Title*:* Cosmology in a Physical reality context.

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Abstract: Being part of a global and coherent PhR model, any partial theory about large scale phenomena has to respect the rules and laws, proposed for or applicable to the smallest objects and processes that constitute the cosmos we belong to.

Comments: A list of frequently used terms has been added at the end of this article.

1. A comparison between two concepts and models.

- Being part of a global and coherent cosmic PhR model (in fact a TOE), any partial theory about large scale phenomena must be in agreement with laws and rules, proposed for or applicable to the smallest objects and processes that constitute the cosmos we belong to.
- This fundamental condition seems not to be fulfilled in all cases by cosmology in its present state. This is not the obvious result of the enormous difference in scope and scale of all the object classes and phenomena treated by these studies or just related to the enormous distances that separate us from stars and planets, making local observations under well controlled conditions impossible. It seems to be, at least partly due to a non-exhaustive or even incorrect insight in the basic structure and in the most elementary properties of our cosmos, a potential weakness of any top down approach.
- A few examples:
    - The extrapolation of laws, valid at a lowest level in physics, to very large objects and processes is not permitted if these laws do not cover all the relevant elementary properties that have or had an impact on the outcome of this extrapolation. An example is the presence of gravitons that are presupposed in cosmology but that cannot be observed by physicists. So any description of their origin, their nature and behavior can be incomplete and their

potential impact on large scale measurements and observations will remain unclear.

- Many phenomena at elementary level with an impact on cosmology took place billion years ago, so if cosmic evolution started as a singularity in perfect emptiness and happened just once (like a Big-bang in Physics or the Creation event of a first point in PhR), repetitive and direct observations of similar events are impossible whereby observation is precisely the corner stone of Physics as a science, just like bottom up consistency is a basic requirement for any valid PhR model.
- Lack of "visibility" at all levels is an issue if part of the cosmic content has an extremely low coupling rate with our instruments. The same is true if the number of successful measurements is small, a result of the exceptional character of some phenomena or of their enormous distances in space and time that separate them from our instruments.
- Most large scale models (not related to our solar system) in cosmology are based on the outcome of just a single measurement technique, namely light detection or more generally, the observation of EM-waves. Light can interfere or can be bended, absorbed, color shifted (Doppler), reflected, delayed, diffused, polarized or can be just too weak to be seen etc..It has a high but nevertheless limited speed, so it might take millions of years before it will reach our instruments and we do not know for sure what happened to a light ray in the course of its journey.
- Most observations of cosmic phenomena take place by instruments, installed on or in the neighborhood of our planet Earth, itself an object with a location and an history that is hard to position properly in an all encompassing cosmic model. Is our planet (eventually temporarily) in a privileged state or is it not (the famous Goldilocks hypothesis) ?
- In this TOE we question for good reasons some laws that are generally accepted by the scientific community (e.g. the relativity principle and a "no speed higher than c" rule, even for

information propagation). In a consistent TOE model these doubts and their potential impact on large scale phenomena cannot be neglected.

  - In PhR only 6 base laws driving the cosmic evolution are the basis of everything, but on a smallest (point - or Planck-) scale where they effectively apply, any direct observation or measurement technique, as practiced mostly by physics, fails and will continue to fail forever. Indirect observation techniques are less reliable. The result is that large scale cosmological and small scale physical models could show a serious lack of compatibility: actual physical theories do not reveal the common base between certain classes of phenomena: e.g. what is the link between a gravity-type force, an EM force and a particle's internal structure?

- This document is proposing an unproven but consistent set of solutions for the evolution as well as for the present and the passed large scale content of our cosmos, consistent with the elementary principles valid for the smallest components that constitute the cosmic content. They lead to revolutionary ideas that will be hard to be accepted but they have at least the advantage that the same large and small scale laws and properties apply all over the cosmos. Internal consistency is a basic requirement for any candidate TOE and in the present state of cosmology and physics, being the result of an historical top down approach, this criterion is not necessarily fulfilled.
- An extrapolation of PhR concepts as introduced at the most elementary level (e.g. points and zerons), up to the scale of stars and galaxies is a very speculative exercise. Indeed we skip hereby several superposed levels of cosmic structure and behavior, some of them deduced and described in PhR as well as in Physics (e.g. photon creation and propagation). For PhR, problems will show up when trying to quantify things. These attempts are confronted with definitions, observations and measurements in Physics that are sometimes hard to reconcile with PhR . Even if PhR presupposes that many observations in Physics are biased or misled by the fact that instruments are made of components that are not effective or

representative for analyzing the full cosmic content, a PhR model should not be allowed to simply use their definitions, standards, parameters etc… to support some of its own presuppositions. A good example is the difference between the speeds of light and contra-light, the vacuum parameter μ and the value of the (inverse) fine structure constant.

- Next chapters will focus on some major discrepancies between the two approaches.

2. (No) Big –bang.

- In PhR an hypothetical, by base laws driven scenario has been proposed, describing the origin and the first steps in the evolution of our cosmos. Although both, cosmology as well as PhR, accept a one-shot event in an undetermined location in perfect emptiness, as the start of our evolution, the next steps in both stories are different.
- Cosmology, maybe due to a lack of an adequate description of a most elementary state (a valid cosmos(1) version), is proposing a quasi infinite density (by an incredible scale reduction) of unknown elementary objects, laws, properties and terms like energy and temperature, plus a single event that triggered the expansion (or inflation) of cosmos(1) after a fraction of a second, producing processes and objects (like particles, quarks and EM waves) that scientists “know” and that belong to their “scientific comfort zone”.
- Since its first introduction, this spectacular Big-bang scenario has been a source of doubts and of more questions than answers. However, it has not been contradicted by the scientific community because there was and there is no valid alternative. Where initially the idea of a Big bang was inspired by the observed constant Hubble expansion rate of most cosmic distant matter configurations, this proposal fails to explain why stellar configurations that belong to (e.g.) our Milky Way do not expand and why cosmologists recently observed a non consistent and even increasing Hubble-like expansion rate at the border of our cosmos, measured when “looking” extremely far back in the past.

- So the consistency between a Big bang scenario and the behavior of objects and processes as observed today, is not perfect. Adding the abstract and theoretical impact of so called "dark energy" just hides the problem.
- This TOE presupposes a common set of 6 simple laws and rules, recursively applied to the outcome of a unique creation event (a first **point** (cosmos(1)) with a single property (**charge**) that makes the difference between something and nothing), as well as on the content of all subsequent cosmic states up to now. What in such scenario is (or was) increasing in the course of the evolution, are (e.g.) the size of the cosmos, the number of so called "elementary components (points and zerons)" and the level of complexity and persistency of point compositions and their mutual interactions. This process proceeded quasi continuously, be it that the speed at which the first steps in this scenario took place, was extremely high. One could argue that we could have named the very first part of such PhR consistent evolution (the emergence of a double raster) also a (controlled) Big bang, although the process itself was totally different from what cosmologists are proposing. Complexity (quantified by a growing global Shannon entropy number of a closed cosmic volume, whereby new creation events, not driven by the base laws applied to a previous cosmic state, are excluded) went up from zero (the initial single point state cosmos(1)) to an ever increasing (our cosmos is supposed to be a closed system) and extremely high and non-measurable number today.
- This TOE does not presuppose (yet) a final state or an absolute time reversal of our cosmos (e.g. a big crunch), neither does cosmology but both do not exclude such scenario.
- If the term "cosmos" is used in this text, it means "our cosmos": if there exists another cosmos, its discriminating property will be different from "charge" and it will remain not observable to us.

3. Not an abstract, empty space-time background (Physics) but a dynamic, quantized and double-layered point-zeron raster (PhR).

- Space-time in physics is an abstract concept although it owns several properties that are crucial in Physical laws and theories, but difficult to understand and to accept in what pretends to be an “on-observation-based approach”. Indeed, a space-time volume being in some kind of perfect vacuum state (so without the presence of matter or radiation) seems to have no tangible content but has properties like μ and ε parameters. It is able to transport matter (particles) and enables EM and even Gravitational waves to propagate. It can be “curved” (GR) by massive objects and/or fast moving particles and it will under certain conditions behave as a multi-type mathematical field, being a source of new particles when punctured by colliding particles in high energy states (see Relativistic Quantum Field theory).
- In a PhR model abstract objects are “suspect” and so are purely mathematical representations of forces, particles, waves etc…The same is even true for at least partly intuitive concepts like dimensionality, symmetry, particle propagation etc…
- Starting from nihil, a PhR model requires properties and objects with a precise definition and directly or indirectly deductable from the initial creation event, just by using a few intuitive presupposed cosmic properties, a limited set of 6 base laws and a process of logical deduction, that nevertheless permits in a relative small number of particular states and cases, some flexibility due to external perturbations with several distinct results and a distribution with a stochastic character.
- Counting by using the set of natural numbers is PhR consistent, all the other sometimes sophisticated mathematical calculations and representations can be extremely useful approximations of PhR but they are just advanced empiric equivalents of reality: a “non-educated” electron does not use Lagrange or Dirac equations to figure out how to behave or to move.
- In PhR terms: space-time is a dense dynamic double layered point-zeron raster or grid (CPS/UZS), geometrically in fact a multidimensional sphere growing in emptiness since the creation event, a recursive process driven by the base laws. What exists

(observable or not) in our cosmos are just dynamic and layered compositions (or patterns) of (at lowest level) coherent points and zerons. Locations that are (temporary or permanently) not in a point-zeron state are in a transition state or are empty. Point and zeron charges in a transition state are sources or antenna's of charge info packets. If an empty location is a dynamic and in fact quantized micro-object, induced and/or sustained by a complex local point/zeron pattern, it will be called a hole. The exact location of a hole is slightly variable because patterns that sustain it are themselves dynamic. A hole does not emit charge info, the enclosing zerons however do.

- An hypothetical but representative (without any pattern and not just a single zeron in the course of its life cycle) cosmic point raster volume has statistically a fixed null charge density (leading everywhere to an a priori standard value for a property called the local ε parameter in Physics). The most simple, by replication persistent point pattern called a zeron (in fact a coupled phase shifted point pair, alternatively growing "in time" at each side) in its maximum growth or life time state, will interact at one "longest" side with a compatible neighbor zeron, according to two possible and distinct scenario's. They lead to locally different point-hole ratio densities and to distinct μ parameters determined by cyclic short-lived matter- or contra-matter-like states of interacting zeron-pairs.
- The presence of large densities of coherent complex point-zeron sets (particles or gravitons) can lead to non-standard raster properties and to distinct parameter values (like G, μ, fine structure constant…) and to different maximum "speed of light" c-values .
- Whatever cosmic model would be proposed by cosmology, it should take the existence and the properties of a dynamic double point (CPS) – zeron (UZS) raster into account. "Dynamic" means that, although point and zeron space are strictly quantized concepts, emptiness has no structure and is a continuum with an "infinite-number-of-dimensions" property. Because points and zerons are periodically reset, their next versions can emerge in a near and abstract location that is part of the infinite cosmic (empty) location set.

- Just after the unique creation event the size of the point raster started to grow at a rate or speed of at least 137*c. If the dimensionality number (M in space and time) of point space is finite, the CPS will effectively grow its size, otherwise it could remain (based on the base laws) concentrated in a single (creation) location.

- Such presupposed value of a non-zero minimum phase shift in time will lead to subsequent distinct point states, induced in an a priori infinite empty location subset along multiple directions around a central point, each with a priori equal probabilities to couple successfully in quasi-superposition in space and time with a central charge info emitter. It finally means that growth of the CPS needs to come to an end (or has eventually already reached a maximum size) because otherwise the presupposed conservation of charge all over the cosmos could no longer be guaranteed. This fact would also indirectly violate the principle that no second creation event (creating a new extra point that was not induced by another existing point in an empty location in accordance with the base laws) could take place in the course of our evolution. It finally implies that the cosmos can be treated as a huge single and internally coupled quantum object whereby (theoretically) each short-lived point at every (absolute) quantity of time, could be identified by a unique set of quantum numbers, including the finite phase shift number between the creation point and an hypothetical last peripheral point induced in a growing CPS . It also means that the speed of charge info in perfect emptiness must be extremely high (>> c).
- It supports an intuitive conclusion, saying that just a single creation point, even taking the impact of the base laws into account, will never lead to the creation of an infinite cosmos.
- In previous paragraph the term “quasi-superposition” has been used. It implies that in terms of PhR and contrary to what QM sometimes proposes, a single object cannot be simultaneously in two distinct locations or states, neither can it interact simultaneously with two distinct objects. However, components of an object (like a particle connector in a return state) not involved in tight internal binding can

emit charge info in all possible directions in emptiness. This info is subject to constructive and destructive interference (a base law). It guarantees that multiple effective interactions between a source and several target objects, leading to an exchange of energy between both, cannot simultaneously take place. Using the term “quasi-superposition” implies for zeron-made particles, a minimum time (or phase) shift of order “ τ” between correlated events, a quantum of order 10exp(-43)sec and too small to be measured by physics.

- The delay between the emergence of a local CPS volume and the subsequent formation of the most simple pattern set (being the zeron raster collection) is assumed to be extremely short as compared to the age of the cosmos. The same is true for the emergence of elementary particles out of coherent UZS zerons. Conform these principles light (in fact a stream of micro particles, called fotino’s) was capable to make quasi immediately use of the double CPS/UZS layer in order to propagate (a proposition in conflict with cosmology). Temperature (a term from physics that we prefer to avoid in a PhR model) remains “normal” and is not extremely “hot” like in a Big bang scenario.
- Because EM waves (or fotino showers- see chapter 10) emitted by accelerated particles, need a CPS/UZS raster in order to propagate, they must be conserved, even in a cosmos with a fixed maximum size and when reaching the border without having been absorbed by a successful interaction with a compatible particle. So their paths are bended or reflected by a fixed or shrinking raster border shell, a situation that has (as far as we know) never been taken into consideration by cosmology. It could make a difference if such hypothetical maximum state was already reached before or after the formation of a large particle cluster like (e.g.) our galaxy.

4. Conservation rules and an adequate definition of the term “Energy”.

- In PhR the generic definition of the term **energy** is “the quantized capacity (as per unit of time) of small patterns or large sets of raster patterns, to change the cosmic state ”. The reference unit-of-time in

PhR is the point state-transition time τ or its multiples. Any internal or external change within or between patterns will make use of single or multiple quantized and fastest charge info exchanges between pattern components, being in particular and a priori compatible states. A single external interaction is an event that has an a priori stochastic character whereby the probability of a successful coupling between the emitting and the receiving pattern components of charge info, depends (among other things like free charge, symmetry …) on their mutual distance, measured in raster units in space and in time (or phase angle, expressed in multiples of τ). What the term "distance" is concerned, nature has a tendency to respect a "shortest or fastest path in time" rule, for internal as well as for external interactions between patterns or pattern components: between multiple potential and compatible candidates, the one that can be reached first will be selected. In physics this principle is consistent with Fermat's theory for light ray refraction on contact surfaces between distinct materials (Snell's Law) or with the calculation of extrema of a Lagrangian-type functional, a technique used in RQFT to find trajectories of moving elementary particles. In PhR it is driven by the fact that any pattern component changing in time will emit at point level quantized charge info in all possible directions, taking interference into account (see the base laws). The charge info propagation speed along a path depends on the format of a charge info package (e.g. a simple 2-point polaron or a more complex fotino format), but also on variable local raster parameters like (e.g.) μ and eventually on the local (pre)polarization state of the intermediary point-zeron raster.

- It is precisely this fastest path rule that protects an internal charge info exchange process and the format of a replicating particle against external perturbations, except in particular (return or contraction) states. This leads to normalization of particle-properties for electrons, protons…
- Although these principles seem to be straightforward to understand, they hide a rather sophisticated mechanism. When an external interaction can take place along a shortest path, what comes first: the

respect of the “shortest path in time” rule or of the compliancy rule, taking into account that the target could have changed in the course of the time interval , needed for the emitted charge info package to reach this target ? The answer is complex in case of charge info transport carried by a micro-particle. In that case it depends (e.g.) on the ratio between the effective charge info propagation speed (mostly higher than c) and the exchanged package transfer speed and its autonomy as a pattern on its own. But it depends also on the path’s environmental conditions, on the symmetry of the emitting antenna, on the superposition and interference of charge info used as pre-check etc…So the outcome has a stochastic character and there is no unique answer that would be valid at the smallest level (e.g. the induction process of a new point in the CPS) or on a macro level (e.g. an electron emitted by a cathode in a vacuum tube and hitting a particular raster point at the anode surface). In many cases a pre-check of the adequacy of several potential paths takes place at a speed superior to the speed of the exchanged package itself, whereby candidate paths towards compatible raster components are “marked” by polarization, or “by selection”. Good examples of such pre-check process are the double slit experiment in QM or the results of most EPR experiments, whereby charge info based pre-checks are executed at speeds much higher than c. Anyhow, if a package is finally emitted and hits a candidate target, it will not couple if the target no longer fulfils the compliancy criteria. Superposition and autonomy will enable (and conservation rules will force) the package to find another compatible target.

- One can conclude that in Physics (as well as in PhR) the term “energy (quantity)” is not just a quantum of change but also a measure for a particular state of a particle: so it seems to be a dynamic and/or a quasi-static property. In PhR however the pattern’s content as expressed in raster components, is always dynamic and changes continuously. Even without an external interaction with another pattern only its format is quasi persistent, not its content (expressed in raster components) and even the validity of the former depends on

the scale of observation. So if in PhR the term “energy” is a “property of state” of a particle, it keeps anyhow its dynamic character.

- A process of external coupling at elementary level can lead to visible or measurable results if the frequency of successful interactions is high enough. Observable results hereby are often the outcome of balancing bidirectional interactions with dynamic unequal coupling probability rates. So realistic results for large particle numbers can only be expressed in statistical or average terms (Statistical mechanics and/or Thermodynamics in Physics). The compliancy rules at elementary level remain the same but the relevance or probability of certain processes are strongly dependent on average internal and environmental conditions. Parameters like temperature, itself an important measure of the average energy state of large number of patterns sets, seem to be less representative at the level of a single interaction between the connectors of two protons. “Seem” because temperature could determine the average string length of replicating particles, thus the frequency of being in an interaction enabling state. When a PhR model tries to define the actual energy content of an elementary particle in a non-statistical manner, it has to make use of specific properties of this particle to express and quantify its elementary but dynamic global energy state. This will be (as an example) for a proton its dynamic central (Higgs) antenna pattern state, its connectors format and its replication length (I-max value), including relative phase shifts between strings of the same pattern. All these properties are contributing to a unique symmetry state and have to be expressed in quantized raster units. We remind that in PhR (like in QM) symmetry states are orthogonal, meaning that superposed states cannot impact each other. This kind of parameters determines the energy state of a particle at a particular moment, but even then, its real effective state will depend on the type and scale of observation and on the state and distance of compatible particles in the neighborhood, so in fact the actual energy state proper to each individual particle at any moment remains, as stated before, a dynamic and stochastic qualifier. Hereby “the act of observation” itself requires interaction and changes implicitly a pattern’s state.

- In a similar context and when being partner in a successful coupling, a particle's connector could, at any moment, be either the sender or the receiver of a charge info package, a fact statistically depending on the relative periodicity and phase state of two, for the role of emitter competing connectors in successive replication cycles of the particles.
- A successful interaction between two particle string connectors of two Highs based replicating patterns, moving actually towards each other along coplanar axial replication paths, will reduce after a number of contraction cycles, the length (in phase units) of one of the 3 strings of a particle involved, flipping hereby the orientation of the classical particle spin (the spin vector direction depends on the relative phase shifts between the connectors of the 3 orthogonal strings). So a second coplanar and phase-shifted longest string connector will be the next candidate for interaction. As a result, two axes in a virtual plane, actually shared by both particles, will show a relative number of successful interactions for each particle along orthogonal directions that depends statistically and dynamically on the collision angles between two axes (enabling flexible path curving of each particle in a common Higgs based -3D geometry).
- Anyhow and in order to be successful all individual charge info exchange events and processes have to respect a number of overall conservation rules: in terms of Physics, charge, energy, momentum etc… conservation. In PhR it means: net charge (on a local and on a cosmic scale) and the total net in space and time effective hole content (on a local interaction scale). The latter is a combination of the intrinsic null-mass (taking into account that the number of hole state transitions in the Higgs nucleus will change abnormally at high velocities – in fact PhR of an increased mass in SR) and the dynamic (or kinetic) energy state over the two interacting patterns. If this process creates as the outcome of an unbalanced interaction, a difference particle or a short-lived special particle (muons, pions, etc….but also gravitons – see hereafter), conservation rules apply in case of the three (or even more) particles involved.
- Subtleties like (pre)polarization effects in the CPS/UZS do not consume energy because they only materialize an "ordering by

selection" process of those elementary raster component states along which interfering charge info could propagate. Hereby fundamental raster properties do not locally change.

- If an "high-energy collision event" between particles is inducing on the CPS/UZS raster an extra pair of balanced particles, it required a well synchronized and in terms of raster space overlapping contact (in practice: extremely short I-max values) in order to create as the outcome of an anti-symmetric impact of charge info, balanced zeron sets, like energy-neutral Higgs based mesons.
- These principles, valid at a smallest scale are conceptually important at a largest cosmic scale, be it because any cosmological model starting from nihil and assuming a single creation event, has to sustain global anti-symmetry (in charge, space and time – a CPT conservation rule) over all patterns throughout its whole evolution. Cosmology and physics in their present state can confirm a respect of charge and space conservation rules but not a full anti-symmetry per particle type. Balancing matter with antimatter (e.g. positrons balancing electrons) is not the right answer, be it because these anti-particles are quasi absent in our present cosmos. The null-energy amounts of both add up, so their hypothetical historical presence does not explain how the energy content of the single creation point could always equal the total net energy content of the cosmos including all the mass-equivalent energy amounts ($E=mc^2$) stored in matter-like objects. An interaction between an electron and a positron does not wipe out their total energy amounts but will just transform both patterns into photons. In PhR on the contrary, an hypothetical axion-type interaction between a particle and its contra-version, both in compatible anti-symmetric states, will return their pattern content into standard uncoupled raster components, eliminating in this way their discriminating properties and by definition their energy content.
- In this PhR model the really anti-symmetric version of an atom is a contra-atom: all charge types and spins are inverted but also their unit mass quanta have opposite signs. The latter means that on average the deviations from a standard point-hole density ratio induced in the CPS cancel out between matter and contramatter

particles. Indeed their 2-zeron pairs (e.g. transversal strings) are enclosing holes with a different but anti-symmetric life tenor, as expressed in τ units. When replicating and propagating, they make use of the for each type appropriate subset of dynamic contact-zeron states of the UZS. This implies: distinct fine structure constants, different local μ parameter values and different speeds (c or c') of light and contra-light (or EM and contra-EM waves). Charge info emitted by two-zeron connectors (polarons) does not couple with connectors of opposite types. So contra-matter and their corresponding waves are invisible for cosmologists and for physicists, only axion type interactions with an extremely low coupling probability remain possible and (indirectly) observable. The absence of contramatter in present cosmological models and theories (like in general relativity) explains partly their lack of compliancy with PhR.

- On a cosmic scale the average local ratio between point and hole quantity numbers (the point density) is not everywhere fixed, otherwise the cosmic state could not have changed the way it did. Nevertheless the conservation of the hole content in space and time of an hypothetical stationary CPS/UZS volume without particles or with particles but per hole type, are conserved. This simple principle seems to be ad odds when we will discuss hereafter gravity and non-linear cosmic behavior, observed over space and time together. The same is true on a hole type independent scale, even in a quasi stationary UZS because in most cases (an axion-type interaction between both remains possible) matter and contra-matter behave independently from each other and have distinct parameter values like c and c'.
- This seemingly conflict between local conservation rules and globally non-stationary behavior will reappear when we discuss hereafter the small scale creation and absorption of gravitons (sustaining a persistent hole), a PhR conform raster pattern that makes it possible to combine local with global energy conservation mechanisms in Physics and to explain the notion of "potential" energy and space-time curvature in a GR context. Their growing number could be a cause of a future crunch of our cosmos.

5. Particles are just dynamic and coherent patterns of raster components.

- Although particles are mainly studied by physicists, cosmologists can hardly neglect the contribution of particles to their hypotheses and to the results of their studies of very large matter-made objects like galaxies, stars or planets.
- Most attempts to describe the initial steps in the evolution of the cosmos are proposing just a few scenario's for the first appearances of elementary particles. Hereby quarks and electrons are favorite candidates for being the most elementary building blocks of matter.
- In this PhR model particles are just dynamic and coherent compositions of raster points and zerons (imagine a bird that seems to fly over your TV-screen but it is a composition of properly synchronized pixels, in fact activated by sets of semiconductor components in appropriate states). Except from single zerons, the only elementary pattern configurations that have a certain (be it relatively small and a by level of complexity decreasing) probability to appear spontaneously on the primitive cosmic CPS/UZS raster, are dynamic anti-symmetric and properly phase shifted subsets of 2 (=EZP), 2X(EZP) = 4 (=EZK) or 2X(EZK)=8 (=EZO) zerons.
- Matter particles have a single (leptons and baryons) or a double superposed (mesons) Higgs nucleus or core (an EZK or 4-zeron pattern – ideally these zerons are in 4 phase shifted or orthogonal CZ,DZ,CH,DH states).
- Gravitons are circular "closed" 2-zeron patterns and the outcome at Higgs-core level, of an unbalance between contracting branches of particle strings. Other difference particles at core level like fotino's and neutrino's are simple patterns with a mainly in a Higgs-like format and at point-level sustained cyclic behavior. Electrons could be considered to be difference particles at zeron replication level, emerging in case of neutron decay.
- Polarization patterns (like ordered zeron made Coulomb field lines) and quantized charge info patterns (like polaron or fotino showers) are non-persistent zeron configurations, interconnected or

synchronized by charge info, emitted and selected by ordinary “free” particle connectors in I-max or return states of replicating strings. They are dynamic and coherent (or temporarily bound) sequences of primitive raster components. In terms of physics they could materialize “gauge particles” like virtual photons.

- The impact on cosmology of particles with a PhR compliant behavior is important:
  - The early state of the cosmos requires the presence a double dynamic raster to enable the appearance of particle-like patterns, not a “Big-bang- like explosion in emptiness”.
  - Particles in order to originate and for local conservation rules, need anti-symmetric EZO’s with 2 X 4 quasi perfectly balanced matter and contramatter Higgs-like zeron sets (PhR of the so-called “eightfold way” in particle physics ??). This condition requires on its turn an elementary local volume of the UZS that is sufficiently “flat”. Both, positive and negative mass-like contacts between neighbor zerons in the UZS have to be present and “available”, meaning: not too frequently engaged as components in other local pattern sets. We will call a short-lived double anti-symmetric Higgs pattern state <u>contra-symmetric</u>.
  - The first class of particles appearing spontaneously in a young cosmic raster volume are contra-symmetric <u>neutron / contra-neutron pairs</u>, the outcome of spontaneous symmetry breaking of an EZO by an internal axion exchange of a quasi perfect contra-symmetric 8-zeron state into two orthogonal τ phase shifted anti-symmetric 4-zeron Higgs. This event is leading to replication of a particle and a contra-particle whereby these two persistent processes are transparent to each other.
  - A nucleo-synthesis chain based on proton or proton-neutron coupling as proposed in cosmology might be not correct or at least not complete. Dense sets with mostly interacting and coherent neutrons (there is no external Coulomb coupling – dynamic Coulomb field lines between string connector zerons remain inside the neutron pattern) show numbers with a gradually decreasing probability (depending on their time-to-

decay, complexity and symmetry) of appearing spontaneously. This unstable process will lead anyhow to partial and dynamic neutron decay and to the formation of multiple more or less stable collections of isotopes of atoms (Mendeleev's table). Hereby and in a next step, a quasi-stable or dynamic isotope can be combined with (an) still unbound neutron(s) to form, through axion/polaron reactions, new but less probable isotopes.

- The full stochastic process of complex pattern formation is temperature-sensitive (a term in Physics to quantify on average multiple forms of energy stored in a dynamic nucleus pattern), meaning that the average velocities and forthcoming collisions of atoms could have a different impact on nucleons and on lepton-like spin-offs, as the replication cycles and string length variations are different for both particle types (leptons and baryons types). It means that zeron strings of both classes, even with a common origin will pass thru their contraction- and I-max-states in a non-synchronous way and precisely in those states, patterns are sensitive to external interactions. Periodic exchanges of polarons and the varying impact of Coulomb-like polarization strings between nucleons and electrons, between electrons of a shared nucleus and finally between components of neighbor atoms lead to complex behavior of all these patterns, including ionization and formation of molecules and crystal lattices. Stability means that the fundamental structure and its symmetry in space and time of a replicating pattern is maintained whereby internal conservation rules apply under varying internal and environmental conditions, enabling several distinct energy and momentum states of patterns.
- The presence of particles required initially the emergence of equal numbers of contra-particles (the latter transparent to our instruments, at least for normal photon interactions or for polaron coupling in general). Their anti-symmetric states are quasi-identical with those of matter, although one must take into account that their behavior is conditioned by slightly different raster parameters (the fine structure constant, μ-parameter and

c' values).The speed of contra-EM waves is assumed to be slightly higher than c. The nucleo-synthesis chain will depend on the fact of a particular particle made object (stars and planets) have either an overlapping concentric mixed-type or single-type particle content. The last group does not have flat zones and the capability to produce new neutron/contra-neutron pairs is partly missing: existing cosmological models describe them properly.

- Gravitons (and contra-gravitons) are released by accelerated Higgs-made replicating particles and contra-particles or absorbed and again released by these particles when moving at constant velocity in (e.g.) a very weak central symmetric or in a non-radial gravity field.

- The presence of a double raster, the intrinsic symmetry properties of Higgs based particles, the base laws and conservation rules explain why some mathematical models are partially successful in describing cosmic behavior, not vice versa.

6. A CPS/UZS space-time raster with a finite maximum size: quid the link with and the impact on the behavior and the properties of our cosmos ?

- The PhR scenario as described in this text, is supposed to start from a single creation event, followed by a base-laws driven growth of a dynamic M-dimensional point space. In a randomly chosen "closed" cosmic (CPS) volume in its regime state, the base laws lead to a priori equal probabilities of two event types for zeron contacts in their i-max states: a point reduction by reset or an induction of a new point in a local temporarily empty location. This statement however cannot be valid in an instantaneous "open" border volume that is still in a transition state. Taking a large scale central symmetric, isotropic and spherical format of the CPS into account (the only possibility in case of just one creation point and without any discriminating property to implement anisotropy) there had to be initially and at a given moment more empty space available, anywhere in a virtual mixed shell at the border of the CPS, outwards than inwards, a situation that has locally an impact on the relative probabilities of both event types.

The new-point-creation rate at the border had to be, at least in relative terms, higher outward than the regime induction and reset rate inside an inner volume. This implies after a fraction of a second (a few times τ) a quasi stable point density in a stationary inner CPS volume and a gradually increasing size at the outside of the object that we and cosmologists call: "our cosmos". The larger the CPS volume, the smaller the (high order) differential or marginal instantaneous growth rate will be, mainly due to a decrease in curvature of the border layer. However its impact after some growth steps will be locally extremely small. These principles seem to be obvious for any central symmetric space-driven growth process even in a 3D geometry, but non-spatial growth, expressed as number of new points per virtual unit volume is also possible by exhausting all dimensions around a border point.

- In PhR dimensionality M of an "empty" CPS volume in a regime state was defined as a constant figure that reflected the number of neighbor points surrounding another point and having an a priori equal probability to interact successfully with the central antenna point. This figure M has been assumed to be finite and only constant in a non-border point volume in its stationary state, meaning that induction and reset probabilities are equal, what guarantees a constant or "flat" local point density figure, on average equal numbers of dynamic positive and negative point states and a constant point-hole density ratio in the CPS. Although the regime value M is fixed , this number refers to a variable set, dynamically selected in an infinite dimensional empty cosmos(0). This means that we could see the cosmos as a gigantic quantum object (Physics) whereby any specific version of point and zeron states could be at least theoretically qualified by a unique set of quantum numbers, embedded in an infinite dimensional or continuous empty space.
- We assume that such local equilibrium state is needed to allow the spontaneous appearance of zerons, being the most straightforward and standardized point patterns. Hereby any local zeron creation process will follow the cosmic evolution instantaneously and fills the CPS quasi immediately with zerons after the emergence of a

stationary local point volume. We accept implicitly that everywhere a local stationary CPS state with an identical M value will indeed be reached, leading everywhere to an identical zeron creation process. If that would not be the case in some locations, one needs once more a discriminating parameter or property to materialize such difference between locations. Except from the value of the large scale radius of the cosmos and the related age and state of the most outer shell, such local property seems not to exist in a non-border stationary CPS volume, at least initially and without the presence of particles or patterns like gravitons (see hereafter).

- The formation of an UZS (zeron space) introduces a new situation and implements a selective reduction in dimensionality. Zeron formation must respect, as a point pattern on its own, charge conservation and constant point-hole density ratio's but accept multiple options in contact states between growing point strings of two neighbor zerons.
- Formation of layered point patterns in the CPS (zerons and complex zeron sets like particles) have to be seen as the outcome of dynamic or hazardous perturbation-like processes of what initially was for a short time an homogeneous CPS in a quasi-equilibrium state. So the numbers of those sets remain, at least in local relative terms, small compared to the value M: the large majority of (dynamic) points in a CPS volume at any time and in any location, is not part of any pattern.
- For several reasons we are not sure that the cosmic CPS and UZS growth process will last forever (see earlier). The main reason relates to the finiteness of M. As stated before infinite growth could lead to a non-respect of the overall charge conservation rule or would require extra creation events. Even if we assume that globally a particle formation process strictly respects conservation of charge, the same cannot be guaranteed locally and during an individual pattern's life cycle: electrons and protons do not compensate each other on a smallest local scale and atoms can be ionized. This also means that the locally available subset of points with dim M is not necessarily a constant figure. Nevertheless we assume that the number of CPS points involved in particle formation is everywhere small in relative terms (as stated before: a perturbation type approach).

- Things are even more uncertain for local point-hole density ratio's. Variable Higgs based (thus 3D) particle density distributions with a spherical form (e.g. stars) will lead to acceleration and to the production of radial graviton density gradients. Theoretical and "on average" compensation of matter and contra-matter-like deviations from fixed point-hole density ratio's, does not mean that the number of persistent holes of any type, even on a large double raster scale, will remain everywhere the same: concentrations of both matter and contramatter particles will gradually increase the number of static holes inside the cosmic border shell and this process is stochastic, meaning that even the border shell itself will not be perfectly spherical. Clustering of particles into large sets like stars and planets presupposes acceleration and an increasing number of holes around a central concentration location. Persistent holes will violate the normal fixed point-hole density ratio, maintaining however our assumption about a relative small number of pattern points versus the total point density in the CPS. The question is: will this assumption hold forever whereby the origination of more new particles at the borders of gravity fields (see hereafter) lead by acceleration to more persistent graviton-holes inside the cosmos.
- So the probability of the growth of the cosmos, coming ever to an end is as stated before, non-zero. Cosmologists should even accept the possibility that a maximum size has already been reached, although nobody knows precisely when such event (or series of events) happened in the past.
- What are the consequences of this hypothetical scenario ? Once the size of the cosmos has been reached, the number of stars and galaxies can only grow by the internal creation and clustering of additional and globally equal quantities of matter and contramatter. Successful pattern creation events require locally flat space-time curvature states in order to happen frequently, a condition that will be gradually more difficult to achieve due to the presence of huge non-flat gravity (or graviton density) fields induced by large numbers of propagating, accelerated particles and/or contra-particles.

- So a realistic scenario for reaching the maximum cosmic size could be conditioned by the ever increasing number of graviton (or contra-graviton)-like holes enclosed by the cosmic border shell, a situation leading sooner or later to a big shrink (or crunch) of the cosmos.
- Another, on fundamental and conservation rules based conclusion is that light emitted by existing starts and contra-stars and not hitting a particle-like target before reaching the cosmic border, cannot escape from a finite UZS volume. It means that replicating and propagating fotino streams hitting the border shell, will be reflected or bended or diffused or a combination of all these potential effects. Unfortunately optical terms and concepts like the definition of a refraction index (with c=0 in emptiness) cannot be simply applied to this situation.
- It also means that, depending on several parameters, the reliability of results and conclusions of many observations could be doubtful. Examples of sources of "uncertainties" are:
    - the (dynamic) position of our instruments in the cosmos, relative to the border shell
    - idem for any observed object itself
    - the distribution, the intrinsic properties and the impact of cosmic objects (stars and planets) and the curvature of gravity fields on light trajectories, even before they eventually couple with our instruments
    - the relationship and differences between real and observed properties (like color, position, velocity…) of any source of light or contra-light or EM wave ...
- It will be hard to make a distinction between direct and indirect light ray bundles, reaching our instruments. It might well be that the number of galaxies and stars and nebula that cosmologists observe is an overestimated representation of reality. In case of multiple interferences, reflections, prismatic color splits and shifts and Doppler effects, it will be hard to distinguish reality from reflected and modified copies of such "reality".
- Global cosmic parameter values and measurement techniques of large distances between objects and emission times of light have to be revised. As an example: quid the use of standard candles for

distance measurements of very far objects ? Candle stars seem to own a common brightness property leading to a reliable fixed ratio between their distance from our instruments and their luminosity. However, if the Earth and a “candle star” could be connected by an unchanged light ray perpendicular to a fixed large cosmic sphere, we could observe many times the same “white” colored star whereby distances and luminosity are obviously correlated and function of the number of reflections back and forth over a quasi fixed diameter of the cosmos before they ever reach our instruments: such measurement will not reveal the through distance from a particular object to the Earth. Hereby we assume implicitly that the evolution of the cosmic diameter in the neighborhood of its hypothetical maximum is changing more slowly and that the Earth occupies a position not too far away from the center (the creation event location) of our cosmos.

- Light emitted by stars and galaxies might have been many times “reflected” or/and even “refracted” or will be the outcome of interferences in the outer cosmic sphere, before reaching our instruments. In this way light rays could be color-shifted and erroneously assimilated with ancient and distant objects that are qualified as existing since the Big bang.
- Other potential consequences: the Hubble expansion rate, measured by the observation of color shifts in light rays could be, in a finite fixed cosmic size scenario, dependent on the reflection angles of light on the border sphere and cannot be seen as a prove of further expansion of our cosmos. In case of a growing or shrinking cosmos, things are even worse.
- All these statements are speculative, although even an accelerated expansion rate as recently observed and considered to be driven by the presence of a mysterious amount of dark energy, could be explained by an improved capability of our instruments to look further back in the history of our cosmos, permitting observation of objects in a state of real growth, at the time before an hypothetical and dynamic maximum size of the cosmos was reached !

- This proposition would also explain why gravity fields seem to need more dark matter (in fact graviton densities) than what is predicted by Newtonian and by GR models, in order to explain why peripheral stars in a galaxy are moving too fast along tangent orbits around their galactic symmetry centers. If these stars are mainly located at the outer side of galaxies (whereby the critical diameter would be related to the maximum size of the cosmos – see next paragraph), they could be "phantom stars", meaning that they are just reflected pictures of real stars. It could even be that the number of galaxies that really exist, is limited to the ones belonging to the "Local Group".
- In cosmology and at least until the eighties, the Hubble expansion rate was considered to be constant and related to the cosmological constant in Einstein's GR.
- Milgrom discovered that if R is the unknown fixed size of the cosmos, Einstein's laws of motion for distant stars in many galaxies breaks down, starting approximately from distances related to accelerations as small as c^2/R and measured from the center of a galaxy. So modified gravity theories (e.g. MOND) emerged as an attempt to address properly such mystery.
- In PhR and assuming that the Earth is located not too far away from the cosmic symmetry center, there is no need for alternative cosmological models, because reaching a fixed maximum size of the cosmos at distance R from the center, would be the limit above which no new peripheral stars of a galaxy could be observed in cosmology, other than fake copies of existing stars. In that case measurement of their reflected distances and velocities are meaningless.
- However there could be other reasons in PhR-terms for non-GR conform behavior of (real) peripheral stars, as based on another phenomenon than phantom star-based observations and an hypothetical finite cosmic size. Whenever flatness in locations, distant from the center of a huge spherical gravity field, is such that significant large quantities of new matter and contramatter particle pairs still have a good chance to emerge in a dynamic border region, the local radial G factor will be different from the quasi stationary

value in locations closer to the center (see chapter 9). Physics (e.g.GR) is not PhR compatible and breaks down whenever flat border regions of a galactic volume enable large quantities of new particles (and contra-particles) to emerge. This will reduce local space-time curvature (PhR) at least for a while, but also these new particles, once accelerated towards the condensation center will increase gradually partial (meaning (e.g.) for matter-like graviton fields alone) large scale curvature , a phenomenon that is only in a quasi stationary state conform with GR. Flat zones at the border of a galaxy can be dynamic, meaning that they will shift further away from (e.g.) a galactic symmetry center when the size and the impact of a central "black hole" is increasing.

- One could say that Milgrom's ideas can be PhR - compliant if the value R is not the size of the cosmos but the instantaneous diameter of any mixed-type galaxy where new stars emerge temporarily in a dynamic locally flat border volume .

7. A fixed and absolute speed limit as imposed by Special Relativity, seems to be add odds with parameter values that are the same everywhere in an extremely large cosmos.

   - This PhR model seems to be in conflict with some rules and restrictions imposed by Special Relativity (SR):
     - Contrary to what SR presupposes, there exists in spacetime a preferred , be it dynamic and phase shifted reference frame, in casu the double CPS/UZS raster.
     - C is a maximum speed limit for matter-like particle propagation only, whereby "propagation" in PhR terms means: the maximum speed at which successive generations of short-lived replicating particles are able to occupy subsequent average positions along a coherent fastest path on the double grid. In line with this principle, even a simple photon is a sequence of replicating fotino versions, connecting gradually source and target at a "virtual" speed, limited to "c", a value valid in a neutral quasi particle-free UZS. In PhR (and being one of its base laws) the

propagation speed in emptiness of charge info is fixed but has a value that is much higher than c, otherwise dynamic charge info based interaction processes would not even be able to maintain the dynamic internal structure of a CPS/UZS quantized pattern. Another excess of the "c" limit applies to the rate at which elementary point patterns are growing (e.g. a point replication process in a simple zeron).

- In a context of fotino emission it should be investigated how an accelerated particle, replicating in a disequilibrium state after one of its connector was hit by a polaron and before it really shifts its position, will impact the double grid, when this pattern is passing through the contracted state and is transformed into its anti-symmetric format. Based on the outcome of the double slit experiment and taking energy conservation rules into account, this impact could be limited to a sequence of polarization steps of grid components along multiple superposed paths by properly formatted charge info packets. This could be nothing else than just a stochastic selection process in the UZS of properly synchronized contact EZP's along shortest paths, an ordering process that does not consume energy but requires anyhow charge info propagation (including a destructive interference property – think again on a double slit experiment and the importance of symmetry) taking place at an effective speed much higher than c. It is an event sequence similar to the polarization of a series of UZS zerons, as induced by free single connector zerons in I-max whereby the outcome is a dynamic and growing set of Coulomb field lines. In this context and what the "definition of terms" is concerned, it remains to be specified if the final long range transport of an energy quantum (in this case a polaron) between source and target particles and packaged as subsequent short-lived patterns, will be called a fotino sequence or that the multiple short lived paths carrying (pre)polarization charge-info in the UZS, would be named fotino streams. In this PhR model, we opt for both (the context makes it clear) : we assume that each contraction of a particle pattern in a

non-equilibrium state emits (as a difference pattern) a fotino - like superposed (pre)polarization shower propagating at speeds much higher than c. When finally an “antenna” particle adapt its I-max value and shifts its position, a complete(d) photon selects the ultimate shortest fotino-path to connect source and (compatible) target, transferring in this way energy at a maximum speed value c. This micro-replication process behaves as a particle and propagates at the speed-of-light as measured by the physicist’s instruments. Nevertheless a much higher (pre)polarization speed was needed to understand (e.g.) EPR test results or a double slit experiment.

- There is no dragging at the time a photon (defined as a polaron carrying fotino particle sequence) is emitted by the Higgs nucleus of an antenna pattern, shifting effectively its position. Fotinos (as photon components) are difference patterns (or micro-particles) with a fixed replication length “1”, “released” by a parent particle when it stands still (in absolute terms, be it relative to the double grid) in a contracted state. What “moving” means for the parent is, once more and by charge info exchange, a shift of the symmetry center towards a next adjacent replication knot. This location becomes the contraction center for a new particle version. Without dragging and assuming a fixed value c, the results of Michelson-Morley’s experiment are mathematically spoken obvious and have no added value.
- Emission of a real photon as an autonomous particle is often the outcome of a cyclic 2° order acceleration-deceleration process of a charged particle. A first order photon materializing a direct polaron interaction between pattern’s string connectors as described earlier, exchanging a single momentum quantum between source and target is often named a “virtual photon” in Physics and is acting as a “force”. The “real” photon is able to travel over longer distances and requires often a Coulomb-like polarization path to properly connect source and target. It means that only this high order process corresponds with an EM wave

in Physics that can be properly described by Maxwell's equations.

- Free neutron interactions with an atom nucleus are examples of a non-Coulomb coupling leading to absorption of the neutron or to scattering (elastic with momentum exchange or non-elastic with momentum exchange plus a change in the energy state of an atom nucleus). It is a combination of polaron and short range axion type interactions in PhR terms.
- Lorentz transformation formula's remain valid in PhR and are a good approximation of the changes in the Highs nucleus that take place in non-linear replication processes of high-momentum particles with a very short replication length (I-index values of order 1). In that context: if (e.g.) the decay period of a fast moving muon, observed as the outcome of a collision between a cosmic ray particle and an atom in an air molecule, is longer than the life time of a slow moving muon under local experimental conditions, such result is in line with PhR. It has indeed nothing to do with "….some weird curvature of spacetime …" but it must be a real and unique PhR conform process: it should take the impact of the collision on the particle's non-linear anti-symmetric replication schema (in an already since its origination fast moving muon pattern) into account. The fact that simple Lorentz formula's can be successfully applied, means implicitly that the speed of the measurement instruments themselves versus the double grid are not too high and/or quasi constant, otherwise the (non)-application of a simple "composition-of-speeds" rule on two distinct intrinsically non-linear processes, could lead to incorrect results. Finally and in case of an even more extreme energy impact, it could be that Lorentz formulas are no longer "excellent approximations" of PhR.
- GR (General Relativity) too has some difficulties to properly describe PhR. We mentioned the interpretation of a cosmological constant but other potential conflicts exist:
    - GR does not take the presence of contramatter into account (a fundamental issue - see hereafter).

  - Quantum effects like the role of graviton densities are not part of GR, so a rather abstract spacetime curving mechanism had to be introduced to explain particle motion by gravity. Curving spacetime could mean that Einstein had implicitly replaced Newton's "action at a distance" by another mechanism whereby a large spacetime volume is curved by a central mass object equally located "at a distance".
  - In PhR-terms and as an example, our Sun is not an object attracting the Earth or curving spacetime. It is just surrounded by a gravity field that is the outcome of an historical step-by-step condensation process by a stream of matter-like particles, accelerated mainly in the past towards the Sun by a mainly radial and increasing graviton density gradient. So even if the Sun would suddenly disappear (what is impossible and in conflict with conservation laws), such event would not have any immediate impact on the orbit of our Earth, at least if the actual graviton density distribution would not change at the same time (e.g. due to gravity waves ??).
  - Extreme and unlimited gravity based effects leading to the growth of black holes and proposed by GR, are not PhR compatible (see hereafter).

- Taking previous remarks about the limited ability of SR to properly describe Physical Reality into account, the fact that fundamental parameters are the same all over the cosmos is not a surprise in the context of this PhR model.
- The base laws implement the presence of a unique (creation) point format with standard and equal growth and shrink time values **τ** and a fixed charge quantum content (+/- **q**) all over the cosmos. A fixed **h**/2 action amount (a convolution of time and energy) amount is required to create or to reset a point.
- The presence of a double CPS/UZS raster as a non-abstract spacetime reference frame, determines the **standard** values of parameters **ε and μ** , whereby two distinct interaction scenario's between replicating

neighbor zerons in their i-max states will lead to either matter or to contramatter-like contact behavior with a different tenor for any dynamic (or short lived) EZP pair. It implies that for matter and for contramatter two distinct **μ** and **c** values and different ordinary and inverse **fine structure constant** values (137,03..and ???…) are present since the earliest steps (in absolute time) of the cosmic evolution.

- The role of a fixed number **137** being the maximum number of point replication steps in a zeron life-cycle before an external interaction between neighbor zerons becomes more probable than an a further growth due to constructive interference with charge info spectrum emitted by a 2-point zeron nucleus antenna, is crucial. The number must be prime but it is not clear why it must be exactly 137 and not some other fixed prime number. Is the explanation a pure local issue or is it related to the size of the cosmic object and to the unknown value M, enabling hereby on a macro scale the emergence of a huge stable interconnected quantum state ? The latter is not very probable because it implies that the regime value would be the outcome of a gigantic trial and error process, sensitive to effects on a cosmic scale ! If it is a local issue, it could be that an unknown value τ and the number 137 are the only combination that guarantees that both interaction scenario's between neighbor zerons permit a stationary oscillation pattern of a two-sided replicating point string of any zeron versus its virtual central symmetry location. All this would guarantee stable values for the two fine structure constants.
- We refer to what was mentioned in chapter 1 as an issue relative to (e.g.) the use of c, μ and ε parameters proper to physics, and fundamental raster properties of our cosmos, put forward by PhR: are their definitions consistent with each other? If we propose a c' value for contra-EM waves that is slightly higher than c, and we try to prove this by using a formula like c = sqrt (1/εμ), we "talk Physics" and we implicitly presume that μ' < μ. Where PhR within its own concept, makes an acceptable proposition when making a distinction between 2 possible scenarios for contact EZP processes on an UZS raster, it should be able to link these scenario's on one hand to matter- or to contramatter-like behavior, and on the other hand to fundamental

fotino-based replication and propagation process, the latter depending on the tenor of holes in contracted states of the parent Highs that emitted one of both types of fotino streams, and finally to EM-wave propagation in vacuum, as conform with Physics. A larger tenor of a hole means: a smaller propagation speed, a higher μ value and a larger inverse fine structure constant. Without computer simulations we are unable to confirm this statement, but it is quite obvious that two types of matter, of EM waves and of fundamental parameter values exist in our cosmos. At a macroscopic level of cosmology, it seems to be in conflict with several propositions made in this text (e.g. PhR proposes that there is more contramatter than matter present in the central black hole of our Milky Way) if computer results would confirm that c' =< c. Fortunately this seems to be a non-issue.

- When investigating this potential conflict, one has to take into account that a "background" double grid parameter like μ must locally compensate unbalances in particle densities and properties between matter and contramatter (see next chapter 8). Particles are indeed just patterns of bound raster elements: if (e.g.) the density of matter in a virtual UZS volume is substantially higher than the contramatter density, the relative number and the local density of "free" unbound raster elements with typical contramatter-like contact properties will be higher, and so will be the complementary and average raster properties.
- The geometrical 3D and the over 90°phase shifted tetrahedron symmetry of a Higgs explain the role of natural numbers **3** (nmbr of orthogonal replication directions) and **4** (nmbr of states by free zeron role interchanges between 4 Higgs zerons).
- No other fundamental and universal constants are needed to fully describe cosmic behavior in quantitative terms, so at least in terms of PhR there is no reason why fundamental constants and parameters in an empty cosmic CPS/UZS volume would be different all over the cosmos . Hypothetical non-equal values would require some extra unknown discriminating properties. However all this could mean in a

worst case that some so called fundamental parameter definitions or values in Physics are not PhR compatible (or vice versa).

8. Black holes.

- The presence of a “dual anti-symmetric” or “contra-symmetric” content of our cosmos is an essential presupposition, needed to understand how the creation of a single point in combination with six base laws, could ever lead to the complex cosmic state to which we belong. It implies that matter-like patterns must be at least globally balanced by equal amounts of similarly formatted quantum patterns with opposite (or inverted) fundamental properties, like mass and standard free particle charge types. The forthcoming local unbalances are to be compensated by distinct but dynamic properties of UZS “unbound” raster state densities. At least a phase shift τ at point level has to be accepted when matter-contramatter pairs originate, otherwise nothing would ever exist.
- Because an underlying “primary” or “pattern-free” point raster needs to be locally “on average” charge neutral, previous assumption requires a second discriminating property between subsets of point patterns that would be the basis for a new symmetry break, enabling a higher level of complexity in a next step of the cosmic evolution.
- As explained in previous chapters, such dynamic property is present in a local UZS volume, when pairs of adjacent zerons interact in their i-max states. If two of their slightly (over τ) phase shifted zeron connectors of “long” branches interact successfully in spatially overlapping states, each with appropriate charge types, one of both contact points will be reset by charge info emitted by the other growing zeron, leading to a net reduction of local point density. Another but similar scenario takes place when an extra point is induced in the hole state location of a phase shifted connector of a short branch of a neighbor zeron, leading to a local increase in point-hole ratio density. Both scenario’s require in terms of space and phase (or time) a high-dimensional CPS what will locally guarantee the abundance of appropriate zeron pairs.

- Charge amounts and average numbers of charge types must remain conserved per zeron and over both interacting zerons and the two different contact processes must lead (due to the appropriate phase shift) to shrinking of the two sets of point strings involved. Computer simulations have to properly analyze both scenario's whereby it needs to be stressed that a connector of a replicating point string is a combination of a (with a central 2-point antenna coupled) time-like axial point and an in the CPS "ad hoc" selected slightly (of quantized order τ) phase shifted transversal point that will (in the growth or shrink phase) reset the local axial point: if in one scenario the axial point in i-max has been reset by the connector of the other string, the local transversal point will not be selected and the overall charge amount is conserved thanks to the synchronous contribution of a last connector point at the end of the phase shifted opposite branch of the point string. In the second scenario, the induction of a point in the hole connector of a short branch will force this branch into the longer state. Both cases lead to a role inversion of the notion "longest or shortest branch" and to a small position shift of the central symmetry location of the zeron replication pattern involved: geometrically a zeron pattern has only a 2-point length and the terms "short" or "long" have to be seen as sequences of over τ phase shifted 2τ time slices, in combination with a left-right symmetry property (parity as in Physics).
  CPT conservation has to be respected per zeron and per interaction over both zerons, taking auxiliary transversal points into account.
- When later in the course of the evolution, pairs of particles appear as the outcome of an axion-type interaction between two zerons of an EZO, they need to have anti (or contra-)-symmetric properties, mainly based on opposite charge types, on the distinction between both point-hole density ratio's and on their geometry (leading to opposite string spins when replicating, not to be confused with a particle spin). As these requirements have an ad-hoc or stochastic character in the UZS, the probability of a spontaneous successful simultaneous appearance of an adequately formatted EZO is small in relative terms and its probability is depending on the presence of

what we call " flat or unbiased" local raster conditions in a particular UZS volume. Taking the presupposed high density of zerons in a multidimensional UZS space into account, the number of particle-contra-particle pairs appearing in an unbiased cosmic volume can still be extremely high in absolute terms (in "young" volumes without the presence of patterns or in locations with comparable densities of both pattern types – see hereafter "gravitons and gravity").

- If large numbers of particle pairs split up in patterns with a neutron and contra-neutron replication format, they will gradually condense into growing matter and contramatter volumes. For matter it means (and at least as a very first step): "…as short-lived neutron compositions", gradually transformed into globally charge neutral atoms and/or eventually as ions, compensated by uncoupled or loosely coupled electrons into molecules.
- Large spacetime volumes occupied by charge neutral particle sets can be mixed with those occupied by anti-symmetric contra-particles. Their properties make them transparent to each other: only axion interactions are possible but with an extremely small coupling probability. Or both can be separated because their acceleration in case of gravity driven condensation, will be slightly different. It makes sense to assume that most (but not exclusively) central volumes of galaxy clusters contain an excess of contramatter because the contra-particle maximum speed is a bit higher, so they condensed in the past a bit faster than matter. Also the local state of flatness (in the sense of charge and hole type neutrality) of the UZS, can be disturbed or enhanced as the outcome of the dynamic flow of matter and contramatter particles at distinct speeds as high as c or c'.
- Around central galaxy clusters dominated by contra-matter, large scale peripheral density fluctuations can lead to the creation of mainly matter made stars and planets and maybe less frequently to their contra-versions. So in general, their geometrical distributions over the cosmos were originally the outcome of layered superposed condensation processes, taking a, for matter and contramatter different value of acceleration towards the center of (as an example) our milky way into account.

- Contrary to cosmology, a PhR model is able to make meaningful predictions about the geometrical distribution of clusters of matter (and contramatter) in our cosmos: planets around the Sun could not have orbits located at whatever distance from the Sun but their relative positions are the outcome of certain deterministic rules and processes as proposed by this TOE (see also chapter 11).
- Black holes are not (or not just) the outcome of an extremely strong condensation process of charge neutral matter but most probably of the presence of huge numbers of at least partly unbalanced (and invisible) contramatter particles and objects. Their excessive presence in an outer shell of a huge central object, in case of mixed overlapping condensation volumes, is due to differences in parameter values like c, leading to higher probabilities of matter-type star and planet formation along particle journeys towards a galactic center, so relatively less particles will reach the center. Ordinary EM waves emitted by matter in the center of a composite object can (eventually) not escape if the shell of contramatter at the surface impacts spacetime (and its parameters) in such a way that most of the photons orbits will be bended, so their rays circulate in a thin shell that separates matter and contramatter volumes of a central symmetric partially mixed object. The fact that a black holes content itself is invisible just means that emitted contra-photons (or contra EM waves) do not couple with our optical instruments.
- Condensation of particles (or contra-particles) accelerated by polaron impact of gravitons cannot lead to quasi infinite mass densities in the center: short range, charge based Coulomb forces (with polaron impact of virtual photons) or even axion interactions are much stronger and will prohibit excessive or quasi infinite particle and contra-particle densities on a double grid. This means that the conservation of momentum principle in the neighborhood of a large central spherical condensation volume will force particles into spiral-like orbits and that explains in case of “landing”, the origin of initially increasing rotational momentum and the nice spherical form of growing stars and planets. In PhR terms: axial particle strings oriented along the main gravity field gradient and due to polaron

impact, will no longer be the fastest, and the relative probability of an increase in momentum along a transversal string direction in a 3D Higgs based replication schema, will go up.

- In a similar way the rather stable fixed orientation of the rotation axe of macro-objects can be explained: hereby we refer to what has been put forward in this text about path curving capabilities of particles and the non-radial graviton coupling probability of orthogonal particle strings.
- One of the main conclusions is that the perception and the definition by cosmologists of black holes is at least partly in conflict with this PhR model. An unlimited increase of mass density in a small fixed volume of spacetime, as the result of a gravity driven condensation process of particles is impossible in a PhR concept, where abstract forces do not even exist and gravitons are just byproducts of any standard particle acceleration process.
- To make things clear: the presence of excess contramatter shells around a matter core in a mixed-type black hole has a similar impact on the surrounding UZS parameters relevant for normal photon propagation, as what cosmology erroneously presupposes to be the outcome of an extremely strong central gravity field. The latter proposal is not PhR compatible.

9. Dark matter, Gravity fields and Gravity- (or Gravitational-) waves .

- Gravity-like forces (Physics) have been described in PhR terms in other articles published on viXra. In a nutshell: Higgs based particles (and contra-particles), accelerated by whatever polaron-based interaction with one of its connector in an I-max state, will release a closed circular pattern in the CPS/UZS, called a graviton (or contra-graviton) particle. A graviton is a difference pattern emerging in the contracted state of two branches of a particle string that carries at one side of a string, a connector with an extra quantized phase shifted transversal zeron pair (in fact an in time lengthened EZP hole). Such unbalance in a replication process will come to an end once the parent particle has shortened its I-max value by 1 and attains a new

regime state. Hereby it increases (or decreases) its momentum state (physics). This means in PhR terms: by shifting periodically in the contracted state the central symmetry location at a higher (or lower) pace over the local UZS raster. We call a particle after a position shift a next version of the particle, owner of a slightly changed momentum.

- Variable densities of gravitons released in the UZS materialize what is called a gravity field. Hereafter is explained how any Higgs based particle moving at constant speed along one of its axial strings in a flat graviton field, is in fact locally and temporarily unbalanced whereby any released gravitons will be reabsorbed (or vice versa) after a position shift, a process without net momentum change or impact on a growing (or reduced) radial gravity field. In practice this statement is less significant as perfect flatness rarely exists.
- A graviton sustains a persistent or stationary matter- or contramatter-like (and by a rotating EZP enclosed) hole in the UZS raster, in fact an extra phase shifted contracted state of a normal persistent 2-zeron pattern: subsequent versions of the enclosing EZP will form a planar and closed circular pattern.
- In other terms: a dynamic virtually rotating EZP maintains an extra time quantum packaged as a quantized hole with a fixed duration, whereby its tenor has a slightly different value for a matter and for a contramatter EZP holes. Gravitons as (circular) patterns and as long as they do not interact with a particle connector, are persistent. They are different from (e.g.) standard short-lived contact patterns between any two neighbor UZS zerons in i-max states. Although both implement locally a small point-hole density excess or shortage versus a theoretical standard CPS point-hole density ratio, their hole tenors are not the same and as stated, a contact EZP is short lived and a graviton is persistent and finally a contact EZP can implement a hole density increase or a decrease where in case of gravitons, this difference in impact depends on the connector symmetry state of a replicating and interacting particle.
- Charge neutrality, persistency and quantized isotropy of a rotating graviton pattern require extra axion-like interactions between subsequent adjacent versions of the rotating EZP pattern, leading

each time to an additional inversion of charge types and neutralizing in this way the usual standard charge type inversion in the contracted state of two branches of a point-replicating zeron. It means that the charge type of a zeron that goes first through the contracted state in combination with the prolongation of the hole state guarantees charge neutrality of EZP's, added up over the total circular pattern.

- In case of an interaction between a graviton and a particle, we assume that the impact of a polaron-like time quantum, packaged as a rotating graviton EZP, on a connector of this particle will be a priori and in absolute terms, invariant and identical with the impact of a normal polaron carrying EZP connector. However the probability of successful coupling is much higher due to the fast rotation of a graviton EZP. It will obviously depend on the matter/ contramatter property and on the orientation of the graviton's virtual central rotation axe (perpendicular to the rotation plane) versus a particle's axial shortest string direction (both have to be at least coplanar).
- The ultimate momentum impact as such, depends on the symmetry state of the connector of a multi-state string, replicating out of a complex Higgs nucleus, at the time of interaction. Think hereby also on the case of forced deceleration whereby interaction takes place in the anti-symmetric connector state of a moving spin1/2 or spin1 particle (we will not mention the case of "deceleration" each time again in this text).
- The angle between symmetry axes seems to be less critical as a graviton rotates and the impact on a particle connector is anyhow time-like. Also the rotation sense is not important because the net impact of a graviton coupling means always a prolongation of the embedded hole state of an EZP.
- As a summary: Gravitons are primitive difference patterns, in a sense that they compensate at central Higgs level the impact of the two-sided contraction of transversal strings of a replicating particle in a disequilibrium state. "Primitive" because they balance the impact of a I-max disequilibrium on the complex Higgs core contraction process itself. Hereby and under the impact of 3D -replication, contraction, inversion and position shifts, the subsequent free zeron states along

each string direction in a central EZK will play a crucial role. This phenomenon is (as an example) similar with what happens in a Higgs when the reshuffling of the replication schema of a neutron turns it into a proton schema plus an electron, hereby releasing a neutrino as difference pattern. There is however an important difference in the kind of disequilibrium to be compensated: a neutrino pattern can propagate and is most probably an “axial string correction”, a graviton rotates locally and is rather a “transversal string adjustment”.

- It is clear that computer simulations are needed to describe this process and to confirm following crucial statement valid at moderate particle speeds: “the delayed impact of a one-shot polaron interaction with a connector, as observed at the moment of a real position shift and taking the symmetry impact of any inversion process of a contracting Higgs based pattern into account, will lead (on top of a photon emission or absorption, balancing momentum-type energy amounts) to an adjusted particle replication schema and to the release of an extra circular graviton difference pattern, induced on the double grid”.
- In terms of Physics, the modified graviton density distribution in space materializes the change of energy stored in a non-flat gravity field due to the position shift of particle over a short length. In QM this graviton can considered to contribute as a static field quantum to this increased (or decreased if a particle is forced to move in the opposite direction) gravity field gradient .
- What has been discussed in previous paragraphs as the PhR conform impact of polarons and graviton distributions on momentum and/or on new graviton production, concerned an incremental (or decrementing) 2°-order effect: in the simple case of a particle moving at constant speed, a graviton is released and re-absorbed by the same particle, after a position shift and taking its symmetry inversion processes into account. It means that a moving particle is at least able to restore a local gravity field after each position shift. It presupposes that a replication process with a fixed I-max value of particles moving at constant speed contains enough asymmetry at central Higgs level to force a central Higgs into a stationary behavior and leading to a

position shift after a certain number of contractions. It also justifies why PhR is treating graviton emission as a Higgs driven process.

- A graviton/contra-graviton pattern is on average charge and charge info neutral (it does not produce a net external Coulomb or quantized magnetic field). It is unable to propagate over the double spacetime grid and has a spin 2 type property. It requires indeed a single shrink and growth cycle to enter again into a similar (be it rotated over a small angle in a plane) 2-zeron state, as compared to a spin ½ Higgs based replicating pattern that needs 4 growth and shrink cycles to reenter into the same particle state. Matter and contramatter particle string spins, just like gravitons and contra-gravitons, rotate in the opposite sense versus each other but this makes no difference for what the time impact of a polaron on a connector is concerned .
- Enormous and mostly central symmetric graviton and/or contra-graviton distributions with a, towards the center, increasing radial density gradient, materialize in terms of Physics large scale gravity fields. They have been, in the course of their history, gradually built up by accelerated particles moving towards one or two (in case of central mixed matter-contramatter volumes) spatially overlapping condensation hubs (galaxies, stars, planets).
- Computer simulations are (once more) required to confirm to what extend the number of subsequent EZP states per tour of a graviton pattern could vary, whereby it has to be checked that a variation of this number has little impact on the coupling probability between a planar graviton and a particle connector. Most probably this number is related to the value 137, the ideal inverse fine structure constant. We also assume that after successful coupling a graviton pattern will be reproduced in a backward position versus a position shifted particle or will turn into standard UZS components (zerons - points).
- If the anti-symmetry of subsequent contractions of strings of a spin ½ or 1 particle taking place before a position shift, are the cause of the axion-like impact on a graviton pattern, built up by free zerons at central Higgs level, it has to be investigated if any type of accelerated Higgs based pattern is indeed able to contribute effectively by excess graviton production to a gravity field with an increasing radial

gradient. If persistency of a graviton pattern requires an extra built-in axion type interaction and if gravitons inherit this property from their parent particles, reducing the effective internal free inverse fine structure constant value from 133 (a value typical for a replicating neutron pattern) to 132 (the proton case with an extra rotating built-in axion exchange in the nucleus and a reduction by one of the number of electron-like, in superposition replicating strings, a small but important change that explains its persistency), it could be that only accelerated neutrons contribute to graviton production. However this would mean that the nucleus of an accelerated atom would only partially contribute to the increase of a central symmetric gravity field. We reject this idea except if the contrary would be proven. Hereby we should take into account that a process of building up a large scale gravity field seems to require the acceleration of charge neutral objects like neutrons, full atoms, molecules and other conglomerates. In those cases there is no external photon emission.

- When a spin-2 (contra-)graviton in a gravity field is interacting with a compatible connector state of a replicating spin ½ or spin 1 particle (or contra-particle), it will accelerate or decelerate this particle depending on the symmetry properties of the particle's coupling connector state in a 4 (spin ½) of 2 (spin 1) cycle schema. So an opposite momentum impact takes place when a graviton interact with the same particle in its subsequent anti-symmetric state of a 4 (or 2)-steps spin-cycle. On average a uniform (or flat) particular graviton density distribution should have (as stated before) no net impact on the momentum state of a particle "moving" in a non-curved graviton density field. So it is important to repeat that even non-accelerated particles or whatever large composite mass objects have the capability to interchange the relative positions, occupied by their own mass contributing components (as a net built-in hole impact) with those of any local absorbed (and/or released) graviton. This happens for each position shift of a matter/contramatter object along its orbit over the double raster and particle by particle for composite patterns: it means that an object moving along a tangent orbit will not leave a location with weakened gravity field density

behind after each position shift (this PhR conform mechanism is compliant with the outcome of the application of a dynamic left-right or right-left tensor equation as proposed in GR).

- But if the graviton impact on subsequent connector states of a spin ½ particle has opposite effects, how can a radial gravity field lead to a net acceleration and condensation of matter and contramatter particles? Well even if a gravity field with a (on a large scale quasi perfect) spherical symmetric distribution in spacetime, has locally a negligibly small radial density gradient of contributing gravitons, the probabilities of a successful coupling between a field and a particle's connectors in two successive I-max states, will be slightly different due to a higher graviton **density** (per unit volume), oriented either towards or away from the central symmetry center. Any stationary central symmetric **spherical** distribution of gravitons shows, due to its large scale geometry alone, a slightly higher graviton density towards the center than away from it, but it is clear that the variation in and the impact of such minuscule radial density gradient over a length of just a particle string, will be extremely small. This explains why a gravity force in physical models is so much smaller than any other type of force, although any PhR conform impact of a graviton on a connector is polaron-like, just like (e.g.) in case of an interaction with a photon. The difference between both is that a spin-1 photon interaction requires a specific connector state in order to be successful whereby often pre-polarization by an UZS string (a coulomb field line) determines a priori what the sense of the net impact on the motion of a particle will be .
- On a macro scale (galaxies, stellar systems and planets, in fact all condensation hubs) we notice that the impact of a central symmetric field is never 100% radial but a combination of a "strong" radial and a weaker tangent component, leading either to new "slightly" rotating spherical condensation hubs and/or to a belt of debris on an elliptic orbit or (in case of landing) to a tangent impact on the surface of an existing hub, leading on its turn and gradually to a growing spherical volume with an increasing rotational momentum.

- A non-zero tangent (or transversal versus the field gradient) coupling probability is due to the fact that in a Higgs based replication process the “longest and/or fastest string connector property” gets lost after each successful axial coupling. So depending on the particle spin orientation, the connector of one of the two temporarily longest transversal strings has on its turn a smaller (a matter of parallelism of connectors and polarons) but non-negligible chance to couple successfully with another particle or pattern by polaron interaction. On top of the compatibility of their matter/contramatter like property, they only need to have coplanar string directions and their rotating connectors have to be parallel, a condition that is geometrically less stringent for quasi-collinear axial strings (and can be neglected for circular graviton patterns). So coupling probabilities between particles depend on the angle between coplanar replication axes (see hereafter: bending of trajectories of “colliding” particles, conform QM and SR in Physics).
- It is important to repeat that the replication length (and I-max) of a particle will decrease (down to a limit value 1) when its velocity goes up, so although a single graviton impact itself is not string length dependent, the length and the frequency of graviton-driven interactions will change. The latter explains why the impact of an existing gravity force on the motion of a non-relativistic particle with fixed mass (m) shows a behavior that (e.g.) in Newtonian mechanics can be adequately described by a second order differential equation whereby the “gravity constant” as coupling factor and the amount of central mass M, are supposed to stay the same. The force itself has a form $F=G*M*m/r^2 = m*d^2r/dt^2$.
- The total energy balance of a replicating and accelerated (or decelerated) particle in a gravity field towards (or away from) the condensation center requires (in physics) the emission (or absorption) of photons (or a virtual photons or contact polaron) and eventually the release of extra gravitons, certainly if acceleration is due to a non-gravity force. If acceleration is solely due to an existing graviton density gradient, no extra terms seem to be needed when checking the energy and momentum balance by a local equivalent (e.g.) QM

description, each time a particle is interacting with the gravity field. This seems to be odd but its non-importance has to do with the tremendously small impact of gravity on particle motion as compared to other forces in physics. The way coupling between a gravity field and a particle takes place, could explain partly why the Standard model has a problem to integrate gravity in its equations and to combine QM with General relativity.

- Unbalanced absorption of a graviton is leading to a radial position shift of a particle towards the main symmetry center, hereby releasing a graviton in a slightly shifted backward position. In case of multiple subsequent acceleration steps, this process takes place at an increasing frequency because the position shifted particle's I-max value became gradually smaller. The total energy equation in Physics should be balanced by a reduction in potential energy of the particle, against an increase (or decrease) in kinetic energy and (eventually) the external or internal emission of a photon. In PhR and for a single non-charge neutral particle both effects are materialized by a gradually smaller I-max value and by the emission of a photon carrying an EM energy quantum, but equally at field level by a small non-linear change in the local hole based energy density distribution due to an increased graviton density gradient.
- In Physics a radial position shift of a particle towards the central mass is increasing locally the gravity field strength by adding virtually the (hole type) mass of the particle to the amount of central mass (in practice a negligible effect for a single particle), in PhR the rearrangement of the gravitons density distribution in a spherical symmetry geometry changed directly the local field strength.
- On a cosmological scale and if acceleration is solely due graviton impact, the rearrangement of matter and gravitons does not increase the total number of real particles contributing to the field but the speed of the pattern's rearrangement process goes up and the string length of particles down when approaching the central hub. The total number of field-contributing particles only depends on the total number of EZO's and particles that ever originated in flat border volumes and obviously on the increased size of those volumes. It will

not lead (as stated) to an infinite central density of matter because non-gravity forces will finally stop radial acceleration and lead to an elliptic orbit of the particle and/or to an increased rotational momentum of the central condensation volume.

- It is important to analyze and to understand the behavior of a PhR conform replication mechanism in those cases whereby a non-gravitational force (physics) on a collection of particles (ex: one throws a ball high in the air) is superposed on the impact of a gravity field (the ball will fall back along a parabolic path).
- If a particle is a component of a charge-neutral complex pattern like an atom, a common (but not necessarily identical) change in replication length of nucleons and electrons can make the photon emission transparent to an observer (if one throws a charge-neutral ball in the air, it will not emit light).
- Gravitons and contra-gravitons do not interact with particles with an opposite mass type. Charge info patterns emitted by both graviton types are phase shifted and materialize slightly different time quanta: they implement versions of quantum holes with non-compatible life times, so polaron-like coupling between a graviton and a contramatter particle connector (or vice versa) is impossible. We also assume that photons do not couple with gravitons or that their coupling probability is anyhow negligibly small. Nevertheless, even this small coupling rate could explain why light rays can be bended by extremely large and curved matter-based gravity fields, although this bending could also be indirectly the outcome of curved raster parameter distributions.
- The number of about simultaneously accelerated particles and their radial graviton field impact can be extremely important in case of a fast growing central volume, surrounded by dynamic temporarily “flat” cosmic shells with a still very high local production rate of new particle pairs. Despite the extremely small local impact of a few more or less gravitons on the momentum state of a Higgs based particle, huge gravity fields are gradually emerging around young stars and planets, leading to a fast growth of these objects themselves, the

result of an intense and gradually increasing acceleration and condensation of new (contra)particles.

- A strong local gravity gradient will be the cause of non-flatness in PhR terms if locally different hole/particle density ratio's, as caused by distinct quantities of matter and of contramatter particles, exist in an UZS volume , a phenomenon reducing the probability of spontaneous creation of EZO's and additional Higgs/contra-Higgs pairs. As the impact of the hole density gradient increases in a non-linear way when approaching the symmetry center of a large volume and because the maximum propagation speeds of matter and contramatter are slightly different , spontaneous particle pair production has nevertheless a chance to take place in specific "belt-like" locations around a central spherical volume, particularly in case of the local presence of a mixed matter/contramatter field. In a next chapter and as an example, a relationship between the locations of subsequent planets around our central sun will be proposed. What makes this process less transparent is that contramatter-planets cannot be observed.
- In a "young" cosmos the radial hole density gradient itself at the borders of new stars, surrounded by large (compared to the radial field size) flat shells, will initially be small. This is due to the presence of an excess number of new matter as well as contramatter particles in the peripheral less curved volumes than in a radial field zone in regime. This is obvious because the initial growth rate of the UZS/CPS raster was much higher than the rate of formation of any new large matter/contramatter object. When gradually more matter is concentrated in the center of a gravity field, hereby increasing its radial field strength, subsequent flat shells are present only at larger distances from the center. <u>In such distant flat shell, GR or Newtonian physics will no longer hold</u>. It is important to stress that a gravitational force, as stated before in a PhR as well as in a GR approach, is sensitive to the graviton density gradient, less to the absolute density value.
- A normal spherical symmetric graviton density distribution surrounding (e.g.) a large peripheral planet of our Sun (e.g. Saturn or

Neptune) has to be superposed on the, at large distances weakened graviton density gradient around the Sun itself. The superposition of both fields could create a volume with a net local graviton density gradient between the planet and the Sun that is rather small and partially (meaning: per matter/contramatter type) flat (or even negative). GR based models take this curvature obviously into account but in such distant flat volume new particle pairs could have a non-negligible chance to emerge (at least if also a properly curved contra-graviton density is present) and that effect is not covered at all by GR. This could (e.g.) explain the two-Pioneer-mysteries, a phenomenon whereby the orbits of both satellites curved slightly in the direction of the Sun, after they just passed Saturn. Accepted explanations like conceptual deficiencies on board of both spacecrafts are obviously possible (e.g. the recoil effect of a stream of forward emitted thermal infrared photons) but it is strange that these deviations had never been noticed before the Pioneers just passed Saturn. It is also bizarre to see how an experiment that was set up to validate Einstein's GR , once a non-conformity showed up, was not seriously considered as a sign for the validity of alternative models (like MOND).

- Too small peripheral G-values would also explain the formation of spiral arms filled with stars and surrounding central black holes. Further investigations are needed to find out that this "low-gradient phenomenon" is always present at the borders of most matter-based condensation volumes with about-flat local border zones (where large numbers of extra particle/contra-particles have a significant chance to emerge) or only if the contra-graviton density gradient in these local volumes is equally weak.
- In this context it is important to accept that dynamic graviton and contra-graviton condensation processes can simultaneously take place around a shared symmetry center without disturbing each others behavior, meaning that about equal amounts of matter- and contramatter-like EZP densities can temporarily exist in the UZS, even in an on average non-peripheral and curved gravity field of a particular type. In a next chapter we come back on this phenomenon

(and on mechanisms leading to the emergence of new galaxies, stars and planets).

- A important conclusion based on previous PhR conform statements, is that traditional cosmologic concepts and ideas about the origin and the behavior of large gravity fields are not correct or at least not complete:
    - Large mass objects do not maintain actively a gravity field: these fields are the outcome of an historical, although never ending condensation process of matter (and/or contramatter) charge-neutral particles, accelerated towards the symmetry center of a spherical graviton distribution. If such condensation process is still ongoing because important quantities of new particles are still emerging in “flat” distant locations, surrounding a central condensation object, GR or Newtonian gravity models are not correct in a (dynamic) distant border shell of a gravity field due to the presence of belts with small mixed graviton-contra-graviton density gradients.
    - Neither direct “action at a distance” as proposed in Newtonian physics, nor the mysterious distant capability of a large central mass volume to curve spacetime (GR), are PhR compliant.
    - The elementary quanta that sustain gravity fields are gravitons and materialize dark matter (or contra-matter). There is no need for another mysterious particle to explain anomalies in the results, calculated conform GR or Newtonian physics (e.g. distant stars around the center of our galaxy and moving too fast , are PhR compatible if those area’s were flat in the past when they emerged, a state leading to local massive particle creation).
    - Acceleration of particles towards a central condensation hub will lead to:
        - higher momentum values (high residual temperature in the condensed regime state) and lower potential energy value (this guarantees conservation of energy in Physics)
        - shorter replication lengths, thus higher replication cycle frequencies and to an appropriate hole distribution over a gravity field volume (a combination of built-in particle

holes in the center and peripheral graviton densities). Hereby hole and charge quantities are conserved over a fixed enclosing cosmic volume, taking extra spontaneous particle pair creation in flat zones into account (PhR).

- In equivalent mathematical models like the Standard (particle) Model, gravity has to be taken into account by a, on a large scale varying (graviton based) gauge (a normal technique, each time small scale local symmetries as described by QM are superposed on a different large global symmetry property) that does not disturb, up to many orders of magnitude, the small scale quantum field character, neither the particle's behavior, as calculated with the help of QM or RQFT models. For particles close to the center of a condensation hub the impact of small scale axion interactions and obviously of high-temperature ionization and EM-field effects, have to be taken into account. In normal circumstances gravity will have a negligible impact on the dynamics described in any local reference frame, whereby this impact will be driven by a large scale force that could be calculated conform GR, although adjusted for the creation of extra gravitons in flat areas and hereby taking contramatter into account (LENR effects). All this is just theory and unpractical in most cases because both scales, the gravity scale and the quantum scale are so extremely far apart from each other. Computer simulations could help by rescaling the problem (with a risk of errors). Additionally and in order to calculate the presence of local dynamic flat areas distributions, contramatter could and should be directly integrated into Einstein's GR model.

- Another important conclusion is that gravity waves seem not to be PhR compatible. Gravitons of the same type (either matter or contramatter) are identical (except from their orientation, anyhow a less important property from a conceptual point of view), they cannot move over the double spacetime grid and they do not interact with each other. A "sudden" condensation process of two gigantic objects like black holes or huge neutron stars will change only locally the consolidated graviton-contra graviton density distributions. Their

impact on local matter and contramatter fields and particle densities can be enormous but excess energy will only be released by photon (EM waves) or contra-photon emission, not by propagating gravity or graviton waves (whatever that could be). Exceptions could be the impact of a massive and fast propagating pulse of particles/contra-particles on distant graviton densities or a combination of matter-contramatter fields that produce flat zones, leading to a sudden excessive creation of new particle/contra-particle numbers (that normally stand still !) followed by a large scale distant disturbance of graviton densities but these complex phenomena, if they exist, can hardly be called “graviton waves”.

- In an experiment like LIGO, any unwanted impact of EM waves on an interferometer will be detected and automatically eliminated from the observed results, but this does not happen for contra-EM waves. If their intensity would be extremely high, they can change locally the point-hole density ratio of the CPS/UZS raster itself, so they could have indirectly a weak impact on the observed results.
- This speculative statement can be checked by measuring more precisely the speed of these so called gravity waves: contra EM waves are slightly faster than ordinary EM waves. At present these measurements are not precise enough to draw relevant conclusions and several successful tests are needed before an average result can confirm (or contradict) any PhR based theory.
- In this context It is not a surprise to hear that LIGO detected several times, just after the observation of a gravity wave, a gamma ray bundle emitted apparently by the same (mixed) source, and propagating at a “normal” (but less than c’) speed value c .

10. Cosmic radiation and the observation of super-heavy particles.

- Cosmic background radiation (CBR) in a PhR perspective is a topic that will not be treated in detail, as any analysis of its origin and its properties is strongly dependent on the unproven hypothesis about the presence of a closed coherent, spherical symmetric and finite

cosmic volume, filled with a double point-zeron raster, a proposal contrary to an absolute and unbounded vacuum in cosmology.

- In this PhR model and as an example, quantized EM and contra-EM waves propagate on the CPS/UZS raster. They can be reflected from or bended within the dynamic border shell of this raster. In both cases they are able to carry conserved quantities of information and energy between source and target, but they are anyhow unable to propagate in emptiness. If a fotino in PhR is just a dynamic pattern of raster components, where in Physics a photon is the smallest info and energy quantum of an EM wave that can propagate in vacuum, it is clear that PhR is at odds with any “empty cosmos” model.
- In cosmology the CBR is often considered to be a picture of the growing surface of a quasi-perfect black body radiator, corresponding with a temperature of about 2.7° K. Its dynamic state and its properties should be seen as the expanding 3D surface of an initially small cosmic volume just after the Big-bang when matter did not even exist (an inflation based model, at least partly in conflict with PhR). Our instruments would observe indirectly a picture of this surface and its content after a tremendous delay due to the speed limit of any information transfer by EM waves.
- The properties of a CBR’s energy density spectrum as emitted by EM waves, correspond quite well with the (low and presupposed) temperature value of an equivalent black body radiator. In its more actual state, this picture is disturbed locally by the presence of large matter-like clusters, a combination often shown on colored maps per halve hemisphere and observed and averaged over a “long” period of time. All these measurements are the result of sophisticated and high-quality experiments.
- A PhR proposition about the CBR, based on a spherical closed UZS volume with intrinsically balanced matter and contramatter-like inter-zeron contacts, is unproven and the use of classic formula’s for black-body EM spectra and temperature calculations might be too simplistic and are anyhow by principle in conflict with the bottom-up approach practiced by this PhR model.

- In physics and on a small laboratory scale a black-body object is often described as a perfect closed 3D sphere with black painted walls and a very narrow aperture thru which EM waves can enter but have little chance to escape by reflection, so all the by radiation entering energy is reflected and/or ultimately absorbed by the walls. The regime EM spectrum of a marginal amount of radiation, escaping from this object is solely determined by the wall temperature of the sphere. The similarity with a closed cosmic sphere as suggested in this PhR model is striking: in PhR, EM waves are reflected by the outer layer of the cosmic raster, but this picture is disturbed if rays are absorbed by matter or contramatter objects distributed over the cosmic volume.
- The in this chapter called cosmic (particle) radiation (as initially observed on Earth) is an influx of accelerated and eventually rotating charge neutral particles, including difference patterns like photons, neutrino's …., propagating in complex gravity (and/or electromagnetic fields if complex particles become charged by collisions), surrounding stars and planets.
- When mainly by gravity forces accelerated particles hit air molecules (e.g. like around the Earth), collisions will produce sometimes spectacular optical effects in the upper layers of our atmosphere. The high amounts of kinetic energy of the original particles are the cause of the production of showers of short lived sub-particles, hitting the surface of the Earth with extremely high velocities. It was suggested before (as imposed by this model) that at speeds close to c, changes in non-linear replication schema's of patterns like (e.g.) muons would explain their increased life times, not some artificial, observation dependent curvature of an abstract spacetime volume (SR). In those cases where cosmic particle radiation hits the surface of other planets without atmosphere, their impact will be even more destructive and could at least partly explain why life (like ours) on these planets had difficulties to emerge.
- Additional to these "collisions-with-protons" related effects, other pattern type objects like photons and neutrino's, are hitting directly (e.g.) the Earth. Neutrino's are charge neutral spin ½ difference particles (they are leptons (Physics) with a small at Higgs level,

electron-like replication schema (PhR)) , observed on earth as the outcome of nuclear reactions and of their forthcoming pattern and energy unbalances in the central Higgs, mainly the outcome of symmetry adjustments, modified role interchange processes and free zeron behavior within the Higgs nucleus of mutated particles. The number and nature of unbalanced contracted strings determines the neutrino type (its internal replication schema) although this type might change if a neutrino would be involved in other external interactions (e.g. with gravitons ??) or when it passes thru a CPS/UZS volume with raster properties that are substantially different from those of its initial environment.

- In cosmic rays neutrino's are released in nuclear reactions, taking place on large distant objects (in Physics), or (in PhR terms) if in case of unbalanced replicating particles in their contracted states, superposed Higgs patterns, each with multiple versions of free zerons, are reshuffled. When we observe them on Earth at speeds close to c, they are most probably emitted by nuclear processes taking place in or around the Sun. In order to produce an event measurable by our instruments, a neutrino needs to interact with a target by axion coupling at point level. Hereby a connector zeron is flipping the sign of its charge, however the probability of a successful hit of an uncorrelated target, is extremely small. Indeed, two particle zerons, to be involved in a collision and a subsequent axion interaction, should quasi coincide in space but they also need to have the appropriate sign and phase, whereby each of both zerons can be in about 137 different phase states per point growth /shrink cycle. So in most cases neutrino's just cross the Earth without being involved in any collision at all.
- EM-like photons are difference spin 1 patterns emitted (often due to direct local polaron exchange with another particle, materializing virtual photon impact in physics) by unbalanced replicating particles with a central Higgs architecture. Their origin is the outcome of a multiple step process.
- In first steps and each time an unbalanced replicating Higgs based particle goes thru its contraction state, multiple superposed virtually

coupled polarization patterns with an EZP format (in fact point replicating contact EZP's in the UZS), are building up by selection (to be compared with Coulomb –like single zeron polarization paths in the UZS). When this process proceeds, a cascade of potential paths for real polaron propagation are emerging. This pre-polarization happens at a speed much higher than c and does not transport a net energy amount, just (charge) information. Propagation of randomly emitted and quantized charge info takes destructive interference into account and as such the symmetry of the set-up of an experiment (e.g. the case of the famous double slit experiment).

- These multiple coherent paths exist for a short time until one path is selected as the fastest or the most probable, taking the antenna state, its format and symmetry and charge info interference principles (see base laws) into account. This selection takes place as a final step, at the time the antenna of an unbalanced particle is shifting effectively its position on the grid, restoring hereby the regime symmetry state of its internal replication schema, be it with a modified I-max value and with a new stored momentum state in the central Higgs.
- A complete photon is released, coupling between source and target can take place and a mass (or hole or action-) quantum packaged as a polaron, can ultimately be exchanged between source and target. This non-local coupling process takes place at a maximum speed c whereby each propagation step is similar to what happens in a normal micro Higgs based pattern, replicating and aligned along a single string but with an absolute minimal string length. It carries a polaron action quantum, makes use of a fasted pre-polarized EZP path and shifts its position after each growth and shrink cycle (a spin 1 schema). The transparent multidimensional fotino shower of polarized zerons and zeron contact pairs (EZP's) disappears gradually and spontaneously, becoming again a collection of ordinary unbiased or stochastic components of the double CPS/UZS raster.
- We refer to other viXra articles to understand the role of the phase state of free zerons in the central Higgs when it comes to determine when a position shift takes effectively place.

- In this text, the term “fotino” is used for each short-lived micro-pattern that act as the elementary version or component of a photon propagation sequence. Sometimes however, each individual UZS zeron pair of a preliminary polarization path in the UZS has been called in this article a (candidate) “fotino”, mainly when we talk in this text about the double slit experiment: this can be misleading !
- We can compare any direct polaron exchange process by means of a virtual photon (Physics) with what happens in case of a real photon transport. In the first “direct- contact” case, pre-polarization over a short distance between two candidate interacting particles is often determined by the presence of Coulomb field lines, in fact single UZS zeron selection sequences originating from a temporarily free zeron in a long connector in an I-max state and reaching a hole of another particle’s short connector, enabling a polaron coupling between specific replication states of a spin1/2 schema (PhR of the Coulomb force in Physics) . In case of a real photon the distance is often too long for using this direct local coupling mechanism, so EZP-like pre-polarization of the UZS is needed and the final polaron transport requires a multiple short-lived fotino sequence (a photon), in order to connect source and target, be it with a certain delay and making the final selection and interaction a stochastic process. Fotino’s behave then as real propagating micro-particle versions.
- Another special group of cosmic rays is more bizarre: their particle composition is not well understood, the collision energy involved can be extremely high (up to 10exp(20) eV) and the chances to observe and measure their rare arrivals on Earth are extemely small. When they hit protons in air molecules, a shower of unstable high-energy particles like muons, pions etc.. are produced. Cosmologists did not yet identify their origin and here on Earth, physicists have no knowledge of a single equivalent type of object described by particle physics, with a null- mass and/or a kinetic energy large enough to explain the impact of these “monsters”, even if one takes their very high speed close to value c into account.
- An hypothetical explanation within a PhR concept could be as follows. Earlier in this text we explained that spontaneous particle production

in the cosmos could take place in a young spacetime volume or later on, in any local flat CPS/UZS volume with a high density of quasi balanced numbers of matter- and contramatter-like contacts in i-max states. As a consequence, a process of spontaneous EZO formation has statistically a chance to take place more frequently, whereby the outcome will be the production of sometimes large number of neutron / contra-neutron pairs. The exact locations in the cosmos of zeron sets that own these conditions are hard to predict but the presence of a flat curvature surface of overlapping gravity and contra-gravity fields are obviously optimal conditions for spontaneous production of excess quantities of neutron/contra-neutron pairs. If a large well synchronized collection of these charge neutral dual patterns could reach a properly curved gravity field with a superposed and temporarily balanced graviton-contra-graviton density gradient (this could be the case on earth !), they will be accelerated as a mixed group whereby the neutron (and contra-neutron) decay is (are) delayed. These restrictions are not even needed if (taking the extremely low temperature of “empty” space into account and depending on the origin of these neutron sets) it could be that groups of properly synchronized neutrons alone would form semi-stable collective sets with an internal energy spectrum that shows statistically a narrow Bose-Einstein-conform energy density distribution. It has to be investigated that the decay of individual neutrons in these complex states, would also be delayed: so they might be able to travel collectively over long distances and could reach occasionally our instruments on Earth as a group. Because neutrons that belong to those sets are coherent, observations could misinterpret the measurement results and consider the group to be a single massive particle with a total energy, dependent on the size of the group.

- In the same context it could be that large neutron-groups could be a basis for the presence of small neutron-stars. This suggestion is totally unproven but the same can be told about alternative proposals by cosmologists about the origin and the internal structure of those stars whereby the presence and properties of these objects can only be

indirectly deduced from observed EM-waves, gravity fields, magnetic fields etc.. in their neighborhood.

- What has been suggested in this chapter as potential sources of cosmic rays, are in fact processes and phenomena that could take place anywhere in the cosmos. Concentration in a central symmetric gravity field of large numbers of extra accelerated particles can also lead today to the emergence of young stars in any galaxy.
- PhR predicts that, what has been proposed for a matter-based cosmic environment like the one to which our Earth seems to belong, is taking simultaneously place in invisible, by contra-matter dominated “worlds”. These phenomena are transparent for our instruments, even if they would take place in spatially overlapping cosmic volumes (except and although indirectly, in case of sensitive interferometer experiments meant to detect “gravity waves”).

11. Our Sun and the solar system.

- The structure and the behavior of our Sun implement important properties of a complex class of stars, called white (or yellow) dwarfs or it is more precisely a G type main-sequence star (G2V). The present version of the Sun has an estimated age of about 4.6 billion years and its “visible” inner surface (the photosphere) has a diameter of 1.4x10exp6 km (109 times the Earth) and a border temperature of 5800°K, decreasing to 4100°K at 500km above the “photosphere” (the coolest zone). The Sun contains more than 99% of the total mass of our solar system.
- In the “atmosphere” (a next composite shell around the “photosphere”) a first layer (the “chromo-sphere”) has a temperature, increasing from a minimum value of 4000°K to 20.000°K at a relative “height” of 2000km . In the outmost layer (the “corona”) temperature raises locally from 1x10exp6 °K to values as high as 20x10exp6 ° K . Finally a less well defined zone filled with so called “solar wind” is surrounding the total volume of the Sun.
- Based on many sophisticated observations and measurements, cosmologists have studied and described in depth most of the Sun’s

properties: magnetic field patterns and their strengths, variations and distributions (several magneto-hydrodynamic models for our Sun's content exist), energy production rates, the periodic sunspot densities, solar wind distributions, photon spectra and neutrino emissions etc..

- So one might question what a PhR model could add to the results of all these excellent studies and investigations. Like often in physics, models are able to make efficient and correct analysis and predictions of an object's behavior, starting hereby from observations (in so far they are possible) but show poor capabilities to explain the "why's ?" of certain phenomena, in this particular case mostly linked to the state and the evolution of our complete solar system.
- A few examples of at least partly open questions:
    - In a central 25% volume of the core of the Sun, more than 90% of its nuclear energy seems to be produced, leading to a maximum inner temperature of about 15.10exp6 °K, a value gradually decreasing towards the surface of the core to less than 5000 C. If the core of the Sun is a nuclear fusion reactor, how is energy transported to the border of the photosphere in order to sustain this gradient (a combination of radiation and convection?).
    - How can a temperature of less than 5000 degrees at the surface of the photosphere go up to 20.000.000 degrees at the outmost border of the corona, in fact a distance several times further away from the hypothetical nuclear reactor in the center of the Sun than the value of the core thickness as such ? Magnetic reconnection effects leading to energy density redistribution in a plasma (magnetic energy converted into kinetic energy) could partly explain those figures but not in full.
    - What explains the periodicity of the sunspot activities and the frequency of the inversion of the orientation of local magnetic field zones in the atmosphere ? Both seem to be correlated.
    - The energy emitted by the Sun was 2,5 billion years ago only 70% of what it is today. This means that the Earth at that time did not get enough energy to sustain water in a liquid state and to explain its fairly constant temperature in the course of its

evolution. An at that time higher conservation percentage of heath due to a more dense terrestrial atmosphere filled with greenhouse gasses (one of the possible explanations) is not in agreement with some other local observations . How to explain all this (obviously in this case the response has to be found in/on the Earth itself) ?

- The age of the Sun is about 4,6 billion years or 1/3 of the hypothetical age of the cosmos (the time passed since the Big bang, as conform the age of the cosmos presupposed in cosmology). What happened in the mean time ? Multiple successive generations of our Sun could be the answer but where was the location of previous versions? It could even be that both events (the Big bang and the formation of the Sun) approximately coincided, at least possible if an alternative scenario as suggested in this PhR model, would be accepted.

- Many (potential) discrepancies between PhR and cosmology are related to the presence, yes or no, of contramatter in the cosmos. If contramatter condensed at least within the core of the Sun together with matter, some issues mentioned above could be logically explained. The nuclear reactions in the core are in that case low temperature (LENR) reactions with a high probability of spontaneous EZO formation depending on dynamic “locally flat” grid conditions, on their turn and indirectly the outcome of small differences in fine structure constant values and distinct maximum matter and contramatter particle speeds and densities. Based on the analysis of the Sun’s EM spectrum, the appearance of different sorts of atoms - would be the result of a PhR compliant nucleo-synthesis cycle starting from neutron and contra-neutron pairs, the latter showing their own non-observable contra-nucleo-synthesis cycle. The most probable combinations of decaying neutrons would be simple hydrogen and helium patterns and their formation would be an exothermal nuclear reaction.
- If an at least partially overlapping matter- contramatter core is present in the Sun , the ratio between the masses of both classes is unknown but because the c’-value for contramatter could be slightly

higher it makes sense to assume at least initially, the presence of a somewhat larger quantity of contramatter than matter-like mass, close to the center of the Sun: because equal quantities of matter and contramatter are initially created and because the sun's planets seem to be rather matter made, this assumption makes sense. That could mean that what is observed as a gap between the core of the sun and the surrounding chromospheres could be a for EM waves partly transparent layer filled with a contramatter excess quantity.

- The slightly slower or delayed arrival of matter in the center of the Sun's increasing double gravity field, could have built up a second spatially separated and dynamic "flat" shell around the Sun's photosphere where again LENR-like reaction processes would have a chance to take place, leading finally to the very high temperature increase in the Sun's atmosphere. When evaluating this theory one must take a rise of temperature and the ionization of simple atoms into account, meaning that electromagnetic forces and interactions, much stronger than gravity effects, have to be taken into account.
- In this scenario and at some distance from the center, a with the distance from the center decreasing reflux of matter and contramatter particles ejected by the core's nuclear reactor, would be compensated by new accelerated (contra)particles arriving from abroad along the large scale double radial gravity field. As a main source of new matter and contramatter influx in this zone, we should focus on distant particles and contra-particles, emerging in locally flat gravity fields at an expanding border of the Sun's global sphere of influence (the solar system) and accelerated by growing radial graviton /contra-graviton density fields.
- These multiple superposed wave-like spherical ripples of dynamic flat density states, being a source of subsequent intensive particle creation processes, could explain even on a larger scale outside the Sun, how, when and where planets, eventually with matter and hidden contramatter cores, had a chance to emerge. This phenomenon could happen even along the increasing radial and curved gravity field of our Sun, as the outcome of distinct maximum propagation speeds of a-priori equal matter/contramatter amounts.

- In this perspective it makes sense, for what the history of the planet configuration around our Sun is concerned, to assume a multi-stage scenario:
    - In a first step larger planets (Jupiter, Saturn, Uranus, Neptune) emerged at locations where stepwise and subsequently (so the presence of one of them facilitated the emergence of the next) a cross-over of appropriate densities of matter and contramatter particles existed, hereby taking their different maximum speeds and opposite spiraling orbits into account. This could make dynamic and locally flat conditions possible in not yet fully stationary graviton-contra-graviton fields produced by all objects directly or indirectly involved in this process. This presupposition could explain why the orbits of these planets around the Sun are fairly coplanar. Their hypothetical internal heath production and the orientation and direction of their rotation axes could be conditioned by their internal matter-contramatter mixed content ratio's.
    - Thanks to favorable conditions as mentioned before, a first very heavy planet like Jupiter could gradually build up a local gravity field with a single or double (for matter and/or contramatter) gradient in a direction opposite to the Sun, that was locally stronger than the non-balanced and at long distances decreasing double gravity field gradient of the Sun alone: local flatness could lead to and/or was further improved by extra particle-contra-particle creation processes. All this could make new distant flat curvature conditions possible: the faster contra-contramatter flow towards the Sun should locally compensate the increasing local graviton density gradient around Jupiter itself, leading step by step to the creation of new but smaller planets like Saturn, Neptune etc…each eventually with a mixed core. For Saturn a mixed core could explain the presence of belts of matter (or rings) , in fact the outcome of a new particle production process in flat double raster volumes in non-Newtonian border zones of the planet's double locally interfering gravity fields. It could be

the reason why the Pioneers orbit started to slightly deviate from their predicted paths … in the neighborhood of Saturn !

- Between Jupiter and the Sun the gravity field of Jupiter show an opposite gradient that could partially neutralize the impact of the at this distance weakening gravity field of the Sun itself whereby again the different speeds of matter and contramatter could play a role in creating flat zones where smaller planets started to emerge out of new neutrons/contra-neutrons .
- The time schedule of the origination of Mars, the Earth, Venus and Mercury based on geological investigations could be verified and enhanced by computer simulations, taking these principles into account.
- In this scenario also the Earth could be a mixed planet. This means that its core contains a low-energy nuclear reactor (LENR). This could solve another mystery, namely the fairly constant temperature of the Earth and the existence of liquid water, even at a time the Sun's light emission was still too weak to produce an adequate amount of heath received by our planet. Also the rarely observed spontaneous emission of neutrino's by the inner volume of the Earth itself could be explained. Finally an equilibrium between its matter and contramatter content in combination with its temperature could be the reason why life is present on earth and not on other planets. This would implicitly mean that organic growth makes use of favorable flat conditions in order to take place.
- As quasi parallel magnetic fields produced by rotating concentric matter and contramatter volumes have independent directions of their rotation axes, a change in the relative position and strength of the impact by these volumes would eventually explain why in the course of the Earth's history, the orientation of the virtual magnetic axe has changed and even been inversed a few times, to be compared with the fixed orientation of the actual rotation axe of matter (total rotational momentum is conserved – the rotation of contra-matter mass volume would be transparent). (Anti)-Symmetry rules suggest that magnetic

fields of matter and contra-matter quantities have opposite signs (this remains to be proven: contra-electrons have a positive charge but what about the orientation and signs of spinning strings (quarks) or orbital momentum directions of contra-electrons around a contra-atom ?). Also the unit-strength of the orbital spin can be different taking a difference in polaron impact into account. Finally the two spheres that are the outcome of deviations of new particle /contra-particle orbits when approaching and hitting the Earth, could rotate in the opposite senses.

- Gravitons and contra-gravitons are unable to move on the double grid but it is possible that in the course of the evolution their relative densities and orientations along and in combination with particles and contra-particles on their double overlapping but opposite orbits and measured inside a rotating Earth have fluctuated, leading equally to a variation of the orientation and the net strength of the magnetic field, whatever the values of the particle/contra-particle spins and orbital momenta would be. The fact that these phenomena seem to be less significant these days could mean that in the course of the evolution of our planet Earth the matter sphere became dominant versus a smaller concentric contramatter volume.
- If somewhere in space, dynamic volumes would still exist (even within our solar system) where occasionally quasi flat conditions are present, the high local production rate of slow neutron/ contra-neutron pairs could be extremely dangerous for a spacecraft passing through such zone: it would be destroyed without a trace in a fraction of a second. It will be difficult (but not impossible) to detect these dynamic forbidden areas in advance in the spacecraft itself and to change autonomously its flight direction or orbit (control from the Earth would come anyhow too late). Hypothetically a similar local and instantaneous flat state could temporarily exist on Earth on a small scale and would be dangerous for all kind of (moving)

equipment, making use (e.g.)of Lithium batteries, very sensitive to exothermic Li-neutron nuclear reactions.

- We do not know if solely contramatter-made planets are part of our solar system and what their impact, properties and orbits could be

- In a same context we could reconsider some properties of the Sun:
  - If the Sun has a double matter/contra-matter core, storing comparable amounts of both particle types, we can assume that their volumes rotate in the opposite sense. Rotation means that the kinetic energy of particles accelerated in a central gravity field but repulsed by the core through non-polaron type interactions, transform their energy into rotational energy (see before) and their PhR based distribution explains the spherical form and symmetry of stars and planets.
  - In stars other than our Sun and where these volumes have homogeneous spherical density distributions, the probabilities of spontaneous EZO creation (and subsequent neutron/contra-neutron production) are similar, hereby acting as a uniform source of energy and particle creation. This is valid in any stationary state even if the maximum rotation speeds of matter and contramatter particles are slightly different.
  - If this distribution in our Sun is not homogeneous or isotropic (e.g. due to the presence of large planets (Jupiter-like and potentially another similar large non-visible antimatter planet) in the neighborhood , absorbing selectively particles of a particular type), the rotating Sun could contain successively and over a circle distributed areas with more and with less flat conditions.
  - This could explain the nature and the intensity of sunspots, including the varying magnetic field of the Sun. If indeed areas with more matter are followed by areas with more contramatter and vice-versa , this situation in combination with slightly different speeds of matter and contramatter particles, could lead to secondary flat zones in the neighborhood of transition locations between two areas (leading to a local sunspot),

followed by zones that are dominantly matter- or contramatter-like (with opposite magnetic field signs) in non-transition states. Per rotation cycle of the Sun several of these spots will emerge but if their origin reflects the presence of a large external object with an anisotropic impact (e.g. a huge contra-Jupiter in the neighborhood) the sunspots distribution and activity could vary over time.

  - This scenario could explain also why the frequency of intensive sunspot activity is twice the frequency of the inversion of the global magnetic field of the Sun. This suggestion corresponds with earlier cosmological models of our Sun's behavior.
  - All these scenarios require that the solar system and the Sun have reached a quasi stationary state and that its content rotates at a constant pace: the creation of new matter (and contramatter) quantities and the emergence of extra particles and contra-particles will have, at least in relative terms, little impact on the Sun's actual rotation speed taking its huge amount of mass into account.

- Many of these presuppositions are applicable to the core volume and to the stars of our galaxy, what could have led to the emergence of many objects like our Sun, propagating along opposite elliptic orbits in a single (in present cosmological models) or mixed superposed gravity fields produced by a huge massive object (a so called black hole) concentrated in the center of our Milky way. The growing volume occupied by a galaxy with a central rotating mixed matter-contramatter hub, can lead to a stepwise increase of large peripheral flat volumes that are a source of new local condensation processes. Hereby new local stars will gradually emerge, standing initially still versus a rotating galaxy configuration, what would explain their spiral-wise distribution once they start to grow and to rotate. They prove indirectly the correctness of an important PhR proposal: when a new particle/contra-particle pair is emerging out of an EZO, it initially and in absolute terms, stands still versus the UZS raster.
- It seems to be highly unrealistic to assume that accelerated matter particles in a strong radial and central symmetric gravity field of a

black hole would spontaneously decide to stop in the course of their journey in order to condensate as quasi perfect balls moving along stable orbits perpendicular to their previously quasi radial trajectories. Why ? What are the physical laws that explain such behavior ? Why are the Sun and other stars in our galaxy condensed in those locations where they are spotted now? Or is all this just a matter of coincidence ? Why are some of their orbits (like orbits of planets) often coplanar ?

- In most actual cosmological models and by proposing multiple successive generations of objects like our Sun, once exploded at the end of their nuclear life cycles whereby the debris of an explosion would condense again to form a next generation of stars, alternative theories seem to hold, but in these complex and heuristic scenarios (too) many questions remain unanswered.
- The presuppositions in this chapter that would lead to an alternative theory for the origin and the history of our solar system (as well as for other similar systems), are based on many hypotheses. They are speculative, even in a PhR perspective, but at least they are consistent with a base law driven theory. They need to be further investigated with the help of computer simulations but there is no doubt that mainly the presence of huge quantities of contramatter with a distinct c parameter value is the major game-changer. In this PhR model its existence is a must, otherwise the whole theory would collapse.

12. Artificial Local flatness as an ultimate source of energy

- Large scale flatness of a double CPS/UZS raster has been proposed as the primary condition for spontaneous matter and contramatter production and was (and still is) implicitly the main source of energy and/or mass on a cosmic scale.
- It enables a partial separation in time and/or in space between two main classes of particle-like patterns whereby, in line with this PhR model, the main discriminating factor between matter and contra-matter is the different tenor of embedded holes in EZP configurations, like gravitons, transversal strings and short branch

connectors of particles. Theoretically this “separation” is not perfect because axion interactions at point level between connector zerons of particles and contra-particles that each belong to one of both classes remain possible, although their probability is very small in an uncorrelated environment (comparable with the chances of a successful random proton-neutrino collision).

- Even in an on average non-flat (or curved) environment, it seems to be possible to create dynamically on a small scale, flat local conditions. This is not a surprise because any charge or charge info impact on spacetime curvature has often a local character and is much stronger than a hole based impact, the latter being the major cause of non-flatness in locations where matter and contramatter have been separated on a cosmic scale or where graviton densities dictate spacetime curvature. Hereby we should not forget that without the presence of patterns, the UZS itself is intrinsically a source of equal densities of the two hole types. We repeat the generic definition of (local) flatness in a non-empty cosmos: it means: any temporary condition, induced by superposed global and local dynamic patterns, that increases the probability of spontaneous EZO formation in the UZS up to a significant figure, as compared to the EZO production rate in a particle-free or “empty” raster. We repeat that an EZO is a contra-symmetric short-lived , dynamic composition of an EZK and contra-EZK with a common central symmetry location, a state that can emerge by “coincidence” in the UZS raster.
- Examples of dynamic artificial local flatness seem to be short-lived flat locations in some appropriately and heavily doped metal FCC crystals with significant but dynamic (thus potential) local adequate symmetry properties. Most probably similar symmetry states could also be dynamically “created” by complex organic 3D molecules like enzymes but this interesting topic (see on Google: biological transmutations) will not be discussed in this text.
- “Potential” because even a crystal that fulfils theoretically the appropriate symmetry conditions (e.g. central interstitial locations in a lattice unit cell of a Nickel crystal, doped up to saturation with Hydrogen or in a Palladium crystal heavily doped with Deuterium), in

order to impact properly the symmetry of local UZS-raster state distributions, will produce flat micro-zones that show a non-persistent and stochastic behavior. Examples of sources of perturbations of potentially flat conditions are: (e.g.) raster impurities, the internal temperature sensitive and quantized impact of phonons (solid state physics), leading to complex variable local momentum states (PhR) etc….

- Numerous small and properly doped crystals, suspended in a fluid at the appropriate temperature, seem to show a statistical momentum state distribution that enables short-lived flatness in particular locations of CPS-UZS grid volumes. Fine tuning of these conditions seems to be a complex exercise, be it because macro-effects like the motion of the whole apparatus versus the UZS grid (e.g. the impact of the rotation of the Earth) are superposed on small scale conditions and could have a negative impact on the average numbers of temporarily flat locations. That means that the probability of spontaneous EZO appearance in a local CPS/UZS volume will fluctuate, what on its turn excludes a sustained production rate of slow neutron-contra-neutron pairs. Finally, even under steady state production figures of neutrons/ contra-neutrons, each with an initial null-momentum, the motion of the reactor itself relative to the UZS grid makes that slow neutrons have a tendency to escape from the apparatus (see “Parkhomow radiation”). Multiple cold fusion-boxes piled up in a container gave better energy production figures per box than a single isolated box (Rossi – Cold fusion experiments), a result that is obvious because neutrons “escaping” from one box, have a chance to impact successfully the reactor in a next adjacent box.
- In order to transform the null-energy of neutrons straight into a useful form of energy like heath, “low temperature” nuclear fusion reactions or transmutations are required (e.g. one successful neutron / Lithium reaction will release an energy amount of more than 20 MeV , to be compared with 5 to 20 eV numbers, released by most chemical combustion reactions). Lithium derivatives can be added to the fluid suspension containing the properly doped crystals.

- Energy released as heath can be on its turn a cause of local non-flatness. So a nuclear chain reaction leading to an explosion, a potential risk in a fission reactor, is excluded. An explosion due to an excessive production of heath in a small volume within a short period of time, remains possible and could destroy the reactor.
- If low temperature nuclear fusion (LENR) processes could be kept under control, they would be a major continuous and cheap source of energy in the future. Contrary to fission, LENR reactor plants would be energy production factories that would not produce a lot of radioactive waste (Li isotopes needed for energy production by cold fusion, can be recycled whereby the remaining end product of a nuclear reaction chain would be inert He gas). The potential risk of slow neutrons escaping from a reactor, must be kept under control, otherwise these particles could transform stable environmental atoms into long-lived radioactive isotopes.
- A condition for success is that scientists believe in a PhR model that combines on one hand the respect of the energy conservation principle (a major argument today against LENR theories and claims) and the more or less continuous production of energy under controllable conditions. Otherwise investors will hesitate to spend money on developing this technology.

13. Conclusion.

- It seems to be easier for scientists to develop reliable physical and mathematical models for nature's small scale behavior, than to explain in a consistent and evolutionary perspective and starting from scratch , the emergence, the behavior and the evolution of large objects like galaxies, stars and planets.
- Some basic rules applicable to our cosmos and presupposed in this PhR model, could lead to new or at least adjusted cosmological models that would be able to answer many open questions relative to the origin and to the behavior and properties of all these enormous massive objects involved. Observations alone could hide the truth,

leading to non-complete, inconsistent or even erroneous models and conclusions.

Vocabulary of terms frequently used in a PhR context.

Axion (interaction): Where a polaron has an impact on the momentum property (Physics) of a particle-like pattern (and indirectly on the local point-hole density ratio in the UZS), an axion changes the local charge density and the net quantized charge info distribution in the UZS. For axions it means that a one-shot charge info pattern emitted by a point (or zeron) configuration has forced another point (in a zeron, being the receiver) into two subsequent identical charge states (a simple interaction between two free CPS points is obviously axion-like but the result is not persistent and it does not belong to the class of interactions as meant here). This dynamic excess-(or free) charge is stored in the connector of long branch of a particle and maintained in the course of its replication process. Its impact on the double CPS/UZS raster (a polarization line) is assimilated with an electric field line. Transfer of momentum between particles requires a polaron interaction whereby the probability of a successful coupling between particles increases thanks to the presence of polarization lines. If a particle's dynamic excess charge distribution is producing (by interference) a quantized charge info pattern, this pattern materializes a magnetic field in physics. As charge is a conserved quantity on a cosmic scale, an axion-type interaction will create quasi simultaneously two excess charges with opposite charge types in both interacting patterns. In nuclear binding with role interchanges between protons and neutrons, direct short range axion coupling (in combination with polaron coupling) is important and materializes (as a gauge particle) the strong interaction force in Physics. A successful long range axion coupling between uncorrelated particles has a very low probability rate.

Base Laws: 6 base laws determine cosmic behavior at point level.

- Law 1: Law of inertia. Any quantized change of the cosmic state cannot take place without any delay (or in zero time lapse). At point level it means that a point can only change from the empty state into a charged state q or vice versa in a fixed finite time lapse τ. This law creates a local symmetric quantized time dimension if we neglect the asymmetric impact of charge info on the large scale cosmic growth (see hereafter).

- Law 2: Emission Law. Any change of the charge property of a cosmic state leads to the emission of charge info in all directions, starting from any point that flips its charge state. The sign of this charge info is such that it is meant to annihilate the change or impact that was the cause of its emission.
- Law 3: Induction-reset Law: The impact of a well synchronized charge info quantum on the overall cosmic state is such that if it hits first an empty location, a new point will be induced with an appropriate charge sign, taking the sign and the state of the one that emitted this info (the source) into account. If it hits first a point in an appropriate regime state (a target), both with a compliant sign, it will reset this point into an empty state.
- Law 4: The coupling Law: Any exchange of a charge info quantum between points or between a point and an empty location and synchronized as required to reset or create a standard point (a point interaction), has to respect the "overall conservation of charge" principle, counted over source and target. It means that a combined successful induction-reset process or coupling is restricted to both interacting objects. Any point source or target cannot simultaneously be involved in two ongoing coupling processes. The fastest potential exchange along the shortest path will be the most successful. It does not prohibit a point, once its charge content starts to change, to emit on its turn charge info to be used later in a next coupling process. This new emission should not interfere with charge info exchanged in the course of an ongoing coupling.
- Law 5: The superposition Law: Charge cannot be superposed (e.g. a point charge q cannot be more charged and grow to a value 2q). Charge info is subject to destructive interference, leading to its partial annihilation in a subset of locations or directions. Quantized phase shifted charge info can lead to constructive interference, meaning that the tenor of an empty location can be lengthened or that a point's null state can start to change again without delay. The latter can lead to a compact or dense growth or shrink (axial) replication process.

- Law 6: The constant speed law: Charge info propagates in emptiness at fixed speed, a value much higher than at least 137 times c, the speed of ordinary light in physics.
- **These 6 laws apply simultaneously in any combination. Their ultimate goal is to annihilate the impact of the creation event and restore the ideal empty state. Such attempt is not immediately successful and leads in a first phase to the creation of a dense, fast growing, dynamic spherical volume around the creation point, filled with short-lived anti-symmetric positive and negative points embedded in empty space. We assume that the perturbation principle applies, meaning that there is more empty space than points in a random cosmic volume in its regime state.**

Charge: the only discriminating signed and quantized property of a point. Its amount +/- q for a single point equals one Coulomb unit charge in Physics. The total net amount of charge in our cosmos is a conserved quantity, equal to the initial quantity q induced in cosmos(0) by the creation event. Charge cannot be described in other more elementary objects and properties in our cosmos.

Charge info(rmation): an abstract fluid emitted (conform the base laws) in an infinite number of directions, as the outcome of a change in the charge state of a point or a set of points (see base laws). Quantized charge info patterns and amounts can be assimilated with magnetic fields in Physics.

Connector(s): The dynamic composite state of the most external set of points or zerons of (a) replicating string(s). Each branch of a string has its own connector: its phase and position relative to a central nucleus pattern, are gradually growing and shrinking whereby its position index value is increasing or decreasing between 1 and I (or i) -max. What is important is its ultimate return state value (I-max or i-max), where in case of zeron patterns, external interactions by exchange of polaron- or axion-like charge info are possible: small I-max values imply higher replication frequencies and more momentum and (kinetic) energy (Physics).

Conservation rule: dictates that a specific property or sum of properties of a pattern (or set of patterns) will not change under certain interactions or over a certain time lapse and /or space volume.

Contraction state: That state of replicating strings where the two branches (or the pattern of 6 branches in case of EZK based zeron replication) shrink their axial replication length to the standard antenna length, where after their roles and properties are inverted versus a virtual central symmetry location. This inversion materialize the tendency in nature to wipe out any non-empty pattern state what only results into the creation of its anti-symmetric copy. In case of complex pattern behavior like a 4-zeron (or Higgs or EZK) replication cycle, 4 contractions and inversions are needed before a pattern reenters into an identical configuration state (a spin ½ particle in Physics).

Contramatter: Any anti-symmetric copy of an ordinary matter-like particle (e.g. a positron with a charge type and other properties opposite to those of an electron) but additionally with an opposite mass or hole type property. A difference in hole type of local contramatter densities has consequences for μ, c' (speed of contra-light) and the fine structure constant parameter values in its neighborhood. The speed of light is indeed depending on local raster properties and the excessive (or reduced) presence of contramatter versus matter will lead to a reduced (or increased) density of raster contact EZP's available for ordinary light propagation.

Cosmos(0): the initial unbounded empty state of our cosmos.

Cosmos(1): the first non-empty state of our cosmos and the outcome of a single creation event. Its single point state implements a simple set with Shannon entropy zero.

CPS: Complementary Point Space is the growing spherical collection of points available for pattern formation. The full set of points (including points involved in high order pattern formation) is simply called "Point Space". Without high order patterns, point space is on a statistically representative scale, homogeneous with a net charge density that is null per unit volume. The point-hole density ratio per reference volume without the presence of patterns, is fixed.

CPT-conservation: a term in particle physics, referring to the fact that certain relevant mathematical descriptions of particle's state or behavior or interactions are invariant for specific combinations of inversions of reference frames or properties like Charge, Parity and Time in the equations. Some

violations of the combined CPT conservation rule seem to exist and these anomalies are sometimes hard to explain in physics. In terms of PhR they can be due to the absence of contramatter in physical models.

Creation event: the first and single event that transforms Cosmos(0) into Cosmos (1) by inducing a single point with a single discriminating property (charge) in an undetermined location at an undetermined time. This concept replaces the Big-bang event in Physics. Its origin is unknown and beyond the scope of this PhR model.

Difference Particle: A pattern that emerge as the difference between a parent particle and its sub-products in case of decay (e.g. when a neutron decays into a proton and an electron, a neutrino will emerge as difference particle). It carries a difference in central EZK-layout and behavior before and after decay. The transformation of a particle into a next version can equally be a source of difference pattern production (e.g. an accelerated particle shifts its position and shrinks its replication length, emitting a photon or, as another example, a contracting neutron moving at constant pace in a gravity field and absorbing a graviton that will be afterwards released in a backward position).

Dimensionality: A dynamic property of a single pattern or a pattern of patterns. In physics (and in linear algebra) it refers to the number of base vectors (forming a reference frame) needed to describe analytically the behavior of a particle or a set of particles (e.g. in a crystal lattice). If refers also to its capability to maintain its properties before and after a real or virtual symmetry operation in space and/or time. In PhR a generic definition refers to the number of directions (in space and time or phase) along which a central antenna has a priori equal probabilities to couple successful with surrounding compliant patterns or particles. As an example: a Higgs-formatted tetrahedron antenna of a proton enables a successful coupling (a collision) between one of its 6 orthogonal connector pairs and a connector of another particle with a similar central Higgs architecture whereby two of their axial replication directions are coplanar and intersect virtually with each other. This explains why Physics “sees” our cosmos in 3D. Emptiness in PhR is infinite-dimensional, the CPS is M-dim, the UZS N-dim and their reduction factor is M/N=137 (in phase space, set by point replication).

Discriminating Property: a property of a point or point pattern that makes the difference, either between an object and emptiness or between two objects of a quasi-identical population in our cosmos. Charge is the only discriminating property that in case of a simple point, makes the difference between something and nothing. This term is also related to the concept and the definition of symmetry.

Energy: As a most general PhR conform definition, it is the capacity of a pattern (or particle) to change the state of the cosmos. Hereby it covers internal changes (e.g. replication) and external modifications of patterns. It is used as a quantity of change or as a quantity of state. Energy transfer requires necessarily a discriminating property between patterns involved in energy transfer. Such transfer cannot be performed in a zero time lapse.

Event: any (inter)action that changes the state of our cosmos. An action requires a convolution of energy and time.

EZK or Higgs: a super-symmetric set of 4 adjacent zerons. In a perfect EZK, they form geometrically a regular tetrahedron, whereby the 4 zerons (or two perpendicular phase shifted EZP's) show 90° phase shifted point replication cycles. Theoretically they are simultaneously in interchangeable DZ,CZ,DH,CH states. Such ideal EZK state is unstable because an exchange of charge info between zerons would imply annihilation by destructive interference in the central symmetry location of the tetrahedron. It means that at least one replication cycle is slightly phase shifted and such "property" is dynamic what leads to superposed states of several pattern versions (by dynamic role interchanges) and finally to zeron replication. The symmetry properties of a Higgs explain why we observe the subset of particles and patterns, like the ones everything in our cosmos is made-off, in 3-dim.

EZO: An anti-symmetric over τ phase shifted EZK pair, each with a different embedded mass type (in fact a contra-symmetric EZK pair)

EZP: a 2-zeron pattern, 180° phase shifted whereby one zeron connector is in the DZ return state when the other is in the CZ state. Such ideal 2 zeron pattern is unstable (see also EZK). A contact-EZP is not a particle but a short lived pair of adjacent UZS zerons, interacting in their return states. Their two different interaction processes on a stationary UZS raster explain a difference in μ, in the

local fine structure constant and a difference in c, the speed of light. Depending on the connector combination, they materialize a slightly different mass quantum. Ordinary phase shifted EZP's are integrated as transversal string components in matter- or contramatter-like patterns and particles and two phase shifted EZP's form an EZK.

(Inverse) Fine structure constant: See Physics. The dimensionless inverse fine structure constant should be exactly 137, the number of replication steps "in time" of a zeron-like point pattern and the reduction factor between the number of dimensions M and N of the CPS and the UZS. However the interaction in i-max with a neighbor zeron explains a small discrepancy between the theoretical value and the really observed situation. This deviation is slightly different for a matter and contramatter-like i-max contacts and leads to distinct contact hole tenors. The combination of both types at the two ends of each single point string should sustain in the UZS, a stationary local oscillation state of this string over a marginal time shift of order τ.

Flatness: the state of a CPS/UZS volume with a local density of free points and holes that guarantees a probability of spontaneous EZO formation up to a level that is comparable to that of an initial particle-free CPS/UZS volume. A natural or artificially flat state in a with pattern filled cosmic volume can produce (with a probability depending on the flatness level) slow neutron-contra-neutron pairs.

Forces: There are no forces in PhR. Transfer of energy, momentum, mass etc… like in Physics are just the outcome of interactions between patterns whereby Axions and/or Polarons are exchanged between compliant patterns or pattern components in appropriate connector states.

Free zeron: In a realistic and replicating EZK, stability of the pattern and binding of knot zerons requires only three zerons involved in quasi simultaneous interactions in a shared dimension. In the central EZK, a single 2τ charge info quantum is interchanged between 3 local zerons leading to what is called their binding by role interchanges and to the superposition of several quasi-identical versions of the same antenna pattern in the UZS. However non-simultaneous replication in 3 orthogonal symmetry directions requires 3 extra 2τ shifts. It means that once replication out of the central EZK antenna starts off as the

outcome of an axion exchange between two zerons of two contra-symmetric EZK's in an EZO, strings will emerge in 3 superposed orthogonal directions whereby the phase angles of 3 of the 4 central zerons are determined and fixed but the phase of the 4th is still free and dynamic. The effective inverse fine structure constant for EZK zerons in a neutron nucleus is reduced from 137 to 133. Hereby we must understand that role interchanges and superposition implies that at least 6 (one per branch) versions of free zeron states in the EZK co-exist. They act as a memory (or counter) of the momentum state of the pattern. Their net value are the outcome of the impact of, by polaron interactions imported excess holes, on the tenor of a replication process. Where the symmetry of a replicating string is such that the value of this counter remains fixed for a particle moving at a normal constant speed with a fixed reduced I-max value, this is no longer the case in a transition phase just after a polaron interaction. Restoring of an equilibrium needs several replication cycles in order to change the central EZK pattern to a state that leads to a position shift of a next version of the pattern (observed as "motion" in physics), a change in I-max value and eventually to multiple short-lived versions of free zerons. At very high speeds where I-max has reached a limit value of about 1, this phenomenon is the cause of a relative delay in the pattern's replication process, increasing in this way its mass (Special Relativity).

Graviton: A rotating circular and flat 2-zeron UZS pattern able to sustain a fixed polaron-like hole. A graviton materializes a unit gravity quantum (Physics). It is unable to move and it is persistent as long as in does not couple with a particle connector in an I-max state. Its large scale density distribution on the CPS/UZS raster materializes a gravity field. It exists in two distinct hole formats (gravitons and contra-gravitons) with a different hole tenor whereby cross-coupling with each other or with particles and contra-particles is impossible.

Hole: a hole is a short-lived and free-of-charge location state, carrying nevertheless an interfering quantized amount of charge info. This quantization requires a fixed delay between replication cycles of enclosing patterns whereby the fastest path principle and a fixed speed of charge info in emptiness (a base law) apply. When a point is reset into an empty state, its charge info content has a different sign, whether it is the outcome of the reset of a positive or of a negative point. In this context we use a notation DH and CH. A contact between

a pair of connectors of adjacent point-replicating UZS zerons in their return states are producing short-lived holes with a slightly different tenor. They materialize positive and negative embedded hole densities that impact parameter values proper to the UZS raster. Polaron interactions with a connector in I-max of a short branch of a replicating zeron pattern (a particle) lengthen the tenor of an embedded hole in a connector-EZP over a time quantum 2τ, increasing after a number of replication steps, particle mass and/or momentum. Gravitons and contra-gravitons are persistent as long as they do not interact: they can maintain a hole in their symmetry center until they couple by polaron exchange with a connector of a replicating zeron in one of its return states.

I-max (or i-max) : the maximum number of steps (or knots) of a replicating zeron or point string in a particular momentum state. This index value (I and I are integers) refers to reaching the return state of a string. Where i-max is fixed, this is not the case for I-max for a zeron-replicating particle out of a Higgs-like core antenna. Its value depends on its momentum state.

Interaction: Any quantized exchange of charge info between pattern components. Within replicating patterns, interactions are internal between knot-like components and between the central antenna and string knots according to a strict charge info exchange schema. When the longest string of a replicating particle is reaching an i-max or I-max state, external interactions with appropriate connector states of other compliant patterns or particles are possible. Between zeron-made particles, exchanges of normalized charge info quanta are packaged as axion or polaron-type patterns.

Knot: a successfully selected component of a replicating string (a point or zeron string) indexed by an integer i or I. Selection of candidate components out of a locally available source (like the CPS or the UZS) requires an appropriate distance in space and time, taking the superposition and interference of charge info, emitted by a central antenna and by partial string connectors, into account. This deterministic, on the symmetry of the central antenna and on the shortest path principle based process, leads to a perfectly (in terms of geometry and time or phase) distributed set of components. It explains why normalization and complexity of composite patterns if further steps of the

evolution of our cosmos, are possible and why (in Physics) equivalent mathematical descriptions of their real behavior can be correct and successful.

Location: any abstract position in space and time in cosmos(0). Any event or any object taking place or induced in a location can only be referenced to in relative and/or abstract terms (there are no pre-existing rulers in cosmos(0), able to locate cosmos(1….X) state(s) or their content).

Mass: A measure for (in PhR terms) a net quantized amount of time, stored as dynamic and eventually superposed holes in a set of EZP-like components of a replicating particle. Unit-mass values are different for matter and contra-matter. In PhR, intrinsic particle mass (like in $E=mc^2$ or like gravity related mass) and inertial mass both refer to the same fundamental pattern and particle property.

Particle spin(s): a phenomenon identical with magnetic spin or an internal orbital quantum spin of particles observed in Physics. As an example and for electrons, the spin vector in PhR terms is oriented along the trisectrice between the 3 axial phase shifted orthogonal replicating strings. It represents the net (taking interference into account) charge info impact of the dynamic slightly phase shifted free zerons and holes of the connectors of 3 orthogonal, in length varying strings. For holes any interference effect is less obvious because a hole as such does not emit charge info but the enclosing zerons do. The relative phase values of the 3 shifted connectors of the long branches will change each time a particular string participates in an external polaron interaction that impacts the particle's momentum: it interchanges the "fastest connector or longest string" property within the string triplet. This event will have an impact on the orientation of the spin vector in a virtual fixed 3D reference frame with axes that coincide with the 3 axial particle strings. For protons and neutrons the spin concept is more complex. The magnetic spin is weaker, taking role interchanges and symmetry of the central tetrahedron and their impact on the replication process into account.

Pattern: A coherent and dynamic set of points, interconnected by the exchange of appropriate charge info quanta along fastest paths. Large objects are pattern of patterns whereby connections can be broken by external or internal interactions. In this sense very few patterns are persistent as a pattern and

never as a version (their raster content changes anyhow). Examples of persistent patterns are points, zerons, EZK's (Higgs), electrons and protons. Particles in Physics are patterns but not all patterns (in PhR) are observed in Physics as particles (e.g. a single zeron).

Periodicity (of a cyclic process): The time it takes (expressed in multiples of τ) for a replicating pattern to re-enter into the same connector configuration state.

PhR (Physical Reality): the (proposed) set of unproven most elementary components, processes and laws that constitute our cosmos and dictate its behavior. It is a theory and its correctness cannot be proven but internal consistency, on top of compliancy with Physics can be used to check the validity of any proposal.

Point: The single most elementary particle-like object in our cosmos and the direct outcome of the Creation event. It owns a fixed signed amount of charge "q" as the sole discriminating property between something and nothing. A point has a fixed growth and shrink cycle τ and $h/2=E(q)*\tau$ is the action needed to set or reset a point.

Point Replication: two orthogonal anti-symmetric pairs of two appropriately phase shifted points with a shared central symmetry location are able to induce by a single (axion-like) interaction in one point of each pair, two successive charge states of the same type (but opposite in the two pairs, in order to guarantee overall charge conservation in the cosmos). Each pair is able to maintain this single anomaly several times in a row whereby along fastest paths in time, an anomalous point state is copied, alternatively left-right, be it with a phase shift of order τ. An event sequence that creates and sustains this growing two sided point pattern is called a point replication process. Each 2-point pattern is called a point string or a zeron, an in time (or phase) growing linear composition of two branches whereby their last position and/or time shifted point states are called dynamic connectors. Adding points to a string is a selection exercise of appropriately phase shifted point pairs, being dynamic connectors, out of a set of replicating partial point strings, emerging as short-lived versions replicating in multiple superposed (slightly phase shifted) time dimensions around a common central location. All successful selected points

(or knots) of a growing branch are interconnected between each other and with one of the central (antenna) points by well synchronized (or in time equidistant) charge info exchanges (a case of constructive interference). This means that the sequence of successive selected internal point states of each partial successfully completed string branch, are 2τ phase shifted. Charge info emitted by enclosed "axial" points "set" a connector state, a local appropriate "transversal" CPS point resets it again into an empty state. With respect of the fastest path selection rule, the longest pattern "in time" is able to persist over 137 successive quantized replication steps. When reaching that limit (i-max) the probability of interaction with a neighbor zeron in a compliant short-state and acting as a short lived transversal string, is higher than the probability of a delayed successful internal coupling with another appropriate superposed 2-point antenna of the same length. This external interaction is the cause of a phase jump τ what leads to a shrinking (in time) under the impact of an ongoing internal axial charge info exchange process, whereby the initial net charge type is maintained until the string enters into a contracted 2-point state and the charge type is inverted and (as a new version) an anti-symmetric string restarts its growth. The contact state between two adjacent interacting zerons in i-max, generates or eliminates a hole, in fact a positive or a negative deviation from a standard local charge-hole density ratio, being a form of positive or negative "mass" and a source of energy: as two types of interaction are possible (an excess point is reset or a hole is filled with an extra induced point) two dynamic zeron classes exist in the cosmos, leading to matter and contramatter-like behavior. Each class contains zeron states with a slightly different hole tenor as unit mass quantum and a slightly distinct fine structure constant 1/137, +/- xxxx (physics). The intrinsic, a priori fixed, tenor of 137X2τ is determined by successive internal interaction shift over small opposite time quanta and the requirement that, despite the distinct impact of an external interaction between zerons in i-max, the original oscillation-like growth-shrink like process must be stationary (otherwise the CPS/UZS raster as a global coupled quantum macro-object would not reach an equilibrium state, needed to permit a further evolution of the cosmos) could determine the prime number value 137 (why 137 and not another prime number ??). This suggestion has to be confirmed by computer simulations.

Polaron (interaction): One of the two fundamental quantized types of interactions. It permits an exchange of an appropriate charge info package between compatible patterns or pattern components with respect of conservation principles, leading to a change of certain properties in both, the emitter and the receiver of the package. In the polaron case it changes the quantized hole content and/or tenor in both interacting objects and because these objects are just raster point compositions, it has a small impact on the local point-hole density ratio in the UZS itself. To change the hole tenor of a particle's short branch connector, a properly synchronized EZP like charge info pattern has to be exchanged. This elementary pattern is called in PhR a polaron. Emitter and receiver of a polaron have to be two particles (or patterns) of which one has an over 2τ phase shifted zeron composition (e.g. gravitons) or both have connectors in I-max states of short branches of Higgs based replicating particles. Polarons transfer momentum between particles. Either the exchange is direct (connector to connector via a virtual photon in Physics) or the polaron is embedded in a photon pattern or in a graviton. The hole tenors for matter and contramatter are different, so a normal polaron cannot couple with a connector of a contra-particle (and vice versa).

Process: a coherent sequence of events.

Raster(s): A generic term for the CPS or the UZS or both together.

Return state: A connector state whereby the growth of a replicating point or zeron string stops. Thru an appropriate phase shift and a by coupling with the central role-interchanging antenna pattern, all string branches indirectly start to shrink. Reaching a return state is the outcome of a different process for point and zeron replication. In case of point replication, growth (in time or phase) stops when two neighbor zerons interact what happens under standard conditions in an UZS raster (after 137 steps). In case of zeron replication out of an EZK antenna, this process stops when a phase shifted transversal free zeron copy (it is synchronized with a free zeron in the central Higgs when the pattern is in the contracted state) in the connector of the longest branch is reaching an appropriate phase angle. When this happens, the roles of two zerons of the connector are interchanged. The new axial zeron state is over τ phase shifted, whereby charge info coming from zerons in the enclosed branch resets the new connector state and reduce step by step the string length. Former string zerons

become again ordinary UZS zerons. The offset value of the phase angle of a free connector zeron depends on the equivalent value of a free zeron in the central Higgs. This value determines the maximum string length and the life time of a replicating patter and indirectly its momentum, being the pace at which subsequent, in position-shifted particle versions emerge. So the free zeron configuration in the central Higgs acts as memory of the momentum property of a particle. Photons and neutrino's propagate as modified Higgs patterns at maximum speed c and their micro-replication mechanism must be different (for neutrino's computer simulations are needed).

String: a linear coherent set of knots, in fact selected raster components (points or zerons) integrated in an out of a central antenna zigzag-wise emerging coherent pattern, able to grow and to shrink alternatively left and right (the two branches of a string). In terms of Physics we could call this process simplistically a form of oscillation whereby the string length would be its variable amplitude. Knots and part of the central antenna components are interconnected by charge info exchanges with a central antenna as well as between knots. This process is called point or zeron replication, as it is able (without external interactions) to maintain in the course of a by physics measurable time lapse, an initially single anomaly in the central antenna pattern, by distributing and storing its impact in one or several (symmetry depending) string connectors.

String spin: this term refers to the circular distribution of subsequent free transversal zeron states, selected around knots of linear axial zeron string of a replicating Higgs-based particle. Its virtual rotation sense is opposite for matter and for contramatter particles. It is linked to the role inversion process in the central Higgs tetrahedron, and hard to compare with any equivalent particle property in Physics.

Superposition: Several versions of the same pattern can co-exist as the outcome of the intrinsic symmetry property of a central cyclic charge info emitter (or antenna). As these versions emerge by coupling with multiple central components, internally bound through fixed phase shifted charge info exchanges, these external components are in relative terms also phase (or time) shifted. Where in QM superposition means that (e.g.) a particle can simultaneously be in several superposed states, this statement is not entirely

PhR conform. However QM is not able to detect between multiple versions small phase shifts of order τ.

Symmetry: A local or global property of a pattern of points/zerons that refers to its invariance for certain discrete or continuous transformations by virtual or real charge info driven interactions. Examples of transformation classes are translations in space and/or time (over a raster) and/or between dimensional subset (see zerons), rotations, inversions, changes in charge or/and mass types …. Transformations can be real (active) or can refer to changes in reference frames in which the behavior of a patter (e.g. a particle) has been (mostly) mathematically described (passive). If a pattern (or a system) has a local symmetry that is embedded in a global (e.g.) raster with its own distinct large scale symmetry properties, a mathematical description of a local state or process has to add a "gauge" term that is representative for a large scale property and has only a limited impact on local small scale behavior, transformations and symmetry properties. In PhR and at the time the UZS/CPS raster was (still?) growing, the negligible impact on (e.g.) local raster parameter values, of a radial translation in space/time of a local subset of dimensions embedded in the global quasi infinite dimensional spherical CPS, is an example of these principles. In physics (QM) the integration of gravity fields produced by large mass objects or discrete electricity / magnetic fields in their small scale mathematical quantum formalism, are other examples.

UZS: The collection of zerons being a dynamic raster of replicating 2-point patterns. It spontaneously and dynamically emerges within the CPS by selecting (as a cyclic process) points in appropriate states and integrating them in point-replicating patterns. Also in this case the perturbation principle holds, meaning that only a small but variable fraction of points are, at any moment, part of a zeron pattern. In Physics and Cosmology the UZS has to be treated as a gigantic coupled quantum object filled with more complex patterns that constitute matter (Physics).

Zeron: An elementary UZS component and the smallest persistent cyclic (with periodicity T) point pattern in the cosmos. It has a two-point central antenna, a linear (in time) axial + transversal point string, two connectors of which one maintains an over T/2 persistent charge excess, the other a hole. The (physical) length of a zeron in a fixed time frame is just about one point because the

initial set of two antenna points the pattern is made off, are perfectly τ-phase shifted over halve a point growth-shrink life cycle (2τ), meaning that the time and space distances between both are fixed and small. The two points of a pair couple with each other over a minimum distance in a minimal time lapse for 50% of their point life cycles, the other 2X50 % are distributed over exchanges with points of each branch. When the two central points flip their states taking their partial replication processes in both branches into account, they remain perfectly synchronized and properly phase shifted. It just means that two points of a central antenna pair "live or behave" in separated subsets of dimensions: charge info exchanges in one growing or shrinking branch do not disturb the partial replication process in the other. A zeron has 4 special short-lived connector return states labeled CZ, DZ, CH, DH. CZ en DZ refer to opposite charge types, CH en DH to hole types. Only connector return states are (external) interaction enabled, the other states and due to the fastest internal interaction principle are not. Only in those states zerons have "external" energy meaning that they are "external interaction" enabled. For holes the term energy means that they implement dynamically or sustain a small quantum of emptiness as a form of inertia, observed as mass. In PhR energy is linked to a discriminating property, being a non-standard point-hole density ratio. In physics and in combination with replication, it explains partly Einstein's equivalence formula $E=mc^2$.

Zeron Replication: A cyclic growth and shrink process of a zeron-made pattern, whereby a one-shot anomaly in a central symmetric antenna (in casu an EZK or Higgs) is copied along multiple symmetry directions by adding step by step selected UZS zerons in appropriate states, to this pattern, along 3 orthogonal zeron strings. These zeron knots are bound with each other and with the central EZK by appropriate quantized charge info exchanges. The initial anomaly (mostly a net unit charge quantum excess) is stored in multiple slightly phase shifted string connectors, a dynamic process depending on the symmetry and the internal behavior of the central antenna.

Zeron Replication and Collisions. Replication can lead to a successful external one shot or cyclic coupling between connectors of compliant patterns like particles, whereby both are in appropriate I-max states. Standard charge info packages can be exchanged (axions or polarons) between both whereby one

connector is the emitter, the other the receiver. The roles of both are not pre-determined and synchronization is a statistical phenomenon. Hereby the pattern with the shortest string is more frequently in an I-max state and has more chance to be emitter. It explains why in case of two colliding particles, the fastest particle will statistically, in case of coupling by repetitive interactions, lose momentum in favor of the slower.