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: Changes versus version 1 are printed in Italic. An updated list of frequently used terms has been added to this article. In the future such list will be joined to new versions of other PhR -articles on viXra*.*

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 and laws 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 related 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 *that starts from nihil*.
- 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 *limited* to our solar system) in cosmology are based on the outcome of just a single measurement technique, namely light detection or more precisely, 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 *(or photon)* in the course of its journey.
- Most observations of cosmic phenomena *make use of* 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 ("About Physical Reality" on viXra.org/abs/1604.0230). 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” *to explain an increase of the cosmic expansion rate,* 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 *(according to cosmologists)* 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 *terms,* properties and objects with a precise definition and directly or indirectly deductable from *a unique* initial creation event. *It leads to the evolution of our cosmos* 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 *whereby* external perturbations *give* several distinct results and a distribution with a stochastic character.
   - Counting *(addition or subtraction)* 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 a Lagrangian 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 high-dimensional sphere growing in emptiness since the creation event, a fast recursive process driven by the base laws. All what exists (observable or not) in our cosmos, are just dynamic and layered compositions (or patterns) of (at a 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 or return state o*f a replicating particle pattern and not permanently involved in internal or persistent external pattern binding,* are sources or antenna's of *stationary quantized* charge info *patterns*. *In this context excess emissions due to free charges in a replicating pattern, taking its time-geometry properties into account, can produce as the outcome of constructive interference at point level, dynamic (electric-like) fields (Coulomb) or (magnetic-like) fields (spin, Aharonov- Böhm effect …) . Such fields are classes of polarization patterns in the UZS (single axial zeron orientation or dual transversal contact-zeron effects , leading to open axial chains (electric field lines) or closed rotating charge info patterns (magnetic field lines) that make use of local free UZS zeron densities, as represented in Physics by appropriate ε en μ parameter values. Free connector charges are partially bound with EZK zerons by charge info exchange but in some cases a local reset takes place what means that the replication process has still a local impact.*
- 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 <u>hole</u>. 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 *along a linear dense over 2τ quantized path*) in its maximum growth or life time state, will interact at one "longest or *fastest*" side with a compatible neighbor zeron, according to two possible and distinct scenario's. *These interactions lead to locally different point-hole ratio densities (ε parameter) and to distinct μ parameter values, as determined by densities of cyclic short-lived matter- or contra-matter-like hole states of interacting zeron-pairs (contact-zeron or contact-EZP's)* .

- The presence of large densities of coherent complex point-zeron sets (particles *in solid state lattices* 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. *Physical raster parameters like ε and μ will express in PhR the local availability for new pattern formation and propagation (e.g. photons), of basic components (raster points and contact-EZP holes – see hereafter), meaning "not already engaged in other processes and patterns".*
- *The zeron raster (UZS) is able to support the emergence and the replication and propagation of matter as well as contra-matter patterns (like (e.g.) particles). This capability is indeed, as stated before, the outcome of the double scenario for interaction in i-max between adjacent growing zerons in the CPS. The factor 137 in combination with the value τ guarantees a dynamic multidimensional stationary two-state UZS locally oscillating network and is the source of two fixed but dynamic tenors of contact-EZP holes. The average density distributions of these two hole types in the UZS are a priori equal but their availability for supporting (e.g.) propagating particle patterns of each type (matter and contramatter) can depend on strong unbalances: on one hand the varying local density distributions of particles or contra-particles (e.g. gravitons: see hereafter) and on the other hand, on the relative availability of free contact-EZP's of a particular type, taking also polarization effects into account. Hereafter in this text, we refer indirectly to such local unbalances when using the generic term "(non)-flat conditions" in the UZS.*

- 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 an 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 grow its size, otherwise it could theoretically remain (in line with 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), as otherwise the presupposed conservation of charge all over the cosmos could no longer be guaranteed. Denial of this conclusion 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 internally coupled quantum object whereby (theoretically) each short-lived point at every (absolute) amount 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 (*in space and time)* 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 at two distinct locations or in different 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 *quantized* charge info in all possible directions in emptiness. These *info packages* are subject to constructive and destructive interference (a base law). It guarantees that multiple effective interactions between a source antenna and several target objects, leading to an exchange of energy between both, cannot simultaneously take place. *Using the term “quasi-superposition” implies for quantized zeron-made particles, the presence of a minimum time (or phase) shift of order “ τ” between correlated events, being a quantum of order 10exp(-43)sec and too small in order to be measured by physics. Application of this rule can be subtle: when as an example, in a later step of the evolution a simple particle-like pattern like an electron starts growing, the zerons that constitute one of its axial strings (its knots) will be subsequently coupled in time with several antenna-zerons with lower index values, meaning that there is no delay between the end of a reset process (a matter of transversal coupling with selected and with the central EZK synchronized local zerons) and the start of a next growth cycle. This tight-binding principle guarantees standardization of the duration of a replication cycle for all members of a particle class and it protects them against random external charge info attacks except in special replication states (in I-max or in the contraction state). It does not violate the minimal delay rule when coupling takes place between several (be it indirectly correlated) pattern components.*
- The delay between the *original* emergence of a local CPS volume and the subsequent formation of the most simple pattern set (being *in fact* the zeron raster) 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 *correlated set or* stream of micro *patterns*, called fotino's) was capable to make quasi immediately use of the double CPS/UZS layer in order to *emerge and 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 *photons made of coherent* fotino showers- see chapter 10) *induced* by accelerated *charged* particles, need a CPS/UZS raster in order to propagate, they must be conserved *as a pattern, even in a cosmos with a fixed maximum size and when reaching its border, as long as they have not been absorbed by a successful interaction with another compatible particle*. So their paths will be bended or *their patterns* 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 large particle clusters like (e.g.) our galaxy.

4. Conservation rules and a *generic* definition of the term "Energy".

- <u>In PhR</u> the generic definition of the term **energy** is "the quantized capacity (as per unit of time) of small patterns, *as well as* of large sets of simple raster patterns, to change the cosmic state ". *This change cannot take place in zero time units (a base law).* The *only fixed reference unit*-of-time in PhR is the point-*empty* state-transition time τ. *This definition of energy accepts implicitly that a pattern cannot change an object in its environment if it is identical with it. So it presupposes the presence of a "time dependent discriminating property".* L*ike in Physics PhR calls the convolution of time and energy an amount of* ***action****, expressed as multiples of a h/2 unit quantum and being in fact and at the lowest level the action amount required*

to induce in an empty location (or to reset) a standard point charge state q in a lapse of time τ.

- Any internal or external change within or between patterns will make use of single or multiple quantized and fastest charge info exchanges (called **interactions**) 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 *propagation and* 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 *effective* 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 slightly more complex fotino format), but also on variable local raster parameters like (e.g.) μ and eventually on the (pre)polarization state of the local 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 principle leads to normalization of particle-properties for electrons, protons…*as measured by physicists.*

- 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” *or “facilitated”* by polarization *of raster elements*, or “by selection”. Good examples of such pre-check process are the double slit experiments in QM or the results of most EPR experiments, whereby charge info based pre-checks are *performed* 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 (as 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 *in Physics* an important measure of the average energy state of large number of patterns sets, seems to be less representative at the level of a single interaction between the connectors of two protons. “Seems” because temperature could be *related in PhR to* the average string length of replicating particles, thus the frequency of being in an interaction enabling state.
- *In PhR there are only two special elementary states that materialize <u>locally</u> an amount of energy as compared to a uniform density of positive and negative points in the CPS: a positive or negative charge density excess in space-time and a hole-charged point density ratio with a positive or negative deviation versus the equal standard value.*
- 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 *with previous paragraph in mind*. This will be (as an example) for a proton its dynamic central (Higgs) antenna pattern state, its *changing* connectors format and its replication length (I-max value), *taking* relative phase shifts between strings *and branches* of the same pattern *into account*. All these properties are contributing to a *specific* symmetry state and have to

be expressed in quantized raster units. We remind that in PhR (like in QM) *some* 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.

- *To change the energy state of a particle (or a pattern) an interaction is required. Interaction means the exchange of a micro-pattern packaged as an axion or as a polaron (or a graviton- see further): the first is able to change the charge states of both interacting patterns, the second is changing their time behavior and indirectly local point-hole densities and related properties like momentum, mass etc…by modifying their replication schema's and integrating them in the main pattern (e.g. a photon absorbed by a proton). These changes take place at point level as expressed by fixed quanta of order q and τ.*
- 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.
- 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 net in space and time effective *and quantized* 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 that will increase substantially at high velocities close to c – in fact PhR of a mass increase in SR) and the dynamic (or kinetic) energy state *counted* over 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 *neutrino's,* 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 *most* fundamental raster properties do not locally change *(μ could vary)*. *It is important to accept that charge info itself does not contains energy otherwise (e.g.) destructive interference would violate an energy conservation rule. Idem for the "coupling" base law.*
- 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, *partly* balanced *but often short lived* zeron patterns (e.g. Higgs based mesons).
- These principles, valid at a smallest scale are conceptually important even 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. Cosmological models and physics in their present state can confirm a respect of charge and space conservation rules but not 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. Their null-energy amounts 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 (*a phenomenon with a low probability rate)*, returns their pattern content into standard uncoupled raster components, eliminating in this way their discriminating properties and by definition their energy impact.

- 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 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) *and opposite null mass energy amounts*. Charge info emitted by two-zeron connectors (polarons) in I-max 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 rate remain possible and are (indirectly) observable. The absence of contramatter in present cosmological models and theories (like in general relativity) explains partly their lack of *compatibility* 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), although *the local hole density in space and time of an hypothetical stationary CPS/UZS volume without particles (including gravitons) is fixed and conserved*.
- 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 *large scale* "potential" energy and space-time curvature in a GR context. *Hereby both matter and contramatter densities are to take into consideration, even if on a small scale, particles and contra-particles very rarely interact by axion-type events.*

- *On a cosmic scale, increasing graviton and contra-graviton densities could lead to a future crunch of our cosmos*.

5. 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 this space a stochastic process will lead to the emergence of a subspace of dynamic UZS patterns called zerons. Zerons are able to maintain a dynamic connector point subset (the UZS) in the same fixed charge type state, hereby reducing its dimensionality "in time" . The underlying process, called "point replication along a point string" will reduce M to a 137 times smaller number of dimensions N. Growth of a point string stops by interaction with a compliant neighbor zeron point connector (see chapter 3).*
   - 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: *either* a point reduction by reset or an induction of a new point in a local temporarily empty location. *In a local stationary and UZS volume devoid of patterns both types are correlated for a critical ε dependent M to N reduction number 137.*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 cause or 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 *as stated before* 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. *This remark is important because the reset of a point in a replicating point string depends on the availability of an adequate random CPS point : if the probability of such reset event would be too low, one cannot assume equal growth and shrink times for a point string.*
- 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 could 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 of 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 *particle* 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 such 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) took place 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. *Such scenario presupposes that the probability of the creation of new zeron versions would start to decrease, leading to a partial UZS destruction and subsequently to shrinking of the CPS (an unproven phenomenon).*
- 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 object *to be observed*
    - 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 reconsidered. 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 a moment 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 *radial* 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). *Hereby we repeat that the meaning of the term "flatness" in PhR is not the same as (e.g.) an equivalent term in GR when qualifying a local gravity field curvature under the impact of two large enclosing mass distributions.* 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 happen further away from (e.g.) a galactic symmetry center when the size and the impact of a central "black hole" is increasing.

6. 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 *(and remaining)* 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 is *just* a composition of properly synchronized pixels, in fact activated by sets of semiconductor components in appropriately *synchronized* 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 a primitive cosmic CPS/UZS raster, are dynamic *contra- or* 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, c*ontracting according to a double inversion sequence at EZK level ?*) Higgs nucleus or core (an EZK being a 4-zeron pattern *or a Higgs*– ideally these zerons are in 4 phase shifted or orthogonal CZ,DZ,CH,DH states).
- Gravitons are *dynamic flat and* circular "closed" 2-zeron patterns and the outcome at Higgs-core level, of an unbalance between contracting *transversal* branches of replicating 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 UZS zeron configurations *along linear paths*, *selected and* interconnected or synchronized by charge info, emitted by ordinary "free, *meaning not involved in an internal interaction*" particle connector zerons in I-max or return states of replicating strings. *Subsequent synchronized and polarizing charge info emission processes take place each time a fixed I-max connector return state is reached, a phenomenon that lasts until a replicating particle re-enters into an equilibrium state and/or occupies a new shifted position on the double grid. Polarization patterns* are dynamic and coherent

(or temporarily bound) sequences of primitive raster components. In terms of physics they could materialize *or enable* "gauge particle" *propagation* like virtual photons. *The propagation speed of a polarization pattern is much higher than c and does not consume energy: it is just an ordering by selection process along a fastest path.*

- The impact on cosmological *models* 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 *contra*-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 *(or have already called)* a short-lived double anti-symmetric Higgs pattern state *with opposite mass types:* <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 *between corresponding zerons* of a quasi perfect contra-symmetric 8-zeron state, *leading* to two orthogonal τ phase shifted anti-symmetric 4-zeron Higgs. This event is *immediately* leading to replication of a particle and a contra-particle whereby these two *orthogonal* 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 interaction – dynamic "Coulomb field – like" *polarization* lines between string

connector zerons remain inside a 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 *(a process that needs further investigation)* and to the formation of multiple more or less stable collections of isotopes of atoms (*filling* 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 *and often unstable* 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 mathematical models are (sometimes partially) successful in describing cosmic behavior, not vice versa.

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 *in M-dim* dynamic and, *in infinite-dim,* phase shifted reference frame, in casu the double CPS/UZS raster.
  - *A term like "dynamic" needs in this context some comments . Most of the large scale observations made by physicists and cosmologists make use of light (EM-waves), propagating at a fixed speed c, as part of any measurement process and technique . If the growth rate of the maximum size of the double*

raster and the propagation speed of charge info in emptiness are exceeding by far the value c and if the UZS raster, deployed of particles, has everywhere the same properties, we belong a-priori to a cosmic subspace that is, in local terms, spherical symmetric whereby we are implicitly in the center of a corresponding virtual volume of M dim and there is no easy way to find out what the relative position of this volume is versus a global absolute CPS volume, centered around the unknown creation location. Our relative position is indeed depending on a quasi continuous shift in time of point replication processes in a local representative CPS volume that historically were leading to the creation of our local UZS raster subspace and its pattern content. That means that Einstein's relativity principle can be correct, even in M-dim, be it for the wrong reason and if applied on the spherical M' subspace to which we belong. We are in a local Goldilocks position if the replication length of Higgs based patterns in our neighborhood have an absolute maximum value ! So if we stated in this PhR that the relativity principle in SR is wrong, it would be more correct to say that:

- *There is a preferred and absolute reference frame being the spherical growing M-dim point-zeron raster centered around the creation event, so from this perspective SR is wrong.*
- *The growth speed and the charge info propagation speed in emptiness is much higher than c. Also the propagation speed for contra-light is slightly higher than c. In both cases SR is wrong although the latter statement makes little sense if SR does not recognize contramatter.*
- *Any observer using a measurement technique constrained by the value c of EM propagation on a double CPS/UZS raster with universal properties would consider himself to be in a Goldilocks state at the center of its relevant spherical sub-volume in M' dim if its local I-max value of replicating particles is larger than all other distant replication processes within the same virtual sub-*

volume. Such I-max value is depending on the "history" or "evolution" of its observation location because initial neutron states with superior I-max values can only shrink their I-max states due to local matter or contramatter interactions and redistributions and their forthcoming impact on hole distributions and momentum states of both particle classes.

- *Within such M' sub-volume and using a local preferred reference frame in space and time, the use of Lorentz transformation formula's using a fixed value c can be correct, although in an encompassing M dim reference frame they should be subject to a higher level transformation formula that takes the unknown absolute value c_v into account, at least if local calculations are made for events taking place in a sub-volume close to the border of the CPS/UZS. .*
- *All processes in a local CPS-UZS volume behave in the same way and are allowed to use the same base parameter values like c, μ, ε, the fine structure constant etc…. whereby some of these values are slightly different for matter / contramatter. There is a cross- impact on some of these figures if the local UZS particle density distribution disequilibrium is so important that the standard 50-50 % presence of the two types of free contact-EZP's is disturbed. An example is a black hole-type UZS volume.*
- *Because "we" and "they, meaning other distant observers" cannot measure the absolute charge info speed c_v there seems to be no way to find out which one is closest to the creation event location and the absolute reference frame linked to this location remains transparent to all observers in every subspace. If we succeed in performing an experiment where new neutrons-contra-neutron pairs are created, the relative speed of the instruments involved versus these neutrons*

gives us an indication about the Earth's relative velocity in our locally relevant sub-sphere but not versus the global M sphere.

- *Light or contra-light emitted by any replication process in any location, will propagate in volumes with a non-excessive matter density (e.g. not like in glass), at a fixed speed because fotino based replication and propagation is a local quantized process that depends on standard UZS-CPS properties and parameters.*
- *Things have to be revisited when light emitted by an object in our neighborhood would be reflected (eventually many times) by a cosmic sphere with a maximum size around the creation event. In that case the picture that we would observe in all directions of particular star configuration could give us some indications about our absolute position relative to the creation event in an M-dim cosmos.*
- *If the absolute cosmic sphere would rotate around a virtual axis, its location and orientation versus (e.g.) the rotation plane of the earth around the sun could help us to find our absolute position in the cosmos (the axis of evil ??). Idem if there are differences in the properties of the two hemispheres above and under the rotation plane of the earth around the sun (to be confirmed).*

- C is the 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 fotino versions, *replicating over distances of the length of an EZK nucleus and* 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 be able to maintain the dynamic internal structure of a quantized CPS/UZS pattern. Another excess of the "c" limit applies to the rate at which elementary point patterns are growing by replication (e.g. a point pattern growth and shrink process in a simple zeron).

- In the context of a fotino emission process *and neglecting here the internal stepwise transformation of its central Higgs,* 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 and regains a regime state, impacts the double grid, each time its pattern is passing through the contracted state and is *transformed* into its next anti-symmetric format. Based on the outcome of the double slit experiment and taking energy conservation rules into account, this impact could be just 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 (taking into account its base law conform destructive interference property *and the presence of disturbing local pattern densities* – think hereby *again* on *trajectory bending in* a double slit experiment and the importance of symmetry) taking place at an effective speed much higher than c. Such event sequence is similar to the polarization of a series of UZS zerons, as induced by *dynamic and single free connector* zerons in I-max whereby the *measureable* 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-type 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 adapts *effectively* its I-max value and shifts its position, a complete(d) photon selects the ultimate shortest fotino-path (*or sequence of paths if taking interference and local disturbing objects into account – think again at light passing thru a small slit or a crystal lattice – a fotino pattern has a dynamic transversal state enabling rotation and bending of its propagation path)* to connect source and a compatible target, transferring in this way energy (and an equivalent amount of mass) at a maximum speed value c. Such micro-replication process behaves as a sequence of subsequent particle versions, a pattern propagating at the speed-of-light c 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. *In many applications (electronics) bursts of EM waves are the outcome of a second order phenomenon whereby the I-max values and the speeds of high numbers of free replicating charged particles (mostly electrons) are modulated by a cyclic process in an electric circuit. Their wavelength is determined by the set-up of the electric circuit (plus antenna) and the EM field vector properties depend on the fotino densities or in fact, their emission rates per unit of time by the circuit antenna.*

- 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 and shortest replication length , "released" by a parent particle as an antenna that <u>stands still</u> (in absolute terms, be it relative to the local double grid) in its contracted state.

What "moving" means for the parent is, once again and driven by charge info exchange, a shift of the EZK symmetry center along an axial string towards a next adjacent replication knot (as axial string knots are equidistant in space and time, momentum is a quantized property), so its location becomes the contraction center for a next particle version. By dropping the presupposition of dragging and by accepting a fixed value c, the results of a Michelson-Morley experiment are mathematically spoken obvious and have as such no added value.

- *As stated above, the e*mission rate 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 single 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 intermediating an "EM-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 this process corresponds with an EM wave in Physics, as properly described by Maxwell's equations.
- Free neutron interactions with an atom nucleus are examples of a non-Coulomb based 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 treated as 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. In cases of even more extreme amounts of energy involved, 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 *of* a stream of matter-like particles, accelerated mainly in the past towards the Sun by a *dominantly* radial and gradually 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 ??). *In PhR terms, dark matter is just another name for a graviton density distribution. In some cosmological experiments "collisions" of two large galaxies have been observed, whereby the outcome was a redistribution of matter by the bending of the trajectories of interacting stars and planets but whereby two huge enclosing volumes of dark matter just seemed to cross their paths, continuing their journey, independent from what happened to their original central condensation hubs. Cosmologists see this as an indication that dark matter is a substance on its own. In PhR it proves that a gravity field is nothing else then an historical graviton distribution, actually independent from the presence of a central "attracting" mass. However, what makes things even less transparent is that after a position shift of a large matter volume along its orbit, the original graviton distribution in previous locations is re-installed for gravitons involved actively in the momentum process . It means that the original "slow" condensation process of a massive spherical object took place over a volume of the size of a torus, temporarily filled with gravitons and, enclosing the rotating object along its orbit.*

  - *Hypothetical e*xtreme and unlimited gravity based effects leading to the growth of black holes as proposed by GR, are not PhR compliant (see hereafter).

- Taking previous remarks into account about the limited ability of Relativity to properly describe Physical Reality, the fact that fundamental parameters are the same all over the cosmos is not a surprise, according this PhR model.
- The base laws implement the presence of a unique and fixed (creation) point format with standard and *constant* growth and shrink

time values **τ** and a fixed charge quantum content (+/- **q**) for the whole cosmos. A fixed **h**/2 action amount (a convolution of time and energy) 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 behavior with a different *hole* tenor for any dynamic (or short lived) *contact-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 *136,97* ???…) are present since the earliest steps (in absolute time) of the cosmic evolution.
- The role of the fixed number **137 is crucial** : it is the maximum number of point replication steps in a zeron life-cycle before an external interaction between neighbor zerons becomes more probable than a further growth *of selected superposed point strings by* constructive interference *of* charge info emitted by the connectors of shorter strings around a common 2-point zeron nucleus antenna. The number must be prime but it could be unclear why 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 CPS object, itself dependent on an 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, permanently sensitive to large scale effects in our cosmos!
- 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 *interconnected network of local* oscillating zeron patterns, in fact two-sided replicating point strings able to rotate in the contracted state around a virtual central symmetry location. *This scenario goes together with respect of the CPT conservation rule by each replicating*

point string, whereby the interchange of the longest branch property (the negative P term in CPT – C is maintained and T is negative as replication starts to shrink) in case of destructive interference of the previously longest branch connector due to the impact of an external zeron connector (one of the two possible contact scenario's). All this would guarantee *persistent* values for both fine structure constants.

- We refer to what was mentioned in chapter 1 as an issue relative to (e.g.) the use of abstract c, μ and ε parameters in physics, and the fundamental raster properties of our cosmos, put forward by PhR: are both definitions compliant with each other? If we propose a c' value for contra-EM waves being 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 (conform its own principles) makes by deduction a proposition that requires 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 a 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. *If an EZO splits into a neutron-/contra-neutron pair, conservation of energy implies that* $E=mc^2 = E'=m'c'^2$ *, so if c'>c the contra-neutron mass m' is slightly smaller than the neutron mass m what makes sense if the hole tenor in an EZP' integrated in a contra-particle is smaller.*
- *Without computer simulations we are unable to confirm this statement, but in PhR it is quite obvious that implicitly two types of matter, of EM waves and of fundamental parameter values should exist in our cosmos: SR and GR do not cover this fact. However at a macroscopic level, there would be a conflict between some propositions in this text, saying (for example) that there is more contramatter than matter present in the central black hole of our Milky Way, contradicting hereby computer simulations leading to c'*

=< c values. *When investigating such potential conflicts, 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 temporarily* ***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" (or unbound) raster elements with typical contramatter-like contact properties will be higher, and so will be the complementary and average raster properties for other pattern types . This principle is valid for particle and contra-particle densities separately what can be misleading in a raster volume with mixed particle/contra-particle densities.*

- 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 . *If previous statements about the local character of the value 137 are correct, <u>all the fundamental constants in our cosmos can be linked to the values q and τ and M (and to the set of natural numbers), the only properties of the creation point: this conclusion is extremely important for the correctness and the internal consistency of this PhR model.</u> Although the value 137 is an important parameter, certain replication patterns spread its value over space and time symmetry properties (see other PhR articles on viXra).*
- Hypothetical non-equal values would require some extra unknown *but non-fundamental* discriminating properties. However this could imply in a worst case scenario that there would be some so called fundamental parameter definitions or values in Physics that are not PhR compliant (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. *That means that for reasons of charge conservation, each of both particles of a pair has to be charge neutral (a neutron and contra-neutron).*
- Also because an underlying “primary” or “pattern-free” point raster needs to be locally “on average” charge neutral, previous assumption requires a distinct discriminating property between subsets of point patterns that would be the basis for a new *and over the CPS distributed* 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 *neighbor* 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 *eventually* to a small position shift of the central symmetry location of the zeron replication pattern involved (*remains to be proven by computer simulations)*: geometrically a zeron pattern has only a 2-point length and the terms "short" or "long" have to be seen as *two,* over τ phase shifted *sequences of* 2τ time slices, in combination with a *dynamic* 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 (*PhR of the mass property)* and on their geometry (leading to opposite string spins when replicating, not to be confused with a particle spin (*in QM*). As these requirements have an ad-hoc or stochastic character in the UZS, the probability of a spontaneous successful 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 *neutral 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 c' is a bit higher than c, 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 most galaxies*, 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 a shell of *excess* contramatter at the surface impacts spacetime (and its parameter *values*) in such a way that most of the *orbits of emitted* photons will be curved. 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.
- *If ordinary photons emitted by a matter-like core particle reach the surface of a black hole, they enter into a larger UZS volume dominated by contramatter. So in relative terms the complementary contact-EZP's that are not engaged in contramatter replication are predominantly matter-like. That means that pre-polarization by multiple fotino patterns is facilitated and that bending of propagation paths of ordinary photons is such that these photons are confined to a shell near the surface of the black hole mixed volume. This phenomenon can be compared with light refraction at the surface between two transparent materials with different speed-of-light properties. So PhR proposes another explanation than gravity for the*

fact that a black hole does not emit light and has a tendency to confine ordinary light, coming from inside in a halo surrounding a core volume.

- *Contrary to what GR is proposing, c*ondensation of particles (or contra-particles) accelerated by polaron impact of gravitons cannot lead to quasi infinite mass densities in the center: short range*, charge info based 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 *angula*r momentum and the nice spherical 3D form of *most* 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 of *a replication triplet* , and the relative probability of an increase in momentum *transfer* along a transversal string direction in a 3D Higgs based replication schema, will *become more probable*.
- 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 an excess contramatter shell around a smaller 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.

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

- *As forces (see Physics) do not exist in PhR, they need to be replaced by equivalent direct or delayed interactions between raster patterns, whereby in the second case field particles like photons, gravitons etc. will store and/or carry temporarily primitive energy-carrying charge info formats (polarons, axions) as potential coupling instruments between versions of main particle types or components (atoms, baryons, leptons...). Interaction processes have to respect over-all energy conservation rules.*
- Gravity-like forces 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 connectors in an I-max replication state, will release *at the time its present version will be substituted in the contracted state by a new version,* a closed circular pattern in the CPS/UZS, called a graviton (or contra-graviton) particle. A graviton is a difference pattern emerging *step by step* in the contracted state of two branches of a particle string that carries at one side a connector with an extra quantized phase shifted <u>transversal</u> zeron pair (*an EZP,* in fact an in time lengthened EZP hole) *due to an external polaron perturbation at connector level (meaning: each particle string contraction releases a single EZP copy as a partial and future graviton pattern that is still linked to the particle replication process at the level of its central EZK or Higgs – computer simulations are needed to confirm this process).*
- *This transition state* comes to an end once the parent particle has shortened its I-max value by 1*. It increases (or decreases) its momentum state (physics), meaning in PhR terms: by shifting periodically in the contracted state the central symmetry location at a higher (or lower) pace over the UZS raster. We call a particle state after any position shift, a next version of this particle, being in case of an extra imported or exported polaron, the owner of a slightly*

changed quantized momentum property. *At this moment, a net graviton will be released as a difference pattern.*

- Variable densities of gravitons released in the UZS materialize what is called a gravity field. Hereafter is explained how *even an* 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 *conservation rules require that* in this case any released graviton will be reabsorbed (or vice versa) after a position shift, a process without net momentum change or net impact on a flat gravity field, *although an hypothetic situation as perfect flatness rarely exists.*
- A graviton sustains a persistent or stationary matter- or contramatter-like hole (enclosed and maintained by a rotating EZP) 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 circular pattern. *One could say that it interchanged local positions on the UZS with a corresponding excess hole in a Higgs based replicating pattern when shifting the central location of a next version in the UZS over one quantum distance.*
- In other terms: a dynamic virtually rotating EZP stores and maintains an extra time quantum packaged as a quantized hole with a fixed duration, whereby its standard tenor has a slightly different value for matter and contramatter EZP holes. Gravitons as autonomous (circular) patterns and as long as they do not interact with a particle connector, are persistent. *The enclosed hole represents a unit mass or contra-mass quantum: so terms like a persistent hole, a unit mass quantum or a unit time quantum and a graviton are equivalent, referring to the same property of an elementary UZS pattern.*
  Gravitons are different from (e.g.) standard short-lived contact-EZP patterns between any two neighbor UZS zerons in their i-max states. Although both implement locally a small point-hole density excess or shortage versus a local 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, compared to an ideal replicating point string *short connector* in an UZS zeron where in

case of gravitons, a difference in impact on the replication cycle depends on the connector symmetry state of a replicating and in i-max interacting particle, *at the time the interaction takes place (this effect of a spin 2 graviton cancels out over a full particle life cycle – see further). The hole density type of energy depends on the particle class of the EZK (matter or contramatter-like) that released a graviton.*

- Charge neutrality, persistency and quantized isotropy of a rotating graviton pattern *presupposes an* extra axion-like interaction between zerons of subsequent adjacent versions of the virtually rotating EZP pattern, leading each time to an additional inversion of charge types, neutralizing in this way the usual standard charge type inversion in the contracted state of two *transversal* branches of a point-replicating zeron. But charge neutrality *could equally mean that a graviton pattern has been built up as a difference pattern between transversal connectors in the course of subsequent contractions of unbalanced inverted EZK zerons. The virtual rotation axis of the graviton is oriented along the string carrying the unbalance. The complete charge-neutral graviton will be released when a position shift of a parent EZK takes place and its internal equilibrium will be restored. Inversion* means anyhow 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, *but the assumption of a dynamic extra axion-like charge info exchange between subsequent EZP's , built in a free (= not involved in a polaron interaction) graviton guarantees the persistency of the dynamic graviton pattern as such* .
- In case of an interaction between a graviton *(in a gravity field)* and a particle *connector*, we assume that the <u>absolute impact</u> 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 *emitted by another particle or by a photon*. However the probability of successful coupling is much higher due to the fast *virtual* rotation of a graviton EZP. It will obviously depend on the matter/ contramatter *type* property and on the orientation of the

graviton's virtual central rotation axis (perpendicular to the rotation plane) versus a particle's axial string *orientation* (both have to be at least coplanar).

- The ultimate *net* momentum impact as such, depends on the symmetry state of the *short transversal* connector of a multi-state string, replicating out of a complex Higgs nucleus, at the time of the interaction *(remember that the term or property "spin" refers to the number of contractions and inversions of a stationary replicating EZK based pattern, needed to re-implement the same particle connector configuration)* . Think hereby also on the case of forced deceleration whereby interaction takes place in the anti-symmetric I-max 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 would be not important *(we presume that it is the same for all gravitons released by the same particle class - matter and contramatter gravitons rotate in opposite sense but they are anyhow non-compatible because their embedded hole tenors are different) as* the net *local* impact of a graviton coupling always means an increase of the duration of the hole state of a short *connector* EZP versus its standard I-max state: the *difference of impact (acceleration or deceleration) is related to the charge types and the relative phase angles of the enclosing zerons and depend as such on the spin ½ or 1 replication schemas of the particle in its I-max states, taking the inversion of the EZK and the role of free zerons in the contracted state and their coupling with transversal string zerons into account (a complex process that determines indirectly the next I-max value as such and the role inversion of transversal zerons of a branch: it needs computer simulations)* **.** *In this context we draw the attention on the ambiguous wording when using the term "tenor" for a standard hole duration in an EZP or in a contra-EZP , and for the tenor of a hole state of a connector in a short branch of a replicating zeron pattern, a term applicable to matter as well as contramatter particles : both replicate in the same way!*

- 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 particle replicating in a disequilibrium state. “Primitive” because they balance the impact of any I-max disequilibrium on the complex Higgs core contraction process itself. *Hereby and taking the impact of 3D -replication, contraction, inversion and position shifts into account*, 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 a reshuffling of the replication schema of a neutron turns it into a proton schema plus an electron, hereby releasing a neutrino as difference pattern *at central EZK level*. There is however an important difference in the kind of disequilibrium to be compensated: a neutrino pattern *is able to* propagate and is most probably an “axial or mixed string *disequilibrium* correction”, a graviton rotates locally and is just a “transversal string adjustment” *that goes together with the symmetry state sequence of a central EZK in the course of a replication process*.
- <u>It is clear that computer simulations are needed</u> 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 *that* balances 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 slightly modified graviton density distribution in space materializes the change of energy stored in a <u>non-flat</u> gravity field, as determined by the position shift of particle over a small unit length. In QM terms this graviton can considered to contribute as a static unit field quantum to the 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 a 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 *EZK related* symmetry inversion processes into account. It means that a moving particle is at least able to restore a local gravity field *(materialized by a certain graviton density distribution)* 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 and/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 short shrink and growth cycle to re-enter into a similar (be it rotated over a small planar rotation angle) 2-zeron state, this as compared to a spin ½ Higgs based replicating pattern that needs 4 growth and shrink cycles to reenter into an identical particle state. Spins of matter and contramatter particles, just like gravitons and contra-gravitons, rotate in opposite senses versus each other but this makes no difference for what the time impact of a polaron on a connector is concerned . *Hereby the term "rotate" just refers in fact to the orientation of subsequent versions of transversal zeron pairs of a branch at the time a graviton was built up in the contraction state of a replicating pattern.*
- 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 and *to the distribution of free zerons in a central (EZK) Higgs*. 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 could explain 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. <u>We reject this idea</u> except if the contrary would be proven. If a graviton is a difference pattern that has been gradually built up by two unbalanced branches of a polaron-carrying string just before and after inversion in the contracted state, charge neutrality is anyhow forced by the inversion process itself, whatever the number of contractions (neutrons versus protons) is !*

- *W*e 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 *at constant velocity*" 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 *whatever the orientation of the string that was subject to a polaron perturbation*. 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 (e.g.) 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 Einstein tensor equation as proposed in GR). *This statement is important and means that the virtual <u>net</u> local mass-impact of released gravitons and an (unchanged) null-mass of a position shifted parent particle need to be the same : so the graviton layout and its primitive rotational replication schema have to respect this principle. That is why a net local gravity field density distribution only changes in case of particle acceleration or deceleration, compensating a change*

in momentum energy of a (non-relativistic) particle with constant null-mass.

- 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 distinct graviton* ***densities*** *in unit volumes oriented either towards or away from the central symmetry center of a large matter (or contramatter) distribution*. Any stationary *at large scale* central symmetric **spherical** distribution of gravitons will show due to its geometry alone this asymmetry 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 *and experiments* is so much smaller than any other type of force, although in PhR terms the impact of a graviton or a photon on a particle connector are both polaron-like. The difference between both is that a spin-1 photon interaction requires a *more* specific connector state *of a particle* in order to be successful, *contrary to a spin-2 graviton*. *The outcome of a photon coupling is also sensitive to the orientation of the photon spin.* Pre-polarization by an UZS string (a coulomb field line) determines a priori what the sense of the net impact on the motion of *two* particles will be *in case of a direct short range virtual photon interaction (an electromagnetic coupling in physics)*.
- 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 *(in fact young stars or planets)* 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 *angular* momentum. *It explains why rotation axes of stars and most planets (Uranus is a typical exception) are stationary and quasi permanently perpendicular to their rotation plane (PhR behind conservation of rotational or angular momentum).*

- A non-zero tangent (*or perpendicular to the radial 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 *temporarily* lost after a successful axial *connector* 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 is irrelevant for circular graviton patterns). So coupling probabilities between particles depend on the angle between coplanar replication axes (see hereafter: bending of trajectories of "*elastic scattering*" 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 *interaction* impact itself is not string length dependent, the *reach* 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, as is the case when 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 representation, each time a particle is interacting with the gravity field. This seems to be odd but its non-relevance in QM 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 values became gradually smaller. On a macro scale and in a energy equation in Physics a reduction in potential energy of a particle should be balanced against an increase (or decrease) in kinetic energy and (eventually) by the external or internal emission/absorption 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 *and as a macro-scale-phenomenon,* 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 *the enclosed* mass *in a virtual sphere* (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 *and remains a micro-scale event*.

- 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 *a relative increase of polaron type charge info exchanges with an orthogonal string connector and* an elliptic orbit of the particle and/or to an increased *angular* momentum of the *enclosed* 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 and *momentum* 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 a *different* 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 could also be 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/ contra-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 *that has an impact on the density of non-engaged contact-EZP's in the UZS, hereby* 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" distributions of 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 and production 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 increasing distances from the center. In such *dynamic* distant flat shells, GR or Newtonian physics will no longer hold. 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 *in volumes gradually more distant from a large scale symmetry center* 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 is just limited to cases where locally the contra-graviton density gradient 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 co-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 low mixed graviton-contra-graviton density <u>gradients.</u>
    - 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.
    - <u>The elementary quanta that sustain gravity fields are gravitons and their masses materialize dark matter (or contra-matter</u>). There is no need for another mysterious particle to explain anomalies in the results, calculated conform GR or Newtonian physics (e.g. distant stars *rotating* around the center of our

galaxy and moving too fast *and nevertheless do not escape* , are *PhR compatible if the local cosmic volumes that they occupy along their present orbits, used to be in a "flat" state at the time these stars emerged, a state leading to local simultaneous massive particle and contra-particle production*) *and if the enclosed large scale graviton densities are able to maintain locally the adequate particle orbits*.

- 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 values (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 will have 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 scale 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 interactions, have to be taken into account. In normal circumstances gravity will have a negligible impact on the *short range QR based* 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 *as well as* contramatter) are identical (except from their orientation, anyhow a less important property *except in cases where several graviton densities are superposed : e.g. the local gravity field on earth, superposed on the large scale graviton distribution of the sun*), 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 would 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 would exist, could hardly be called "graviton waves".
- *In the set-up of an experiment like LIGO, any unwanted impact of EM waves on interferometer measurements will be detected and automatically eliminated from the observed results, but this does not happen for contra-EM waves (physics is not even aware of their existence). If their intensity would be extremely high, they could*

disturb the local point-hole density ratio of the CPS/UZS raster itself, having 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 measurements are not precise enough to draw relevant conclusions and several successful tests are needed before an average result can confirm (or contradict) *statistically* 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 *strong* gamma ray bundle emitted apparently by the same (mixed) source(s), 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 as proposed in cosmology.
- In this PhR model and as an example, quantized EM and contra-EM waves propagate on the CPS/UZS raster, *materialized by in space and time varying (contra)fotino densities, packaged as (contra) photons* . They can be reflected from or bended within the dynamic border shell of this finite raster. In both cases (contra)photons are able to carry conserved quantities of information and energy between source and target, and they are anyhow unable to propagate in emptiness. If a fotino in PhR is just a *particular short-lived* dynamic pattern of raster components, where in Physics a photon is the smallest info and energy quantum of an EM wave that can propagate *even in vacuum and behave as a continue object*, 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 at a temperature of about 2.7° K. Its dynamic state and its properties could be seen as the expanding 3D surface of an initially small cosmic volume *at the time of a* Big-bang when matter did not yet exist (an inflation based model, at least partly in conflict with PhR). Our *cosmological* instruments would observe indirectly a picture of this surface and its content after an enormous delay *due to the limited speed of whatever information transfer process, based on EM waves*.
- The properties of a CBR's q*uantized* 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 *on the walls*, so all the by radiation entered energy is *internally* 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 *in those cases where* rays have been absorbed by matter or contramatter objects, distributed *all* over the cosmic volume.

- The in this chapter called cosmic (particle-like) 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 became 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, *on their turn* 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, *with Lorentz transformation compliant decay periods*, not some artificial, observation dependent curvature of an abstract spacetime volume (SR-compliant). 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. *In cosmology the origin of huge quantities of proton based showers in cosmic rays is a mystery. In PhR they were initially just neutron/contra-neutron pairs and the outcome of spontaneous EZO decay in "flat" border volumes of our galaxy.*
- *Apart from* these "collisions-with-protons" 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 EZK (Higgs) level, electron-like replication schema (PhR)) . On earth they are observed as the outcome of nuclear reactions (physics) or of their forthcoming pattern and energy unbalances in a central Higgs (PhR) , mainly the outcome of symmetry adjustments, modified role interchange processes and free zeron behavior within the Higgs nucleus of mutated *high energy* particles *with I-max values close to 1*. The number and the kind of unbalanced contracted strings will determine the neutrino type (its

simple internal replication schema –*this pattern behaves as a real particle, able to propagate just like an electron*) *whereby its* type might change *(so called neutrino oscillations) in the course of its journey. In PhR this phenomenon could be the outcome of slowly varying internal replication process or it could be that* a neutrino was "hitting" another local pattern (e.g. a graviton ??) *or that it* passed thru a CPS/UZS volume with raster properties that were substantially different from those of its o*riginal local* environment.

- *Neutrino's In cosmic rays are mostly released in nuclear reactions, taking place on large distant objects (in Physics). This means in PhR terms: in those cases where unbalanced replicating particles with superposed Higgs patterns, each with multiple versions of free zerons, are reshuffled in their contracted states*. *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 on earth a secondary event that could be measured by our instruments, a neutrino needs (most probably) to interact with a potential 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 in order to be involved in a collision and an axion type of interaction, must quasi coincide in space but they also need to own proper sign and phase values at zeron level, whereby each of them can be in about 137 different phase states per growth /shrink point replication cycle*. That is why in most cases neutrino's just cross the Earth without being involved in any collision at all. Some neutrino's seem to originate from inside the *Earth itself what means in PhR terms that these nuclear reactions could support a the mixed type planet theory*.
- EM-like photons are difference spin 1 pattern distributions, emitted (often *originated by a* direct local polaron exchange with another particle, materializing virtual photon impact in physics) by unbalanced replicating particles with a central Higgs based architecture.
- Their origin is the outcome of a multi-step process. In its initial phase and each time an unbalanced replicating Higgs based particle goes thru its contraction state, *a shower of* multiple superposed, virtually

coupled by selection, polarization patterns with a contact-EZP format will emerge *(a process* to be compared with Coulomb –like single zeron polarization paths in the UZS). When this process proceeds, a cascade of p*arallel* short-lived potential (*or candidate)* paths for photon propagation *will* emerge. This selection of *appropriate contact-EZP's* by simple charge info emission p*ropagates* at a speed much higher than c and does not transport a net energy amount, just (charge) information. It takes destructive interference into account and as such the (*at any moment changing)* symmetry of the environmental set-up of an experiment (e.g. the case of the famous double slit experiment).

- These multiple coherent *parallel* paths exist for a while, until one path is selected as the fastest or the most probable, taking the antenna *and target* states, their format *(e.g. the equivalent wavelength)* and symmetry and charge info interference principles (see base laws) into account. The *ultimate* selection *and coupling (direct with another target particle or postponed and intermediated by a completed photon that behaves as an autonomous particle)* 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 momentum state stored in the central Higgs*. When a complete quantized photon is released, coupling between source and target can take place *directly* and a mass (or hole or action- or energy) quantum, packaged as a polaron, can be exchanged.
- *To summarize the case where antenna and target do not couple directly: when a photon is released by an antenna particle, it behaves itself as an autonomous difference micro-particle, able to propagate over distances much longer than a single wave-length. As long as this particle does not interact with a compliant target, with respect of the principles of energy and momentum conservation, it continuous its journey on the double grid. It takes pre-polarization by local particle densities into account and it behaves like a real particle (so its propagation path could be curved due to its own curving capabilities) .*

- A 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 (*due to the hazardous behavior of the UZS itself)*, becoming again a collection of ordinary unbiased or *random* components of the double CPS/UZS raster, once a photon is complete and propagates.
- We refer to other viXra articles to understand the role of the phase states 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 *(transversal)* 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 *(as compared to the equivalent wavelength of an autonomous photon pattern)* 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. *Selected f*otino's behave then as *patterns of* 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 extremely 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 near to value c into account.
- A speculative PhR compliant explanation 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, leading to the production of sometimes large number of neutron / contra-neutron pairs (*see before – cosmic rays)*. The exact locations in the cosmos of zeron subsets with the appropriate conditions and properties are hard to predict but the presence of flat curvature surfaces of overlapping gravity and contra-gravity fields are natural conditions for spontaneous production of excess quantities of neutron/contra-neutron pairs. If a large well synchronized collection of these charge neutral 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 our Earth !), they will be accelerated as a mixed group in a state whereby neutron (and contra-

neutron) decays could be delayed. These restrictions are even not required 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 (solid state like) sets with an internal energy spectrum that shows statistically a narrow Bose-Einstein-conform energy density distribution. *Neutrons are spin1/2 particles and never show at "normal" temperatures an energy spectrum of that type but there are other cases where particle-pairing at very low temperature takes place (think on super-conduction by paired electrons in certain materials at extremely low temperatures and appropriate magnetic fields).* 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 over long distances and could reach occasionally our instruments on Earth as a group. Because neutrons that belong to those sets would be *quantum-wise* coherent, observations could misinterpret the measurement results and consider the group to be a single massive particle with a total amount of 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 candidate-sources of cosmic rays, are in fact processes and phenomena that could a-priori take place anywhere in the cosmos. Concentration in any central symmetric gravity field, of large numbers of extra accelerated particles can also lead today to the emergence of new young stars in a galaxy.
- PhR predicts that most of what has been proposed for a matter-based cosmic environment like the one our Earth belongs to, can take simultaneously place in non-observable and by contra-matter

dominated “worlds”. These phenomena are normally transparent for our instruments, even if they would take place in a common spatially overlapping cosmic volume here on earth. An exception could be the outcome 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 more precisely G type main-sequence stars (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 . *Between the chromospheres and the corona is a rather chaotic transition zone (200 km) filled with hot plasma fibrils and filaments moving at high speeds between both spheres.* 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 *observable* 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 total 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 *in a volume* 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, *in a volume* close to the center of the Sun: *as on a cosmic scale* equal quantities of matter and contramatter *have* initially *been* created and

because the sun's planets seem to be rather matter-made, this assumption makes sense. This *presupposition* 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 mainly filled with a contramatter excess density.

- The slightly slower or delayed arrival of matter in the center of the Sun's increasing double gravity field, *in combination with and superposed on outwards ejected nuclear waste of the core reactions*, 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-type 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. *Hereby one must take the presence of a huge double field gradient and a by contramatter dominated black hole in the center of our galaxy into account.*
- All 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 around matter and hidden contramatter cores, had a chance to emerge. *Such* 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 combination with central symmetric gravity fields around in size decreasing planets* .

- In this perspective it makes sense, for what the history of the planet configuration around our Sun is concerned, to assume a speculative 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 *and a reflux of solar waste 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 longer 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-matter 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 gradient *opposed to the Sun's gravity field gradient,* that could partially neutralize its impact at the *appropriate distance.* Again the difference in maximum speed of matter and contramatter particles could play a role in creating flat zones where smaller planets started to emerge out of new neutrons/contra-neutron pairs .
- 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) *in the neighborhood of an overlapping flat shell* . 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 as 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.
- *It would be interesting to reconsider the status of Pluto and its 5 moons in a PhR perspective. It could be that at least Pluto itself is a mixed planet, enabling LENR-type energy production in a contact surface in its core. This theory would explain why this planet seems to be a source of Nitrogen (where does this*

otherwise come from ?) and confirm that the temperature at its surface is too high to be explained by solar radiation, taking its eccentric orbit and its large average distance to the sun into account.

- As quasi parallel magnetic fields produced by *charged rotating concentric matter and contramatter volumes have rotation axes with independent orientations versus each other*, 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 its virtual magnetic axis has changed and has even been inversed a few times, as compared to a fixed orientation of the actual mechanical rotation axis of matter (total rotational momentum is conserved – the rotation of a contra-matter mass volume would be transparent). *As also for a contra-world, its angular momentum is a conserved quantity, a reorientation of the magnetic field requires either a substantial eccentric increase of charged contra-mass or the temporarily presence of another invisible contra-object that has an impact on the orientation of the rotation of our hypothetical contra-world.* (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 in Physics) or orbital momentum directions of contra-electrons around a contra-*nucleus* ?). 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 *sensitive to* deviations of new particle /contra-particle orbits approaching and hitting the Earth *and its contra-partner*, could rotate in the opposite sense. *Finally the two symmetry centers of our world and its contra-world could not coincide or could be subject to a secondary relative motional effect.*
- 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 a growing 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 local production of slow neutron/ contra-neutron pairs could be extremely dangerous *for life on earth*. Hypothetically a local flat state could temporarily exist on Earth on a small scale and could be dangerous for all kind of (moving) equipment that makes use (e.g.)of Lithium batteries, very sensitive to exothermic Li-neutron nuclear reactions.
- We do not know if *exclusively* 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 speed of rotation of matter and contramatter particles is slightly different.

- If this distribution in our Sun is not homogeneous or isotropic (e.g. due to the presence of large planets (Jupiter-like or eventually a similar large non-visible *contramatter* planet) in the neighborhood , attracting particles of a particular type), *a rotating Sun volume could contain circularly distributed areas with more or less flat conditions and nuclear activities.*
- This could explain the nature and the intensity of sunspots, *including the cyclic magnetic field properties 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.
- *In a PhR concept the question of stability of hypothetical concentric volumes of matter and contramatter has to be*

investigated. What are the relative degrees of freedom of such two balls with a quasi common symmetry center , taking short range internal interactions in contact surfaces into account ? Can a ball escape from this combination or is a sustained common orbital rotation possible ? What is the impact on the combination of partial external gravity fields ? Could this (e.g.) interaction lead to wobbling orbits of two interacting planets with a distinct matter/contramatter quantity ratio?

- 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 ?
- *A possible scenario for the emergence and evolution of our solar system (as described here before) is focusing on the gradually*

changing matter and graviton distribution around the sun and between and around newly emerging planets. If these dynamic processes have been determined by graviton density distributions, as well as by contra-graviton densities and subsequently by spontaneous creation of new neutron-contra-neutron pairs, large scale flatness as an UZS property was and is important. That means that the relative position of the Sun on a galactic scale has to be taken into consideration in order to fully understand its evolution.

- In most actual cosmological models and by proposing multiple successive generations of large 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 will be 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 a EZP based patterns like gravitons, transversal strings and dynamic short branch

connectors of particles. Theoretically this "separation" will not be 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 *intrinsically a local* character and is much stronger than a hole based impact, the latter being the major cause of non-flatness *(in GR terms*) in locations where matter and contramatter have been separated on a cosmic scale or where variable graviton densities dictate spacetime curvature. Hereby we should not forget that without the presence of patterns, the UZS itself is intrinsically a source of *on average* equal densities of the two hole types. *The more a local UZS volume is biased by the presence of an excessive density of contact-EZP's of a particular type (e.g. a strong local graviton or contra-graviton field in GR) , the less that volume is flat.* We repeat the generic definition *and criteria for* (local) flatness in a non-empty cosmos: it means: any temporary condition, induced by superposed global and local dynamic patterns, that increases o*r decreases* the probability of spontaneous EZO formation in the UZS up to a significant figure, as compared to the *original* 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" on the UZS raster.
- Examples of dynamic artificial local flatness seem to be short-lived flat locations in some regular appropriately and (*with hydrogen or deuterium)* heavily doped metal FCC crystals, *owner of* significant but dynamic (thus potential) local adequate symmetry properties. *Hereby charge distribution but also hole related charge info distribution (spin properties of raster components) are important.* Most probably similar symmetry states could also be dynamically "created" by

complex organic 3D molecules like enzymes but this interesting topic (see 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 *short-lived* and stochastic behavior. Examples of sources of perturbations of potentially flat conditions are: (e.g.) *lattice* impurities, the internal temperature sensitive and quantized impact of phonons (solid state physics), *propagating over the raster and* leading to complex local variable momentum states (PhR) etc….
- Numerous small and properly doped crystals, suspended in a fluid at the appropriate temperature, seem to show statistically a 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 are superposed on small scale conditions and could have a negative *and unpredictable* impact on the *density numbers* of temporarily flat locations. *Also the presence of graviton densities in combination with varying non-observable contra-graviton densities (if our planet would have a mixed character - an unproven presupposition) could have a (be it weak) impact on the presence of local flat conditions.* That means that the probability of spontaneous EZO appearance in a local CPS/UZS volume will fluctuate, what on its turn complicates 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" on Google). Multiple cold fusion-boxes set- up in a container gave better energy production figures per box than a single

box (see Rossi – Cold fusion experiments), a result that is consistent with what we mentioned before, as neutrons "escaping" from one box, have a chance to impact successfully the *energy production rate of a* reactor in an 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 do 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 easier for scientists to develop reliable physical and mathematical models for nature's small scale behavior (e.g. QM), than to explain in a consistent and evolutionary perspective and starting from scratch , the emergence, the behavior and the evolution of very large objects like galaxies, stars and planets.
- Some basic rules applicable to our cosmos and presupposed in this PhR model (*e.g. the presence of contramatter*) , could lead to new or at least adjusted cosmological models that would be able to answer many open questions. 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 (version 2).

Axion (interaction): Where a polaron (*an EZP connector zeron pair of a replicating zeron string)* 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 *(in fact a point interaction between point replicating zerons) has an impact on the charge type property of a particle (Physics) and* changes the local charge density and the net quantized charge info distribution in the UZS. This means that a one-shot charge info pattern emitted by a point (e.g. *as component of a dynamic* zeron *connector or an EZK*) has forced another *compliant* point (in an *UZS- or in a particle string-* zeron, being the receiver) *after a shortest or quasi zero time interval* into two subsequent identical charge states *(any CPS interaction conform the base laws between a shrinking points and an empty location is obviously axion-like but the induction of a new point is slightly delayed and takes place in a distinct location: it does not belong to the class of interactions as meant here)*. Such dynamic excess-charge can be (e.g.) stored in the connector of long branch of a particle and will be maintained *during a certain number of replication cycles*. Its impact *in special replication states (I-max or the contraction state)* on the double CPS/UZS raster (a *Gauss or Coulomb* polarization line) is assimilated with an electric field line. If a particle's dynamic excess charge distribution is producing (by *constructive* interference *along a trisectrice of 3 phase shifted branches*) a quantized charge info pattern, it materializes a magnetic field in physics (*e.g. magnetic spin of an electron)*. As charge is a conserved quantity on a cosmic scale, an axion-type interaction must create simultaneously two excess charges with opposite charge types in two interacting patterns *with respect of a CPT conservation rule*. 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 an extremely low probability rate *because it has to take place between pattern points in appropriate free connector return states . In particle physics, axions may have a disturbing impact and lead often to a decay of the original*

pattern after mutation by high energy collisions that increase the probability of successful short range axion coupling.

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 a zero time lapse). At point level it means that *it takes a* fixed *and* finite time lapse τ *for* any *empty location or an empty* point state *to* change into a charged state q or vice versa. This law creates a local symmetric quantized time dimension *whereby* we neglect the *global* asymmetric impact of charge info on the large scale cosmic growth *, a macro-process with its own time dimension*.
- Law 2: Emission Law. Any change of the charge property of a cosmic state leads to the emission of charge info in all directions by any point that flips its charge state. The sign of this charge info is such that it is meant to annihilate the change *at the source or at least its external* impact *by compensating w*hat was the cause of its emission. *An empty location cannot emit spontaneously charge info but enables the propagation of charge info according to law 6 or the induction of a new properly signed point according to law 3.*
- Law 3: Induction-reset Law: The impact of a well synchronized charge info quantum *emitted as proposed in law 2,* on the cosmic state is such that if it hits first an empty location (*a new location in a growing cosmos or the empty state of a former point)*, 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 *compliant* target), it will reset this point into an empty state. *This process has to respect law 4.*
- Law 4: The coupling Law: Any exchange of a charge info quantum between two 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 (called a coupling) is restricted to both interacting objects. Any point being a 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 *due to a successful coupling*, 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 (*see CPT conservation)*.

- Law 5: The superposition Law: Charge cannot be superposed (e.g. a point charge q cannot be more charged and grow (e.g.) 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 change again without delay. The latter can lead to a compact or dense growth or shrink (axial) replication process, *protected against random interactions.*
- Law 6: The constant speed law: Charge info propagates in emptiness at fixed speed, a value much higher than at least 137 times c, being the speed of ordinary light in physics.
- **Comment: 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 of the cosmos. 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 (the CPS). We assume that the perturbation principle applies, meaning that there will be more empty space than points in a random cosmic volume in its regime state.**

Bifurcation: *an interaction within or between components of a complex pattern that splits its format and main event sequence into two independent sub-patterns (meaning: non- sensitive to new interactions of another type then the one that has lead to the original split), each involved in complementary chains of events. An example is a split of an EZO by an internal axion type interaction into two EZK's (a Higgs and a contra-Higgs) whereby both sub-patterns will not be sensitive in the future to polaron-type interactions, proper to each other's class. Conservation rules apply. In case of an EZO split, it means*

that CPT is conserved between the original EZO and the two sub-patterns together. As a result, the new emerging complementary matter and contramatter particles will have opposite charge types (C conserved) , 2 orthogonal strings that respect opposite relative phase shifts in space versus the 3°, leading to opposite spins (P not conserved) and there will be a 180° phase shift at point level between shrink and growth cycles of replicating strings (T not conserved). Classic electricity laws applied to contramatter are different, meaning that the left-hand rule becomes a right hand rule and that the relative phase shift between an E and B field vector in Electromagnetic waves is inversed.

Charge: is the only discriminating signed, *dynamic* and quantized property of a point. Its *fixed regime* amount +/- q for a single point equals one Coulomb unit charge in Physics. *At any time in an M-dim cosmic reference frame t*he total net amount of charge 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 *terms* and properties *of* our cosmos. *The context has to make clear that the term "charge" refers to the regime state of a point or to such dynamic flow of charge (or current) that it will be able to build up (or reset) a state q (or empty location) in a fixed time lapse τ.*

Charge info(rmation): an abstract fluid emitted (*and propagating* 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. *Charge info is subject to the superposition base-law.*

Connector(s): The dynamic and composite state of the most external set of points or zerons of (a) replicating string(s). *Hereby "external" refers to a maximum phase (or time, dimension and rotation angle) for point strings in zerons and additionally, to space or length or index-value in case of zeron strings.* Each *short* branch of a string has its *proper* connector *with a complementary state reached after a quantized shift (or delay) of order τ or 2τ versus the "fastest" connector in the long branch.* A*ll the dynamic connector versions have* phases and positions relative to a central nucleus pattern (*the central antenna Higgs)*, that will gradually change or grow and shrink whereby the position index value is increasing or decreasing between 1 and I (or i) -max.

This replication process along a fastest path is driven by axion and polaron interactions between pattern components of a branch and/or with well synchronized components of a central EZP or EZK pattern. What is most 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 *packages* are enabled: small I-max values imply higher frequencies of full replication growth and shrink cycles and more momentum / energy (Physics) as *stored and maintained (if no external interactions) in subsequent particle versions*.

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

Contact-EZP: *see EZP. It is a short lived UZS pattern between two compliant point connectors of neighbor UZS zerons, both in their i-max states. Two type of interactions are possible and the number (137) of point replication steps in combination with the value τ and the CPT conservation rule guarantees a local stationary oscillation state of any local dynamic replicating N-dim zeron set.*

Contraction state: That particular state of replicating strings where two branches (or a complex phase shifted pattern of 6 branches in case of EZK based zeron replication) shrink their axial strings to standard *initial 2-zeron* antenna length values, where after *in a next step* the roles and properties of antenna components are inverted versus a virtual central symmetry location. This inversion materialize the (*unsuccessful)* tendency in nature to wipe out any non-empty pattern state what just results in the creation of its anti-symmetric copy (*see Base law comment)*. In case of *dynamic* complex pattern like a 4-zeron (or Higgs or EZK) replication cycle, 4 string *growth and* contractions and inversions are needed before a pattern connector set reenters into an identical configuration state (a spin ½ particle in Physics). *In case of anomalies stored in connectors and unbalances between contracting branches, a position shift of a virtual symmetry center over a standard UZS raster length takes place and eventually one or several autonomous difference patterns can be separated from the parent in this contraction process. Both processes respect all conservation rules.*

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

CPS: Complementary Point Space is the *initially* growing spherical collection of points *remaining* available for pattern formation. The full *M-dim* 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 relevant 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 a particle state or its behavior in case of interactions, are invariant for specific combinations of inversions of reference frames or properties like Charge, Parity and Time in their 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 *differences* could be *the outcome of the* absence of contramatter in physical models. *The CPT conservation rule is a direct outcome of the base laws: an example is how an 180° phase shifted interaction (T-) in I-max of an axial connector of a replicating particle can lead to excess charge conservation (C+) and the shrinking of a string (P-). The most primitive expression of this law refers directly to the base laws: a growing (T+) positive point (C+) will emit charge info*

at the "back side of the growing edge" " (P-) that is able to induce a growing (T+) negative point (C-). Or it can reset (T-) a positive point (C+) at the same side (P-).

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 a 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 *the grid components involved in* a parent particle's *replication cycle* and its sub-products in case of decay *or transformation* (e.g. when a neutron decays into a proton and an electron, a neutrino will emerge as difference particle). It carries *often* a difference in *the* central EZK (*free zeron)* layout and behavior before and after decay. The transformation of a *mutated* particle into a next *more stable* version *in the contracted state is a potential* source of difference pattern production (e.g. an accelerated particle shifts its position *faster* 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). A *difference particle integrates in its pattern often one of the superposed versions of a parent core (mostly an EZK) , enabling its autonomous replication capability.*

Dimensionality: A dynamic property of a single pattern or a pattern of patterns. In physics (and in linear algebra) it refers to the *adequate* 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 *replicating* Higgs-formatted tetrahedron antenna of a proton enables a successful coupling (by *interaction in I-max*) between one of its 6 connectors and a *compliant* connector of another particle, *mostly (graviton coupling is an exception)* with a similar central Higgs architecture whereby *at least one* of *each pattern's* axial

replication *string* 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. M is the maximum number of neighbor points able to interact with the creation point without increase of the cosmic volume. If M would be infinite, the maximum cosmic size would be just to point-sizes. The minimum time shift between to neighbor points sets the maximum size of the cosmos. The reduction factor between point and zeron space is M/N=137 (in phase space, as set by point replication). *It confirms the role of the collision angle (elastic collisions in particle physics).*

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 *and to the generic definition of the term “energy”*.

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. by replication) and external modifications of patterns. It is used as a quantity of change or *as well* as a quantity of state. Energy transfer *between patterns* requires necessarily a discriminating property between *both whereby simple differences like time, charge and symmetry states (or dimension) could play that role* . Energy transfer *requires an interaction, in fact the exchange of a micro-pattern, and it has an impact on the pattern lay-out of both interacting objects. Such process* cannot be performed in a zero-time lapse *and its probability distribution has often a stochastic character*. *The combination of energy and time is measured as a quantized property “action”.*

Event: a *smallest* (inter)action *between patterns or inside between pattern components or between a pattern and one of the two grids* that changes the state of our cosmos. An action requires a convolution of energy and time *and is quantized (a multiple of h/2)*.

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 *as a pattern* because an exchange of charge info between zerons *in order to bind them,* would imply annihilation by destructive interference in their central symmetry location. It means that at least one replication cycle is slightly phase shifted and such "property" is dynamic (*see contact-EZP's)* what leads to superposed states of several pattern versions (by dynamic role interchanges) and *enables* finally zeron replication *whereby the central EZK acts as an antenna*. The symmetry properties of a *central* Higgs explain why we observe *a* subset of particles and patterns as most of the ones our cosmos is made-off, in 3 *orthogonal geometrical dimensions*. *An EZK does not appear spontaneously in our cosmos as it represents an unbalance in mass-type energy. Either its is part on an EZO, so this unbalance does not exist, or the missing energy is delivered by collision-type interactions between particles.*

EZO: An anti-symmetric over order-τ phase shifted EZK pair, whereby each *EZK shows* 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), *so the definition applies also to two slightly phase shifted zerons integrated in a more complex pattern (like a Higgs)* . A contact-EZP (see above) is not a particle but a short lived pair of adjacent UZS zerons, interacting *when both parent patterns (zerons) are* in their *compliant* return states. Their two *possible distinct* interaction *scenario's* on a stationary *unbiased* 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 *enclosed* mass quantum. Ordinary phase shifted EZP's are integrated as transversal string components in contramatter or matter patterns and particles. Hereby two *orthogonal* phase shifted EZP's form an EZK *that is a phase shifted interconnected copy of a central EZK antenna*.

Field: ***:*** *A concept used in mathematics and modern quantum physics but in PhR a term that refers refer to large dynamic subsets of raster components (most often primitive zeron patterns that share a common anomalous*

property). They materialize abstract large scale location sets in classic physics, facilitating distant forces between particles (gravity, gauss, magnetic …fields).

(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 and the really observed value (*137,034 for matter)* . This deviation is slightly different for a matter and contramatter-like i-max contacts , *due to* distinct *contact-EZP* 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 over a marginal time shift of order τ.

Flatness: the *dynamic* 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 patterns filled cosmic volume can produce (with a probability depending on the flatness level) slow neutron-contra-neutron pairs (*combined with (e.g.) Li-atoms, a source of LENR)*.

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 *point or zeron* connector *return or contraction* states.

Free zeron: In a realistically replicating EZK, stability of the pattern and binding of knot zerons requires only *a dynamic subset of* three zerons involved in quasi simultaneous interactions in a shared dimension. In the central EZK, a single 2τ (*rather τ + τ)* 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 *each* 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

dynamically along 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) *phase shifted (in 137 dim)* 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 values *and dynamic behavior* 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 (*meaning:* with a fixed reduced I-max value), this is no longer the case in a transition phase just after a polaron interaction. Restoring an equilibrium needs several replication cycles *and contractions* in order to change the central EZK pattern to a state that leads to a *cyclic* position shift of a next version of the pattern (observed as "motion" in physics), a change in I-max value and eventually to multiple *superposed* short-lived versions of free zerons. At very high speeds where I-max has reached a limit value of about 1, this phenomenon *in a particle's contraction state,* is the cause of a relative delay in the pattern's *due to a local complex state interchange EZK*-replication process, increasing in this way its mass (*see* Special Relativity *in Physics*).

Graviton: A rotating circular 2-zeron UZS pattern able to sustain a fixed polaron-like hole. A graviton is a pattern equivalent to a unit gravity quantum (Physics). It is unable to move and 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 *sustained* hole tenor whereby cross-coupling with each other or with particles and contra-particles is impossible. *It is charge neutral and has a spin-2 property meaning that it takes halve a life-cycle (growth +contraction) to reenter into the same quantum state. This means that it is able to couple successfully with spin 1 and spin ½ particle connectors in subsequent I-max states, although with an opposite momentum impact. It is released by an Higgs based replicating particle at the time of its position shift on the UZS.* Gravitons and contra-gravitons are persistent as long as they do not interact: they can sustain the hole in their symmetry center until they couple by polaron exchange with a *zeron* connector of a replicating

particle in one of its return states. *However this event will release in the contraction state of the particle, a new graviton version in a slightly space shifted position: so in fact the relative positions of the particle and the graviton are interchanged.*

Hole: a hole is a *dynamic* short-lived and free-of-charge location state, carrying nevertheless a *by constructive* interference quantized amount of charge info *(so there exist plenty of empty locations in the CPS that are short lived non-standard holes)*. 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 sign that is different, 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 *alternatively two* slightly different tenors. They materialize positive and negative embedded hole densities (*meaning: above or below UZS average)* that impact several 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) *doubles* the tenor of an embedded hole *state* in a connector-EZP over a time quantum 2τ, increasing after a number of *contractions*, particle mass and/or momentum *state values*.

I-max (or i-max) : the maximum number of steps (or knots) of a replicating zeron or point string in a particular momentum state *before it starts shrinking again (in time and/or space)*. These index values (I and i are integers –*counting is the only math operation possible in PhR*) refer to reaching the *i-max or I-max* 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 *and implicitly on the relevant free zeron phase (or dimension) state in the central EZK of a replicating particle*.

Interaction: Any quantized exchange of charge info between pattern components. Within replicating patterns, interactions are internal between knot-like zeron components and between the central antenna *components* and *axial and transversal* string knot *zerons* according to a strict *fastest* 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 *mandatory (for i-max) or* possible (*in I-max)* . Between zeron-made particle *connectors*, exchanges of normalized charge info quanta are packaged as axion or polaron-type patterns.

Inversion: When a replicating particle)like pattern is reaching its contraction state, a next anti-symmetric version (versus a virtual symmetry center) is induced in the CPS/UZS that leads again to a new growth cycle of the pattern. This process will at the lowest level respect the base laws of PhR , meaning that this new version tries to restore the empty cosmic state by inverting charge types and certain geometrical properties like string-spin. However perturbations and space and time shifts make it impossible to annihilate a pattern. Hereby contraction will respect overall conservation laws: if this is impossible by the inversion process as such, one or several difference particles will be stepwise induced and released, eventually after several contractions of a replication process.

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) *imposes* an appropriate distance in space and time, taking the superposition and interference of charge info emitted by a central antenna and *or/*by partial string connectors, into account. This *quasi* 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 *or dimensionality*) distributed set of *interconnected* components. It explains why normalization and *increasing* complexity of composite patterns in further steps of the evolution of our cosmos, are possible and why (in Physics) equivalent mathematical descriptions of their *real PhR-conform* 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 *(or delay)*, stored as *or sustained by* dynamic and eventually (by *constructive interference)*

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 inertial mass in *momentum formalism (Physics) or in* $E=mc^2$ or like a gravity related mass) *all* 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, *about simultaneously* 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 internal* 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. *In PhR and contrary to Physics, there is no conflict between a description of a magnetic spin phenomenon in terms of a (pseudo) rotating charge and (e.g.) the maximum speed limit c for a moving particle: in PhR an electron does not even rotate.* For protons and neutrons the spin concept is more complex. The magnetic spin is weaker, taking role interchanges and symmetry of the central EZK 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 patterns of patterns whereby connections can be broken by external or internal interactions. In this sense very few patterns are persistent as a pattern and *they are* never as a version (their raster point and zeron content is changing anyhow). Examples of *quasi* persistent patterns of points are zerons, EZK's (Higgs), electrons and protons. Particles (Physics) are *raster* patterns but not all patterns (in PhR) are observed in Physics as particles (e.g. a single UZS 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 *including the relevant i-max / I-max index numbers*.

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 its internal consistency, on top of compliancy with *proven laws and confirmed results of experiments in* Physics can be used to check the validity of whatever proposal.

Point: The single *quantized* 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, *be it with two opposite sign states*. A point has a fixed growth and shrink cycle *time* τ and h/2=E(q)*τ 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 *between* one point of each pair, two successive charge states of the same *charge* 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 *(or shorter)* point strings, emerging as short-lived versions replicating (*at extremely high but gradually decreasing frequencies)* in multiple superposed (slightly phase shifted) time dimensions around a common central location. All successful selected points (or knots) of a growing branch are connected with 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 *connector* 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 and appropriate "transversal" CPS point resets it again into an empty state. With respect of the fastest path selection rule, the longest pattern "in time" s*ustaining a fixed charge excess,* is able to persist over 137 successive quantized replication steps. *This in time axial string is dense meaning that successive point shrink and grow cycles take place without delay, protecting the string against random external charge info based interaction attempts.* When reaching *a critical* limit (i-max), the probability of interaction with a neighbor zeron in a compliant short-state and acting as a short lived transversal string, *becomes* higher than the probability of a delayed successful internal coupling with another appropriate superposed 2-point antenna string of the same (*time)* length *around the shared symmetry center*. 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 re-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 *embedded* "mass" and *as a discriminating property,* a source of energy: as two *scenario's* of interaction are possible (*the induction of an extra point in an empty short branch location or the reset of a point in a long branch connector)* an excess point *state* is reset *or induced and conform CPT-conservation, the shortest branch becomes the longest* or a hole is filled with an extra induced point a*nd that short branch becomes the longest*) two dynamic zeron-state classes exist *with a slightly distinct replication length in time*, leading to matter and contramatter-like behavior. Each class contains zeron *pair* states (*see contact-EZP)* with a slightly different hole tenor as unit mass quantum *(e.g. in E=m'c'²)* 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 could not reach an equilibrium state, *in fact required* to permit a further evolution of the cosmos) could determine the prime number value 137 (why 137 and not another prime number *depends on the value τ ?*). This suggestion has to be confirmed by computer simulations.

Polaron (interaction): One of the two fundamental quantized types of interactions *between patterns on a double raster that are possible (see Axion for the other type)*. *Interactions* permit 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 *either* 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 *long (the emitter) and* short branches (*the receiver)* of Higgs based replicating particles *(a collision type of interaction)*. 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 o*r in another gauge boson (Physics)*. 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). *As long as a polaron stored in a connector has not been integrated in a new particle state by effectively reducing the I-max value of a replicating string and/or adjusting the multiple free zeron configuration of a central EZK, the same connector (due to the extra phase shift between enclosing zerons) is not susceptible to a new polaron coupling. This adjusted phase shift of a free connector zeron is supposed not to perturb the replication process as such (to be proven by computer simulations).*

Process: an e*ncompassing* coherent sequence of events.

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

Replication: *see point or zeron replication.*

Return state: A connector state whereby the growth (*in time or in space/time)* of a replicating point or zeron string stops. In case of point replication, growth (in time or phase) stops when two neighbor zerons interact *directly* what happens under standard conditions in a *particle-less undisturbed stationary* 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 *(synchronized with a free zeron in the central Higgs each time the pattern passes thru a contracted state*) in the connector of the longest branch is reaching an appropriate phase angle *versus the phase of the zeron in the corresponding axial string* . *When this happens, the roles of two transversal zerons of the connector are interchanged. The new axial zeron state sensitive for coupling with the rest of the axial branch zerons will be over τ phase shifted whereby CPT conservation leads an inversion in P and T*. Charge info coming from zerons in *knots of* the enclosed branch resets "*know"* the new *phase shifted axial* connector state and reduces step by step the string length. Former string zerons *are released* again *as* ordinary UZS zerons. The *initial* offset value of the phase angle of a free connector zeron (*and the actual I-max value*) depends on the equivalent value of a free zeron *state* in the central Higgs. This value determines the maximum string length and the life time of a replicating pattern and indirectly its momentum state, being the pace at which subsequent, in position-shifted new 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* copies of Higgs patterns at maximum speed c and their micro-replication mechanism must be different (for neutrino's computer simulations are needed).

Role interchanges. *A term used to express the implicit dynamic character of the role of the 4 zerons of a central EZK in a complex pattern. Their behavior is initially the outcome of an at high frequency rotating phase shift, required to bind and to synchronize internally the 4 zerons of a "stand-alone" EZK. It means that more complex particle states derived from such hypothetical initial Higgs configuration and due to external interactions in connectors and indirectly with the central EZK, might coexist as superposed versions of the same basic pattern. Depending on the kind of extra interactions and the binding process with new*

added components of micro-patterns, this multi-superposition freedom can be limited after a few replication cycles what will explain several distinct decays and replication scenario's and particles with different properties (like mass). Contrary to some theories in physics, PhR rejects a theory that enables identical superposed states of a single pattern, co-existing simultaneously: at least a phase shift (τ or 2τ) between these so called superposed states is required.

String: a linear coherent set of knots, in fact *compliant and* selected raster components (points or zerons), 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 (*in time and/or space)* 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 with enclosed knots of the same string branch (*there are no direct interactions between branches of the same or a different string of the same particle, well indirectly via the central EZK)*. 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 *(in time and space)* and storing its impact in one or several (symmetry depending and *dynamic*) string connectors. *The symmetry of the central antenna determines the direction along which one or several axial substrings are able to grow in time and/or space, carrying an initial perturbation in its (their) connectors. Growth takes place in line with the fastest path rule whereby other paths cancel out due to destructive interference (a base law).*

String spin (for zeron replication): this term refers to the circular distribution of subsequent free transversal zeron states, *selected and added to* 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 *complex* role inversion process in the central Higgs tetrahedron, *already set at the time of the initial EZO split,* and hard to compare with any equivalent particle property in Physics. *The in 137 dim phase shifted distributions of free zeron states in the central EZK (or Higgs) are linked by direct charge info*

exchanges to the dynamic circular distribution of transversal zeron states in successive string knots.

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 *such* 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, *virtual* 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 (*often*) 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, *transformation capabilities* 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 *as historically* produced by large mass objects or *the contribution of large* discrete electric/ magnetic *effects* on their small scale mathematical quantum formalism, are other examples.

UZS: The *name of the* collection of zerons *in the cosmos,* being a dynamic raster of *two-sided in time* replicating 2-point patterns. It *once emerged* spontaneously and dynamically within the CPS by selecting (as a *dynamic and*

cyclic process) points in appropriate states *and integrating them in by point-replication selected zeron patterns. Growth of the CPS took place at an incredible speed out of the creation event location in the CPS. Even if the chances of point replication are relatively small on a CPS scale, taking the stringent requirements for two successful orthogonal point pairs into account, the regime zeron density of the UZS will be extremely high because dynamic growth processes of replicating point strings take place in quasi-superposition along an extremely high number of 2-point dimensions embedded in an M-dim set around a very dense set of candidate symmetry centers and taking off in an absolute time frame that is just slightly phase shifted (emptiness is a continuum). So the UZS as a coupled raster could be seen as the outcome of the superposition of dynamic sub-rasters with distinct orientations and time shifts measured by a virtual cosmic clock in M-dim.* Also in this case the perturbation principle holds, meaning that only a small but variable fraction of points are, at any moment, part of an UZS 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 or PhR) *and contramatter (PhR). The UZS raster and its properties enable the emergence and the evolutionary type of processes of matter as well as contra-matter patterns. We assume that if the size of the CPS in the cosmos would be finite, the UZS has equally reached its maximum volume. If the dimensionality of the CPS has a fixed value M, the dynamic UZS subset has a dimensionality N after a reduction by 137, as the outcome of point replication. This dynamic and eventually as a pattern moving UZS point-subset keeps its intrinsic properties, even when its content is gradually replaced by in M dim phase shifted points, whenever such pattern would approach the outer shell of a finite(PointSpace, except at extremely short distances). Another names for the CPS and / or UZS are grid or raster.*

Zeron: An elementary UZS *raster* component and *as a pattern* the smallest persistent *and* cyclic (with periodicity T) point-made object in the cosmos. It *emerges out of* a two-point central antenna, a *combination of a* linear (in time) axial and transversal point string *with at each side alternatively growing dynamic* connectors of which one maintains an over T/2 persistent charge

excess, the other being *50% of the time* in a *dynamic* hole state. The (physical) length *(its radius)* of a *point string in a* zeron in a fixed time frame is just about one point because *each* initial set of two antenna points is internally τ-phase shifted (or 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 % cycles are interactions with points of each branch*. When both central *antenna points will* flip their states *and* taking the partial replication processes in the two branches into account, they remain perfectly synchronized and properly phase shifted. It just means that *multiple versions of* a central *2-point* antenna pair "live or behave" in separated subsets of *time* dimensions: charge info exchanges in one growing or shrinking branch do not disturb the partial replication process in the other. A zeron has 4 *dynamic* special short-lived connector return states labeled CZ, DZ, CH, DH. CZ en DZ refer to opposite charge types, CH en DH to distinct *contact-hole* types. Only dynamic connector states are interaction enabled permitting growth in time: o*nce a new selected point is part of a string, its previous connector state collapses* and due to the fastest internal interaction principle it is no *longer available for external interactions*. Only in *extreme return* states zerons have "external" energy, *a term synonym of "are external interaction enabled"*. For holes the term energy means that they implement and dynamically sustain a small quantum of emptiness, a form of inertia, observed as <u>mass.</u> In PhR energy is linked to a discriminating property, being *in this case* a non-standard point-hole density ratio. In physics and in combination with *zeron* replication, it explains partly Einstein's equivalence formula $E=mc^2$. *It is crucial to understand that all UZS zerons are strictly spoken identical: distinct hole properties refer to interacting zeron pairs in i-max (contact-EZP's).*

<u>Zeron Replication:</u> 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 *and alternatively left-right to each branch*. These so called zeron knots are bound with each other and with the central EZK by appropriate quantized charge info exchanges *along shortest paths as observed along axial strings*. 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. *A replication pattern out of a central EZK (a Higgs) shows geometrically a tetrahedron based symmetry. A simple electron replicates along 3 perpendicular directions or strings, whereby each axial string corresponds with a rib of the central tetrahedron. A neutron replicates in superposition along a double anti-symmetric conic bundle of electron-like axial strings whereby the 3 orthogonal symmetry axes of each double cone are perpendicular to opposite ribs of the central EZK antenna. This complex pattern determines the ratio between an electron and a neutron mass. It is interesting to notice that fastest zeron replication along a single axial string materializes a straight line as the outcome of the charge info superposition base law (see also Feynman-this is not obvious in PhR because particles do not move, only pattern versions do).*

Zeron Replication and Collisions. *Except from direct internal interactions with central EZK zerons of particles in the contracted state, r*eplication can lead to a successful external one shot or cyclic coupling between connectors of compliant patterns like particles, *photons or gravitons* 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 the emitter. It explains why in case of two colliding particles *and polaron exchanges*, the fastest particle will statistically, in case of a coupling by repetitive interactions, lose momentum. *Axion exchanges between zeron points in connectors of non-coherent particles are extremely short range in space and time and have low probabilities to happen. As the binding by strong interactions (the strong force in Physics is not a different type of interaction in PhR) in the nucleus of an atom is a combination of cyclic axion and polaron exchanges between neutrons and protons it explains why this coupling is subject to confinement (Physics) and why "color force" (point based axion exchange) and zeron-based (in PhR) polaron coupling (EM interaction in physics) have a strength ratio with value 137 and show different ranges of applicability.*