The model of the universe as thermodynamics inwardly open system flattened by the velocity of light

Dr. Alfred Bennun
Full Professor Emeritus of Rutgers University

Abstract

A self-contained universe constrained by velocity of light (c) of 10^{60} Planck bosons in the dissipative state could be thermodynamically characterized as an inwardly-open system, with a dissipative state of enthalpy and of accumulative entropy. The latter, creates intergalactic-voids dispersing by the absorption of the heat discharged as entropy, with a dissipative function by its expansionary rate. This one is over one thousand times larger than that of matter, exercising a pressure for preserving galactic contour, in similitude to the 70% missing dark energy, by inwardly distending the space allowing recoil according to the Hubble constant. In rotational system the increment of linear momentum, when approaching c, allows that incremental resistance overflows deviating energy to generate angular momentum. Thus, redshifts contributions increment inertial mass as 25% equivalent to dark matter. Contributions to the latter could be expected by the primordial resonances of gravitational waves, generated by the uncoupling density fluctuations of the universe. This allows quantization and asymmetric annihilation of the primordial transitional particles at the plasma state, from which emerge the acoustic waves imprinted in the universe. Quantization results in quarks, distending and retracting between two gravitational focuses at their spin axis, similarly to electron ellipsoidal orbitals have two focuses, which by elastic delocalization and their velocity allows quantum mechanics solutions integrating uncertainty. At the current dispersed centrality, the primordial older galaxies were observed as a *lookback on time* by the Sloan Digital Sky Survey (SDSS). The scaling of its growing curvature, suggested to reproduce an expansionary logarithm spiral of Planck bosons, by the curvature obtained by parametric down-conversion (PDC), recurrent succession 2^n. The causal link for a continuous open flat space with rotationally asymmetry is assumed to be supported by an expansion angle of 0.192º, which corresponds to the relationship of 2 phi angles (2×1.618) inwardly k≈ -1, suppressing any tendency to increase values over the flat state, without reaching the π value required to close space (k≈1).

Introduction

The Sloan Digital Sky Survey (SDSS) [1] and its Baryon Oscillation Spectroscopic Survey (eBOSS) [2] shows the primordial acoustic oscillations and its elongation imprinted in the universe, as a space-time function of the universe expansion.

The spatial distribution between the wave shape and intergalactic distances could differentiate the predominance of Lyman-α, Quasars, Young blue Galaxies, old red galaxies and nearby galaxies. At low scales there are fractal behaviors [3]. The Navarro-Frenk-White model has shown that a slowing logarithmic changing curve for an energy density model, could also include rotational curves about flat for the larges scales [4].

The non-linear electromagnetic relation of could occur in a vortical high energy dense plasma, due the conservation laws in classical and quantum electrodynamics (QED), which only display linear U(1) symmetry [5].

The work methodology by the cosmic microwave background (CMB)-cartographers [6] reprograms by geometric tensors sins and cosines, to obtain an equivalence, which does not distorts the equivalence of three-dimensional space in a plane projection. The interpretation of the CMB-cartographers by an equivalent homolographic treatment could not be accurate because requires a more precise angular deviations than obtained from the available data.

Cartographers do not need any more equivalence of a horizontal to a perpendicular line, to draw ellipsoidal maps that show rapid convergence using the Newton-Raphson iteration. However, do not project the depth dimensionality by parallelism, using a time axis. By the Boomerang experiment they obtain an ellipsoidal cut of observations of 1 degree. However, do not allow observation of the much smaller open angle, required for dimensionality of an inwardly open thermodynamic system. Thus, the ellipsoidal maps may eventually need to be scaled, to include the angular

momentum required for the Planck bosons dissipative state.

The Friedman equation relating the density with the curvature of space by k=1: positive curvature (like a ball), k=0: zero curvature (flat like paper) and k=-1: negative curvature (saddle-like). Hence, it could be incomplete if it could not incorporate an integrative solution of tendencies, like an inwardly curvature. This could configure a thermodynamic system, functioning as phi-open but with tendency to never reach a π-closed curvature. The commensurate angular relationship of curvatures used support the tendency to a flat state: 2phi (3.2) with a limit never closing: π (3.14).

The flat universe accordingly to electromagnetism vs gravitational forces reflects the proportionality of the thermodynamic states maintained between recession-enthalpy and recoil-entropy. The latter, may be calculated as a local persistence of the flat tendencies to equilibrium and its treatment by a formulation: $\Delta G = -RT \ln K\text{eq}$. This one may be used to represent a thermodynamic curvature tendency. However, equilibrium is avoided by coupling the dissipative volumes of galaxies that are much smaller than the corresponding in voids, which are continuously decreasing its internal entropy by decreasing its heat density.

Gravitational waves and its incidences over plasma state produce baryon acoustic oscillations along the universe, with contributions to the primordial energy dissipation thermodynamics state that can be treated by acoustic inhomogeneity of the photons distribution.

The manifestation of virtual energy could be treated as a local PUC input equilibrating the predominant PDC to support the flat state of the universe. Hence, the Casimir experiment reflects that in the laboratory the contraction of the space between two electromagnetic plates by PUC could allow the low energy CMB permeating everywhere allows a lower number of higher energy photon could emerge. At has been shown the experiment decreases the larger CMB volume of photon localization in the relation decreasing their number represented by a 100% volume of photon localization by the emission of a much smaller number of high frequency of photon compressed into only a 6.25% volume. These higher frequency photons allow that by their smaller volume of localization could escape the internal space of the parallel plates.

Thermodynamics of Planck bosons

Thermodynamics systems are defined as close by reaching equilibrium, or as open in dissipative state. In a self-contained universe the characterization as open implicates an inwardly dissipative state as a function of dissipative enthalpy and its cumulative heat-entropy, creating intergalactic space (voids) that by its rate of expansion of over one thousand times, about that of matter dissipates heat by a cooling tendency dimensioning the flat state.

Introducing voids evolution allows inferring that the effect of gravity could become less and less significant, because the continuous increment of void volume, restricts in their enclosed space how far could reach the influence of gravity.

The dissipative expansion of 10^{60} Planck bosons determines the initial causality state equivalent to arrow of time, which has been astronomical observed as a *lookback on time*. This finding requires a theoretical integrative description for space fluctuation by the decoupling of the constitutive forces of the Planck bosons. These state emitted gravitational waves, which dispersed in the state of plasma, generates the baryon acoustic oscillations measured by the Baryon Oscillation Spectroscopic Survey (eBOSS) project, a part of the Sloan Digital Sky Survey (SDSS).

This one represents non-equilibrium of inwardly-open thermodynamics state. It was found that the latter geometrically could be illustrated by a natural growth from an initial centrality state with later has expanded according to the Hubble recess restricted by the velocity of light, acting as a bottleneck flattening expansion. It role would be equivalent to slow-down any abrupt tendency, to reach equilibrium before the system exhaustion of the critical energy generation of enthalpy.

The number of Planck particles that the primordial universe breathes can be calculated from the total mass of the current observable universe ($\boldsymbol{m_{total}}$).

The total mass of the universe can be calculated by multiplying the critical density by the volume:

$$m_{total} = Density \times Volume = \rho \times \frac{4}{3}\pi (r_V)^3$$

$$m_{total} = 9.557625 \times 10^{-30} \frac{g}{cm^3} \times \frac{4}{3}\pi \left(1.66723 \times 10^{28} cm\right)^3$$

Total mass of the observable universe:

$$m_{total} = 1.85534 \times 10^{56} g$$

The value obtained coincides with the bibliography. The total energy of the universe: $\boldsymbol{E_{total} = m_{total} \times c^2 \Rightarrow}\ E_{total} = 1.04077 \times 10^{83}\text{MeV}$

The sequential decoupling of strong, weak, electromagnetic and gravitational forces allows fluctuations in density and generation of gravitational waves with speed of light, which at the periphery of the observable universe can contribute to the increase in inertial mass (or dark matter).

Number of Planck particles: $\boldsymbol{n_{Planck} = m_{total} / m_{Planck}}\ \therefore$

$\boldsymbol{n_{Planck} \approx 1.86 \times 10^{56}\, g / 2.18 \times 10^{-5}\, g}\ \Rightarrow$

$n_{Planck} \approx 8.525 \times 10^{60}$

The mechanism by which Planck particles emit energy would be the transformation of orbital angular momentum into rotational kinetic energy in new particles. That is, the kinetic energy would be transformed into the mass of the new particles.

$E_{rotational} = \frac{1}{2} \mathrm{I_x} \times \omega^2$, where $\mathrm{I_x}$ is the inertia tensor and ω is the angular velocity.

In terms of the angular momentum $E_{rotational} = \frac{1}{2} \vec{\omega} \times \vec{\mathrm{L}} = \frac{\vec{\mathrm{L}}^2}{2\mathrm{I}}$, where $\vec{\mathrm{L}} = \mathrm{I} \times \vec{\omega}$

The sum of the relativistic energies of the particles arising from the Planck would be:: $E_{rotational} = \frac{1}{2} \vec{\omega} \times \vec{\mathrm{L}} = \sum \sqrt{\left(m \times c^2\right)^2 + (\mathrm{pc})^2}$, where ***m*** is the rest mass of the new particles.

The mechanism would be opposite to the contraction of a mini-black hole consuming mass-energy. The particles would emerge as a jet of particles radially perpendicular to the axis of rotation.

The radius of the visible universe is commonly expressed as: $r_{\mathrm{V}} = \int_{t_E}^{t_0} \frac{c}{a(t)} dt = c \int_{1100}^{0} (1+z) \frac{dt}{dz} dz$.

In this case it is assumed that the expansion parameter evolves as: $\frac{1}{a(t)} = \left(\frac{t_0}{t}\right)^{2/9} = 1 + z$ and the result is expressed below in general form: $\boldsymbol{r_{\mathrm{V}} = \int_{t_E}^{t_0} \frac{c}{a(t)} dt = c \int_{t_E}^{t_0} \left(\frac{t_0}{t}\right)^{2/9} dt = \frac{9}{7} c \times {t_0}^{2/9} \times t^{7/9}}$.

Numerically, from the time of the Age of last dispersion to the present, it is equivalent in seconds to the interval from $t_E \approx 1.19 \times 10^{13}\text{s}$ to $t_E \approx 4.33 \times 10^{17}\,\text{s}$, respectively: $r_{\mathrm{V}} = 1.67 \times 10^{28}\ \text{cm}$.

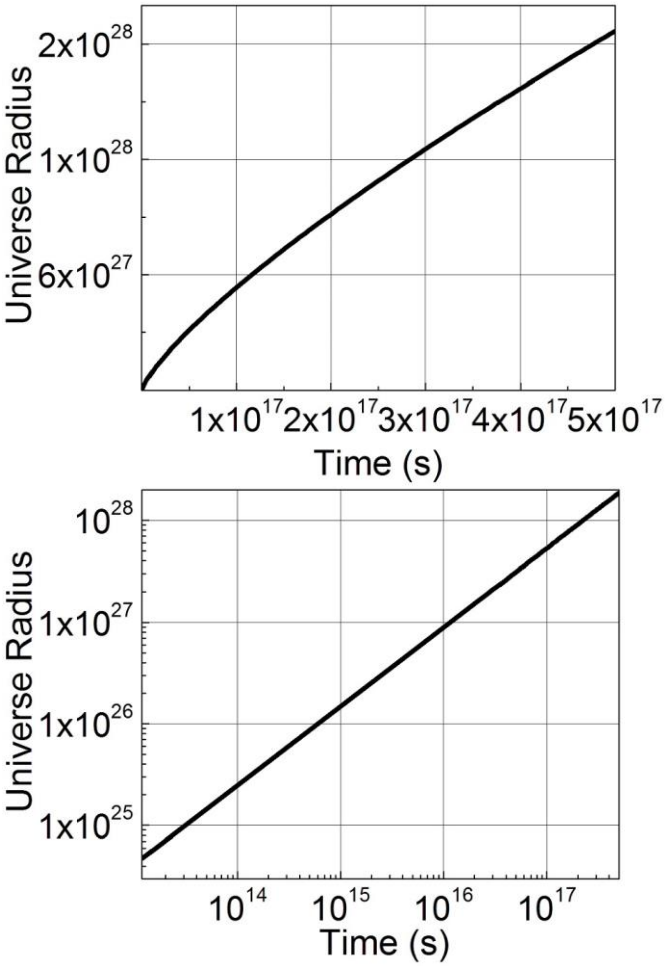

Figure 1: Universe radius vs time.

Expansion as a function of recession-enthalpy vs recoil-entropy

In 2005 it was described that for galaxy structures such as pairs of galaxies and their compact clusters there is some evidence for a nonzero angular momentum of the entire structure. The qualitatively and quantitatively examination of the orientation of the galaxies in clusters found a strong alignment within the number of clusters, reflecting that a non-zero angular momentum, showing that galaxies and their compact groups do not allow the vanishing of their angular momentum.

The galactic rotation curve, which shows the rotation speed versus distance from the center of the galaxy, cannot be explained by visible matter alone. The simplest explanation is to assume that visible matter makes up only a small part of the cluster. The galaxies show signs of being composed mainly of a halo of dark matter concentrated at their center, with

almost spherical symmetry. Galaxies with weak surface brightness are important sources of information for the study of dark matter, since they have a low ratio of visible matter to dark matter, and they have several bright stars in the center that facilitate the observation of the curve of rotation of peripheral stars.

The rotation sense acquired by the universe determines asymmetry at origin, allowing a dissipative anisotropy state to Planck bosons that shaking the space-time by uncoupling of forces, generating gravitational waves that originate perturbations of overdensities at the plasma state.

The angular momentum integrates in a single rotational axis [7] that at the time of galaxies conformation has aggregated matter in galaxies in a proportion of 93% for those recessing according to the Hubble constant and the rest with opposite gyratory sense.

Giant sound waves propagated through the blazing hot matter that filled the Universe shortly after the Big Bang. These squeezed and stretched matter, heating the compressed regions and cooling the rarefied ones.

This sound was similar to what seismologists describe as a large earthquake. Traces of sound survive because in the beginning the universe was very dense and had resonance. In such compact material, sound could spread easily.

Hence, baryon oscillatory sound of decreasing frequency across the universe and observed at the most distant curvature like a sound horizon. The projection of *lookback on time* may allow estimating that the photon-baryon pressure at the distant border, plus the kinetic energy as inertial mass, could be present as dark matter.

Another effect of the rotational angular momentum of the universe would be the momentum ratio and the recoil entropy. The latter is internalized outside the galaxies, that is, in the voids and its expansion presses on the galactic edges. By transferring angular momentum to the primordial galaxies, they emit jets of radiation that fill the primordial voids, expanding empty space pressuring recess of galaxies, accordingly to the Hubble constant.

The outward pressure from the intergalactic recession could lead to an increase in relativistic mass due to the Hubble constant.

Einstein's formula that relates the rest mass ($\boldsymbol{m}_0$) with the inertial mass ($\boldsymbol{m}$) due to the speed is: $\boldsymbol{m} = \gamma \times \boldsymbol{m}_0$, where $\gamma = \dfrac{1}{\sqrt{1 - \mathrm{v}^2 / \boldsymbol{c}^2}}$ called the Lorentz factor and c is the speed of light.

A quick calculation would be to assume that the 5% mass increases to 30% due to the intergalactic recession, then: $30 = \gamma \times 5 \;\Rightarrow\; 30 = \dfrac{5}{\sqrt{1 - \mathrm{v}^2 / c^2}} \;\Rightarrow$ $\mathrm{v} = 0.986 \times \boldsymbol{c}$, that is, 98.6% of the speed of light. This value would be the current limit for the accumulation of kinetic energy in relativistic mass form.

An explanation for a non-radiating mass includes hydrogen in an acreation disk, which if restricted by a magnetic field allows its velocity to increase its inertial mass without significant photon emission. The material in the accretion disk was shown to have a highly magnetic field and electrical conductance. The result of all these collisions is that angular momentum is transferred to the outer reaches of the disk while the gas whirls inwardly to the central star.

Expansion model of the voids by dissipative heat-entropy limited by ZPE

The contribution of the partial pressures to the total pressure $\mathrm{P} = \sum \mathrm{P}_i = \sum \omega_i \varepsilon_i$ can be replaced by the pressure of an equivalent system, composed of a single species of particles $\sum \omega_i \varepsilon_i = \bar{\omega}\, \varepsilon_T$, where ε_T the total density is considered in this work and $\bar{\omega}$ is the value that verifies equality. Zero point energy (ZPE) is considered a replacement for dark energy $\varepsilon_{ZPE} = \varepsilon_\Lambda$. Then, the expansion parameter of the universe can be calculated assuming $\mathrm{P_T} = \dfrac{1}{3}\varepsilon_r + \dfrac{\mathrm{v}^2}{c^2}\varepsilon_m + \varepsilon_{\mathrm{ZPE}} = \bar{\omega}\, \varepsilon_{\mathrm{c}}$, where it is assumed that the pressure of the mass tends to zero $\dfrac{\mathrm{v}^2}{c^2}\varepsilon_m \to 0$. $\dfrac{1}{3}\varepsilon_r - 0.7\, \varepsilon_{\mathrm{c}} = \bar{\omega}\, \varepsilon_{\mathrm{c}}$ The solution is $\bar{\omega} \approx -0.7$.

The calculated expansion rate is $\dfrac{a_0}{a} = \left(\dfrac{t_0}{t} \right)^{2/9} = 1 + z$. Where t_0 is the present time that is estimated to be between: 4.27921×10^{17} s and 4.37388×10^{17} s.

Current measurements show that the universe began to expand rapidly for a redshift value of around $z \approx 1.7$. Said value introduced in the expression of the expansion parameter allows determining the time t where said expansion acceleration would begin.

For a present time mean value of $t_0 = 4.32655 \times 10^{17}$, the expression $\left(\frac{4.32655 \times 10^{17}}{t} \right)^{2/9} = 1 + 1.7$ returns a time value of, a mean value for the time where the acceleration of the expansion parameter of 4.48 billion years after the Big-Bang begins.

Primordial quantization of particles emergences

The universe, as a function of velocity of light, functions by acting as an energy dissipative bottleneck to self-contain a flat evolutionary structure. It is assumed that the primordial universe rotated with greater speed on itself and was slowing down transferring to the particles the orbital angular momentum and spin.

The rotational state allows that the quark-antiquark formation is asymmetric, leading to the survival of small quantities of ordinary matter at the primordial 3 minutes, leading to the fusion of quarks in protons but preventing its association as neutrons to explain the only resulting formation of the lightweight elements: hydrogen, helium and lithium. These elements anisotropic dispersion occur thereafter generating space with gravitational secondary effects in spatially flat curvature continuum.

Other author's previous publications in order to unify general relativity and electromagnetism added a 5^{th} dimensions supposed to be rolled up in a tiny pipe with a radius of the order of magnitude of 10^{-33} cm. However, a discrepant analysis had been develop to describe the quantum role of the energy dissipative potential of Planck quantum particles [8].

The role of the stabilizing frictional forces is totally absent from Hamiltonian systems and quantum mechanics but has a dependence of the winding number (the ratio of the resonance frequencies), which allows more stable periodic orbits and greater stability as elementary particles as closely related by KAM theory. On the other hands, a derivation of the inverse electromagnetic fine structure the integral value α=137 plays a role in the enunciation of E-infinity theory [9]. However, does not dabble over the possibility of inwardly open thermodynamics system.

Electrons are arranged around protons in elliptical orbits that absorb heat energy and emit photons. Experimental studies show that when the incident on the electron and photons in the high frequency ultraviolet-blue range, they can add up to emit a photon of even higher frequency. Low-energy photons are dimensionally much larger than the high energy ones and therefore, these ones from the yellow to infrared spectrum could not penetrate into containing compressing internal space of the electron

Hence, could not merge into quantum of higher frequency since are not fastened by electromagnetic compression, regardless of any numerical increase. This was long interpreted as elusive quantum behavior. However, not relating the condition for the input of the photon volume (or capacity to locate) within the contracting electromagnetic contour of electron. The beta radiation voltage potential allows penetrating into crystals atoms and be re-emitted proportionated as many photons that could act as nuclear energy batteries [10].

Electron microscopy, which prevents radiation escape by electromagnets devices, allows energy to accumulate in the electron and allows to reduce their size in order to reach very high image resolutions. A galaxy magnetic field can contain the tendency of hydrogen electrons to radiate. According to the mathematical development of the Schrödinger box treatment acquire boson properties showing that very high energy could be accumulated into electron orbitals. The electromagnetic edges of the electron are inclusive for the dimensions of much higher energy input (electric power dimensioning electrons), with more potent electromagnets preventing excitatory energy to be dissipated in order to reach the electron sizes, for construction of nuclear colliders that are able to explore into the quark structure [11].

The orbitals of ellipsoid shape of particles configuration around axis with 2 focal positions are capable of oscillatory movements to either contract or elasticize these distances. Hence, this effect is transduced into dimensioning many kinetics parameters related by linear or angular momentums stability to the generated particles, could be related to quantic uncertainty. Therefore, the strong force when uncoupled allows the emergence of quark-antiquark which annihilates leaving a remnant of ordinary matter,

with colors integrated into differentiated protons and neutrons.

Parametric down-conversion (PDC) and parametric up-conversion (PUC) had been experimentally observed as spontaneous energy conservation processes. The first one could increase cosmic entropy by decreasing energy density. This process could be described as a potential for the quantization of heat in the black-body radiation increased as a function of temperature [12] allows quantum atomization and its delocalization of structural space-time relationships.

The decay of particle populations generates an increment of enthalpy which supports free energy expenditures. The energy enters into the thermodynamics system by decay, equivalent to dissipation structures maintaining an open system in non-equilibrium.

The pattern of energy distribution suggests a chronology, by the changing population of particles showing a tendency of longer half-life: $t_{1/2}$, which configures a chronological self-selection process.

The fit-plot can be used as a model assimilating collider's generated particles to dissipative states of same or similar primordial particles within cosmic chronology. Hence, the obtained tendency curve may manifest a correlation between deconfinement and reconfinement of uncoupling of forces acting as contour and spin configuration.

These particles detected from collider would respond to the symmetric annihilation, a possible asymmetry of origin of the matter emerging from Planck bosons in a rotational asymmetric universe may not. However, the figure represents peaks resulting from a decay-time relating the generation of particles characterized by energy density.

Hence, it is proposed that the pressure of acoustic oscillations could displace the local space-time distribution of particles.

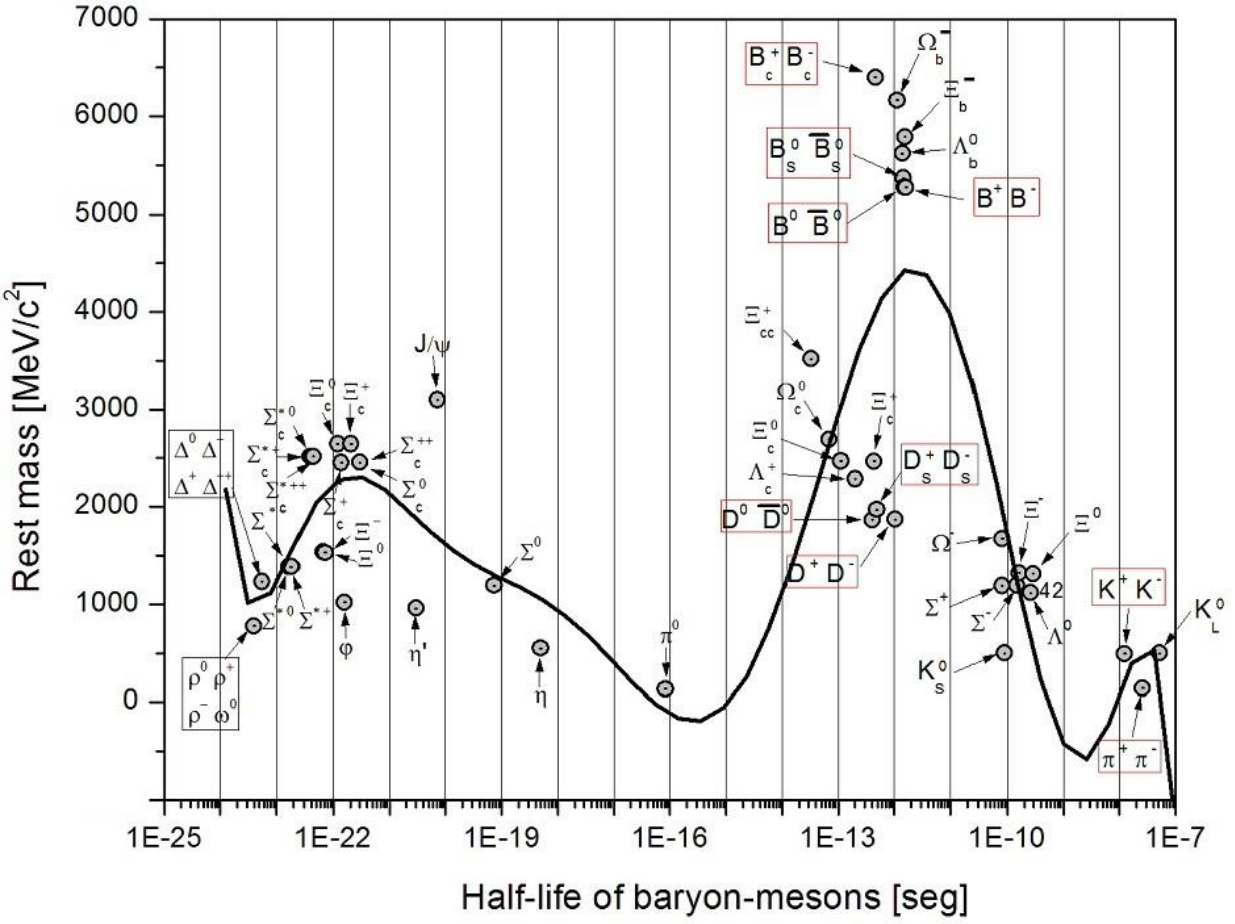

Figure 2: Plot according to their half-life: $t_{1/2}$, and resting-mass: m. *Particles which surge in high-energy colliders like HLC were plotted. The first band groups particles with a $t_{1/2}$ around 10^{-22} s corresponds to strong interaction predominance. The second band groups particles with a $t_{1/2}$ around 10^{-11} s that correspond with electroweak interaction.*

Particles surge in high-energy colliders like HLC. If these particles are present in the primordial plasma state the acoustic oscillations would be tend to differentiate their relationship between particles according to density. Hence, the first band could manifest the presence of the strong interaction:

Mesons: Rho, $\rho^{\pm}$, ρ^{0}, and Omega, ω^{0}: 4×10^{-24} s ; Phi, φ, 1.6×10^{-22} s; Eta prima, η', 3×10^{-21} s; J/Psi, J/ψ, 7.2×10^{-21} s; Eta, η, 5×10^{-19} s. Baryons: Delta, Δ^{++}, $\Delta^{\pm}$, Δ^{0}, 5.58×10^{-24} s; Sigma, $\Sigma^{*-}(1385)$, 1.67×10^{-23} s; $\Sigma^{*0}(1385)$, 1.8×10^{-23} s; $\Sigma^{*+}(1385)$, 1.84×10^{-23} s; $\Sigma_c^{*+}(2520)$, 3.9×10^{-23} s; $\Sigma_c^{*0}(2520)$, 4.1×10^{-23} s; $\Sigma_c^{*++}(2520)$, 4.4×10^{-23} s; Xi, $\Xi^{*-}(1530)$, 6.7×10^{-23} s; $\Xi^{*0}(1530)$, 7.2×10^{-23} s; $\Xi_c^{*0}(2645)$, 1.2×10^{-22} s; Σ_c^{+}, 1.4×10^{-22} s; $\Xi_c^{*+}(2645)$, 2.1×10^{-22} s; Σ_c^{++}, 2.95×10^{-22} s; Σ_c^{0}, 3×10^{-22} s; Σ^{0}, 7.4×10^{-20} s; [13].

When the distance between quarks becomes very short, the intensity or interaction decreases. Hence, in between to 10^{-30} to 10^{-10} s the plasma quark-gluon would show asymptotic freedom. This mechanism allows that each quark or antiquark maintains an unstable state of attraction with the others [14].

The particles interact via the strong force, have half-life of 10^{-23} s. The strange particles, which are characterized by the electroweak interaction, have half-lives between 10^{-10} and 10^{-8} s.

Particles and antiparticles have the same spin and mass, but opposite electrical charges, and quantum numbers strangeness S, $S=-(n_s-\bar{n}_s)$, isospin I_3, lepton number L and baryonic number B. However, Σ^{+} and Σ^{-} are not antiparticles have the same B=1 and masses are not identical. Strong interaction conserves the strangeness S, but after to 10^{-10} s the weak interaction dominates which ignores S and I_3.

Recognition of the specific direction of the longitudinal-spin and handedness for neutrino emission allows selecting different reaction paths.

The rotational dissipation of Planck bosons in the asymmetric inwardly thermodynamics universe may produce local pair annihilation, but the released energy by short lived particle decays [15] may allow the predominance of the more stable quarks and electrons required for synthesis of hydrogen, helium and lithium

A second band results from a latter drop of temperature allowing particles in which electroweak interaction became manifest and the deconfined energy becomes substrate of subsequent reactions, supports the creation of new particles.

As the distances between pions became greater than 1 Fermi, the energy involved by an attempt of quarks separation, becomes greater than the mass of the pions and these multiply [16]. Production of pions $\pi^{+}[u\bar{d}]$, $\pi^{-}[\bar{u}d]$, $K^{+}[u\bar{s}]$, $K^{-}[\bar{u}s]$, $p^{+}[uud]$, has been detected at 900MeV with ALICE at the LHC [17]. These processes at primordial universe could be expected to prevent accumulation of high energy photons and favor the increase in the population of quarks and antiquarks conforming the quark-gluon plasma at 10^{-10} s [18].

Mesons: Pion, π^{0}, 8.4×10^{-17} s; neutral D, D^{0} and $\overline{D}^{0}$, 4.1×10^{-13} s; Charmed B, $B_c^{\pm}$, 4.6×10^{-13} s; Strange D, $D_s^{\pm}$, 4.9×10^{-13} s; Charged D, $D^{\pm}$, 1.04×10^{-12} s; Strange B, B_s^{0} and $\overline{B}_s^{0}$, 1.46×10^{-12} s; Neutral B, B^{0} and $\overline{B}^{0}$, 1.53×10^{-12} s; Charged B, $B^{\pm}$, 1.63×10^{-12} s; Kaon-short, K_s^{0}, 8.9×10^{-11} s; Kaons, $K^{\pm}$, 1.24×10^{-8} s; Pions, $\pi^{\pm}$, 2.6×10^{-8} s; Kaon-long, K_L^{0}, 5.2×10^{-8} s. Baryons: Xi, Ξ_{cc}^{+}, 3.3×10^{-14} s; Charmed Omega, Ω_c^{0}, 6.9×10^{-14} s; Ξ_c^{0}, 1.12×10^{-13} s; Charmed lambda, Λ_c^{+}, 2×10^{-13} s; Charmed Xi, Ξ_c^{+}, 4.42×10^{-13} s; Bottom Omega, Ω_b^{-}, 1.13×10^{-12} s; Bottom Lambda, Λ_b^{0}, 1.391×10^{-12} s; Xi, Ξ_b^{-}, 1.56×10^{-12} s; Σ^{+}, 8.018×10^{-11} s; Omega, Ω^{-}, 8.21×10^{-11} s; Σ^{-}, 1.479×10^{-10} s; Ξ^{-}, 1.639×10^{-10} s; Λ^{0}, 2.631×10^{-10} s; Ξ^{0}, 2.9×10^{-10} s [].

Kaons [19] $K^{\pm}$: m=493.7 MeV/c^2 and pions $\pi^{\pm}$: m=139.6 MeV/c^2, the higher half-life mesons: 1.24×10^{-8} s and 2.6×10^{-8} s respectively.

I.a.1. $K^{+}[u\bar{s}]\rightarrow\mu^{+}+\nu_{\mu}\wedge$

$$K^{+}[u\bar{s}]\rightarrow\pi^{+}[u\bar{d}]+\pi^{0}[\frac{u\bar{u}-d\bar{d}}{\sqrt{2}}]$$

I.a.2. $K^{-}[\bar{u}s]\rightarrow\mu^{-}+\bar{\nu}_{\mu}\wedge$

$$K^{-}[\bar{u}s]\rightarrow\pi^{-}[\bar{u}d]+\pi^{0}[\frac{u\bar{u}-d\bar{d}}{\sqrt{2}}]$$

I.b.1. $\pi^{+}[u\bar{d}]\rightarrow\mu^{+}+\nu_{\mu}$, μ^{+} antimuon,

I.b.2. $\pi^{-}[\bar{u}d]\rightarrow\mu^{-}+\bar{\nu}_{\mu}$, μ^{-} muon,

At the lepton Era occurs the annihilation of muons at 9×10^{-5} s, $\mu^{\pm}$: about 200 times the electron mass [20].

I.c.1. Antimuon, 2.2×10^{-6} s and 105.6MeV/c^2: $\mu^+ \rightarrow e^+ + \nu_e + \bar{\nu}_\mu$,

I.c.2. Muon, 2.2×10^{-6} s and 105.6MeV/c^2: $\mu^- \rightarrow e^- + \bar{\nu}_e + \nu_\mu$,

The muon-antimuon pair's annihilation in order to conserve symmetry was analyzed in the context of 1% asymmetry [21]. This allows inferring reactions progresses from a primordial CP-violation process, at constant total energy capable to increment the relationship matter/radiation at differences steps of the chronology.

Overall assessment of the sequence allows inferring that the decay of particles produced new ones, gradually more stable. In addition, residual high-energy photons trying to separate the quark-antiquark inside mesons, allows an increment of mesons number.

Expansionary logarithm spiral of Planck bosons

A thermodynamic close system allows only the exchange of energy to reach equilibrium. It allows bypassing equilibrium if one or more of its components could be released as a gas or as a precipitate, etc.

An open system to the input and output of energy adds matter. Accordingly, 10^{60} Planck bosons (critical energy) in a state of dissipative enthalpy develop into a self-contained universe. This one could be characterized by the evolution of its expansionary space in a non-equilibrium of inwardly open thermodynamics, evidenced by a *lookback on time*, dimensioning under an angular flat equilibrium between gravitation and kinetics of arc: 0.2^o [22].

However, to qualify as showing open curvature of irreversible thermodynamics requires accepting that there is coupling between a continuous dissipation of enthalpy and a continuous accumulation of entropy-heat in voids, and its dissipation by the continuous expansion cooling effect.

Hence, the latter involves recognition that the creation of the space is coupled to entropy absorption into voids. The voids expansionary rate is above that of matter by over a thousand times, and disperses heat by incremental volume, cooling effect that decreases curvature to maintain a flat state. This heat dispersion allows characterizing the voids pressure over galactic contour as dark energy.

The velocity of light (*c*) acts as a bottleneck delimiting the dissipative rate of enthalpy and heat-entropy accumulative increase, leading to the extinction of the initial energy input or critical. In the rotational asymmetric state of the universe an increment in the linear momentum occurs by approaching *c*. Thus, the relativistic equation shows at greater and greater velocity magnifies a resistance to further increment of mass. Thus, the energy excesses became as a tendency to increment the angular momentum. Hence, allowing the sum of linear and angular momentum to explain redshift above the value *c*. Hence, the z≈1.7 could contribute to the gravity exerted as 25% dark matter.

The Hubble constant measure the expansion rate of the dispersion of galaxies from its primordial origin centrality of 10^{60} bosons by naturally distending space-voids curvature at present to reach first the newly created galaxies and later-on at the more distant borders the primordial ones. An open system never reaches equilibrium because maintains enthalpy in a continuous dissipative state $dH = T \times dS$ leading to extinction of the initial energy input or critical.

Accordingly, it can be modified the thermodynamics perspective because entropy in a self-contained universe the usually concept as the heat released by a system reaching equilibrium cannot escape to non-existential outside. Hence, it can change the meaning of entropy by its role in dimensioning the universe, distending space and the position of galaxies and its pressure over the galaxies containing their contour as dark energy.

Enthalpy expression requires a refrigeration system to prevent entropy-heating. Hence, thermodynamics could reformulate the term T if applied like a differential instead as usually done, or $\Delta G = \Delta H - T\Delta S$, in which case ΔG (critical), a reinterpretation by cooling scale-up to allow an additional potential to ΔH.

At the most external curvature limits *lookback on time* may allow to discover primordial events as uncoupling of forces distorts space and originates a resonance effect of gravitational waves, generating at the plasma state the acoustic oscillations that permeate the universe.

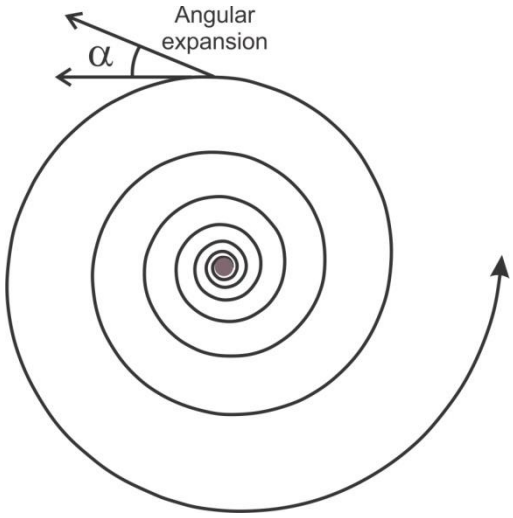

Figure 3: Logarithmic spiral expansion *showing at its center the primordial universe of 10^{60} bosons and that by the* ***lookback on time*** *project energy from its center to the iterative growth until reaching its most distant curvature borders. Thus, could be used to represent how the more recently formed galaxies are located close from its initial center whereas the older primordial galaxies are observed in the more distant distending arms.*

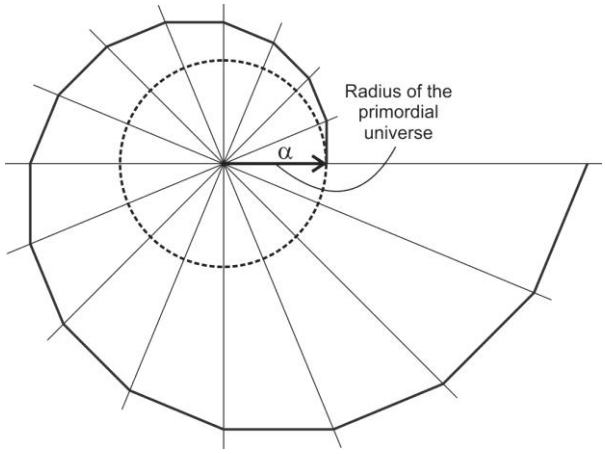

Figure 4: Planck bosons expansionary spiral *obtained by the dissipative state by PDC, a relationship calculated from bosons division into two, according to the logarithmic coupled expansionary sequence 2^n, (n=0, 1, 2, ...etc.) and each one by recurrent increasing their energy location, within a space-time function coupled to the angle rotation (α) and angular momentum expansion. Hence, to reach at the current time the distant space border were the SDSS-located the most primordial galaxies.*

It was analyzed the curvature of a logarithm spiral because its growths naturally from its centrality in a continuum distending of the space-time to its distant borders in where could be observed the state reached by primordial growth.

A logarithm spiral scaled from Planck bosons dissipative state by PDC has been represented as showing a primordial gyratory geometry. Hence, it does not require the postulation of a symmetric complementary universe, and its flatting curvature could have a reiterative value of inwardly open thermodynamics space. Thus, relating a phi angle exceeding the close curvature value of π. The restriction of a flat progression may have as a consequence the emerging of one black hole per 200 stars, which at its event horizon destroys causality and eliminates matter curvatures. Thus, prevents a local tendency to the emergence of curvatures, which could exceed a flat state.

A similar role could be attributed to the 250,000 quasars that had been located, over a very broad range of distances, with its concentration peak at a distant past of about 10 billion years ago.

Discussion

The simultaneous emergence of the total number of primordial 10^{60} Planck bosons (E_P) is equivalent between the frequency limits of a primordial quantum up to the present λ_{CMB} (2.35×10^{-10}MeV). The energy dissipative structure of the Planck bosons emerges as a Big-Bang. The dissipative state is applicable to intermediates structures like elemental intermediates all calculated for the rate of half-life for free and contained neutrons and the more stable protons, etc., as local events.

This thermodynamic rupture of rates equilibrium explains the concatenated cycles present in nature, as dissipative events within self-contained systems, for all energy structures from the life cycle of stars or the open systems. The disruption creates tendencies to restore in cycles, which bridge the lineal correlation between the cause and effect, within the relativistic vs the quantic interpretation of the dynamics of space-time-energy.

Hubble's law of linear relationship between redshift and distance (D): $c \times z = H_0 \times D$, can be interpreted thermodynamically in the relation of decreasing enthalpy and entropy growth, as an expansive function of a center containing Planck bosons to the periphery, with a dissipative potential limited by

a restriction time arrow as hereby is modeled as a role of voids as dissipative limit of heat-entropy, equivalent to zero point energy (ZPE).

The open nonlinear thermodynamics systems that are far from equilibrium allow the emergence of complex life since involves an excess of dissipative enthalpy to decrease the tendency to entropy, by a dynamic irreversible rupture of symmetry blocking any tendencies to equilibrium. This one depends of the preponderance of the velocity of dissociation of one component into two preventing reverse kinetic order, relating the rate probability of molecular collisions to irreversible thermodynamics.

Self-organization was described by Prigogine as "order through fluctuations" or "order out of chaos" [23]. Negative entropy (i.e. increased order, structure or self-organization) can spontaneously appear in an open nonlinear thermodynamic system, which is far from equilibrium. Hence, open nonlinear fits with the described inwardly open systems, which are shown as developed as structure and function. This also applied to complex life species, but requires the emergence of thermodynamics structure capable to accelerate the overall flow of entropy in the total system.

The universe shows a *lookback on time*, which has a similitude on the characterization of complex life by its evolutionary genetic-dependence structured by nuclei acids. The water role of maintaining a temperature compatible with complex life reflects a narrow flat limiting function. Hence, the integrated H-bonds to constitute a polymeric state of water are transfer to proteins for the conformational changes required for their turnover function. Thus, H_2O maintains an inward-open state by coupling its dissipative enthalpy state to the turnover of conformational structuring of proteins (Hb) and those of the kinetic intermediates of enzymes and H-bonds exhausted water became release as an irreversible event, far from equilibrium [24]. At invariant body temperature the generate isolated water molecules could be transported in a liquid state by their polarity complementary, allowing entropy release as the 5% of vapor contained within exhaled air.

Conclusions

The Sloan Digital Sky Survey (SDSS) continuous progression could integrate tendency to a flat continuum, like the astronomically observed *lookback on time*. The primordial Planck bosons had been projected into a dissipative energy logarithmic spiral function (figure 4).

A magnetic field at the peripheral galaxies by hydrogen accretion disks allows electrons decreasing its electromagnetic contour to absorb a greater energy and functions restricting photon emission. A unidirectional rotating primordial universe allows asymmetry of origin and decreases the probability of collision between galaxies.

Cosmic expansion could be explained to become non-equilibrium asymmetry of irreversible preponderance of the rate of PDC over its up-event, which flat structure a figurative bottleneck determining the arrow of time and the rate of annihilation, etc. The λ-elongation was assayed by a simulation of the mechanism of PDC, this one show that the evolution of the CMB radiation spectrum is consistent with the Big-Bang coupling of cooling with expansion.

The chronology, after the Last Dispersion Era, describe expansion of the universe by the evolution of voids, integrating the quantum structure with the continuum of non-equilibrium open thermodynamics of the universe, and by ignoring the distribution of matter since superclusters and filaments, which occupy a much smaller volume than voids.

The results create a chronology order as a density function, which allows the calculation of the re-acceleration Era. Hence, it naturally predicts that the expansion parameter "*a*" defines a relationship $a_0/a = k$ and appears link to the accumulation of zero point energy (ZPE).

Accordingly to results either the quantum treatments by photon elongation and division (PDC) could produce a chronology for the evolution of voids. Hence, allowing the perspective of a quantum integrated Universe under a thermodynamic continuum. Thus, results predict expansion reacceleration at 4400 million light years after Big-Bang, which is close to the observational value.

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