Norbert Winter

UC-4

The Universe Code *Ψ*-19,

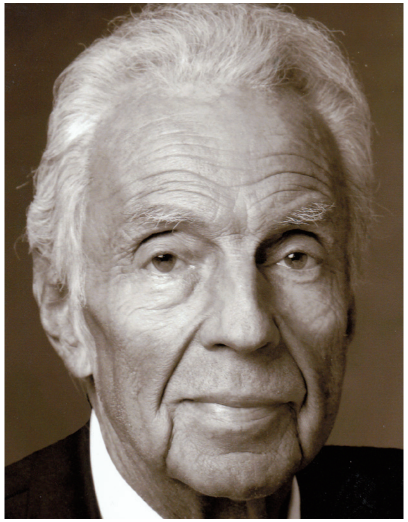
the creation system:

- **of the Big Bang Reproduction Cascade including absolutely all fine and global composition structures of the Earliest Universe directly after the Big Bang ($\frac{2}{3}$ Dark Matter / $\frac{1}{3}$ Normal Matter)**
- **of the elementary particles of Dark Matter and Normal Matter including their inner-structural particle composition and their physical properties**

$$\left[D^{13}_{\sigma_{13}}\,\Psi(x)\right]_{\wr\cup} \equiv \Psi^{19}_{\wr\cup}(x,\sigma_{13}) \equiv \Psi^{19}_{\wr\cup}(x) \equiv \Psi\text{-}19$$

spinors:	Ψ	Ψ	$\overline{\Psi}$	$\overline{\Psi}$	$\overline{\Psi}$	$\overline{\Psi}$	Ψ	Ψ	Ψ	$\overline{\Psi}(x)$	Ψ	Ψ	Ψ	$\overline{\Psi}$	$\overline{\Psi}$	$\overline{\Psi}$	$\overline{\Psi}$	Ψ	Ψ
pointsplits:	$-\xi,-\varrho,-\varepsilon_9$	$-\xi,-\varrho,+\varepsilon_9$	$-\eta,-\varepsilon_8$	$-\eta,+\varepsilon_8$	$-\xi,-\varepsilon_7$	$-\xi,+\varepsilon_7$	$-\xi,+\varrho,-\varepsilon_6$	$-\xi,+\varrho,+\varepsilon_6$	$-\varepsilon_1$	0	$+\varepsilon_1$	$+\xi,-\lambda,-\varepsilon_2$	$+\xi,-\lambda,+\varepsilon_2$	$+\xi,-\varepsilon_3$	$+\xi,+\varepsilon_3$	$+\eta,-\varepsilon_4$	$+\eta,+\varepsilon_4$	$+\xi,+\lambda,-\varepsilon_5$	$+\xi,+\lambda,+\varepsilon_5$

Norbert Winter, 16/02/2018



Norbert Winter

- Norbert Winter, born 1942, raised in Göttingen
- Studied Physics at the Universities of Heidelberg and Munich
- Doctorate in Physics with a thesis on elementary particle theory, supervisor H.P. Dürr
- Employed at the Max-Planck Institute for Physics in Munich, student of Werner Heisenberg
- 1974-2006, change of career into the insurance industry, including 25 years as board member or chairman of various insurance companies
- Despite this professional activities constant engagement with questions of logic and physics and constant contact with high-energy physicists
- From 2006, intensive engagement with questions of logic and physics
- From 2008, concrete and targeted development of the following works:

14/04/2011: “The Construction of Matter” (ADM)
06/03/2012: “Matter, Logic, and Existence” (MLE)
19/04/2013: “The Highly Massive Scalar Boson” (HSB)
26/05/2014: “The Law of Greatest Simplicity” (GDE)
22/05/2015: “The Unified Construction Process of the Universe from Smallest to Largest” (EAU, Kap. I-X.)
17/12/2015: “The Act of Creation of the Universe” (UEA)
04/08/2016: “The Development Process of the Universe from the Big Bang until Today” (UEP)
17/03/2017: “The 6 Key Processes in the Creation and Development of the Universe” (KPU)
17/03/2017: “The Universe Code Ψ-19” (UC)
17/03/2017: “The Universe Code Ψ-19, the unified composition and order system of the Universe“ (UC-AOS)
16/02/2018: “Guide to the source and generating code of the Universe“ (WW-UEC)
16/02/2018: “The Universe Code Ψ-19, the creation system of the entire process of the universe“ (UC-G)
16/02/2018: “UC-1 – The creation of the Universe Code Ψ -19“
16/02/2018: “UC-2 – The Universe Code Ψ-19,
- The creation system of the first ever manifestation of the universe before the big bang (≡ primordial universe)
- The creation system of mass and charge“

16/02/2018: “UC-3 – The Universe Code Ψ-19, the creation system of the big bang (rupture of ${}_5G$) in the primordial universe
- The restructuring of the elementary particle set that has passed through the Big Bang
- the formation of the normal matter elementary particle set = $(p^+, e^-, \nu\,;\, St,\ \gamma\ Z, G)$ ≡ h-atom given suitable energy boundary conditions“

16/02/2018: “UC-4 – The Universe Code Ψ-19, the creation system:
- of the Big Bang Reproduction Cascade including absolutely all fine and global composition structures of the Earliest Universe directly after the Big Bang ($\frac{2}{3}$ Dark Matter / $\frac{1}{3}$Normal Matter)
- of the elementary particles of Dark Matter and Normal Matter including their inner-structural particle composition and their physical properties“

16/02/2018: “UC-5 – The Universe Code Ψ-19, the creation system of dark energy with the coupled construction of 4-dimensional space-time“

Preface:

After publication of the paper

The universe code Ψ-19,   **the unified composition and order system of the universe**

≡ UC-AOS (abbr.)

I have received numerous letters with the question:

1. of whether it would be possible - due to the abundance of the overall material and the breadth of the topic of the paper UC-AOS (Chapter I. - XIV., 356 pages) - to recommend a guide with the help of which one can find a clear path through the overall text of the paper

2. what, according to my opinion and with respect to the present overall situation of elementary particle physics and space physics, are the most important topics on either field

3. Some letters contained the question of whether it would be possible to represent the overall universe process as developed in UC-AOS in full details, in a closed, neatly arranged form on approx. 30-50 pages.

4. In other letters, the request was made to split the comprehensive paper UC-AOS into its 5-6 core topics, whereas each of these 5-6 core topics should be 30-50 pages in length, thus easily readable and preferably deal with a topic that is currently being discussed.

The questions 1. and 2. have been answered in the paper:

Guide to the source and generating code of the Universe at small scale (elementary particles) and at large scale (global structures of the Universe) (2/16/2018).

The third question has been dealt with within the paper:

The universe code Ψ-19,
the generation system of the complete universe process (2/16/2018).

Question 4 is dealt with within the following 5 papers **UC-1** $\rightarrow$ **UC-5**:

UC-1 (02/16/2018)
UC-2 (02/16/2018)
UC-3 (02/16/2018)
UC-4 (02/16/2018)
UC-5 (02/16/2018)

Following UC-1, UC-2 and UC-3, we continue with the paper UC-4:

The present work **„UC-4“** refers to the work UC-AOS.
Therefore, the numerical references used in the following text refer to the numerical representation of the paper UC-AOS.

Thus, the reader can directly navigate to the text within the entire paper UC-AOS and retrieve the required information from the relevant text passages, in case further information on a certain subject is needed.

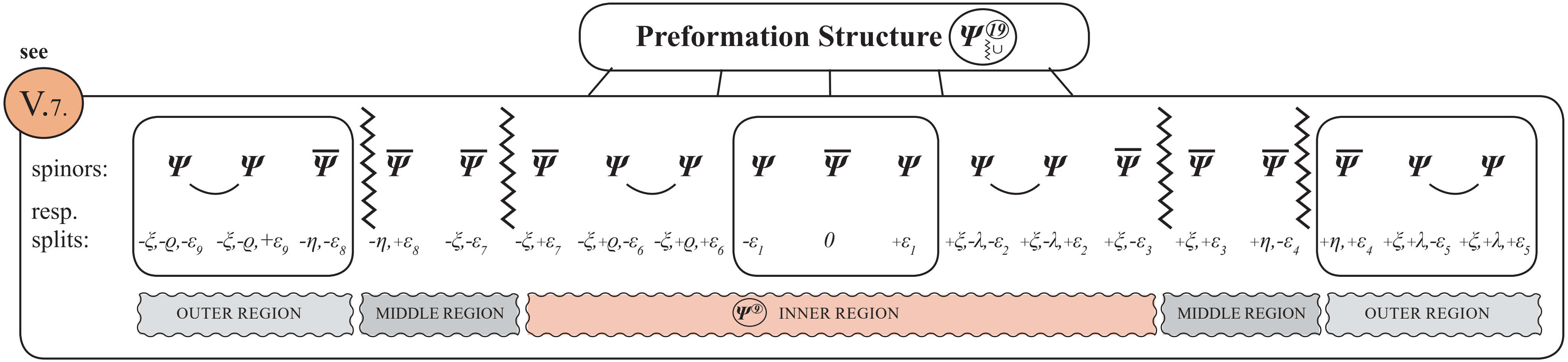
In the paper UC-3 it has been shown how the Big Bang process, i.e the rupture of ${}_5\overline{G}$, affects a single elementary particle set, and how this leads to the creation of the hydrogen atom of normal matter (p^+, e^-, ν ; St, $\underbrace{\gamma\ Z}$, G). I.e, the so-called „normal matter“ is the part of matter that has passed through the Big Bang process (rupture of ${}_5\overline{G}$).

Based on this, the present paper UC-4 will show how the so-called most-colossal Big Bang reproduction cascade was triggered by the rupture process of a single ${}_5\overline{G}$ (single Big bang process) 13.8 billion years ago resulting in the creation of the earliest universe with all its matter and force manifestations ($\frac{2}{3}$ Dark Matter, $\frac{1}{3}$ Normal Matter / Antimatter).

UC-4 contains the following outline:

- The construction process of the Entire Universe by means of a most colossal reproduction cascade, propagating from the centre of the first elementary particle set (≡ prototype) created in the first single Big Bang process.
- The nature of the Big Bang as a most colossal cascade of connected individual Big Bang events in a most colossal chain reaction. The formation of the most colossal reproduction set, identical to the prototype.
- The general validity of the laws of nature as a result of this identical reproduction.
- The limitation of the construction of the Universe by the end of the Big Bang when the production capacity is reached in the Big Bang reaction space by the construction processes gradually becoming too slow at the end of the reproduction cascade.
- The composition of the Universe after the Big Bang:
  66.6% Dark Matter, 33.3% Normal Matter/Antimatter
- The exhaustive list of elementary particles of “Normal Matter” and “Dark Matter” that exist in the Universe, as well as their inner-structural particle composition.
- The elementary particles of Dark Matter and their physical properties.
  Derivation of their inner-structural particle composition and their properties.

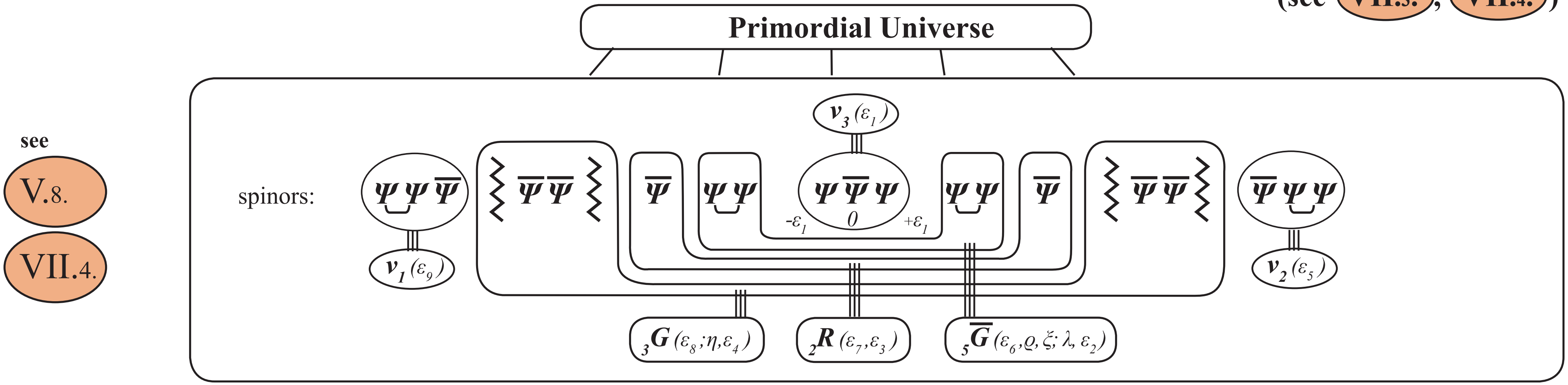
UC-1, UC-2, UC-3 showed how the construction of the preformation structure $\Psi^{(19)}$ initially happened:



,

and that the Primordial Universe then formed as the first ever manifestation of the Universe:

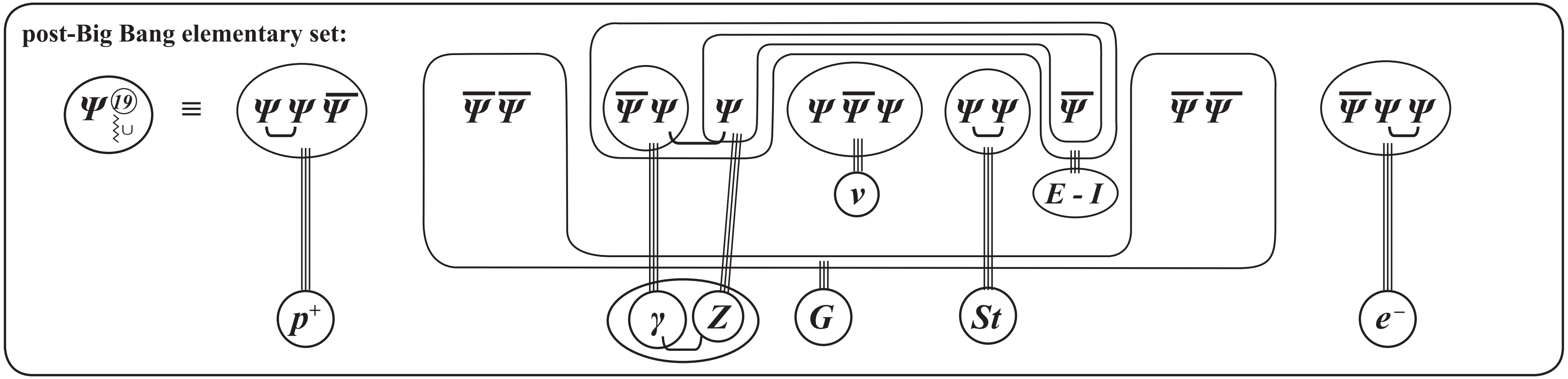
(see VII.3., VII.4.)



*** For the bosons $_5\overline{G}$, $_2R$, $_3G$, the left subscript indicates how many different point splits exist in the inner-structural composition of the boson.**
For example: $_5\overline{G}$ means that $_5\overline{G}$ contains 5 different point splits, etc.

and that the formation of this "tiny" unstable Primordial Universe (unstable because of the 5-split boson ${}_5\overline{G}$ which is itself unstable by VI.3.5.) leads to the rupture of this ${}_5\overline{G}$ boson precisely because of the most extremely strongly repulsive and most extremely massive and hence most extremely short-range anti-gravitational force ${}_5\overline{G}$ (VIII.2. to VIII.10.), and that this rupture (mini-Big Bang) of the ${}_5\overline{G}$ boson creates the post-Big Bang elementary set (IX.2.):

XI.1.



with

fermions: p^+ ≡ **proton**, e^- ≡ **electron**, ν ≡ **neutrino**

bosons: St ≡ **strong interaction boson**, G ≡ **gravitational boson**

$E - I$ ≡ **energy-momentum boson**

i.e. $E - I \rightarrow \gamma\, Z$ ≡ **electromagnetic-weak boson in sub-regions of the Universe (< 10%) where the electromagnetic and weak interaction exists**

This primordial construction process however only creates one (≡1) elementary particle set.

This naturally leads to the question: How did the "incredible" quantity of elementary particles comprising the Entire Universe form? And does this Universe contain any other force or matter elementary particles?

And thus to the question: How did the following process arise?

1 elementary particle set → $10^{\text{colossal}^{\text{most colossal}}}$ elementary particle sets ≡ Entire Universe ?

Everything began with the Existential Act, which existed at the beginning of Everything (see Chapter I.):
There exists "Something", and this "Something" is the minimal possible existing "Something", without which there would exist nothing. This single (1) minimal Something (see I.1., I.2., I.3.) is:

$$\boxed{\text{There exists } \Psi, \overline{\Psi} \text{ with: } D\,\Psi(x) \equiv \lim_{\sigma_\alpha \to 0} \Psi(x-\sigma_\alpha)\,\overline{\Psi}(x)\,\Psi(x+\sigma_\alpha);\ D\,\overline{\Psi}(x) \equiv \lim_{\sigma_\beta \to 0} \overline{\Psi}(x-\sigma_\beta)\,\Psi(x)\,\overline{\Psi}(x+\sigma_\beta);\ \text{otherwise nothing}}.$$

This Existential Act, as shown in Chapters I. to X., leads to the construction of the elementary set $\Psi^{19}_{\wr\cup}(x,\sigma)$ with 19 basis spinors, from which all elementary particles (matter and force particles) that could possibly exist after the Big Bang must form:

XI.1.1.

The development stages (Chapters I. to X.) leading to the final construction of the elementary set $\Psi^{19}_{\wr\cup}$ (see XI.1.), must therefore include a special development stage in which some reproduction mechanism is necessarily triggered, which leads to the construction of not just 1 elementary set $\Psi^{19}_{\wr\cup}$ but a most colossal reproduction cascade of the form:

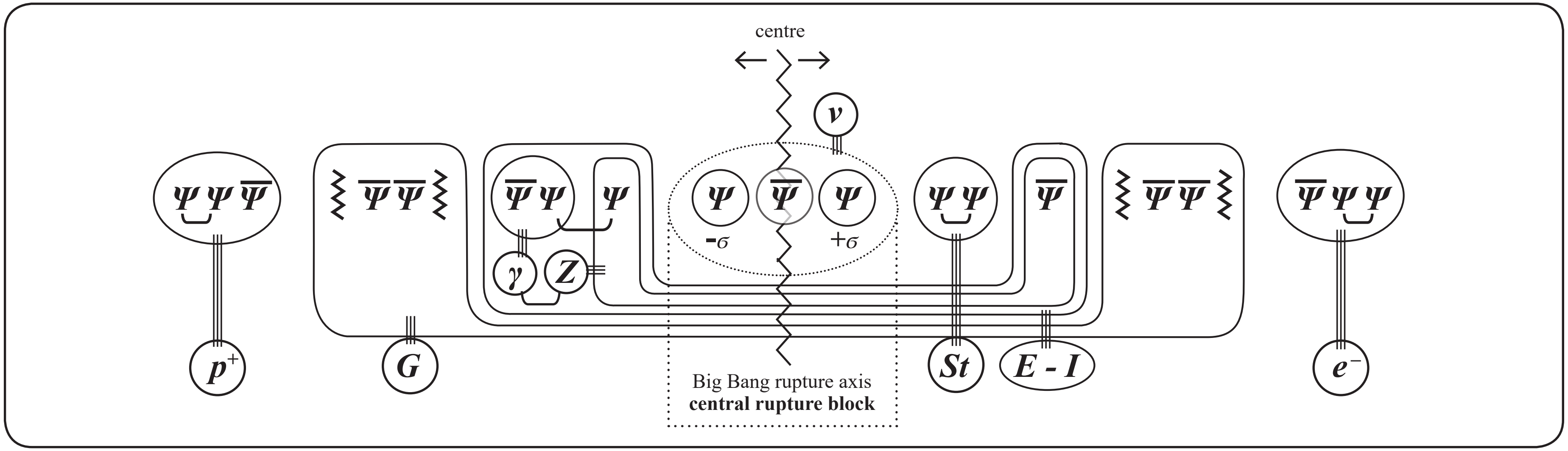
1 elementary particle set → $\left(10^{\text{colossal}}\right)^{\text{most colossal}}$ elementary particle sets ≡ Entire Universe

This leads us to ask:

At which point in the development of the Universe was this reproduction triggered, together with this colossally reproducing construction process?

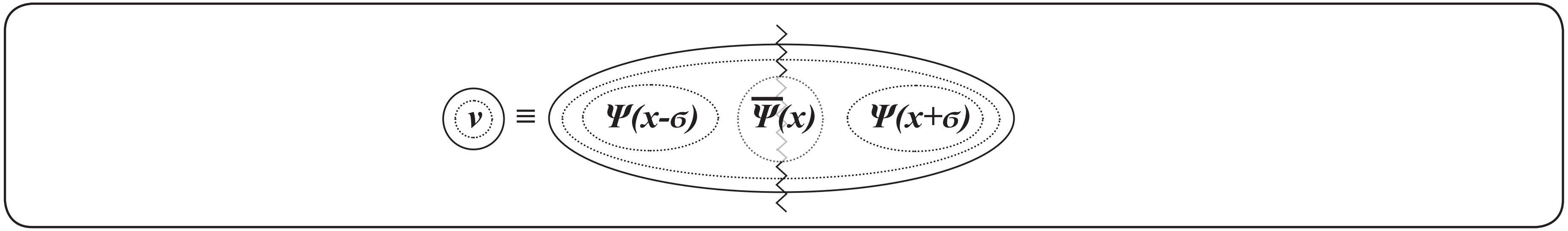
As described in Chapters VII., VIII., IX., the post-Big Bang formation is created from the Primordial Universe formation VII.4., VII.6., by means of the Big Bang process (rupture process) VIII.3. to VIII.7. (see VIII.10.):

XI.2.



Therefore, as shown in XI.2. and VIII.10. there forms a central Big Bang rupture axis, effectively as a central restructuring particle made fragile by the Big Bang $_{-\sigma}\;{}_{+\bar{\sigma}}$, the fragile restructured neutrino:

XI.3.



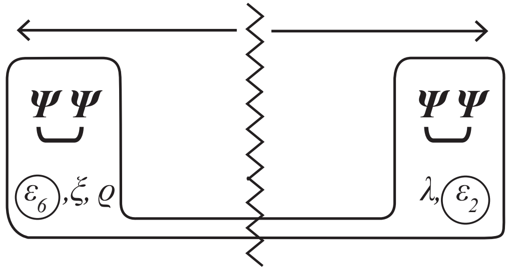
with the Big Bang rupture axis running through its centre.

This means: Each of the individual spinors in the central rupture block, i.e. in

XI.4. $\Psi(x\text{-}\sigma)\ \overline{\Psi}(x)\ \Psi(x+\sigma) \equiv \nu \equiv$ restructured neutrino

are pushed away from each other – because of the preceding system-intrinsic rupture of the repulsive, most extremely massive (and therefore most extremely short-range) anti-gravitational force boson ${}_5\overline{G}$ (see VIII.3. to VIII.7.) – i.e. by the rupture

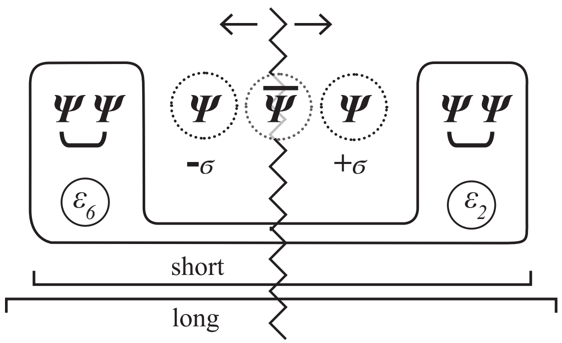
XI.5. ${}_5\overline{G} \equiv$



$\equiv {}_5\overline{G}\,(\varepsilon_6, \xi, \varrho\,;\, \lambda, \varepsilon_2)$ (see VIII.6.)

which also causes the original central neutrino $\nu \equiv \Psi\overline{\Psi}\Psi$ in the Primordial Universe (see) to split as:

XI.5.1.



XI.6.

i.e. as a secondary splitting object $\Psi(x-\sigma)$ $\overline{\Psi}(x)$ $\Psi(x+\sigma)$ (σ).

Thus – triggered by this first mini-Big Bang – in the first elementary particle set (prototype) there forms a fragile, reconstructed, massless 1-split central block that is open with respect to the Big Bang split:

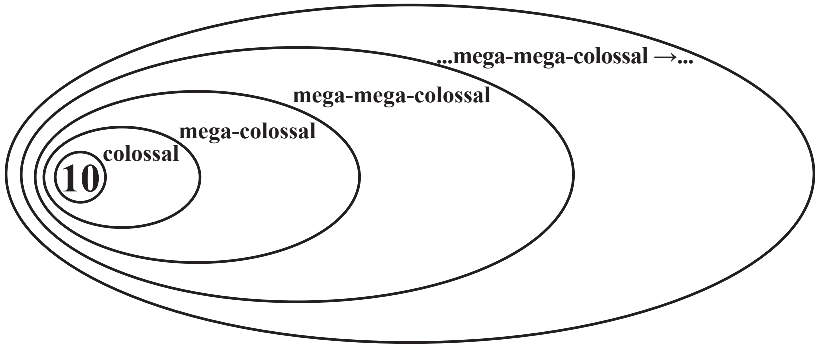
XI.7.

$$\Psi(x-\sigma) \ \ldots \ \overline{\Psi}(x) \ \ldots \ \Psi(x+\sigma) \equiv \nu$$

from which – triggered by the inner-most rupture (see VIII.6.) –

a „reproduction factory“ is opened, creating a “sheerly inconceivable number” of

XI.8.



elementary particle sets :

$\nu_1, \nu_2, \nu_3, {}_5\overline{G}, {}_2R, {}_3G$ **see VII.3.**

$p^+, e^-, \nu, St; E - I$ **or** $\gamma, Z, {}_1G$ **see XI.2.**

which subsequently form the Entire Universe (see section XI.36. later).

This creates

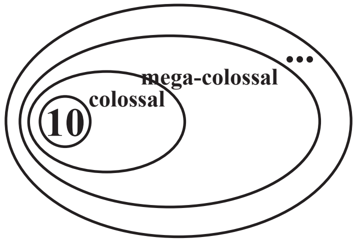
- **at large scales**, all **cosmogenetic entities** studied by cosmology in the widest sense

and,

- **at small scales**, the **sub-atomic, atomic, and molecular composition of matter** studied by elementary particle physics, atomic physics, and molecular physics, ranging up to macromolecular, chemical and biochemical compound structures.

HOW the creation of the Universe came into being by means of the Big Bang process from the inner-most region of the event outwards, and the precise details of this most colossal-scale process, namely

XI.9.



-fold reproduction of the elementary particle set

$\nu_1, \nu_2, \nu_3, {}_5\overline{G}, {}_2R, {}_3G$ and $p^+, e^-, \nu, St; E - I$ or $\gamma, Z, {}_1G$

see section XI.36. below

and **WHY** this incredible reproduction quantity of identical elementary particle sets was created, forming the Entire Universe and guaranteeing that the **laws of physics** are **universal laws** hold uniformly everywhere, on every continent of our Earth as well as every other corner of the Universe, i.e. there are **uniformly valid laws of nature**, as presented in Chapters I. to X., …

..., all of this can be traced back to the chain reaction process of a reproduction mechanism unfolding in the inner-most central block (XI.7.) $\boxed{\Psi(x\text{-}\sigma) - \overline{\Psi}(x) - \Psi(x+\sigma) \;, \sigma \neq 0}$ of XI.2. .

This means: The reproduction chain reaction unfolds from the centre of the central neutrino in XI.2, which is fragile due to being ripped apart by the first mini-Big Bang.

XI.10. $$\boxed{\nu \equiv \Psi(x\text{-}\sigma) \ldots \overline{\Psi}(x) \ldots \Psi(x+\sigma) \;, \sigma \neq 0}$$

This happens as follows: The $\boxed{\text{mini-Big Bang split } \sigma \neq 0 \; \overset{\leftarrow \; \rightarrow}{{}_{-\sigma} \; {}_{+\sigma}}}$ causes the individual basis spinors

XI.11. $\boxed{\text{of the central neutrino } \nu \equiv \boxed{\Psi \overset{\leftarrow}{\ldots} \overline{\Psi} \overset{\rightarrow}{\ldots} \Psi}}$ to be pushed apart.

This mini-Big Bang split $\sigma \neq 0$ separates them into individual objects, thus "individualizing" them and hence exposing each of them to the fundamental dynamic I.1., I.2., I.3. , as described in Chapter I., i.e.

XI.12. $$\boxed{\text{the } 3 \text{ individual basis spinors in } \nu \equiv \Psi(x\text{-}\sigma) \overset{\overset{\sigma}{\leftarrow}}{\ldots} \overline{\Psi}(x) \overset{\overset{\sigma}{\rightarrow}}{\ldots} \Psi(x+\sigma) \overset{\text{individualization}}{\equiv} \Psi_0(x\text{-}\sigma) \overset{\overset{\sigma}{\leftarrow}}{\ldots} \overline{\Psi}_0(x) \overset{\overset{\sigma}{\rightarrow}}{\ldots} \Psi_0(x+\sigma)}$$

each become the starting point of an independent dynamic construction process, precisely as described in detail in Chapters I. to X. .

Thus: From the middle (≡ inner-most central block XI.10.) of the elementary particle set XI.2. that formed directly after the first mini-Big Bang VIII.6., another construction process is triggered:

XI.13.

$\Psi_0(x-\sigma)$	$\longrightarrow$	$\Psi_{0 \wr \cup}^{(19)}(x-\sigma)$	$\equiv$	elementary particle set,	by XI.2.
$\overline{\Psi}_0(x)$	$\longrightarrow$	$\overline{\Psi}_{0 \wr \cup}^{(19)}(x)$	$\equiv$	?	
$\Psi_0(x+\sigma)$	$\longrightarrow$	$\Psi_{0 \wr \cup}^{(19)}(x+\sigma)$	$\equiv$	elementary particle set ,	by XI.2.

XI.14.

Thus: $\Psi_0\ (x-\sigma)$ is the starting spinor for the creation of a $\Psi_{0 \wr \cup}^{(19)}(x-\sigma)$ -systems,

$\overline{\Psi}_0(x)$ is the starting spinor for the creation of a $\overline{\Psi}_{0 \wr \cup}^{(19)}(x)$ -systems,

$\Psi_0\ (x+\sigma)$ is the starting spinor for the creation of a $\Psi_{0 \wr \cup}^{(19)}(x+\sigma)$-systems.

XI.15.

Thus: As a result of the mini-Big Bang split $\sigma \neq 0$ $\left(\overset{\leftarrow \wr \rightarrow}{-\sigma \wr +\sigma}\right)$,
the 3 components of the central neutrino ν XI.10. are "individualized" (see XI.11.).
This "individualization" of the 3 individual components triggers and executes three dynamic processes $\Psi \rightarrow \Psi_{\wr \cup}^{(19)}$ or $\overline{\Psi} \rightarrow \overline{\Psi}_{\wr \cup}^{(19)}$ as presented in Chapters I. to X..

XI.16.

Thus: The separation of the 3 basis spinors of the central neutrino ν (XI.10., XI.11., XI.12.) in the inner-most central block (XI.7., XI.2.) as a consequence of the necessarily occurring first mini-Big Bang (VIII. esp. VIII.5. to VIII.10.) leads to the individualization of each of these 3 basis spinors:

$$\nu \equiv \Psi_0(x-\sigma) \overset{\xleftarrow{-\sigma}}{\ldots} \overline{\Psi}_0(x) \overset{\xrightarrow{+\sigma}}{\ldots} \Psi_0(x+\sigma)$$

XI.17.

Thus: The mini-Big Bang rips apart the existing dynamic relation between these 3 basis spinors: Thus: They are individually separated by the mini-Big-Bang-driven individualization process within the central block XI.7., each of them becoming the starting spinor Ψ_0 of a separate, independent, dynamic system Ψ_0^{27} (III.4.), which by IV.5. then creates the structured system Ψ_{0}^{19} by internally forming the structural foundation Ψ_0^{8} (IV.5.). This system then, in turn, forms into a newly existing manifestation of reality, the primordial force-matter set VII.3., VII.4., which again, due to the primordial force boson ${}_5\overline{G}$ newly created within it, leads to another mini-Big Bang VIII.6. by means of a 3rd production process, etc., etc., etc., …, initiating and constructing a cascade of Big Bangs and hence a reproduction cascade (see below XI.23.).

XI.18. Since the composition of the spinors Ψ_0 and $\overline{\Psi}_0$ is completely structurally and dynamically symmetric;

namely:
- both Ψ_0 and $\overline{\Psi}_0$ are 4-component spinors such that $\overline{\overline{\Psi}}_0 = \Psi_0$
- both Ψ_0 and $\overline{\Psi}_0$ satisfy a unified symmetric dynamic:

$$D\,\Psi_0 = \Psi_0\,\overline{\Psi}_0\,\Psi_0\ , \quad \text{I.1.} \qquad D\,\overline{\Psi}_0 = \overline{\Psi}_0\,\Psi_0\,\overline{\Psi}_0\ , \quad \text{I.2.}$$

it doesn't matter whether a Ψ_0 spinor or a $\overline{\Psi}_0$ spinor is the starting spinor of each dynamic system construction process.

Thus: If Ψ_0 is the starting spinor, a $\Psi^{19}_{0\wr\cup}$-system is constructed.

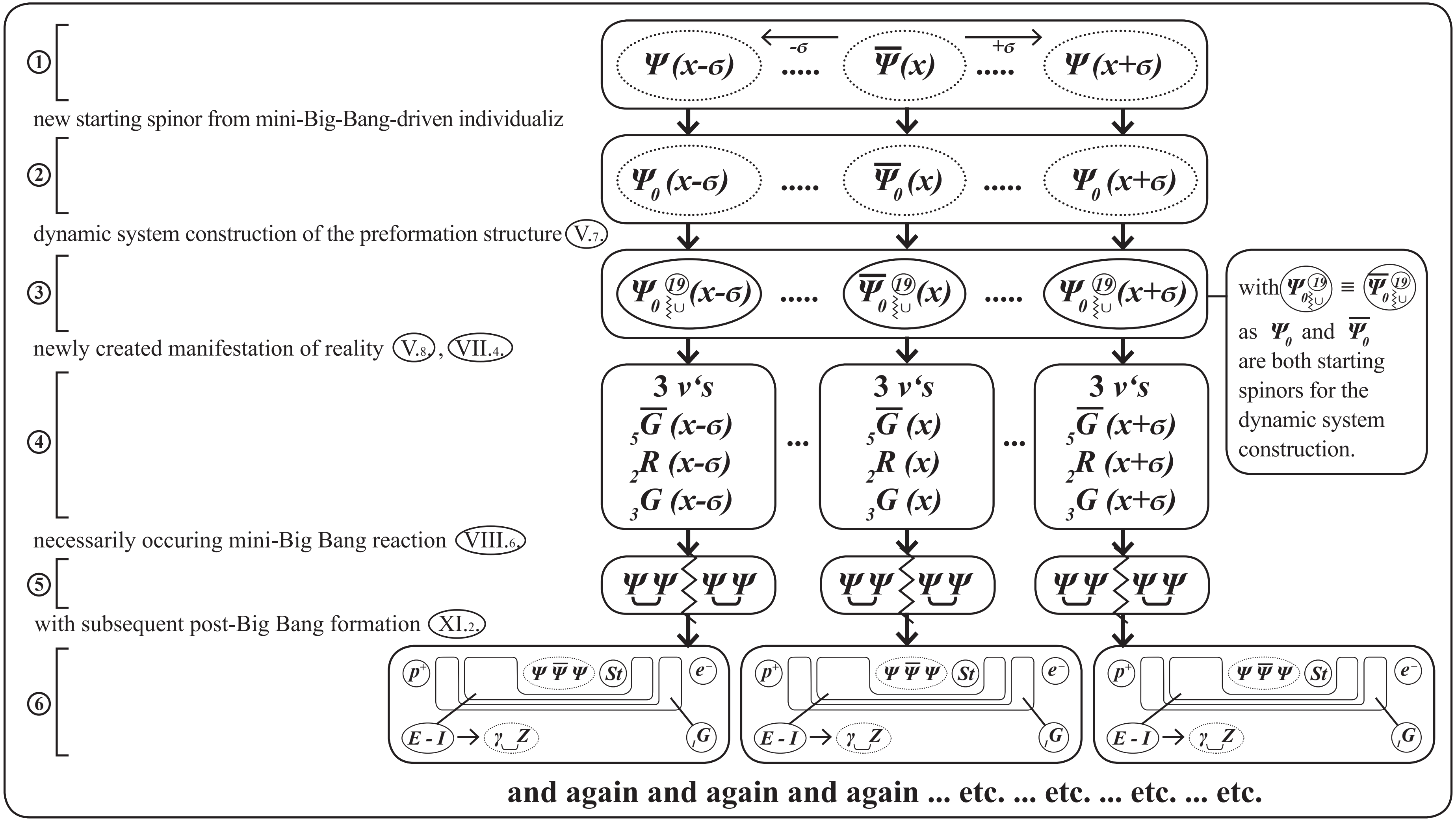
If $\overline{\Psi}_0$ is the starting spinor, a $\overline{\Psi}^{19}_{0\wr\cup}$-system is constructed.

Both systems $\Psi^{19}_{0\wr\cup}$ and $\overline{\Psi}^{19}_{0\wr\cup}$ are constructed absolutely identically (with identical steps, as described in I. to X.) and are therefore identically structured, and hence physically identical.

XI.19. The only thing that matters is that the starting spinor – either Ψ_0 or $\overline{\Psi}_0$ – is "individualized" in its starting position (XI.16.), thus acting as a dynamic starting spinor, i.e. that the starting spinor – either Ψ_0 or $\overline{\Psi}_0$ – caused by the corresponding individual mini-Big Bang $\overset{\leftarrow\wr\rightarrow}{-\sigma\ \wr +\sigma}$ XI.10. is "individualized" (XI.15.) within the central rupture region XI.7. and therefore necessarily (as described in I. to X.) generates a new dynamic system $\Psi^{19}_{0\wr\cup}$, which forms a new VII.4. -system and hence necessarily generates a new instance of the Big Ban VIII.6. , etc., etc., etc., ..., thus constructing the cascade (XI.23.).

Thus: Each “mini-Big-Bang-driven” individualized spinor at the central rupture region XI.7. in the central 3-spinor rupture block (central neutrino XI.10.), regardless of whether it was originally a Ψ-spinor or a $\overline{\Psi}$-spinor, becomes the starting spinor Ψ_0 of a new $\Psi_0^{(19)}$-system and therefore a new primordial force-matter set VII.4., with the following process structure:

XI.20.

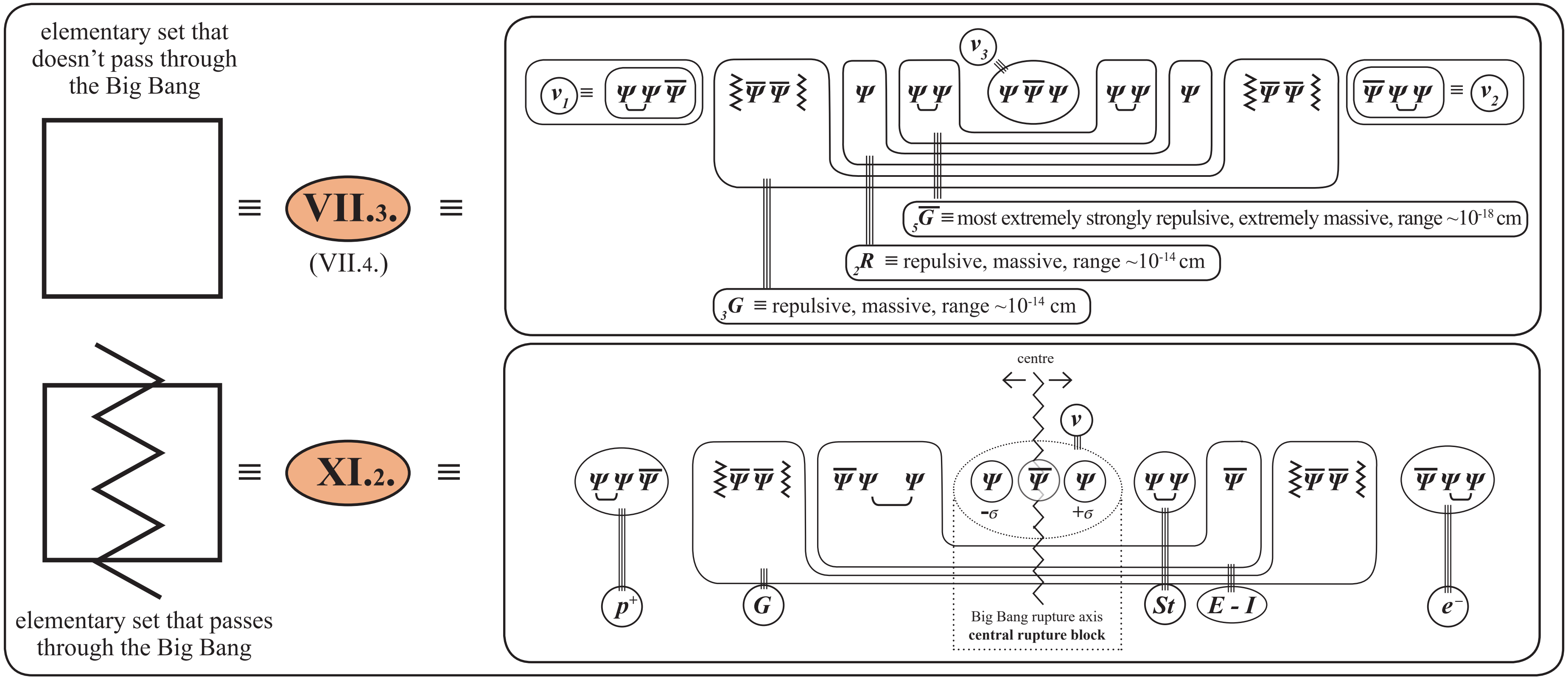


XI.21.

During this chain reaction process and the resulting reproduction cascade, the Pauli principle is not violated, since every mini-Big Bang process creates a point split $\sigma \neq 0$ by means of which the individualization process and next iteration of production occurs. This most colossal reproductive construction XI.20. and most colossal quantity of $\sigma_\nu \neq 0$ ($\nu = 1$ .... to some most colossal number) thus created leads to the construction of the Universe within the Big Bang reaction space.

We introduce the following symbolic notation in order to more easily represent the processes and structures involved in the chain reaction process of this most colossal reproduction cascade:

XI.22.



XI.23.

Big Bang Production Cascade

n-th production level, elementary sets produced: $s(n) \equiv 3^{n-1}$

number of elementary particle sets produced so far $\sum \equiv \frac{3^n - 1}{2}$

$\Psi^{(19)}$

central rupture block (v)

1^{st} production level $\equiv$ n = 1

s(1)$\equiv$ 1 elementary particle set (ES)

$\equiv$ XI.2. $\quad p^+ \equiv \Psi\Psi\overline{\Psi} \quad \overline{\Psi}\,\overline{\Psi} \quad \overline{\Psi}\Psi \quad \Psi \quad \Psi\ \overline{\Psi}\ \Psi \quad \Psi\Psi \quad \overline{\Psi} \quad \overline{\Psi}\,\overline{\Psi} \quad \overline{\Psi}\Psi\Psi \equiv e^- \qquad \sum \equiv \frac{3^1 - 1}{2} \equiv 1$

2^{nd} production level $\equiv$ n = 2

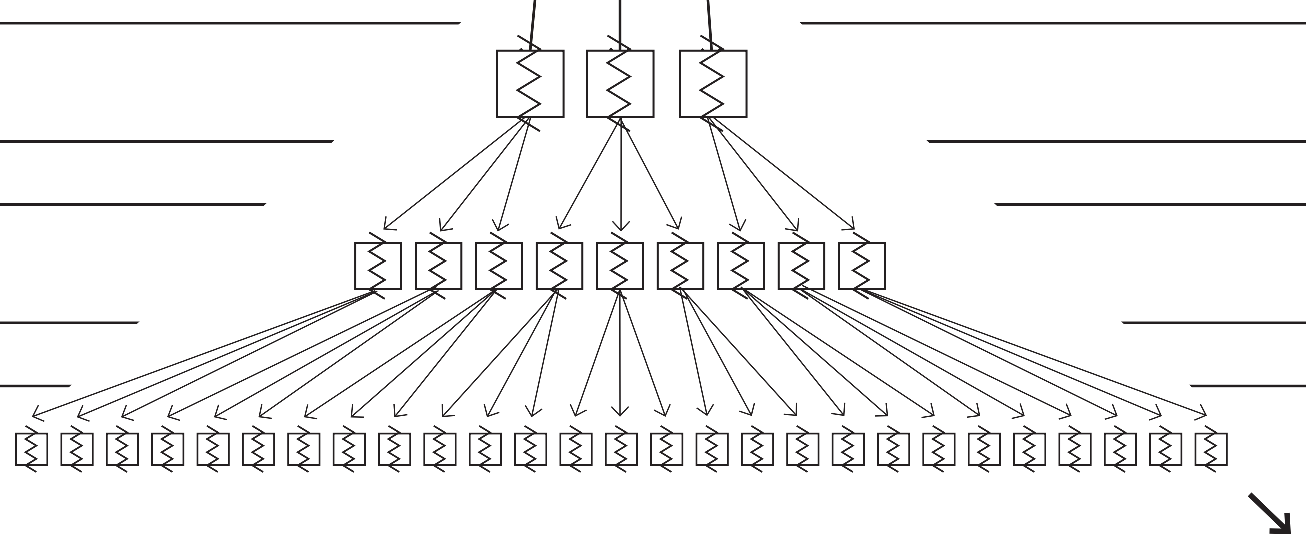
s(2) $\equiv$ $3^{(2-1)}$ $\equiv$ 3 ES $\qquad \sum \equiv \frac{3^2 - 1}{2} \equiv 4$

3^{rd} production level $\equiv$ n = 3

s(3) $\equiv$ $3^{(3-1)}$ $\equiv$ 9 ES $\qquad \sum \equiv \frac{3^3 - 1}{2} \equiv 13$

4^{th} production level $\equiv$ n = 4

s(4) $\equiv$ $3^{(4-1)}$ $\equiv$ 27 ES $\qquad \sum \equiv \frac{3^4 - 1}{2} \equiv 40$



(n_f-1)-th production level $\equiv$ last-but-one production level $\equiv$ last iteration of the Big Bang, which produces ES:

s(n_f-1) $\equiv$ $3^{(n_f-2)}$ ES and from which the last (final) production level n_f is created. $\qquad \sum \equiv \frac{3^{(n_f-1)} - 1}{2}$

--------- END OF BIG BANG --------- END OF BIG BANG --------- END OF BIG BANG --------- END OF BIG BANG ---------

n_f $\equiv$ final production level created from the (n_f- 1)-th and last iteration of the Big Bang, then end of the Big Bang.

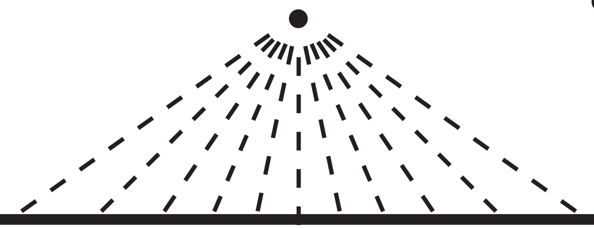
s(n_f) $\equiv$ $3^{(n_f-1)}$ ES □ $\equiv$ production at the final level

As shown in XI.23., in an ever-intensifying reproduction, the 1st elementary particle set ≡ prototype ≡ p^+, G, $E - I$, ν, St, e^- (see VIII.) ≡ 1st production level forms into 3 new elementary particle sets as described in Chapters I. to X. due to the fragile, rupture-susceptible central neutrino ν ≡ Ψ $\overline{\Psi}$ Ψ (XI.6.) contained in this 1st elementary particle set and the reproduction machinery (XI.13.) associated with it. Each of these 3 new elementary particle sets then unavoidably trigger 3 mini-Big Bang events (as described in Chapter VIII.), each of which in turns leads to the next production of 3 new elementary particle sets, etc.

This builds up the reproduction cascade shown in XI.23., each reproduction process triggering a corresponding mini-Big Bang, in such a way that this most colossal reproduction process leads to the creation of $\frac{3^{(n_f-1)}-1}{2}$ - elementary sets, as well as the additional creation of $3^{(n_f-1)}$ □-particles, i.e. particles that do not pass through the Big Bang process, remaining preserved in the original primordial matter structure □ (XI.22., VII.3.) to form the "substance of force-matter", commonly known as "Dark Matter".

XI.24.

$\frac{3^{(n_f-1)}-1}{2}$ finely structured **mini-Big Bang events**, which lead to a vast profileration of mini-Big Bangs creating $\frac{3^{(n_f-1)}-1}{2}$ elementary sets.



≡ **Global Big Bang**

End of Big Bang — End of Big Bang

final-level production of $3^{(n_f-1)}$-□-particle sets (see XI.2.2., VII.3., VII.4.)

XI.25.

Thus, this construction structure of the Big Bang cascade (≡ production cascade) XI.23., which created the Entire Universe around 13.8 billion years ago – probably in the tiniest fraction of a second (the first ever second) – tells us the structural composition of the Universe: Directly after the Big Bang, as a result of the Big Bang production cascade XI.23., the composition of the Entire Universe satisfies the following composition mix relation R :

R ≡

Component ① **The production set of the $3^{(n_f-1)}$-□-elementary sets (VII.4.) ≡ „Dark Matter“ created in the final production level n_f**

———

Component ② **The sum of all $\frac{3^{(n_f-1)}-1}{2}$-⧚-elementary sets (XI.2.) ≡ „Normal Matter/Antimatter” that pass through the Big Bang**

⇓

$$R \equiv \frac{3^{(n_f-1)}\text{-□-sets (XI.23.; VII.4.)}}{\frac{3^{(n_f-1)}-1}{2}\text{-⧚-sets (XI.23.; XI.2.)}} \equiv \frac{3^{(n_f-1)}}{\frac{3^{(n_f-1)}-1}{2}} \equiv 2\,\frac{3^{(n_f-1)}}{3^{(n_f-1)}-1}$$

$$R \equiv 2\,, \quad \text{for } n \geqslant 1$$

When we analyse the Big Bang reproduction cascade XI.23., we see that the creation and construction process of the Entire Universe, including both Dark Matter and Normal Matter, developed from the

central rupture block (ν) ≡ $\boxed{\Psi\ \overline{\Psi}\ \Psi}$.

This central rupture block (ν) is namely the central neutrino (ν) ≡ $\boxed{\Psi(x\text{-}\sigma)\ \overline{\Psi}(x)\ \Psi(x+\sigma)}$ (see XI.2. - XI.3.)

made fragile by the rupture process of $_5\overline{G}$ (see VIII.3. - VIII.8.).

Thus: Due to the nature of the creation process of the Universe XI.23., the central neutrino ν ≡ $\boxed{\Psi\overline{\Psi}\Psi}$ exist:

- **both in the Normal Matter part (33.3% ≡ $\frac{1}{3}$ ≡ sum of of production levels $\sum$ (1 to n_f), namely in the form of the fragile central neutrino (ν) (XI.3.) reconstructed by the Big Bang process VIII.6., along the central Big Bang rupture axis $\boxed{\leftarrow\ \rightarrow}$ by VIII.10., XI.2., XI.3.:**

- **and in the Dark Matter part (66.6% ≡ $\frac{2}{3}$ ≡ final production level n_f in XI.23., in the form of the central neutrino elementary particle, untouched by the Big Bang process $\boxed{\leftarrow\ \rightarrow}$ (rupture process of $_5\overline{G}$ VIII.6.).**

It is worth noting that, as it happens, the creation process of the Entire Universe XI.23. developed from the simplest of all elementary fermions, namely the massless 1-split central neutrino $\nu \equiv \boxed{\Psi \overline{\Psi} \Psi_{(\varepsilon_1)}}$ (see the central rupture block ν in the Big Bang production cascade XI.23.).

This central neutrino $\nu \equiv \boxed{\Psi \overline{\Psi} \Psi}$ is furthermore:

- **The only elementary particle that belongs to both Dark Matter and Normal Matter.**

- **The only elementary fermion that is inner-structurally symmetric:**

  $\nu \equiv \boxed{\Psi \overline{\Psi} \Psi \text{ (1 split)}}$, **by contrast with** $p^+ \equiv \boxed{\underbrace{\Psi \Psi} \overline{\Psi} \text{ (4 split)}}$, $e^- \equiv \boxed{\overline{\Psi} \underbrace{\Psi \Psi} \text{ (3 split)}}$,

  ${}_2\nu_1 \equiv \boxed{\underbrace{\Psi \Psi} \overline{\Psi} \text{ (2 split)}}$, ${}_2\nu_2 \equiv \boxed{\overline{\Psi} \underbrace{\Psi \Psi} \text{ (2 split)}}$; **(see list of components XI.36.).**

- **The one and only elementary particle that is directly created by the fundamental dynamic I.1. $\equiv D\,\Psi \equiv \Psi \overline{\Psi} \Psi$**

  see the construction process I.12., with $D_5\, \Psi(x) = \lim_{\varepsilon_1 \to 0} \boxed{\Psi(x-\varepsilon_1)\ \ \overline{\Psi}(x)\ \ \Psi(x+\varepsilon_1)}$**).**

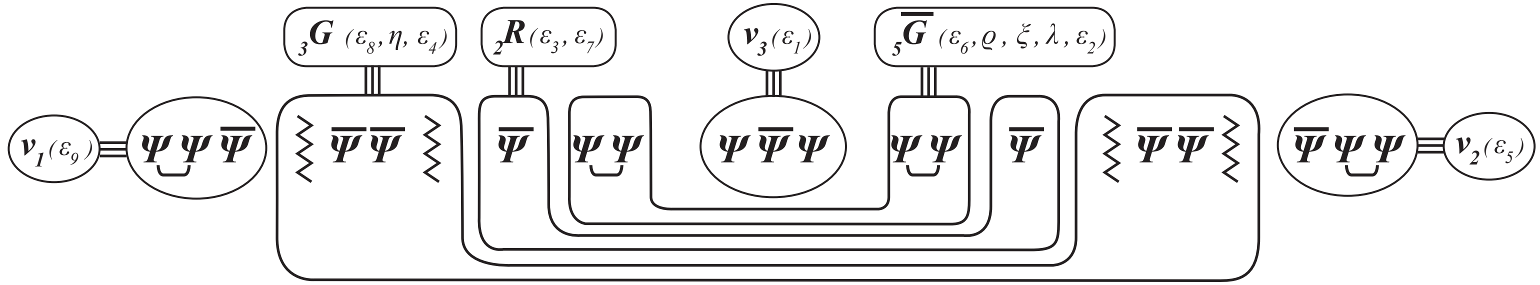
Thus, it holds that
The Entire Universe created in the Big Bang production process XI.23. consists of precisely 2 components directly after the Big Bang, i.e. when it is "newly born":

XI.26.

Component 1 ≡ 66.6 % ≡ $\frac{2}{3}$ ≡ $3^{(n_f-1)}$ □-sets, with □ as in VII.4., XI.22. ≡ „Dark Matter", i.e. the □-elementary sets that do not pass through the Big Bang rupture process VIII.6. at the end of the production process, but are created in the final production level n_f (XI.23.) after the Big Bang reaction space (XI.23.) reaches production capacity and becomes full. Directly after the Big Bang, this 66.6% of the Universe, which consists of □-sets, corresponds to the components of the Universe more commonly known as "Dark Matter". In 2013, the Planck space telescope (Planck Surveyor) found, based on its measurements, consistently with similar previous results such as COBE and WMAP, that the "Dark Matter" proportion of the Universe around 380,000 years after the Big Bang, i.e. "shortly after the Big Bang", was roughly 63%, which matches almost exactly the $\frac{2}{3}$ ≡ 66.6%-Component 1 that the present theoretical approach predicts must necessarily exist directly after the Big Bang, as a consequence of the Big Bang production process XI.23..
We currently do not have any experimental knowledge of the physical composition of "Dark Matter", but we are searching for it.
According to the theoretical approach presented here, "Dark Matter" consists of "□-particles", i.e. the particles whose inner-structural composition and physical properties are analysed in detail in VII.3., VII.4. , namely …

... namely the □-particles (XI.22., XI.23., VII.4., VII.6.), i.e. the (ν_1, ν_2, ν_3, ${}_5\overline{G}$, ${}_2R$, ${}_3G$) -particles:

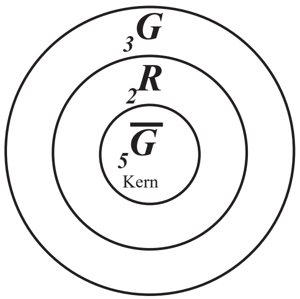
XI.26.1.



XI.26.

Given certain energy boundary conditions, in accordance with the structural composition of XI.26.1., the bosons ${}_5\overline{G}$, ${}_2R$, ${}_3G$ can "stick together", which can be represented in the form of the following structure-layer model:

XI.26.2.



$\overline{G}$ - R - G -"stuck together" given the right energy boundary conditions

XI.26.

The □-particles (see VII.4.)) (i.e. "Dark Matter") thus satisfy the property that, given the right energy boundary conditions, they can form structurally layered "clumps" as shown in XI.26.2., where the inner-most region (≡ nucleus) consists of

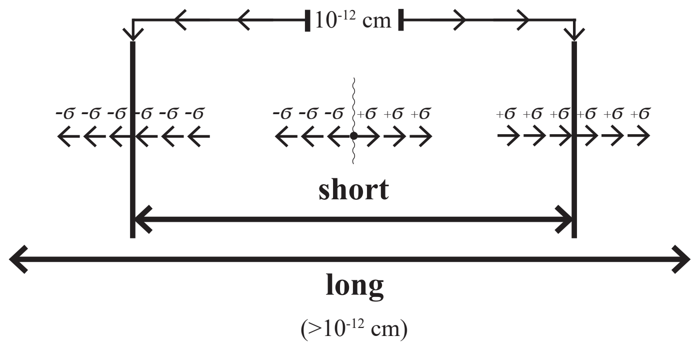
$_5\overline{G}$ -bosons (≡ most extremely repulsive, extremely massive, extremely short-range (~10^{-18} cm)), „surrounded by"

$_3G$ -bosons (≡ attractive, massive, short-range (~10^{-14} cm)) and

$_2R$ -bosons (≡ repulsive, massive, range (~10^{-14} cm)) (see XI.22., VII.3.).

The □-particles of Component 1 are created in the production level n_f of the reproduction cascade XI.23. , i.e. at the end of the Big Bang and reproduction cascade, once the Big Bang reaction space has already been packed full by the most colossal overall production set, and therefore enlarged (≡ extended ≡ expanded) by the total set of $\sigma_n \neq 0$ splits, n = 1 ...... n_f] created by every individual reproduction process, i.e. once the expansion of space-time had already begun:

XI.26.3.

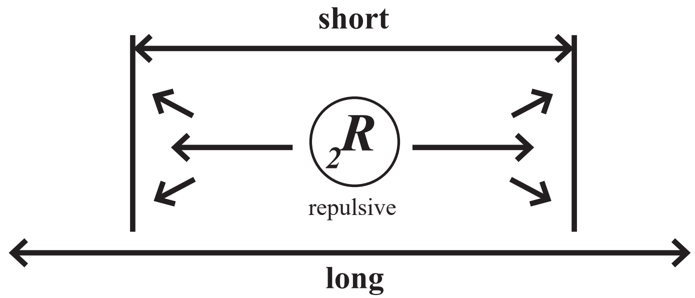


Thus, once the short-range structure of the Big Bang reaction space ($< 10^{-12}$ cm) with its exclusively short-range bosons $_5\overline{G}$, $_2R$, $_3G$ created to full capacity by the individual Big Bang events $\sigma_v \neq 0$, $\sum v \equiv \boxed{\frac{3^{(n_f-1)}-1}{2}}$, a long-range structure ($> 10^{-12}$ cm) is created, and the following happens:

Between the two other bosons produced in the final level n_f – other than $_5\overline{G}$ – (see XI.23.), which are namely $_2R \equiv \overline{\Psi}\,\overline{\Psi}_{(\varepsilon_3,\varepsilon_7)}$ and $_3G \equiv \wr\overline{\Psi}\,\overline{\Psi}\wr\wr\overline{\Psi}\,\overline{\Psi}\wr_{(\varepsilon_8,\,\eta,\,\varepsilon_4)}$, the inner point split distribution shifts. This is made possible by the original distribution of the point splits $(\varepsilon_3,\varepsilon_7)$ in the preformation structure V.7., and is caused by the repulsion force exerted by the massive and therefore short-range 2-split boson $_2R \equiv \overline{\Psi}\,\overline{\Psi}_{(\varepsilon_3,\varepsilon_7)}$ by means of the following process: The repulsion force of the massive $_2R$ - 2-split boson initiates an expansion process:

XI.26.

XI.26.4.



Since the two point splits $(\varepsilon_3,\varepsilon_7)$ of the $_2R \equiv \overline{\Psi}\,\overline{\Psi}_{(\varepsilon_3,\varepsilon_7)}$-boson are not originally bound to $_2R$ by the underlying preformation structure V.7. – unlike the exclusive $(\varepsilon_2),(\varepsilon_6)$- binding to $_5\overline{G}$ that necessarily led to the rupture of $_5\overline{G}$ (see VIII.6.) – the intrinsic repulsion process of $_2R_{(\varepsilon_3,\varepsilon_7)}$ triggers the following point-split-shifting process between the bosons $_2R$ and $_3G$ by transferring the $(\varepsilon_3,\varepsilon_7)$ -splits

XI.26.

$_5\overline{G} \equiv \Psi\Psi\ \Psi\Psi_{(\varepsilon_6,\varrho,\xi,\lambda,\varepsilon_2)}$ remains unchanged

XI.26.5.

$_2R \equiv \overline{\Psi}\,\overline{\Psi}_{(\varepsilon_3,\varepsilon_7)} \equiv$ 2-split object $\equiv$ massive $\equiv$ short-range

$\longrightarrow$ $_0R \equiv \overline{\Psi}\,\overline{\Psi}_{(\text{0-Split})} \equiv$ 0-split object $\equiv$ massless $\equiv$ long-range

$_3G \equiv \wr\overline{\Psi}\,\overline{\Psi}\wr\wr\overline{\Psi}\,\overline{\Psi}\wr_{(\varepsilon_8,\eta,\varepsilon_4)} \equiv$ 3-split object

$\longrightarrow$ $_5G \equiv \wr\overline{\Psi}\,\overline{\Psi}\wr\wr\overline{\Psi}\,\overline{\Psi}\wr_{(\varepsilon_8,\varepsilon_7,\eta,\varepsilon_3,\varepsilon_4)} \equiv$ 5-split object

XI.26.

XI.26.6.

Thus: The □-particles produced at the end of the Big Bang XI.23. (≡ "Dark Matter" ≡ 66.6% of the Entire Universe) take the form of the following 3 bosons after this $(\varepsilon_3, \varepsilon_7)$ -shift:

${}_5\overline{G} \equiv (\underbrace{\Psi\Psi}\ \underbrace{\Psi\Psi})$	≡	**most extremely strong repulsion force ≡ anti-gravitational force, extremely massive, most extremely short-range (10^{-18} cm range)**
${}_0R \equiv (\overline{\Psi}\,\overline{\Psi})$	≡	**massless, long-range, medium-strength repulsion force**
${}_5G \equiv (\wr\overline{\Psi}\,\overline{\Psi}\wr\wr\overline{\Psi}\,\overline{\Psi}\wr)$	≡	**extremely weak attraction force ≡ gravitational force, highly massive, extremely short-range (10^{-16} cm range)**

as well as the following 3 fermions:

\+ **3 types of massless 1-split neutrino with different inner-structural compositions:**

$\nu_1 \equiv (\underbrace{\Psi\Psi}\overline{\Psi}(\varepsilon_9)) \equiv {}_1(\nu_1)$, $\quad \nu_2 \equiv (\overline{\Psi}\underbrace{\Psi\Psi}(\varepsilon_5)) \equiv {}_1(\nu_2)$, $\quad \nu_3 \equiv (\Psi\overline{\Psi}\Psi(\varepsilon_1)) \equiv {}_1(\nu_3)$

or, written in closed form:

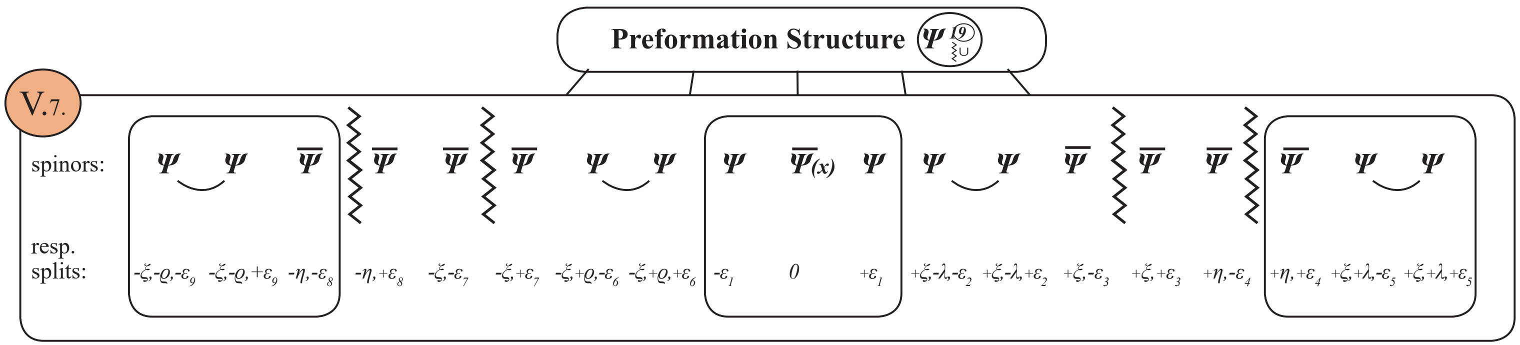
The □-particles produced at the end of the Big Bang cascade XI.23. are:

XI.26.6.1.

$$ {}_5\overline{G} + {}_0R + {}_5G + {}_1(\nu_1) + {}_1(\nu_2) + {}_1(\nu_3) $$

XI.26. XI.26.6.

Now, by VI.3.5., particles with more than 4 point splits are fragile because of their excessive split density, i.e. cannot exist as "stable" elementary particles. This principle now applies to $_5\overline{G}$ and $_5G$. Consequently, in the particle formation process at the end of the Big Bang cascade XI.23., i.e. in the final level n_f, during which the □-particles ≡ $_5\overline{G} + {}_0R + {}_5G + {}_1\nu_1 + {}_1\nu_2 + {}_1\nu_3$ (see XI.26.6.1.) are created as "open raw material", ultimately caused by the preformation structure V.7. which underlies everything and its dynamically constructed and therefore interrelated point split structure:

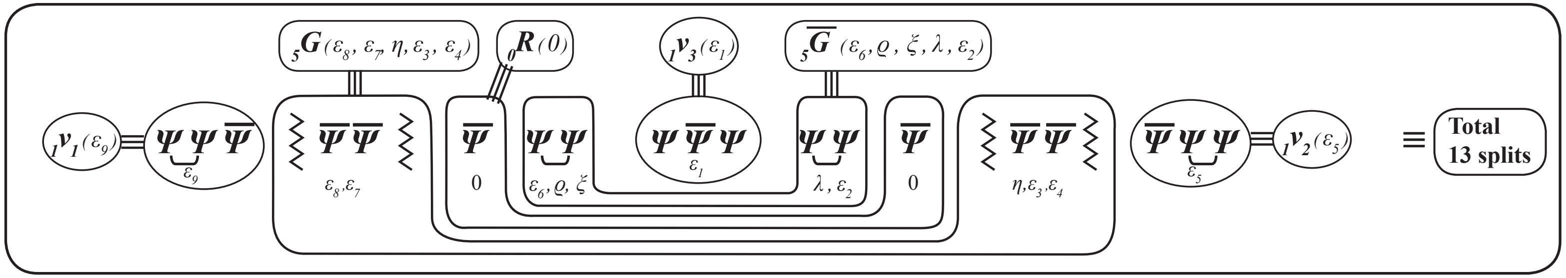


there unfolds the following □-particle stabilization and closing process :

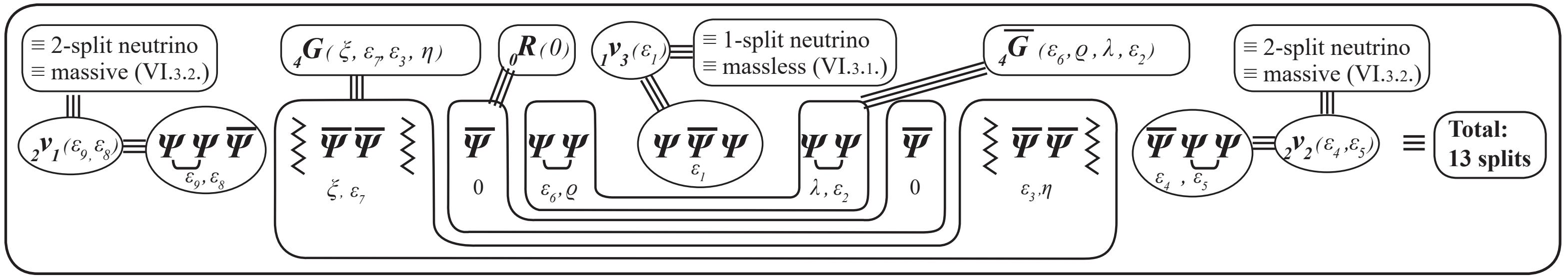
XI.26.

XI.26.6.

□-Particle Formation Process (“Dark Matter”) at the End of the Big Bang Cascade (Point Split Stabilization Process)



point split stabilization process ⇓ ≡ particle stabilization process



XI.26.7.

Thus: The stable, finalized □-particles (≡ “Dark Matter” particles ≡ 66.6% of the Entire Universe) created at the end of the particle formation process of the Big Bang reproduction cascade XI.23. have the following inner-structural particle composition:

$_4\overline{G} \equiv (\underbrace{\Psi\Psi}\ \underbrace{\Psi\Psi}(\varepsilon_6, \varrho, \lambda, \varepsilon_2)) \equiv$ 4-split boson

$_0R \equiv (\overline{\Psi}\,\overline{\Psi}(0)) \equiv$ 0-split boson

$_4G \equiv (\wr\overline{\Psi}\,\overline{\Psi}\wr\wr\overline{\Psi}\,\overline{\Psi}\wr(\xi, \varepsilon_7, \varepsilon_3, \eta)) \equiv$ 4-split boson

$_2\nu_1 \equiv$ 2-split neutrino ≡ massive

$_1\nu_3 \equiv$ 1-split neutrino ≡ massless

$_2\nu_2 \equiv$ 2-split neutrino ≡ massive

XI.26.

XI.26.7.

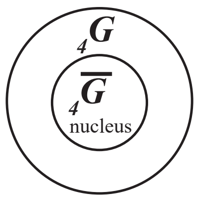
Thus: The Component 1 ≡ 66.6% of the Entire Universe (directly after the Big Bang) ≡ "Dark Matter" consists of the 3 force bosons XI.26.:

- $_4\overline{G}$ ≡ ≡ **highly massive and correspondingly short-ranged at around 10^{-17} cm, most extremely strongly repulsive-acting bosons**
- $_4G$ ≡ ≡ **massive and correspondingly short-ranged at around 10^{-15} cm, most extremely weakly attractive-acting bosons**
- $_0R_0$ ≡ XI.26.6. ≡ **massless and therefore long-ranged, medium-strength repulsive-acting bosons**

as well as the 3 types of neutrino with different inner structures*:

- $_2\nu_1 \equiv \Psi\Psi\overline{\Psi}(\varepsilon_9, \varepsilon_8) \equiv$ **2-split neutrino** $\overset{\text{VI.3.2.}}{\equiv}$ **mass ≠ 0 ≡ massive neutrino**
- $_2\nu_2 \equiv \overline{\Psi}\Psi\Psi(\varepsilon_4, \varepsilon_5) \equiv$ **2-split neutrino** $\overset{\text{VI.3.2.}}{\equiv}$ **mass ≠ 0 ≡ massive neutrino**
- $_1\nu_3 \equiv \Psi\overline{\Psi}\Psi(\varepsilon_1) \equiv$ **1-split neutrino** $\overset{\text{VI.3.1.}}{\equiv}$ **mass = 0 ≡ massless neutrino**

This implies that, given the right energy boundary conditions, the massive "Dark Matter" particles $_4\overline{G}$ and $_4G$ form the following layered clumps:



*** This (the existence of massive neutrinos) is consistent with the conclusions of the work by Takaaki Kajiba and Arthur McDonald (Nobel prize 2015).**

XI.26.

This is the matter distribution of Component ① ≡ "Dark Matter" ≡ 66.6% of the Universe directly after the Big Bang, in the early stages of the Universe around 13.8 billion years ago. If we momentarily disregard the differences in coherence structure between the internal basis spinors Ψ and $\overline{\Psi}$ of each particle, namely $_4\overline{G}$ ≡ „◡◡" and $_4G$ ≡ „⦚⦚⦚", the "Dark Matter" particles $_4\overline{G} \equiv \Psi\Psi\ \Psi\Psi$ and $_4G \equiv \overline{\Psi}\,\overline{\Psi}\ \overline{\Psi}\,\overline{\Psi}$ act as $_4\overline{G} \equiv \Psi\Psi\ \Psi\Psi$ and $_4G \equiv \overline{\Psi}\,\overline{\Psi}\ \overline{\Psi}\,\overline{\Psi}$ -particles, i.e. as a partially structured "particle-antiparticle" pair (V.6.), with different mass and force magnitude structures due to their different inner coherence structures (VIII.5.).

Hence, the "Dark Matter" particles $_4G$ and $_4\overline{G}$ will not undergo the "rapid" direct annihilation processes that occur with "Normal Matter", e.g. in the case of $e^+\ e^-$-annihilation, where both e^+ and e^- have the same mass and therefore the same physical properties, only differing in their charges ⊕ and ⊖.

The features of these annihilation processes of "Normal Matter" ($e^+\ e^-$; $p^+\ p^-$) are analysed in detail in a later section XI.29..

Thus: The dominant "Dark Matter" elementary particle is, by XI.26.7., the most extremely repulsive-acting, highly massive (i.e. short-range, with a range of ~10^{-17} cm) stable anti-gravitational force boson $_4\overline{G} \equiv \Psi\Psi\ \Psi\Psi$.

XI.26.

From the "Planck space telescope measurements", we know the change over time in the composition of the Universe:

„Today" (13.8 billions years after Big Bang)
Dark Matter proportion ≡ 27%
Dark Energy proportion ≡ 68%

compared to

380,000 years after the Big Bang ≡ early stages
Dark Matter proportion ≡ 63% Dark Energy proportion ≡ 0 %

In the meantime, during which the Universe expanded, there must therefore have been processes that transform Dark Matter → Dark Energy and something else:

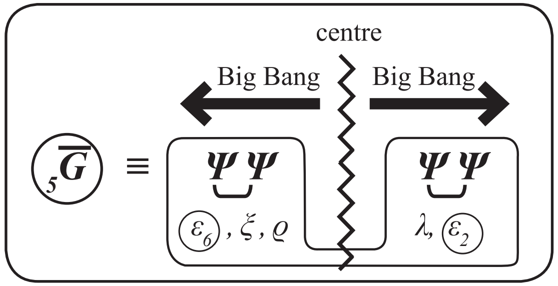
"Dark Matter" is destroyed and
"Dark Energy" is created.

How these transformation processes unfolded in the meantime; what the underlying transformation structure of "Dark Matter" → "Dark Energy" is; how "Dark Energy" is ~~c~~onstructed and what the inner composition structure of "Dark Energy" actually is; whether there are different sub-structures of "Dark Energy"; and what fundamental process associated with "Dark Energy" drives the accelerating expansion of the Universe; all of these questions are analysed in Chapter XII.

But first, we shall analyse Component 2 of the Earliest Universe (see XI.25.):

Component ② ≡ 33.3 % ≡ $\frac{1}{3}$ of the Entire Universe ≡ $\frac{3^{(n_f-1)}-1}{2}$ ⧙-sets ; with ⧙ see XI.2.,

i.e. the elementary sets ⧙, that passed through the Big Bang process VIII.6. ≡



XI.27. Due to the most colossal quantity of $_5\overline{G}$-particles that are produced and which rupture within the most colossally dense Big Bang reaction space during production levels 1 to n_f-1, by XI.22., a smaller subset of these rupture processes do not result in an elementary particle in the form of the $\Psi\Psi(\lambda, \varepsilon_2)$ fragment (right-hand side of $_5\overline{G}$ ≡ VIII.6.) – as described in Chapter VIII. (VIII.6., VIII.10.) and XI.2. – which namely survives as the strong boson $St \equiv \Psi\Psi(\varepsilon_6, \varrho)$ and therefore, as described in Chapters VIII., IX., leads to the construction of

the elementary set IX.1. p^+ E - I ν St G e^-

in subsequent processes, as E - I partially decomposes into γZ (see Chapter IX.).
Instead, the identically structured $\Psi\Psi(\varepsilon_6, \varrho, \xi)$-fragment (left side of $_5\overline{G}$ ≡ VIII.6.) forms into the strong boson St as $\Psi\Psi(\varepsilon_6, \varrho) \equiv St$ after being forced by the Big Bang to transfer an ξ-split.

XI.27.

Thus, by VIII.8., after the rupture VIII.6., the 2-split object- $\Psi\_\Psi\,(\lambda, \varepsilon_2)$ survives by default, by the minimality principle I.0.3., because it is the "simpler object", thus forming into the strong interaction boson St as a Ψ_Ψ (2 split) boson, which then, as described in detail in Chapters VII. and IX., leads to the construction of the "normal"

matter elementary set ≡ p^+ $E - I$ v St G e^-, with $E - I \rightarrow \gamma\_Z$

which is exactly what we usually call "matter". In the majority of the most colossal number of individual Big Bang events, this is what happens. However, simultaneously, in a smaller proportion of these processes, due to the most colossal quantity of $_5\overline{G}$-particles VIII.6. that are produced and which then rupture within the most colossally dense Big Bang reaction space XI.23., it is the 3-split - $\Psi\_\Psi(\varepsilon_6, \varrho, \xi)$ -fragment that instead survives in the form of the 2-split - $\Psi\_\Psi(\varepsilon_6, \varrho)$-object, after being forced to transfer its ξ-split by the Big Bang, making it structurally identical to the strong boson St ≡ $\Psi\_\Psi\,(\varepsilon_6, \varrho)$ while integrating the $\Psi\_\Psi\,(\lambda, \varepsilon_2)$-fragment into an $E - I\,(\varepsilon_2, \varepsilon_7)$-formation and absorbing the split into a $p^-(\eta, \varepsilon_4, \lambda, \varepsilon_5)$ -formation.

Then, in a series of phases completely analaogous to those described in Chapter IX., the "normal"

antimatter elementary set ≡ e^+ St v $E - I$ G p^-, with $E - I \rightarrow \gamma\_Z$

is formed. This explains the creation of **Antimatter**.

Regarding the probability of each process within the most colossal quantity of individual Big Bang events,

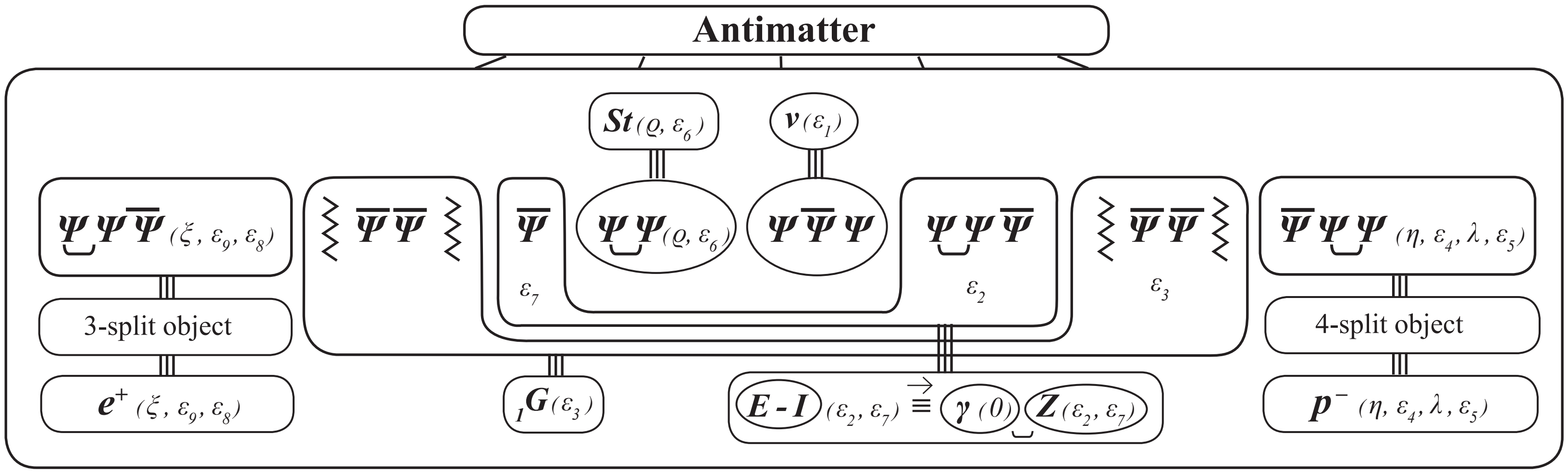
the construction of matter, i.e. $St \equiv \underbrace{\Psi\,\Psi}\,(\lambda, \varepsilon_2)$**-formation and**

the subsequently triggered processes leading to p^{+}, $E - I \equiv \underbrace{\gamma\,Z}$, v, St, G, e^{-}**-set formation**

is more common, since it proceeds from a simpler fragment of the Big Bang process VIII.6. than

the construction of antimatter, i.e. the formation of $St \equiv \underbrace{\Psi\,\Psi}\,(\varrho, \varepsilon_6)$**, triggered by the Big Bang, which originates from the more complex rupture fragment** $\underbrace{\Psi\,\Psi}\,(\varepsilon_6, \varrho, \xi)$ **of the Big Bang**

XI.28. **process VIII.6. - when the** ξ**-split is repulsed by the Big Bang – and then automatically forms the elementary set of antimatter. The full details of the inner-structural point split composition of antimatter are as follows:**

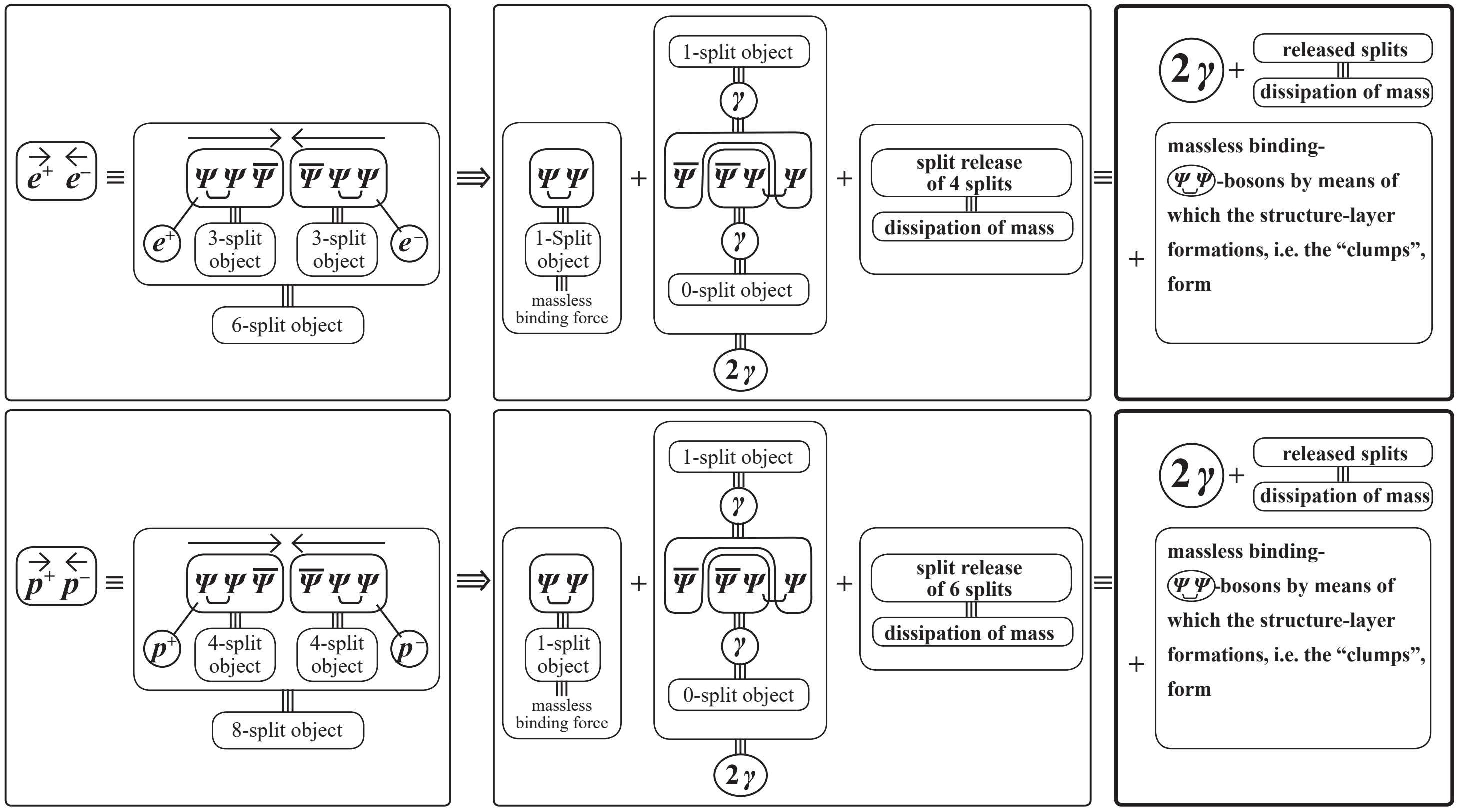


XI.29.

Consequently: After the Big Bang, from the 33.3 %-Component 2 (XI.27.)

- **the larger set forms into matter (matter atoms)** $\equiv$ p^+, G, E - I, ν, St, e^-; **mit** E - $I \rightarrow \gamma\_Z$
- **the smaller set forms into antimatter (antimatter atoms)** $\equiv$ e^+, G, St, ν, E - I, p^-; **mit** E - $I \rightarrow \gamma\_Z$

And: The $\overrightarrow{\text{matter}}$-$\overleftarrow{\text{antimatter}}$ pairs, namely $\vec{e}^-\overleftarrow{e}^+$ and $\vec{p}^+\overleftarrow{p}^-$ create the well-known "annihilation processes":



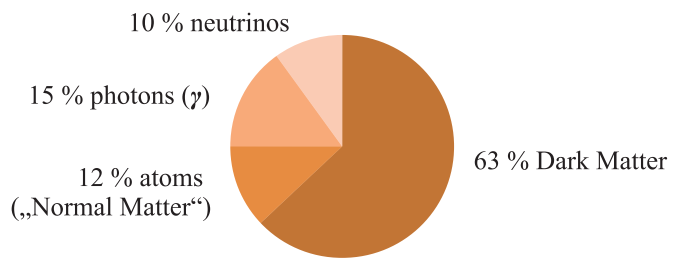
XI.30.

Thus: Directly after the Big Bang, i.e. when "matter" and "antimatter" form (totalling 33.3% of the Universe directly after the Big Bang XI.27.), with quantitatively more matter than antimatter, by XI.29. , the annihilation processes described in XI.29. necessarily occur. However, since the proportion of matter is greater than the proportion of antimatter , the antimatter is completely destroyed by the annihilation processes and only matter remains, together with the annihilation end products . According to the so-called "Planck measurements" ("Planck" space telescope), 380,000 years after the Big Bang – in other words shortly after the Big Bang – the proportion of matter (atoms) in the Universe was around 12%, i.e. 21% of the initial Universe must therefore represent annihilation end products from matter-antimatter annihilation (see XI.29.):

2γ + [released splits ‖ dissipation of mass] + [massless $\Psi\Psi$ binding bosons by means of which the structure layer formations, i.e. the "clumps" are formed] -products

From the Planck data (as well as the COBE and WMAP data), we know the following facts about the composition of the Universe "shortly" (~380,000 years) after the Big Bang

Planck measurements (Planck Published Papers, 21/03/2013



XI.31.

Thus: These "Planck" measurements are essentially consistent with the "model" results of the theoretical approach presented in this work (see XI.23.),

namely the composition mix Component 1 ≡ XI.26. + Component 2 ≡ XI.27. with:

Component 1 ≡ 66.6 % ≡ "Dark Matter" ≡ □-particles, see VII.4., XI.22., XI.36.

Component 2 ≡ 33.3 % ≡ Matter/Antimatter ≡ ⦚-particles, see X.1., XI.22., XI.27., XI.29., XI.30.,

where the proportion of matter is greater than the proportion of antimatter (see XI.29.), so that, after the matter-antimatter annihilation processes XI.30., the remaining fraction of matter of 12% "survives", and the rest of this Component 2, corresponding to a proportion of 21% of the initial Universe, is given by the end products of the annihilation process, which by XI.30. are:

γ ≡ photons ≡ 15 % + split release products + ν's not bound by atom formation
≡ 10 % + massless Ψ_Ψ binding forces as structure-carriers

As for the measured neutrino proportion of 10%, we should bear in mind that, according to this theoretical approach, "Dark Matter" (□-particles, see VII.4., XI.22., XI.26.1.) also contains neutrinos, meaning that a fraction of the measured 10% neutrinos, namely 3.6%, belong to "Dark Matter". The matter/antimatter fraction also contains neutrinos that are not attributable to atom formation.

Thus, this theoretical approach is highly consistent with the experimental Planck measurements.

Moreover, the “Planck measurements” from 2013 found a slight asymmetry in the matter distribution of the Universe, which must necessarily be so according to our present theoretical approach, due to the parity asymmetry of the *E - I* boson IX.15., which forms from the rupture-based structure of the Big Bang process VIII.6., VIII.10. .

XI.32.

Another remark:

The Universe was created around 13.8 billion years ago in the Big Bang cascade XI.23. by a most colossally gigantic reproduction of identical □-particles and identical -particles.

The fact that all of these reproduction processes of □- and -particles are identical explains the universal validity of the laws of nature.

XI.33.

And one final remark:

When considering the reproduction cascade XI.23. we might ask how and why the Big Bang reproduction process chain came to an end.

In other words:

What ended the Big Bang? **and**

Why wasn’t the Big Bang even more vast? **and**

Why isn’t the Entire Universe even “more full” than it actually is?

XI.34.

The answer is:

When the Big Bang reaction space in the Big Bang cascade XI.23. becomes too full and thus too slow because of the most colossal set of

$\frac{3^{(n_f-1)}-1}{2}$ ⦚ -sets created by the first n_f-1 production levels (see XI.22.)

as well as the $3^{(n_f-1)}$ □ -sets created by the final level n_f] (see XI.22.)

meaning that the $_5\overline{G}$ ≡ $\Psi\Psi\ \Psi\Psi$ (5-split)-bosons created by the final production level n_f (among others) are so densely "surrounded" by other particles within the Big Bang reaction space – each $_5\overline{G}$ particle is associated with 8 other particles in the Big Bang reaction space – that the most extremely strong repulsive force of these $_5\overline{G}$ bosons is weakened by these surrounding particles.

Because of this weakening, the rupture processes VIII.6. can no longer occur, ending the Big Bang cascade.

XI.35.

After the end of the Big Bang cascade, the □-particle (≡ Dark Matter particle) stabilization process (≡ point split stabilization process), ≡ XI.26.7. takes place (analysed in detail in XI.26.):

${}_5\overline{G}$ → ${}_4\overline{G}$	highly massive, short-range, most extremely strong repulsive boson
${}_0R$ → ${}_0R$	massless, long-range, repulsive boson
${}_5G$ → ${}_4G$	massive, short-range, most extremely weak attractive boson
${}_1\nu_1$ → ${}_2\nu_1$	massive neutrino (fermion)
${}_1\nu_2$ → ${}_2\nu_2$	massive neutrino (fermion)
${}_1\nu_3$ → ${}_1\nu_3$	massless neutrino (fermion)
13 splits → 13 splits	

Thus: The unstable (by VI.3.5.) bosons ${}_5\overline{G}$ and ${}_5G$ are stabilized during the elementary particle formation phase directly after the end of the Big Bang by transferring one split each to the neutrinos ${}_1\nu_1$ and ${}_1\nu_2$ forming the 2 massive 2-split neutrinos ${}_2\nu_1$ and ${}_2\nu_2$:

The initial state of the Universe (Earliest Universe) 13.8 billion years ago has now been fully created and its 2 components ("Dark Matter" ≡ XI.26.; "Normal Matter/Antimatter") ≡ XI.27.→XI.30.) have physically formed and therefore their inner-structural particle composition and resulting physical properties can be analysed, and are listed in the following component list XI.36..

XI.36.

The Components $(\frac{2}{3}, \frac{1}{3})$ of the total Universe directly after the Big Bang, and the corresponding (6, 6) ≡ 12 elementary particles

Dark Matter

Component ① ≡ 66.6 %			Inner-Structural Particle Composition		by V.,VI.	Mass/Charge	Force Structure	Range	Found?
neutrino$_1$	$_2\nu_1$	≡	$\Psi\Psi\overline{\Psi}$ $(\varepsilon_9, \varepsilon_8)$	≡ 2-split fermion	≡>	massive (mass ≠ 0)			yes
neutrino$_2$	$_2\nu_2$	≡	$\overline{\Psi}\Psi\Psi$ $(\varepsilon_4, \varepsilon_5)$	≡ 2-split fermion	≡>	massive (mass ≠ 0)			yes
neutrino$_3$	$_1\nu_3$	≡	$\Psi\overline{\Psi}\Psi$ (ε_1)	≡ 1-split fermion	≡>	massless			yes
anti-gravitational boson	$_4\overline{G}$	≡	$\Psi\Psi$ $\Psi\Psi$ $(\varepsilon_6, \varrho ; \lambda, \varepsilon_2)$	≡ 4-split boson	≡>	extremly high mass, charged with anti-gravitational elementary charge $\overline{q}_0$	most extremely strongly repulsive	10^{-17} cm	not yet
repulsive boson	$_0R_0$	≡	$\overline{\Psi}$ $\overline{\Psi}$ (0)	≡ 0-split boson	≡>	massless	repulsive	long	not yet
gravitational boson	$_4G$	≡	$\overline{\Psi}\overline{\Psi}$ $\overline{\Psi}\overline{\Psi}$ $(\xi, \varepsilon_7, \varepsilon_3, \eta)$	≡ 4-split boson	≡>	massive, charged with gravitational charge q_0, with $(\overline{q}_0 + q_0) = 0$	most extremely weakly attractive	10^{-15} cm	not yet
as well as the end products created from the annihilation of $(_4G, _4\overline{G})$, including the split release products thus created, and the Dark Energy created from these and other annihilation processes with coupled 4-dimensional space-time structure									not yet

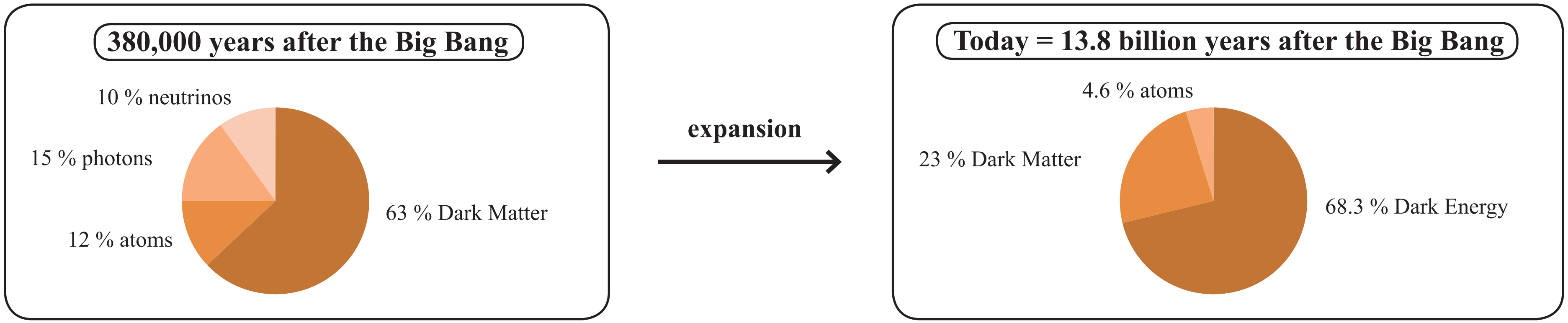
Normal Matter/Antimatter

Component ② ≡ 33.3 %			Inner-Structural Particle Composition		by V.,VI.	Mass/Charge	Force Structure	Range	Found?
proton (antiproton*)	p^+ (p^-)	≡	$\Psi\Psi\overline{\Psi}$ $(\varepsilon_9, \xi, \varrho, \varepsilon_8)$	≡ 4-split fermion	≡>	higher mass, charge ⊕ (⊖)			yes
electron (positron*)	e^+ (e^-)	≡	$\overline{\Psi}\Psi\Psi$ $(\varepsilon_4, \eta, \varepsilon_5)$	≡ 3-split fermion	≡>	low mass, charge ⊖ (⊕)			yes
neutrino	ν	≡	$\Psi\overline{\Psi}\Psi$ (ε_1)	≡ 1-split fermion	≡>	masless			yes
strong force	St	≡	$\Psi\Psi$ (λ, ε_2)	≡ 2-split boson	≡>	massive, uncharged	strongly attractive	10^{-13} cm	yes
energy-momentum	E - I	≡	$\overline{\Psi}\Psi$ Ψ $\overline{\Psi}$ $(\varepsilon_6, \varepsilon_3)$	≡ 2-split boson	≡>				yes
partial decomposition into	γ Z	≡	$\overline{\Psi}\Psi$ Ψ $\overline{\Psi}$ $(\varepsilon_6, \varepsilon_3)$						yes
electromag. force	γ	≡	$\overline{\Psi}\Psi$ (0 split)	≡ 0-split boson	≡>	massless	medium strong	long	yes
weak force	Z	≡	Ψ $\overline{\Psi}$ $(\varepsilon_6, \varepsilon_3)$	≡ 2-split boson	≡>	massive, uncharged	weak	10^{-15} cm	yes
gravitation	G	≡	$\overline{\Psi}\overline{\Psi}$ $\overline{\Psi}\overline{\Psi}$ (ε_7)	≡ 1-split boson	≡>	massless	most extremely weakly attractive	long	yes
as well as the annihilation end products $((e^+, e^-, p^+, p^-))$, see XI.29.									yes

*** For the detailed point split distributions of antimatter particles, see XI.28.**

The values given for the constituents of the Universe in the list XI.36. (which follow from the theoretical approach presented in this work) relate to the early stages of the Universe, directly after it was created in the Big Bang. As shown in XI.26. to XI.32. , this "model data" is consistent with the "measurement data" of the Planck telescope, which measured the composition of the Universe 380,000 years after the Big Bang, i.e. in the early stages of the Universe. Other measurements that hope to capture even earlier stages of the Universe are currently in progress.

However, the empirical "space telescopes" ("Planck", "Cobe", "WMAP") are not only capable of measuring the early stages of the Universe, but also its present state today.
Thus, the Planck telescope (as well as others) has measured a strong shift in the composition of the Universe over the course of the period "380,000 years after the Big Bang" → until "today" :



The questions of how these "shifting and transformation processes" arose, and in particular why "Dark Matter"-parts were annihilated and "Dark Energy" was created between these two moments in time, as well as the details of what "Dark Energy" actually is and how it has lead to the 4-dimensional space-time structure, is shown in UC-5.