral arms cools down again into a gas during this period. All higher atoms / molecules have now been converted and transformed into viscous liquids or even solids. Gravity causes matter like hydrogen and helium to accumulate further and further in a) the futural stars, b) in rotating celestial bodies and their moons around it.

-) The universe / the universe-spherical-shell is a 100% closed system for all forms of EM radiation and all cosmic particle radiation. Because the USS is a closed system this cooling down occurs very slowly and takes billions of years. Now this is mainly done by converting photons from infrared and photons from light into new protons, electrons and new hydrogen. That process always takes approximately 13.8 billion years to complete!

-) In this period 8 the last remaining hydrogen and helium plasma cools further to He atoms and H<sub>2</sub> molecules. All hydrogen and helium transforms back to normal gas.

-) Under the influence and direction of gravitation, all gases and especially that hydrogen and helium accumulate around the now solid spherical rotating cores of pre-stars. A small part accumulate on rotating pre-planets around these pre-stars. That process continues unabated.

-) This plasma **period 8** takes approximately 1 - 2 billion years or more. At that time the development of the rotation of the spiral arms (**Franks**) of the galaxies continues while gravity slows down the expansion of these spiral arms further and further. The energy released during this process is converted into 6 - 8 angular velocities of celestial objects within the clusters, resulting in the same system of angular velocities.

-) In all developing galaxies, 90 - 95% or more solid material accumulates more and more around the billions of larger spheres of solid / viscous matter and to the cores of the approximately 100 - 200 billion future stars present.

-) About 5 - 10% or less of that material accumulates in the 1 - 10 accompanying pre-planets present. All spheres / celestial bodies are still radioactive.

-) In a large number of cases, pre-forms of binary stars or may be tri-stars are formed. **Figure 54a Document G8. The figures after 54 G8 aren't separated for (S) and (E) galaxies!**

-) Around these large central nuclei / pre-stars, 98% or more of the hydrogen and helium gas will eventually accumulate. The hydrogen / helium gas ratio at the start of those pre-stars is approximately

5 : 1. This helium originates the Big Bangs of the **(S) and (E) galaxies**. (Most of the He now present in stars was already formed much earlier during those Big Bangs of the galaxies. Only a small part was formed by nuclear fusion of hydrogen inside the star!)

-) That content of helium increases later by nuclear fusion inside the stars of the galaxies.

-) A small remnant of the helium and hydrogen accumulates around the larger pre-planets that eventually become the gas planets around a relatively small solid core. **Figures 56 and 57 Document G8.**

### **Required formulas / quantities Phase 18 / Period 8:**

#### **The transition at hydrogen and helium from plasma $\diamond$ gas:**

##### **-) Universe-Spherical-Shell/ USS:**

18.1) Determining the duration of **period 8** in millions / billions of years.

18.2) Determining the expansion speed of the universe-spherical-shell/ USS at the beginning and the end of **period 8**.

18.3) Determining the distance to **center C** in light years at the start and end of **period 8** decrease in expansion speed. Decrease gravitational energy expansion with respect to **center C** and increase 5 - 7 forms of gravitational energy within the universe-sphere-shell.

18.4) Determining how much expansion energy has been converted into 4 - 6 forms of angular velocity and thus into the corresponding gravitational / gravitational energy.

Distribution of expansion speed / energy / gravitation and the 4 - 6 forms of rotation / angular speed / energy / gravitation within the universe-spherical-shell. Difference between the start and end of **period 8** and the course during **period 8**.

18.5) Determining the number of rotation / angular speeds within clusters of galaxies.

Increase in these rotation / angular velocities of galaxies within the universe sphere shell.

##### **-) Central black holes developing galaxies:**

18.6) Determining the decrease in expansion speed and the associated gravity and gravitational energy (= dark energy) with respect to **center C** during **period 8**.

18.7) Determine increase of the 4 - 6 forms of angular velocities within the universe-spherical-shell and associated 4 - 6 forms of gravitation and forms of gravitational energy.

Differences Between **the spiral (S) galaxies and elliptical (E) galaxies**.

18.8) Determining the increase in size of the central black hole of the **(S) and (E) galaxies** at the beginning and end of **period 8** and by how much mass, matter, gravitation and kinetic energy this central black hole has increased.

18.9) Determine distribution over the 4 - 6 different angular velocities of that central black hole galaxy (CBHG) within the universe / the universe-spherical-shell. Indicate differences between **(S) galaxies** and **(E) galaxies**.

18.10) Determine the increase in angular velocity of that central black hole and of its rotation / angular gravity and forms of rotational gravity within those 4 - 20 million now formed clusters of galaxies, each filled with 4 - 5 thousand or more futural galaxies.

18.11) Determine the distribution of gravitation and gravitational energy over the then present 5 - 7 different speeds of the central black hole within the cluster of galaxies within the universe-spherical-shell and within the universe.

18.12) Determining the nature and amount of "left" overs of matter expelled from the central black hole of the galaxy. Those ejected "left"-overs are discharged through both vortexes

during the growth of that central black hole. Are those vortexes only clearly visible / observable when matter / celestial bodies fall into this black hole?

18.13) What is the shape of those vortices, do they stay the same and how far do they extend. How do those "left" overs rotate within these vortexes. Indicate differences within **the spiral (S) galaxies systems and these elliptical (E) galaxy systems!**

18.14) Determine the amount of "left"-overs that arise during the growth of that central black hole and are removed and how that happens. What happens to those "left"-overs. How is that material rejected by black holes reformed into protons, electrons and hydrogen?

18.15) How quickly those "left"-overs are removed via both vortexes/ jets and reformed into protons, electrons, new hydrogen, new stars. The developments in the length and structure of both vortexes in thousands of light years. Through gravitation, these new stars can work together to form new smaller secondary galaxies!

18.16) How do these vortices develop over time and how far do they extend. What angular velocity do these vortexes have. What is their spatial and inner structure. How much material is thus discharged from the vicinity of the central black hole galaxy/ CBHG?

#### -) Rest of the galaxies:

18.17) Determining the length of the spiral arms with respect to **R1A** in the **spiral (S) galaxies** and of the rotational speed **R2** of these 2 - 4 spiral arms in relation to the moment of the Big Bangs and the development of gravity both in the spiral arms and in the central black hole of the galaxy.

18.18) Determining the macro shape of the spiral arms in relation to the gravity present. Determine the shape and deflection of those spiral arms. Determine degree of curling around the central black hole.

18.19) Determine which part of the nuclear fusion region of **R1 B** at the **spiral (S) and elliptical (E) galaxies (E)** was able to escape the gravity of that central black hole (CBHG).

18.20) Determining the structure of the **(S) galaxies** and **(E) galaxies**.

18.21) Due to gravitation, the highly radioactive emitted matter in the form of plasmas begins to accumulate in billions of large now solid spheres / pre-cores of stars and smaller sub-spheres and pre-cores of planets. (About 90 - 95% and more of those higher elements thrown out during the Big Bangs now present in the cores of stars!)

18.22) Monitoring the stabilization process within those central black holes of galaxies/ CBHG) and high-energy cosmic rays emitted therewith. Indicate radioactive decay in the matter contained in the spiral arms. Do differences occur in cosmic radiation of these **(S) galaxies relative (E) galaxies?**

18.23) Tracking the growth by gravitation of the trillions of large spheres (pre-stars) and smaller sub-spheres (pre-planets) and the accumulation of hydrogen and helium plasma / gas around those billions of solid or liquid celestial bodies.

18.24) How does this growth develop in the **spiral (S) galaxies** relative much more compact **elliptical (E) galaxies?**

18.25) Tracking and deriving the number of rotational speeds and magnitude of those angular speeds within each of those developing **(S) galaxies and (E) galaxies**.

18.26) Determine the development of angular velocities of all velocities / kinetic energy of those nuclei of pre-stars and of pre-planets. Determine the decrease in expansion velocity of the universe-spherical-shell and increase of the rotation / angular velocities within that universe-spherical-shell/ USS. Effects thereof on the distribution of gravity and distribution of gravitational energies with respect to **center C** and within the universe-spherical-shell.

18.27) Around those central large spheres, through gravitation, most of the hydrogen released at the Big Bangs and therefore abundantly present and the helium gas formed at those Big Bangs accumulates.

18.28) Determine angular velocity of all 4 - 6 velocities of those nuclei of pre-stars and of pre-planets and related vectors of gravity and gravitational energy.

18.29) Determining the decrease in expansion velocity of the universe sphere shell and increase of the rotation / angular velocities within that universe sphere shell /USS and its effects on the distribution of gravitation and gravitational energies.

18.30) How much of the radiation discharged via both vortexes has meanwhile been reformed into protons, electrons and new hydrogen / stars. Does gravity accumulate new hydrogen at locations where new stars / satellite galaxies can eventually be formed thousands of light years from the original plane of the mother **(S) galaxies and (E) galaxies?**

18.31) Do these distant stars indeed result in new and much smaller satellite galaxies?

### **-) Phase 19 universe cycle: Period 9;**

**With the exception of H<sub>2</sub> and He, all other gases condense back to a liquid and/ or solid.**

-) This period takes about 3 billion years or more. Apart from hydrogen and helium, all other gases condense in steps to form a liquid and lose almost completely their associated gas pressure/ entropy.

-) Within that thin universe-spherical-shell the entropy therefore decreases except for the entropy associated with hydrogen and helium. Due to gravity, all gases present are already in increased concentrations, especially around those solid spheres of pre-stars and much less near the rotating lighter pre-planets around them. This also applies to the still gaseous free hydrogen and helium gas within the universe-spherical-shell/ USS.

-) That condensation of gases (except H<sub>2</sub> and He) mainly occurs around those smaller spheres/ cores of pre-stars and a small amount around cores of pre-planets. They have now cooled down the furthest.

-) The remaining hydrogen and helium accumulates through gravitation for > 98% around those less cool but much larger cores of pre-stars and a small part around the larger pre-planets. (In our solar system Jupiter, Neptune and Saturn, among others). **Figure 58**

#### **Document G8.**

-) **Phases 17 - 19** together take about 10 - 13 billion years. This period can no longer be observed.

### **Required formulas / quantities Phase 19 / Period 9:**

#### **-) Universe-Spherical-Shell/ USS:**

19.1) Determining the duration of **period 9** in millions / billions of years.

19.2) Determining the expansion speed of the universe sphere shell at the start and the end of **period 9**.

19.3) Determining the distance to **center C** in light years at the start and end of **period 9** decrease in expansion speed.

19.4) Determining how much expansion energy has been converted into 6 - 8 forms of gravitational / gravitational energy. Distribution of expansion speed / energy / gravitation and the 5 - 7 forms of rotation / angular speed / energy / gravitation within the universe-sphere-shell. Difference between the beginning and the end of **period 9**.

19.5) Determining the number of rotation / angular speeds within clusters of galaxies.

Increase in these rotation / angular velocities of galaxies within the universe sphere shell.

19.6) Determining how much expansion energy has been converted into gravitational energy and how much of that energy has been converted into rotation / angular velocity / energy and into gravitational energy with respect to **C**.

**-) Central black holes developing galaxies:**

19.7) Determining the increase in size of central black hole at the beginning and end of **period 9** and by how much mass, matter, gravity this central black hole has increased.

19.8) Determining the decrease in expansion speed with respect to **center C** of the universe and of the associated gravity and gravitational energy (= dark energy) with respect to **center C**.

19.9) Determining the number of (6 - 8) gravitational components qualitatively and quantitatively at the beginning and end of **period 9** and the forms of gravitational energy / dark energy linked to these 6 - 8 gravitational components.

19.10) Determine the increase in angular velocity of that central black hole and of its rotation / angular gravity and forms of rotation gravity within those 4 - 20 identical clusters formed in **periods 6 - 9**, each containing 4 - 5 thousand or more futural galaxies.

19.11) To determine how many velocities that central black hole galaxy (CBHG) is subject to within the universe/ USS and within the now formed 4 - 20 million identical clusters within the universe-spherical-shell, each with 4 - 6 thousand or more future galaxies.

19.12) Determine the amount and how the "left"-overs are removed during the growth of that central black hole. Those "left"-overs ejected from the central black hole are discharged through both vortexes/ jets during the growth of that central black hole of the galaxy.

19.13) What is the shape of those vortices and how far do they extend. How do those "left" overs rotate and collide within these vortexes.

19.14) How quickly those "left"-overs are reformed into protons, electrons and new hydrogen. The developments in the length and structure of both vortexes in thousands of light years.

19.15) How do those vortices develop and how far do they extend. What angular velocity do these vortexes have. What is their spatial structure and distributions of speeds.

19.16) Within how much period of time those "left"-overs will be reformed into protons, electrons and new hydrogen. Both vortices are up to thousands of light years long.

19.17) Determine the distribution of gravitation and gravitational energy over the then present 4 - 6 different speeds of the central black hole within the cluster of galaxies within the universe-sphere-shell / universe.

**-) Rest of the galaxies under construction:**

19.18) Determine in the **Spiral (S) galaxies** the length of the spiral arms with respect to **R1 A** and of the rotational speed **R2** of these 2 - 4 spiral arms in relation to the moment of the Big Bangs and the development of gravity both in the spiral arms and in the central black hole of the galaxy.

19.19) Determining the macro shape of the *spiral arms* in relation to the gravity present. Determine the shape and deflection of those spiral arms. Determine degree of curling around the central black hole/ CBHG.

19.20) Determine which part of the fusion region of **R1 A** at the **spiral (S) galaxies** and **elliptical (E) galaxies** was able to escape the gravity of that central black hole.

19.21) Determining the structure of these **elliptical (E) galaxies**.

19.22) Due to gravitation, the highly radioactive expelled matter in the form of plasmas starts to accumulate in billions of large now solid spheres / pro-cores of stars and smaller sub-spheres and protrusions of planets. (About 90 - 95% and may be more of those higher elements thrown out during the Big Bangs are now present in the cores of stars)

- 19.23) Monitoring the stabilization process within those central black holes and the high-energy cosmic rays emitted with them. Indicate radioactive decay in the matter contained in the spiral arms. Do differences occur in the **elliptical (E) galaxy** systems?
- 19.24) Gravitational tracking of the growth of the trillions of large spheres (pre-stars) and smaller sub-spheres (pre-planets) and the accumulation of hydrogen and helium plasma/ gas around those billions of solid or liquid celestial bodies.
- 19.25) How does this growth develop in the much more compact **elliptical (E) galaxy**?
- 19.26) Tracking and deriving the number of rotational speeds and magnitude of those angular speeds within each of those developing **spiral (S) galaxies** and **elliptical (E) galaxies**.
- 19.27) Determine the development of angular velocities of all velocities / kinetic energy of those nuclei of pre-stars and of pre-planets. Determine the decrease in expansion velocity of the universe-spherical-shell and increase of the rotation / angular velocities within that universe-spherical-shell / USS. Effects thereof on the distribution of gravity and distribution of gravitational energies with respect to **center C** and within the universe-spherical-shell/ USS.
- 19.28) Around those central large spheres, through gravitation, most of the hydrogen released by the Big Bangs and therefore abundantly present and the helium gas formed by those Big Bangs accumulates.
- 19.29) Determine angular velocity of all 4 - 6 velocities *within each cluster* of those nuclei of pre-stars and of pre-planets and related vectors of gravity and gravitational energy.
- 19.30) Determining the decrease in expansion velocity of the universe-spherical-shell and increase of the rotation / angular velocities within that universe-spherical-shell / USS/ clusters and its effects on the distribution of gravitation and gravitational energies.
- 19.31) How much of the radiation discharged via both vortexes has now been reformed into protons, electrons and new hydrogen / stars. Does gravity accumulate new hydrogen in locations where new stars/ satellite galaxies can eventually be formed a few thousand light years far away from the original plane of the “mother” **spiral (S) galaxies** and **elliptical (E) galaxies**?
- 19.32) Do these distant stars indeed result in new and much smaller satellite galaxies?
- 19.33) Determine which part of the fusion region of **R1** eventually managed to escape the gravity of that central black hole.
- 19.34) Determining the increase in matter and gravity of the central black hole and of its rotation gravity,
- 19.35) Monitoring the stabilization process within those central black holes and high-energy cosmic rays emitted with them. Tracking the radioactive decay to matter in the spiral arms.
- 19.36) Gravitational tracking of the growth of the trillions of large spheres (pre-stars) and smaller sub-spheres (pre-planets) and the accumulation of hydrogen and helium plasma / gas around those billions of solid or liquid celestial bodies.  
Those large spheres later form the nuclei of future stars. The rotating sub-spheres around them result in the (gas) planets. About > 95 - 98% of those ejected higher elements now present in the cores of stars; < 2 - 5% in the orbiting planets.
- 19.37) Determine angular velocity of all velocities / kinetic energy of those nuclei of pre-stars and of pre-planets. Determine the decrease in expansion velocity of the universe sphere shell and increase of the rotation / angular velocities within that universe-spherical-shell / USS. Gravity is speed related force of atoms. Effects thereof on the distribution of gravity and gravitational energies.
- 19.38) Monitoring the stabilization process within those central black holes and high-energy cosmic rays emitted therewith. Tracking the radioactive decay to matter in the spiral arms.
- 19.39) How much of the cosmic particle radiation discharged via both vortexes has meanwhile been reformed into protons, electrons and new hydrogen?

**-) Phase 20 universe cycle: Moment / Tipping point 11:**

**Start condensation of just hydrogen at approximately 20 Kelvin:**

-) Process of cooling continues slowly until both gases cool down to such an extent that this H<sub>2</sub> and He becomes liquid separately and one after the other. Only then do both gases lose their gas pressure. Then the entropy within the universe-spherical-shell also ends!

-) The universe-spherical-shell is now only filled with a mixture of pure hydrogen (approximately circa 3/4) and pure helium gas (estimated approximately 1/4).

-) After these Big Bangs and the start of the galaxies it will take several hundred million years before:

a) the photons trapped in the universe-spherical-shell are further converted into protons, electrons and into new hydrogen and

b) that the mixture of remaining hydrogen and helium in the universe-spherical-shell has cooled down to such an extent that hydrogen can finally first start to condense at approximately 20 kelvin. Heat is released during the condensation of hydrogen. The helium remains a gas with entropy.

-) Most of hydrogen will condense for the second time (indicated by **C2**). The entropy / gas pressure within the universe-spherical-shell will therefore decrease.

-) This condensation of hydrogen and lowering of the gas pressure in the universe-spherical-shell starts about 10 - 15 billion years after the Big Bangs and the start of the formation of these **spiral (S) galaxies** and **elliptical (E) galaxies**. **Figure 58a Document G8**.

**Required formulas / quantities Phase 20 / moment 11 / tipping point 11:**

20.1) No new formulas. Physical, chemical and energetic starting points will be adjusted, because with the condensation of hydrogen in the universe-sphere-shell the gas pressure (entropy) will flatten.

20.2) Determining expansion speed and distance USS with respect to **center C** and thickness USS.

20.3) Determining the amount of gravity and 6 - 8 forms / components of gravity. (Gravity is a velocity-related force of the atom as well as the gravitational energy coupled to gravity).

20.4) Determining the amount of gravitational-linked 6 - 8 forms of gravitational energy with respect to **center C** and within the USS itself.

20.5) Decrease in USS expansion rate relative to **center C** and relapse in the swelling of the USS itself.

20.6) Determine on the 7 - 8 levels of rotational areas / angular speeds within each of these clusters clockwise or counterclockwise and the related amount of kinetic energy.

20.7) Determine on the 7 - 8 levels of gravity / gravitational energy within each cluster and number of rotation points and number of pre-galaxies **R1 A** per cluster.

20.8) Number of identical clusters present within USS is unknown. Within the USS there may be an equivalent number of galaxy clusters with a clockwise and a counterclockwise rotation.

20.9) Thickness of the universe-spherical-shell/ USS.

20.10) All matter universe is still present in the form of only elements of the periodic table with gases hydrogen / H<sub>2</sub> and helium He

20.11) Active forces: All 12 forces of atoms are active.

20.12) Each form of speed generates its own vector (1) on single "shell"-electron) and vector (2) on the electron pair) on: a) gravity (1) / (2), b) the chemical covalent radical force (1), c) the (bio) chemical force (2) and d) on the Vander Waals/ London force (2).

- 20.13) With the condensation of hydrogen, the electrical repulsion (gas force) is increasingly weakened. The swelling universe-spherical-shell due to entropy/ gas pressure decreases. Remains about the gas pressure/ entropy of the helium as gas.
- 20.14) Everywhere in the universe-spherical-shell the condensation of hydrogen starts at the same time. The complete condensation of hydrogen itself takes several billion years.
- 20.15) See further **points 19.19 - 19.39 phase 19.**

### **-) Phase 21a universe cycle: Period 10a:**

#### **The complete condensation of hydrogen only:**

- ) This **period 10a** includes the condensation of all hydrogen alone and is estimated to take approximately 3 - 4 billion years or more for this hydrogen to be fully condensed into a liquid hydrogen.
- ) By gravitation first trillions of smaller spheres with liquid hydrogen are formed, especially around already existing large spheres with solid or liquid matter.
- ) Due to condensation, this hydrogen loses its gas-pressure. Thus the contribution of hydrogen to the entropy within the universe-sphere-shell now disappears completely.
- ) In the 2 - 4 spiral arms of each **spiral (S) galaxy** billions of pre-solar systems are formed from Big Bang dust/ matter. Inside each galaxy under construction will be formed about 100 - 200 billion large spheres in the shape of pre-stars surrounded by liquid hydrogen and helium still as a gas. Around it, smaller spheres / pre-planets, some of which rotate with liquid hydrogen, forming smaller gas planets.
- ) Gravitation deposits that liquid hydrogen on the heaviest central still radioactive solid spheres in the center of those tens of billions of future solar systems with 1 and sometimes 2 future stars. All single and binary stars are accompanied by 1 - 10 planets with their moons. (The author doesn't expect stars without planets!)
- ) Due to collisions with those hydrogen spheres, those central pre-stars are already getting bigger, warmer and hotter, so that the previously deposited hydrogen becomes gas / plasma again. Now gravity keeps that gas / plasma together.
- ) This results in the macrostructure of the galaxy with pre-stars, but without nuclear fusion. See **Figures 58b, 58c and 59 Document G8.**

#### **Required formulas / quantities Phase 21a / Period 10a:**

##### **-) Universe-Spherical-Shell/ USS:**

- 21.1) Determining the duration of **period 10a** in hundreds of millions / several billion years.
- 21.2) Determining the expansion speed of the universe-sphere-shell at the start and the end of **period 10a.**
- 21.3) Determining the distance to **center C** in light years at the start and end of **period 10a** decrease in expansion speed.
- 21.4) Determining how much expansion energy has been converted into gravitational energy and how much of that energy has been converted into rotation/ angular velocity/ energy and into gravitational energy relative to **center C.**
- 21.5) Determining the number of rotation / angular speeds within clusters of galaxies. Increase in these rotation / angular velocities of galaxies within the universe sphere shell. See further corresponding points in **phase 19.**

**-) Central black holes under construction galaxies:**

21.6) Determining the increase in size of central black hole at the beginning and end of **period 10a** and by how much mass, matter, gravity this central black hole/ CBHG has increased.

21.7) Determining the increase in angular velocity of that central black hole and of its rotation / angle gravity. To determine how many velocities that central black hole galaxy (CBHG) is subject to within the universe and within the universe-spherical-shell.

21.8) Determining the decrease in expansion velocity and the associated gravity and gravitational energy (= dark energy) with respect to **center C**. Determining the increase of the 5 - 7 forms of angular velocities within the universe-spherical-shell and associated 5 - 7 forms of gravitation and gravitational energy.

21.9) Determine the amount and how the "left"-overs are removed during the growth of that central black hole.

21.10) How quickly are those "left"-overs being reformed into protons, electrons and new hydrogen. The developments in the length and structure of both vortexes in thousands of light years.

21.11) How do those vortices of the central black holes develop and how far do they extend. What angular velocity do these vortexes have. What is their spatial structure in this period.

21.12) Determine the distribution of gravitation and gravitational energy over the then present 4 - 6 different speeds of the central black hole within the cluster of galaxies within the universe-spherical-shell / universe.

21.13) Determine the increase of the central black hole and its rotation gravity,

21.14) Tracking the stabilization process within those central black holes CBHG and high-energy cosmic rays emitted therewith. Tracking the radioactive decay to matter in the spiral arms.

See corresponding points in **phase 19**.

**-) Rest galaxy of the under construction:**

21.15) Determine the extent of the length of the galaxies spiral arms with respect to **R1 A** and the rotation **R2** of these spiral arms in relation to the moment of the Big Bangs and the development of gravity in both the spiral arms and in the central black hole of the galaxy .

21.16) Determining the macro shape of the spiral arms in relation to the gravity present. Determine the shape and deflection of those spiral arms.

21.17) Following the stabilization process of matter in those spiral arms and the high-energy cosmic rays emitted from them.

21.18) Tracking the growth by gravitation of the trillions of large spheres (pre-stars) and smaller sub-spheres (pre-planets) and the accumulation of hydrogen and helium plasma / gas around those billions of solid or liquid celestial bodies.

21.19) Larger central spheres result in the cores hundreds billions of stars. The rotating sub-spheres around them result in trillions of (gas) planets.

21.20) Determination of angular velocity of all velocities / kinetic energy of those nuclei of pre-stars and of pre-planets. Determine the decrease in expansion velocity of the universe-spherical-shell and increase of the rotation / angular velocities within that USS. Effects thereof on the distribution of gravity and gravitational energies.

21.21) How much of the radiation discharged via both vortexes has meanwhile been reformed into protons, electrons and new hydrogen.

21.22) During this period, the remaining helium gas also cools further and further to the condensation point of helium, which is approximately 4 kelvin.

See further corresponding points in **phase 19**.

**-) Phase 21b universe cycle:**

**Period 10b: Period with cooling universe sphere shell from approximately 20 kelvin to approximately 4 kelvin with the start of the complete condensation of helium:**

-) Then follows the period of 2 - 3 billion years with further cooling of the universe sphere shell to the condensation point of helium, which is around 4 kelvin.

-) This is actually a separate new moment!

-) The latter free helium gas will also lose its gas pressure through condensation. With that, the last piece of entropy within the universe-spherical-shell disappears.

-) During this period and due to collision with hydrogen spheres, the pre-stars continue to grow in size and their temperature continues to increase to millions of Kelvin while their immediate surroundings are getting colder and colder.

-) The same applies to helium as to hydrogen. See further **phases 19 and 20**.

**-) Phase 21c universe cycle: Period 10c:**

**Period with the complete condensation of helium and largely absorption of that helium in the increasingly hotter and faster rotating cores of future stars and gas planets due to collisions:**

-) Following **phases 21a and 21b** follows the period of 2 - 3 billion years with further cooling of the universe sphere shell to the condensation point of helium, which is around 4 kelvin. This last free gas also loses its gas pressure and the last piece of entropy within the universe-spherical-shell also disappears.

-) By capturing hydrogen and helium spheres, these pre-stars, on the other hand, grow in size and their temperature continues to increase.

Through gravitation, this liquid helium results in the formation of ever larger rotating spheres. These are gravitationally attracted to the pre-stars and the larger "gas"-planets in particular. (The helium in our sun mainly originates these Big Bang and start of the galaxies not as the result of nuclear fusion in the sun/ stars itself!)

-) Due to the tangential angular velocities / gravitation, those spheres of hydrogen and helium accumulate in this **phase 10c** more and more in these pre-stars. Universally, this results in more or less the same ratio of hydrogen / helium in stars.

-) Only pure hydrogen is present in the universe-sphere-shell between the galaxies. Inside the galaxies there is a mix of hydrogen and helium. **Figures 58b, 58c and 59 Document G8.**

**Required formulas / quantities Phase 21c / Period 10c:**

**-) Universe-Spherical-Shell:**

21c.1) Determining the duration of **period 10c** in hundreds of millions / billions of years.

21c.2) Determining the expansion speed of the universe-sphere-shell at the start and the end of **period 10c**.

21c.3) Determination of distance to **center C** in light years at start and end of **period 10c** decrease in expansion speed.

21c.4) Determining how much expansion energy has been converted into gravitational energy and how much of that energy has been converted into rotation / angular velocity / energy and into gravitational energy with respect to **C**.

21c.5) Determining the number of rotation / angular speeds within these clusters of galaxies. Increase in these rotation / angular velocities of galaxies within the universe-spherical-shell. See corresponding points in **phase 19**.

**-) Central black holes in the galaxies under construction:**

21c.6) Determining the increase in size of central black hole at the beginning and end of **period 10c** and by how much mass, matter, gravity this central black hole has increased.

21c.7) Determining the increase in angular velocity of that central black hole and of its rotation / angular gravity. To determine how many velocities that central black hole galaxy (CBHG) is subject to within the universe and within the universe-spherical-shell.

21c.8) Determining the decrease in expansion velocity and the associated gravity and gravitational energy (= dark energy) with respect to **center C**. Determining the increase of the 5 - 7 forms of angular velocities within the universe-spherical-shell and 5 - 7 forms of gravity and of gravitational energy.

21c.9) Determining the amount and how the "left"-overs are removed during the growth of that central black hole.

21c.10) How quickly those "left" overs are reformed into protons, electrons and new hydrogen. The developments in the length and structure of both vortexes in thousands of light years.

21c.11) How do those vortices of the central black holes develop and how far do they extend. What angular velocity do these vortexes have. What is their spatial structure.

21c.12) Determine the distribution of gravity and gravitational energy over the then present 4 - 6 different speeds of the central black hole within the cluster of galaxies within the universe-spherical-shell / universe.

See further corresponding points in **phase 19**.

**-) Rest of the galaxies under construction:**

21c.13) Determine the extent of the length of the spiral (S) arms with respect to **R1A** and the rotation of these spiral arms in relation to the moment of the Big Bangs and the development of the gravitation both in the spiral arms and in the central black hole of the galaxy.

21c.14) Determining the macro shape of the spiral arms in relation to the gravity present. Determine the shape and deflection of those spiral arms.

21c.15) Determining the increase of the central black hole and its rotation gravity,

21c.16) Monitoring the stabilization process within those central black holes and high-energy cosmic rays emitted with them. Tracking the radioactive decay to matter in the spiral arms.

21c.17) Tracking the growth by gravitation of the trillions of large spheres (pre-stars) and smaller sub-spheres (pre-planets) and the accumulation of hydrogen and helium plasma / gas around those billions of solid or liquid celestial bodies.

Large spheres later on result in the cores of stars. The rotating sub-spheres around them result in planets.

21c.18) Determining angular velocity of all velocities / kinetic energy of those nuclei of pre-stars and of pre-planets. Determine the decrease in the expansion velocity of the universe-sphere-shell and the increase of the rotation / angular velocities within that USS. Effects thereof on the distribution of gravity and gravitational energies.

21c.19) How much of the radiation discharged in **spiral (S) galaxies** and **elliptical (E) galaxies** via both vortexes has meanwhile been reformed into protons, electrons and new hydrogen? See further corresponding points in **phase 19**.

## **-) Phase 22 universe cycle: Moment 12; tipping point 12:**

### **Start nuclear fusion H in stars;**

- ) Start nuclear fusion in stars. Due to the presence of radioactive material, the hydrogen fusion starts at a much lower level of temperature and of pressure than with the Big Bangs in **phase 16** and the start of these **spiral (S) galaxies** and **elliptical (E) galaxies**.
- ) The first stars started their nuclear fusion about 20 – 25 billion years ago and 20 – 30 billion years after the start with a super cold Little Bang. The fusion started first in the largest of the formed protostars with extremely hot plasma. This nuclear fusion starts spontaneously because of the presence of highly radioactive atoms in the center of these large first stars.
- ) Due to the presence of these radioactive elements in the core of the stars, this fusion process will start much earlier and at a much lower temperature and pressure than in the previous hydrogen supernovas / Big Bangs starting as still 100% pure hydrogen plasma!
- ) **Phases 17 to 22** take about 15 - 20 billion years and are, may be except for a few billion years, imperceptible through electromagnetic radiation. In time, much improved **LIGO / Virgo techniques** and the **Einstein** will make it possible to look back in time / universe clock time up to approximately 30 - 40 billion light years ago. These **LIGO techniques** are based on the observation and measurement of shock-waves of gravitational energy. Gravity is and remains an immeasurable phenomenon.
- ) The nuclear fusion in stars started 35 to 40 billion years after the Little Bang and about 20 - 30 billion years ago.
- ) That point is approximately 7 billion years earlier than 13.8 billion years, our maximum "observation" horizon via the universe-spherical-shell (USS)! **Document G12 & Figures 36a - 36r.**
- ) About 11 - 13.8 billion years ago there were already fully functioning galaxies!
- ) The author estimates that the current universe / USS is at least 40 to 50 billion years old and probably already be 50 - 65 billion years old.
- ) The universe-spherical-shell is divided into 4 to 20 million identical cluster/ facet regions each with 4 - 6 thousand may be even more galaxies. **Figures 60 - 63 Document G8.**
- ) From the hydrogen present, helium is initially only formed through the binding of shell electrons to the atomic nucleus. Nuclear fusion reduces the number of "shell"-electrons. With that a star loses gravity and therefore gravitational energy as well. The nuclei are made up exclusively of protons and electrons. **Document F1d & figures** sketch the structure of atomic nuclei without neutrons.

### **Required formulas / quantities Phase 22 and Moment 12 / Tipping point 12:**

- 22.1) Determining the pressure and temperature at which nuclear fusion starts in stars.
- 22.2) Determining how fast nuclear fusion is unwound in relation to the size of the star..
- 22.3) After all, these "shell"-electrons fused with the atomic nucleus have also lost their ability to generate gravity and thus the corresponding gravitational energy. **Documents E3, E3-1, E3-2.**
- 22.4) Determine solar wind emitted by stars and amount of infrared photons and photons of light.
- 22.5) Determining the rotation / angular speed of the stars.
- 22.6) Determining 5 - 8 movements of celestial bodies within the USS and thus movements of atoms in the universe. Determine number of components of gravity and components of physical and chemical forces of the atom and of their physical and chemical bonds.
- 22.7) Start time duration <1 sec.

**-) Phase 23 universe cycle: Period 11:**

**All matter fuses to elements  $\geq$  Be and is 100% trapped by gravitation together with all energy in one of the 4 – 20 million central cluster of black holes (CCBH):**

-) The universe / USS has arrived in the current **phase 23** of the universe cycle. That phase takes about 350 - 450 billion years with fully functioning and colliding galaxies/ black holes. \*\*\*\*\*)

-) At the end of **phase 23**, gravity reduces the expansion speed of the USS to zero. The universe will then reach its maximum expansion of approximately 11 - 12 billion light years relative **center C**.

Inside as well outside this USS is an absolute 100% vacuum.

**-) Main goal phase 23 / period 11 is:**

a) The fusion in stars and during supernovae of all H<sub>2</sub>, He and Li present in USS up to beryllium or to higher elements acceptable for uptake in a black hole.

b) Ensure that all emitted neutrinos and photons are transformed back into protons, electrons and hydrogen and the formation of new stars,

c) That all new hydrogen is transformed through nuclear fusion in stars to Be and higher,

d) All matter and kinetic energy is increasingly confined in local black holes that are eventually merged through gravitation and collisions into one central black hole cluster (CCBH).

e) All 9 - 11 speeds present at present are ultimately concentrated through gravitation and collisions between galaxies into just one CCBH that has only one rotation speed close to the speed of light c.

-) That entire process of colliding takes a lot of time; approximately 350 - 450 billion years or more.

-) Now the universe / universe-spherical-shell is at the beginning of **phase 23** which has been going on for 15 to 18 billion years. All atoms are now subjected to 9 - 11 speeds within the universe-spherical-shell via celestial bodies.

-) At the end of **phase 23**, gravity has merged all matter and all 4 - 6 thousand **spiral (S) galaxies** and **elliptical (E) galaxies** of the cluster into just **one central black hole cluster (CCZG)** and only one angular velocity remains. With all CCBH's, all rotation axes are precisely oriented to **center C**.

-) The elements  $\geq$  beryllium are the only elements that can transform into black hole elements. Only elements from Be are acceptable for inclusion in a (local) black hole. See **document F1e & figures**. Black holes do not accept H, H<sub>2</sub>, He, Li, loose protons/ electrons and photons/ neutrinos. These left-overs are discharged via both visible or invisible vortexes starting the central blackhole of the galaxy.

-) During this extremely long period, all stars fuse their hydrogen, helium and lithium together to form elements  $\geq$  beryllium. All by stars emitted photons and neutrinos are converted into protons/ electrons, hydrogen and into new stars with nuclear fusion and will end as atoms  $\geq$  beryllium/ Be acceptable for blackholes.

-) All electromagnetic EM radiation and all particle radiation are also converted within 13.8 billion years into protons and electrons, hydrogen and then via nuclear fusion in stars to beryllium or higher elements.

-) Ultimately, all matter, all cosmic radiation / energy and all local black holes must be completely 'swallowed up' by the central cluster black hole (CCBH) such as M87 might be one of them.

-) At the end of **phase 23**, the universe is absolutely dark and cold. All neutrinos, photons, hydrogen, helium and lithium disappeared as well. Then the universe-spherical-shell consists

of only 4 to 20 million identical central cluster black holes / CCBH scattered throughout the whole USS.

-) That universe-spherical-shell is then equivalent 0 kelvin and also reaches its maximum size with a radius of about 11 - 12 billion light years relative to **center C**.

-) Those central cluster black holes (CCBH) rotate at the speed of light  $c$  about their **central C-oriented axes** and are also super cold (2.7 kelvin).

-) Because of the gravitation, present since the formation of the hydrogen atom, the expansion speed of the universe-spherical-shell decreases further and further. The energy released during deceleration is converted into rotational speed of black holes and ultimately the angular speed of those CCBH's.

-) At the end of **phase 23**, this expansion speed / gravity within this always perfectly round universe-spherical-shell has been reduced to zero everywhere the same moment/ universe-clock-time/ UCT. The gravitational energy with respect to **center C** thus also decreases to zero.

-) This expansion velocity/ gravitation is then fully converted into angular velocity of all central cluster of black holes is increases to near the speed of light  $c$ . **Figures 60 - 63**

**Document G8.** The expansion speed of this universe is then fully converted into angular speed of those CCBH as well angular speed related gravity and gravitational energy.

-) During this hundreds of billions of years long period, all stars, planets and smaller black holes are absorbed and incorporated into the central cluster / facet black hole **R1 Af** present in the center of each cluster/ facet region.

-) The unstable higher atoms present in this central cluster / facet black hole must also fully stabilize themselves within the next 350 - 450 billion years. The stabilization of black hole atomic nuclei occurs through the emission of cosmic radiation (protons, electrons and neutrons ( $1p + 1e$ )). That process should end in time.

-) The vortexes disappear completely during this period.

-) **Phase 23** is extremely time consuming. Galaxy collisions reduce the current 9 - 11 velocities in the USS to just one angular velocity of the central cluster/facet black hole **R1 Af**. All rotation axes **R1 Af** are then precisely pointed at the **center C** of the universe.

-) Even the first 4 to 6 billion years of **phase 23** can no longer be observed. So our perception / "event" horizon of the universe cycle is extremely limited.

-) From a technical point of view, photons cannot stretch much further than 13.8 billion light years! **Figures 61 - 69 document G8.**

-) With improved gravitational techniques, this "perception" horizon can be increased from 13.8 years (photons) to approximately 30 – 35 billion (light)years by gravitational shock waves! The above information explains the past and the near future during **phase 23**.

### **Required formulas / quantities Phase 23 and Period 11:**

-) **Universe-Spherical-Shell/ USS:**

23.1) Determining the duration of **period 11** in a few hundreds of billions of years.

23.2) Determining the expansion speed of the universe sphere shell at the start and the end of **period 11**.

23.3) Determining the distance to **center C** in light years at the start and end of **period 11** and at the end of **period 11**. In **period 11** the expansion speed is reduced to zero.

The gravitation with respect to **center C** and associated gravitational energy with respect to **C** has then also decreased to zero! All expansion velocity is then converted to rotation / angular velocity of central cluster black holes / CCBH.

- 23.3) Determining when the expansion energy has been completely converted into angular velocity / gravity and into gravitational energy within the universe-spherical-shell. That energy is then completely converted into rotation / angular velocity / energy.
- 23.4) Determining the number of rotation / angular speeds within clusters of galaxies. Increase in these rotation / angular velocities of galaxies within the universe-spherical-shell.
- 23.5) Determining the number of rotation / angular speeds within clusters of galaxies at the start of **period 11**. At the end, only one rotation / angular speed remains. Then the rotation axes of all CCBH is exactly oriented at **center C**.
- 23.6) Tracking the decrease in the number of angular velocities during **period 11** in conjunction with the increase in these rotation / angular velocities of the remaining galaxies and their central black holes within the universe-spherical-shell.
- 23.7) Determining the increase of how much gravity and how much gravitational energy within the universe sphere shell in relation to the decrease of those 10 - 11 speeds at the beginning and only one remaining rotation / angular speed at the end of **period 11**.
- 23.8) Through nuclear fusion, more and more "shell" electrons are converted into "core" electrons. As a result, gravity and gravitational energy disappear! This gravitational and gravitational energy generated by "shell" electrons decreases to about half. The rest remains as gravity within that CCZG.
- 23.9) The question is whether "shell" electrons of black hole atoms generate as much gravity as the "shell" electrons of ordinary atoms.
- 23.10) Does the enormous angular velocity of black holes / central black holes of galaxies result in a higher / lower gravity than with ordinary atoms? (Only equal gravitational components mutually attract each other. Components differing from each other are indifferent to each other)
- See also corresponding points in **phase 19**.

**-) Central black holes galaxies that merge with the central cluster black holes (CCBH's) under construction:**

- 23.11) Determining the number of central black holes at the beginning of **period 11**.
- 23.12) Determine velocity collisions between the galaxies and reduce the number from 9 - 11 velocities so that at the end of this **period 11** in all 4 - 20 million clusters only one central black hole cluster and one rotation / angular velocity remains.
- 23.13) Determining the increase in size of the remaining central black holes after collisions during **period 11**. By how much mass, matter, gravity and kinetic energy did the remaining central black holes increase.
- 23.14) For the time being, the author assumes that one of the 9 - 11 speeds disappears with every collision. This limits the maximum size of the clusters to approximately 4 - 6 thousand galaxies, possibly more.
- 23.15) Determine the increase in angular velocity of the central black hole remaining after collisions and of its rotation / angular gravity.
- 23.16) Determine speed decreases in the number of rotation / angular velocities to which the remaining central black hole of the galaxies (CBHG) is subject within the universe and within the universe-spherical-shell.
- 23.17) Determining the decrease in expansion velocity and the associated gravity and gravitational energy (= dark energy) with respect to **center C**. Determining the increase of the 9 - 11 forms of angular velocities within the universe-spherical-shell and increase of the associated 9 - 11 forms of gravitation and of gravitational energy.
- 23.18) At the end of **period 11**, all 9 - 11 movements have been reduced to one angular velocity of the central cluster black hole / CCBH.

- 23.19) Determine the amount and how the "left" overs are removed during the growth of that central black hole. Well before the end of **period 11**, all black holes have become completely stable through the emission of high-energy cosmic rays; protons, electrons, neutrons.
- 23.20) How quickly those "left" overs are reformed into protons, electrons and new hydrogen. The developments in the length and structure of both vortexes in thousands of light years.
- 23.21) Well before the end of **period 11**, all cosmic radiation emitted via these vortexes must have been re-formed for 100% into protons, electrons, hydrogen, new stars, via nuclear fusion to atoms  $\geq$  Be and taken up again in one of the black holes present. ,
- 23.22) How big are those vortexes of the central black holes at the beginning of **period 11** and how far do they extend? What angular velocity do these vortexes have. What is their spatial structure.
- 23.23) To what extent do both vortices decrease during **period 11**?
- 23.24) Determine the distribution of gravitation and gravitational energy over the 11 - 13 different speeds at the start of **period 11** and how those speeds merge into only one rotation / angular speed at the end of **period 11**.
- See further corresponding points in **phase 19**.

**-) Remainder of the under construction and also disappearing galaxies within the cluster area:**

- 23.25) Determine nuclear fusion in stars and the duration of complete conversion of H via He, Li into Be and higher.
- 23.26) Determine speed transformation of emitted photons from light and infrared and from cosmic rays to protons, electrons and new hydrogen resulting in new stars.
- 23.27) Within what period of billions of years are those photons emitted by stars and supernovae back as matter and trapped as black hole atoms in local black holes.
- 23.28) Determine speed of uptake of Be in black holes and in speed increase amount of mass, matter and kinetic energy in those different shapes of black holes.
- 23.29) Effects thereof on gravity and gravitational energy with respect to **center C** and within the universe-spherical-shell / USS.
- 23.30) Determination of the length of the spiral arms with respect to **R1** and the rotation of these spiral arms at the beginning of **period 11** in relation to the moment of the Big Bangs of galaxies and the development of the gravity both in the spiral arms and in the central black hole of the galaxy.
- 23.31) At the end of **period 11**, those spiral arms have completely disappeared in the central black hole of: a) the central black hole of the galaxy and finally at the end of **period 11** then b) in the central black hole cluster together with 4 - 6 thousand other galaxies in the cluster.
- 23.32) Determine how fast through collisions between galaxies the number of galaxies decrease and the number of speeds decrease and what effects this has on the macro shape of the cluster and on the gravity present within it, sub forms of gravitation and gravitational energy.
- 23.33) Determine the course of collisions between galaxies and the increase in the amount of matter in those central black holes and increase in the angular velocity of those remaining central black holes and their effects on the generated amount of rotation, gravitation and forms of gravitational energy,
- 23.34) Monitoring the stabilization process within those central black holes and high-energy cosmic rays emitted with them. Tracking the radioactive decay in matter in the spiral arms and cosmic rays emitted.
- 23.35) Within what time is that cosmic radiation reformed into hydrogen and converted via stars / supernovas into Be and higher acceptable for black holes.

23.36) Gravitational tracking of the central cluster black hole from 4 - 5 thousand galaxies and tens of billions of stars and planets and local black holes.

23.37) At the end of **period 11**, no photon, proton, electron, neutron or atom may be present outside the central cluster black hole/ CCBH cluster. All expansion velocity / kinetic energy is then converted into one angular velocity of the central cluster black hole (CCBH).

23.38) Now both vortexes are empty and have completely disappeared. Within black holes, all matter has been fully stabilized for decades. All electromagnetic and cosmic radiation has now been completely reformed into hydrogen and converted via nuclear fusion into Be and higher elements and incorporated the CCBH.

23.39) Besides those 4 - 20 million central cluster black holes/ CCBH's, the universe-spherical-shell is absolutely dark, without any form of EM radiation and with a temperature < 2.7 kelvin.

See further corresponding points in **phase 19**.

### **-) Phase 24 universe cycle: Moment 13/ tipping point 13:**

#### **Maximum expansion of the universe and the universe-spherical-shell:**

-) All mass, matter and kinetic energy has been trapped for 100% in the preceding 350 - 450 billion years and locked up in the then present 4 - 20 million central cluster black holes (CCBH). In each of those equal CCBH's, gravity has brought together about 4 - 6 thousand or more galaxies. At the end of the expansion, each cluster is merged into one CCBH. That expansion then ends universe wide at the same moment/ universe-clock-time/ UCT.

-) The universe-spherical-shell is filled with 4 - 20 million identical central cluster of black holes rotating clockwise or counterclockwise.

-) Via collisions previously in **phase 23**, all 9 - 11 previously present (rotation / angular) speeds were absorbed into only one angular speed of the only remaining central cluster black hole (CCBH). All CCBH have the same radius of approximately 400 - 700 thousand km.

-) These CCBH's all rotate equatorially around their axis at the speed of light. The rotation axes are all exactly pointed at the **center C** universe. That angular velocity can be directed clockwise or counterclockwise.

-) The expansion speed of the universe-spherical-shell has decreased to zero; the angular speed of these CCBH's towards near the speed of light. The angular velocities of all CCBH's are exactly equal and close to the speed of light. All CCBH's have the same amount of kinetic energy.

-) The universe-spherical-shell/ USS is still a perfectly round balloon that will reach its maximum size over 350 - 450 billion years overall at exactly the same moment with an estimated radius of 10 - 12 billion light years with **center C** always perfectly positioned in the center.

-) Within the universe-spherical-shell all EM radiation and all particle radiation have disappeared and transformed into black hole atoms and incorporated into the CCBH's.

-) The universe / universe-spherical-shell/ USS is super cold with a background temperature of approximately 2.6 Kelvin. That is the remaining background temperature of the universe. This is also the minimum temperature of black hole atoms.

-) Just like at the start of this universe about 400 - 500 billion years ago, the universe has become extremely clear again.

### **Required formulas / quantities Phase 24 / Moment 13 / Tipping point 13:**

#### **-) Universe-spherical-shell/ USS:**

- 24.1) Determining moment of maximum expansion of universe **moment 13** in hundreds of millions / billions of years after the start of a super cold Little Bang.
- 24.2) Determining the maximum rotation / angular velocity of the CCBH and thus kinetic energy at the moment of maximum expansion of the universe-spherical-shell / USS.
- 24.3) Determining the extent to which expansion velocity has been converted into angular velocity and rotational gravitation. The angular speed is around the speed of light  $c$ .
- 24.4) The expansion velocity of the universe-spherical-shell and the expansion gravitation and associated gravitational energy with respect to **center C** is reduced to zero.

#### **-) Central Cluster Black Holes (CCBH's):**

- 24.5) Determine the size of the central cluster black hole at **moment 13** and the angular velocity, rotational gravity and rotational energy. Only one angular velocity is left. Rotation axis is exactly aimed at **center C** universe.
- 24.6) In addition to the elementary forces electric charge and magnetic spin, only the rotational gravity remains.

### **-) Phase 25 universe cycle: Moment 14/ Tipping point 14:**

#### **Start contracting universe-spherical-shell / USS towards center C:**

- ) About 400 - 500 billion years after the Little Bang, under the influence of rotational gravitation, the perfectly round universe-spherical-shell consisting of 4 - 20 million identical central cluster black holes / CCBH's starts to shrink towards **center C**.
- ) That contraction of the universe-spherical-shell by gravitation starts everywhere exactly at the same moment and always at the same speed.
- ) It is good to realize that the universe-clock-time continues to run linearly forwards while the space of the universe will contract and decrease again relative to **center C**.

### **Required formulas / quantities Phase 25 / Moment 14 / Tipping point 14:**

- 25.1) Determining moment of maximum expansion of universe **moment 13** in hundreds of millions / billions of years after the start of a super cold Little Bang.
- 25.2) Determining the maximum rotation / angular speed of the CCBH's and thus the kinetic energy of the universe at the moment of maximum expansion USS. No loss of kinetic energy.
- 25.3) Determining the extent to which expansion velocity has been fully converted into angular velocity and rotational gravitation. The gravity and gravitational energy with respect to **center C** has been reduced to zero. Gravity is only present within the universe-spherical-shell.

#### **-) Central Cluster Black Holes (CCBH's):**

- 25.4) Determining the size of the central cluster black hole at **moment 13** and their angular velocity, rotational gravity and rotational energy. Of all the previous 10 - 11 speeds at the start of **phase 23**, only one angular speed remains.
- 25.5) In addition to the elementary forces of electric charge and magnetic spin, only one rotational gravity component remains.

## -) **Phase 26 universe cycle: Period 12:**

**Contract the universe sphere shell of CCBH's towards center C by gravity:**

- ) **Phase 26/ period 12** spans an extremely long period of about 35 - 50 trillion ( $10^{12}$ ) years in which gravity directs all central cluster black holes (CCBH's) back to **center C** of the universe simultaneously and fully coordinated. Due to gravitation, all CCBH's also arrive again exactly at the same moment at **center C**.
- ) This shrinking of the universe-spherical-shell/ USS is estimated to take about 34 - 49 billion years. May be a little less and probably not much more.
- ) That contraction is opposite to the rotation/ angular speed of these CCBH's. After all, that rotation was the result of the decrease in the expansion speed of the USS due to gravitation.
- ) That contraction of the universe-spherical-shell goes therefore at the expense of the rotation/ angular speed of those CCBH's. During the contraction, they will rotate less and less quickly on their axis. All rotation axes are and always remain exactly oriented on **center C** of the universe.
- ) Those CCBH's may only touch each other when they are completely stripped of their angular velocity!
- ) The contraction of the always perfectly round universe-spherical-shell occurs at a fixed, fairly low, contraction speed of approximately 0.10 - 0.15 Mm / s. **Figures 1 - 5 Document G8.**
- ) In these figures, each galaxy should be read as an identical cluster of 4 - 6 thousand or more former galaxies.
- ) At the start of the contraction, the rotation/ angular speed is equal to the expansion speed/ energy at the beginning of the expansion of the universe. Which is at about the speed of light.
- ) On the way back to **center C** the contraction speed of these 4 - 20 million CCBH's in the universe-spherical-shell becomes more or less everywhere the same speed.
- ) On the way to **center C**, these CCBH's like a balloon of CCBH's are also getting closer to each other. At the same time their rotation / angular velocity decreases and with it their rotation/ angular gravity!
- ) The author assumes this results in a constant and constant shrinkage speed of the USS. This has yet to become clear from the gravitational model,
- ) As a result over time, all CCBH's will rotate slower and slower at a constant shrinkage speed of estimated 0.10 - 0.15 Mm/s or about 100 - 150 km/s!
- ) During this retreat to **center C** all CCBH's are thus completely stripped of their rotation / angular velocity and of their kinetic rotational energy and associated rotational/ angular gravity.
- ) The amount of gravitational energy added *free of charge* to the universe in **phase 7** during the formation of hydrogen is now fully used to continuously slow down the acceleration in the contraction of the USS to a more or less constant contraction speed / gravity.
- ) This results in a very quiet contraction of the universe sphere shell, which ends in a *super soft Crunch!* **No Big Crunch!**
- ) The total gravity in the universe / universe-spherical-shell / USS is decreasing and with it the total gravitational energy (= dark energy) in the universe.
- ) During that period of contraction, all individual CCBH's still generate enough contraction speed/ gravity to remain above the Critical black gravity (Cribhgra). (One premature explosion of one of these CCBH's would mean the end of the universe cycle) See **Figures 6, 6a and 7 Document G8.**
- (One CCBH consists of approximately 4 - 6 thousand or more former galaxies)
- ) The journey back to **center C** is by far the longest physical phase in the universe cycle.

- ) These CCBH's have already been fully stabilized in **phase 23**. All cosmic particle radiation emitted in **phase 23** from this CCBH's has been completely converted back into black hole atoms and incorporated into one of those 4 – 20 million CCBH's.
- ) The universe-spherical-shell / USS is completely without photons / darkness and without any form of cosmic radiation. (With all CCBH's, the vortexes have also completely disappeared during **phase 23**)
- ) All CCBH move in a straight line back towards **center C** universe.

### **Required formulas / quantities Phase 26 / Period 12:**

#### **-) Universe-Spherical-Shell/ USS:**

- 26.1) Determining the first period with acceleration of the contraction speed of the universe sphere shell at the start of the contraction.
- 26.2) Subsequently determine the constant shrinkage speed during **period 12**. Also determine whether there is a non-constant shrinkage speed in **period 12**.
- 26.3) Determining the duration of the contraction **period 12** in trillions ( $10^{12}$ ) years.
- 26.4) Determining the distance to **center C** in light years at the start and end of **period 12**. That is the moment when the CCBH's touch and merge with each other.
- 26.5) Determine how much expansion / rotational energy at the beginning of **period 12** and how much of it is left at the end of **period 12** as contraction speed/ kinetic energy USS.

#### **-) Central cluster of black holes (CCBH's):**

- 26.6) Determining the speed of the decrease of the angular velocity CCBH's in relation to their decreased gravity and the decreasing distances between the CCBH's themselves on the perfectly round universe-spherical-shell.

### **-) Phase 27 universe-spherical-shell: Moment 15/ Tipping point 15:**

#### **Start fusing all CCBH's into one thick universe-spherical-shell of black hole matter:**

- ) During that retreat of 35 - 50 trillion ( $10^{12}$ ) years, all 4 - 20 million CCBH's moved in a straight line to the **center C** universe. In that period and only just before the CCBH's touch each other, all 4 - 20 million CCBH's are completely stripped of their rotation and angular velocity.
- ) Those equal spherical, no longer rotating, CCBH's touch each other at the same moment/ universe clock time / UCT and everywhere at the same distance from **center C**.
- ) That fusion of these CCBH's results in the formation of a thick perfectly round universe-spherical-shell consisting of stable black hole matter with a radius of several billion km and with a thickness of approximately 300 - 400 thousand km and consisting of stabilized blackhole matter / blackhole atoms  $\geq$  Be. **Figures 6, 6a and 7 Document G8.**
- ) That merging and forming of one exactly round thick universe-spherical-shell could be regarded as a separate period!
- ) Start displacing black hole atoms in the universe-spherical-shell/ USS.
- ) Both inside and outside that universe-sphere-shell of black hole matter, neither matter, nor any form of electromagnetic (EM) radiation, nor any form of cosmic radiation is present. The universe is dark and cold.
- ) The total amount of gravity and associated gravitational energy that was added free of charge in **phase 7** has now decreased drastically. Used almost entirely to slow down the acceleration from contracting and almost completely disappeared. **Figures 79I - 79 XI document G8.**

- ) The total gravity remains well above the critical black hole gravity / Cribhgra. The required gravity is related to the contraction speed of this universe-spherical-shell of black hole matter towards **center C**.
- ) The universe-spherical-shell always remains perfectly round with **center C** always exactly in the middle.

**Required formulas / quantities Phase 27 / Moment 15 / Tipping point 15:**

**-) Universe-spherical-shell:**

- 27.1) Determining the speed of contraction of the universe-spherical-shell / USS and the duration of the complete fusion of CCBH's into one universe-spherical-shell with a thickness of approximately 300 - 400 thousand km. Duration of formation of this universe-spherical-shell in days.
- 27.2) Determining the shrinkage velocity of the universe-spherical-shell / USS during this period and the resulting gravitational / gravitational energy.
- 27.3) Distance to **center C** in light years at **moment 15**.
- 27.4) Determining the thickness of the universe-spherical-shell / USS and the volume of this USS.
- 27.5) Determining the degree of displacement and its effect on the decrease in the contraction speed and the amount of gravitation generated by speed.

**-) Phase 28 universe-sphere-shell: Period 13:**

**Formation of the Little Bang black hole:**

- ) This period concerns the final stage in the super soft contraction of the universe-spherical-shell/ USS and the formation of the Little Bang black hole with all the mass, matter and kinetic energy of the universe collected in it by gravitation. This Little Bang blackhole/ LBBH has a radius of estimated 25 - 50 million km.
- ) Due to the mutual displacement of black hole atoms, the contraction speed LBBH decreases further and further towards zero. The last remaining form of contraction gravity decreases further and further in the direction of *Critical black hole gravity / Cribhgra*.
- ) This under construction Little Bang black hole is increasingly approaching the point of the Critical black hole gravity / Cribhgra. Cribhgra is equivalent to the amount of gravity of just 5 - 10 stars as the sun. This gravity > Cribhgra is necessary to keep the repelling black hole atoms locked up and thus stable in that LBBH. Cribhgra represents a relatively tiny amount of gravity, of only 5-10 stars like our sun, to keep black holes stable. In principle Cribhgra is quantitatively the same for all types of black holes!
- ) This last period in the universe cycle with the formation of the Little Bang black gate takes only a few millennia.
- ) The radius of the always perfectly round interior is getting smaller and smaller. This interior space will eventually disappear almost completely. Contraction speed going towards zero and thus corresponding gravity as well.
- ) At the end of **period 13**, the shrinkage rate decreases to near zero. The Little Bang black hole then has a diameter of approximately 50 - 100 million km or more with **C** always exactly in the middle. **Figures 10 - 12 Document G8.** (In these figures, each black hole actually represents one central black hole cluster (CCBH) as the remnant of 4 - 6 thousand or more galaxies)

- ) Gravity merges all mass, matter and kinetic energy in the universe into one Little Bang black hole. The gravitational contraction is approaching Cribhgra. The gravitational energy also decreases to zero. **Figures 14 and 15 Document G8.**
- ) This minimum amount of gravity associated with Cribhgra is maintained until the very last moment of the contraction of the universe/ USS.
- ) During this period the Little Bang black hole becomes more and more unstable because the amount of gravity around those repelling black hole atoms decreases further and further.
- ) Only a few seconds before this contraction USS is fully completed and the Little Bang black hole is then almost completely filled, Cribhgra is undershot.
- ) During the entire universe cycle it is required that **center C** always exactly located in the center of the universe and ultimately also of the center of this Little Bang black hole/ LBBH.
- ) Just some seconds before the Little Bang black hole is formed, this LB black hole reaches its Cribhgra! Then the mutual electrical repulsion between there present blackhole atoms becomes greater than the amount of gravity required for stability.
- ) Then all black hole atoms simultaneously break their gravitational confinement in the Little Bang black hole/ LBBH.

**-) Required formulas / quantities Phase 28 / Period 13:**

- 28.1) Determining the decrease in shrinkage velocity of the universe-spherical-shell / USS and the decrease of the associated contraction gravity.
- 28.2) Duration of the formation of the Little Bang black hole with a diameter of about 50 - 100 million km, possibly even more.
- 28.3) Determining the shrinkage rate USS during this period and the reduction of shrinkage gravity until the moment that Cribhgra is reached. Decrease also in the amount of remaining gravitational energy.
- 28.4) Determining the volume of the Little Bang black hole and the amount of protons, electrons present therein, the energy present in matter (atom-cores) and in the "shell"-electrons.
- 28.5) Determining the duration of the entire cycle in conjunction with the amount of mass, matter and kinetic energy.

**-) Phase 29 The Little Bang: Moment 16/ Tipping point 16:  
Phase 29 equals phase 1 of the following and next cycle of the universe:**

**Moment 16: Completion Little Bang black hole with undershoot Cribhgra:**

- ) The Little Bang black hole reaches the Critical black hole gravity/ Crighgra. The gravity is then insufficient to keep the each other repelling black hole atoms together and imprisoned in this LB black hole even longer. **Figures 14 and 15 Document G8.**
- ) The Little Bang black hole is now disintegrating into separate black hole atoms. Without the protection of sufficient gravity, these black hole atoms are also unstable. They break down into an equal number of protons and electrons.
- ) **Phase 29** is again exactly the same as **phase 1** and means the start of the next universe cycle.
- ) This Little Bang black hole eventually breaks down into an equivalent number of protons and electrons. **Figures 16 - 30 Document G8.**

-) With the black hole atom not only gravity and gravitational energy disappear completely, but also temperature and all other atom-related physical and chemical forces and their bonds. This Little Bang settles at 0 Kelvin and can therefore no longer be perceived.

**Explanation:**

The cycle of the universe consists of 13 long periods and 16 short moments/ tipping points always based on the same set of maximum 12 variables/ parameters of the universe. During the 16 short moments/ tipping points only *one* of the physical / chemical basic conditions changes! That makes those changes and in between periods present moments/ tipping points very predictable!

The universe with its cycle forms a completely 100% closed system for mass, matter and kinetic energy. The universe is only open to the universe clock time (UCT) and gravity. Both without wave motion, mass, matter and kinetic energy. Be aware the universe/ USS is 100% closed for shockwaves of gravitational energy measured by **LIGO/ VIRGO!**

Mathematical models can be constructed for any of the 13 long physical periods and the number of 12 variables. The 16 intermediate short moments/ tipping points usually concern only one or a few changes in the physical / chemical forces / bonds and nuclear-physical reactions. Here only the boundary conditions within the mathematical model change. These 13 physical models, completed in succession, together form one complete mathematical model of the universe and of the cycle of that universe!

What is special about this model is that **phase 1** is again exactly the same as **phase 29** of the cycle. At the end of each cycle, the universe automatically continues in the next identically wound cycle.

That also most likely results in only one quantitative solution and one set / narrow band of quantitative values for the 12 variables.

The **29 phases** of the cycle of the universe can also be described quantitatively and in detail. This filling in quantitatively represents not only the complete past of this universe but also the complete future of the cycle of this universe / universe.

The cycle of the universe runs smoothly from start to finish. That is also the start of a new and subsequent cycle. This cycle starts in phase 1 with a Little Bang and ends in **phase 29** with the exact same Little Bang as if nothing had happened in between.

The main phases and periods of the cycle of the universe are shown in **Figures 4a and 4b of document E3-1.**

In each subsequent cycle of the universe-spherical-shell it supplies the gravitational energy with respect to **center C**, in **phase 7** with gravity and gravitational energy added. Gravitation is necessary to slow down the expansion of the universe and all atoms/ matter present there and to bring it back to **center C**. to go through. These overall energy-neutral 29-step cycles repeat themselves endlessly! **Document G16.**

During each cycle, this free added gravitational energy is fully utilized and consumed during the contraction of the universe-spherical-shell/ USS. At the end of the cycle, this added gravitational energy is fully used again. For Science, this gravitational energy with respect to **center C** and of the billions of galaxies **R1's** within the universe-spherical-shell is in fact the

so-called '*dark energy*'. In Science in 2021, the sought-after "dark" energy is not recognized and is linked to gravitational energy!

\*) The *Critical Black Hole Gravity* (Cribhgra) is the minimum amount of gravity needed to keep a black hole stable and to resist the electrical repulsion between the present black hole atoms. Cribjgra is equivalent to the amount of gravity of 5 - 10 stars like our sun. When Cribhgra is reached, all types of black holes become unstable. At that moment the mutual electrical repulsion from the electron shells of the black hole atoms (**document F1e & figures blackhole atoms**) becomes stronger than the gravity that kept these repulsing black hole atoms locked up in the black hole until then. The existing black hole atoms then move away from each other. Without the protection of gravity however, they become completely unstable and then disintegrate into protons and electrons. **Document G6 & figures 1 – 30 G8.**

\*\*) Currently the universe is in the beginning **phase 23** of the cycle of the universe. However, the first 4 - 5 billion years of **phase 23** cannot be observed either. **Phase 23** will take about 350 to 450 million years before the universe's/ USS expansion ends. That moment is about 400 - 500 billion years after the super cold start / Little Bang.

\*\*\*)) A total of 16 short moments/ tipping points that in principle usually only comprise one nuclear, physical or chemical change and 13 long periods in between. These long periods can be modeled mathematically. With the 12 parameters (**Document G3**) these 13 physical long-term models can be solved quantitatively and in detail for any chosen arbitrary moment in the universe cycle. This mathematical model of the universe cycle is a great, essential, and indispensable basic scientific tool.

\*\*\*\*) Due to the extremely small deflection of light and other electromagnetic radiation, combined with billions of years, we see the universe as a fairly evenly filled space with, as it were, the earth at the center of the universe. Apparently this universe/ USS is expanding at an accelerated rate. In reality we look through the one galaxy thin wall of the universe-spherical-shell/ USS. Only there can light move because there presence hydrogen and helium. Furthermore, gravity slows down the expansion of the universe/ USS further and further instead of increasing. This makes it seem as if the universe is expanding faster and faster instead of slower!  
**Document G12 and Figures 36a - 36r G8 / G12 and Figures 74 - 77 Document G8.**

However, the accelerated expansion observations rely on virtual images and optical illusions! In reality, the universe consists of a relatively thin and round and locally flat universe-spherical-shell/ USS.

Between the galaxies is a thin 'glass fiber' of pure hydrogen gas (about a few molecules/cm<sup>3</sup>). Within all galaxies, this hydrogen present and helium present as well:

- a) as a transport medium of light and cosmic radiation and
- b) 'lenses' of hydrogen and helium between the stars that deflect light and cosmic rays.

The inner and outer spaces of the universe / USS are absolutely empty and 100% vacuum both on the inside and outside of the universe-spherical-shell. Important: neutrinos and photons from light and infrared cannot enter and pass through this 100% absolutely empty region.

That vacuum lacks He atoms and H<sub>2</sub> molecules that are necessary and minimal required as a necessary transport medium for all those forms of EM radiation and all forms of cosmic radiation based on 1) waves, 2) particles and 3) kinetic energy and 4) limited by the speed of light!

All neutrons and photons and cosmic rays can therefore only travel through the universe via this thin curved universe sphere shell and there present ether of H<sub>2</sub> and He!

In the universe-spherical-shell / USS, the intergalactic space between galaxies is almost completely empty with an extremely small residue of pure hydrogen. In the galaxies this will be a mix of hydrogen and helium. In addition to hydrogen, each galaxy contains some helium from the galaxy's Big Bang that took place some 20 - 25 billion years ago!

In the universe-spherical-shell/ USS, the tens of billions of galaxies are spread over 4 to 20 million identical cluster areas that are evenly distributed throughout the USS. All electromagnetic and cosmic radiation is only transported through the USS of "H<sub>2</sub> glass fiber" and H<sub>2</sub> / He "lenses" of galaxies. H<sub>2</sub> and He are the necessary "ether" for all EM and for all forms of cosmic particle radiation.

Currently, the expansion of the universe-spherical-shell has decreased rather than increased by gravity, as Science assumes anno 2021. That vision is the result of optical illusions and virtual images!

These virtual images are caused by the extremely small deflection of light in the extremely low concentrations of hydrogen in the universe-spherical-shell and also by the extremely low concentrations of hydrogen and helium and the interstellar H<sub>2</sub> / He space in the galaxies. The author assumes that this deflection is only about one degree every 10 to 40 thousand light years.

On Earth, this deflection generates beautiful, but in fact totally distorted, virtual images from the universe-spherical-shell and especially from the deep universe and most distant parts of the universe-spherical-shell. On Earth we never get to see the real picture of the universe-spherical-shell. This is elaborated in **document G12 & figures 36a - 36r**.

## \* 6) DISUSSION:

In **chapter 5** it appears that the universe and energy-neutral completed cycle is physically, chemically and nuclear physically complex on the one hand, but on the other hand is so simple that the universe and its cycle can be modeled mathematically. With this mathematical model the universe & cycle can be quantified in rather detail.

At the beginning and at the end of each of those 13 physical steps it is possible to indicate exactly which purely physical, chemical and nuclear physical changes/ tipping points will occur.

This indicates exactly how this will have an energetic and model-based effect on the next physical-energetic step. In total, there are 13 physical models that together form one cycle in succession. Curious, the last **step 29** of cycle is exactly the same as **step 1** of the cycle. **Step 29** therefore is **step 1** of the next identical energy-neutral cycle of the universe!

For that reason it is possible to model the universe & cycle mathematically. With that model the universe and its cycle can be fully quantified. First on a large scale. However, with time, the quantitative outcomes of this model will become more accurate and more consistent with scientifically obtained data!

## **\* 7) IMPLEMENTATION AND REALIZATION OF THE MATHEMATIC MODEL:**

The initial set-up of that mathematical model takes approximately  $\frac{1}{2}$  - 1 year with the deployment of 10 - 15 qualified Scientists /modeler's. A total of approximately 5 - 8 Fte scientists are required.

These 10 - 15 Scientists are from various disciplines and can be recruited / supplied by either one university / institute or via different universities / institutes. Every university/ scientific institute has enough knowledge mathematical modelling the cycle of the universe! See **document A6**.

The numerical matching of these 13 physical models/ 16 chemical/ nuclear tipping points and the merging into one universe model requires the same time frame, commitment of experts, use of workspaces and the availability of sufficient computing space of a super computer.

Costs mainly consist of personnel costs, accommodation and use of computer capacity.

These costs are estimated at 1 - 1.5 million euros/ year over a period of 2 - 3 years.

The quantitative results will change the view of Science on the universe & cycle dramatical.

## \* 8) CONCLUSIONS:

1) In this **document G15** [www.uitewijkwinkel.eu](http://www.uitewijkwinkel.eu) the universe is presented as an universe-spherical-shell/ USS as well as an absolute 100% closed system for all forms of: a) mass (waves of electromagnetic EM and waves cosmic radiation), b) matter (atoms), c) kinetic energy and d) shockwaves of gravitational energy.

The universe/ universe-spherical-shell/ USS is just open for: 1) gravity and 2) time/ universe-clock-time/ UCT. Both are without any kind of waves, particles and energy!

2) This universe endlessly passes the same cycle of 29 steps. These 29 steps in the cycle of the universe are explained in more detail in such a way that mathematical model makers can use them to create a mathematical model of the universe & cycle of 29 steps. The physical, chemical and nuclear physical changes / tipping points in that model have been elaborated.

3) That mathematical model of the universe & cycle consists of 13 long-term physical models interspersed by 16 short-term physical, chemical and nuclear physics changes and tipping points within that model. That overall universe model is relatively simple without blind spots.

4) The most difficult part is to quantitatively coordinate the model with its 13 physical long-term steps and 16 tipping points via "try and error" in such a way that **step 29** of the universe cycle ends up in exactly the starting point **step 1** of this cycle. So **step 29** each cycle the same moment is **step 1** of the next cycle of the endlessly ongoing universe!

5) By quantifying that model, it can be further determined within which limits of:

- a) mass (photons / neutrinos, EM and cosmic radiation),
- b) matter (number of protons/ electrons and atoms, neutrons, black hole atoms),
- c) kinetic energy in matter (matter =  $\frac{1}{2} mc^2$  internal rotational energy of mass present/ photons + neutrinos)
- d) free kinetic energy, (free energy not present within matter)
- e) gravity & amount of gravitational energy, (gravitational energy = dark energy)
- f) time/ universe-clock-time/ UCT of one complete cycle in trillions of years and
- g) space/ maximum radius universe-spherical-shell/ USS in billions of light years, the unwinding of one whole cycle of the universe is possible and needed.

6) The drawing up of a first design of this energy-neutral mathematical universe model can be realized with 5 - 8 Fte's Scientists and within an amount of 1 - 2 million Euro over a period of 2 - 3 years.

7) Almost all universities / Scientific institutes in the Netherlands already have sufficient knowledge to mathematically model the universe & energy-neutral cycle of 29 steps. The author (78) still has a slight preference to make this modelling a Dutch project.

8) For Science, this mathematical model of the universe / universe cycle is an essential and indispensable basic tool in Scientific Research worldwide.

**A.P.B. Uiterwijk Winkel MSc; documents A2 & A6.**  
Zwijndrecht, The Netherlands, January 22, 2021

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