2. Is this universe growing, is it closed and at rest inside?

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The idea behind this approach is that the universe grows linear spherical symmetrical and that its total mass increases continuously over time so that the system as a whole remains closed to the outside or from the outside to the inside. The universe should grow by jumps of always the same R_e step and a corresponding mass M_{U_0}. Thus, the number of particles remains countable and finite, but it increases with each R_e step by $k = R_U / R_e \propto R_U$. The density distribution at a fixed point in time is then no longer constant over the radius. However, the total mass contained within a fixed radius does not change, i.e. we may continue to use the Robertson-Walker metric for the $R \le R_U$ range.

To keep the Schwarzschild Sphere closed it is not enough to add new mass somewhere. New mass has a limited velocity of propagation and thus cannot maintain symmetry as a whole if it is not distributed spherically. And it must become more and more numerous, because otherwise also holes would appear in the shell and our basic idea would not be durable in the long run.

The sphere at R_U enlarges and thus surfaces are formed again and again which are not connected with a mass. If these surfaces have exactly the size of the electron surface $A_e = \pi \cdot r_e^2$, then these surface gaps should become important for the overall structure, which is then bound by exactly one particle with a corresponding surface. Everything that does not fit to the scale of this universe should remain insignificant. Such a piece of surface is divided into an inner resting and a second moving outer with which it stands in the information exchange about its surface size, which is to become in the detail later to the term of a mass or energy. Mass should thus have a position and a time size of finite duration, which is delivered continuously to the distant opposite position at the edge. From now on these mass particles with their unit surfaces are responsible for the corresponding surfaces on the surface of the universe. There is a signal of the area size A_e and the mass $m_t = M_{U_0} R_e / R_t$ in always equal distances, which are determined by the total construction.

We get a fixed position of new particles, a mass that becomes smaller and smaller with increasing radius R_U, a total number of fixed particles that increases with R_U and always occupies the same volume. These new particles are not yet connected to the whole universe, except by their fixed position. They should also not propagate spherically like a gravitational field, but only send quantized information packets of the size A_e in the R_U direction to the edge. Thus the particles do not "see" the remaining space their spatial image consists of only one dimension.

In the Standard Model it was assumed that particle masses do not change their mass, no matter where they are in the universe, the mass of stable particles such as protons is the same everywhere. The universe should be homogeneous and have a constant density at a fixed time. In this model, however, the electrically neutral basic particles m_t in distant galaxies have a different mass from ours.

What happens to elementary particles when they move away from their position, do they change their mass?

If the mass remained the same, the particles would start to move permanently and migrate towards the center. A static universe would not be possible and the model would not be comparable with reality. What is special about this approach, however, is the exact assignment of a particle to a position that is connected to the whole. So if one assumes that the particles have to absorb energy when they move towards the center or would release energy when they move away in the R_U-direction, then one would have a mass allocation that belongs to the corresponding spherical shell of the universe.

The energy density of a basic particle would then decrease in the R_U-direction or increase towards the center. The volume of such a particle should always be the same, but the mass should decrease with $\propto 1/R_t$.

If we assume a static universe constantly growing at the edge, then we have to add the constant value Λ to the Lagrange density G for the Principal function $\delta(S_m + S_g) = 0$ otherwise static solutions of the field equations are not possible. The Principal Function of the field S_g then writes itself to

$$S_g = -\frac{c^3}{16\pi k}\int (G + 2\Lambda)\sqrt{-g}\,d\Omega \quad (1)$$

The variation of the Principal Function for the field results in

$$S_g = -\frac{c^3}{16\pi k}\delta\int G\sqrt{-g}\,d\Omega = -\frac{c^3}{16\pi k}\delta\int R\sqrt{-g}\,d\Omega \quad (2)$$

with k as universal constant. Divided into its three parts follows

$$\delta S_g = -\frac{c^3}{16\pi k}\int \delta\sqrt{-g}(R - 2\Lambda) + \sqrt{-g}R_{ik}\delta g^{ik} + \sqrt{-g}g^{ik}\delta g^{ik}R^{ik})\,d\Omega \quad (3)$$

The third integral term can be transformed via the Gaussian Theorem into an integral over the hyper plane surrounding the 4-dim area over which integration takes place. When the field is varied, the term disappears, because according to the principle of the smallest effect, the variation at the edges becomes zero.

Next, $\delta\sqrt{-g} = -\frac{1}{2}\sqrt{-g}g_{ik}\delta g^{ik}$ applies and then δS_g can be written as:

$$\delta S_g = \frac{c^3}{16\pi k}\int\sqrt{-g}g_{ik}\delta g^{ik}\left(R_{ik} - \frac{1}{2}g_{ik}R + g_{ik}\Lambda\right)d\Omega \quad (4)$$

Together with the energy pulse tensor T_{ik},

$$\delta S_m = \frac{1}{2c}\int T_{ik}g_{ik}\delta g^{ik}\sqrt{-g}d\Omega \quad (5)$$ it follows the integral

$$\frac{c^3}{16\pi k}\int\left(-R_{ik} + \frac{1}{2}g^{ik}R - g_{ik}\Lambda + \frac{8\pi k}{c^4}T_{ik}\right)\delta g^{ik}\sqrt{-g}d\Omega = 0 \quad (6)$$

With this we have the Einstein's Field Equations with Λ in the form

$$R_{ik} - \frac{1}{2}g_{ik}R = -\frac{8\pi k}{c^4}T_{ik} - g_{ik}\Lambda \quad (7)$$

Λ is then a constant with the unit m^{-2} and leads in Einstein's Equation to the additional term Λg_{ik} .

We now want to use the Robertson-Walker Metric in the Field Equations. For this we assume a hydrodynamic model, then the following applies to the Energy Pulse Tensor in any coordinate system

$$T_{ik} = (\rho + P/c^2)u_i u_k - Pg_{ik} \quad (8)$$

In addition, the speed of light c and the gravitational constant G should be equal to one.

$$ds^2 = dt^2 - R^2(t)\left[\frac{dr^2}{a - kr^2} + r^2\sin^2\vartheta d\varphi^2\right] = \omega^0\otimes\omega^0 - \omega^1\otimes\omega^1 - \omega^2\otimes\omega^2 - \omega^3\otimes\omega^3 \quad (9)$$

with the orthogonal cobase $\omega := \sqrt{1 - kr^2}$

$$\omega^0 = dt \qquad \omega^1 = R\omega^{-1}dr \qquad \omega^2 = Rrd\vartheta \qquad \omega^3 = Rr\sin\vartheta d\varphi \qquad (10)$$

and corresponding derivatives

$$d\omega^0 = 0 \qquad d\omega^1 = R\omega^{-1}dr \qquad d\omega^2 = \dot{R}rdtd\vartheta + Rdrd\vartheta \qquad (11)$$

$$d\omega^3 = \dot{R}r\sin\vartheta dtd\varphi + Rr\cos\vartheta d\vartheta d\varphi$$

Follows for the 1-form ω_b^a (with $\omega_{ik} = g_{ik}\omega_k^j$):

$$\omega_0^1 = \dot{R}\omega^{-1}dr \qquad \omega_1^2 = \omega d\vartheta \qquad (12)$$

$$\omega_0^2 = \dot{R}rd\vartheta \qquad \omega_1^3 = \omega \sin\vartheta d\varphi$$

$$\omega_0^3 = \dot{R}r\sin\vartheta d\varphi \qquad \omega_2^3 = \cos\vartheta d\varphi$$

With the connection to the tensor $R_{jmn}^i : \Omega_j^i = d \wedge \omega_j^i + \omega_j^i \wedge \omega_k^j =: \frac{1}{2} R_{jmn}^i \omega^m \wedge \omega^n$ (13)

Then follows $\Omega_0^1 = \ddot{R}\omega^{-1}dtdr + \omega_2^1 \wedge \omega_0^2 + \omega_3^1 \wedge \omega_0^3 = \frac{\ddot{R}}{R}\omega^0 \wedge \omega^1$ (14)

The second and third terms are omitted and the result is $R_{001}^1 = \frac{\ddot{R}}{R} = -R_{010}^1$ (15).

The others disappear, then is further $\Omega_0^1 = \ddot{R}dtd\vartheta + \dot{R}drd\vartheta + \omega_1^2 \wedge \omega_0^1 + \omega_3^2 \wedge \omega_0^3 = \frac{\ddot{R}}{R}\omega^0 \wedge \omega^2$ (16).

From this follows $R_{002}^2 = \frac{\ddot{R}}{R} = -R_{020}^2$ (17) and the others R_{0ab}^2 disappear again.

Since with the hyper sphere all three space directions r, ϑ, φ are equivalent we receive

$$R_{0o1}^1 = R_{002}^2 = R_{003}^3 = \frac{\ddot{R}}{R} \quad (18).$$

From $\Omega_1^2 = \omega' drd\vartheta + \omega_0^2 \wedge \omega_1^0 = \left(\frac{\omega\omega'}{rR^2} - \frac{\dot{R}^2}{R^2}\right)\omega^1 \wedge \omega^2$ follows $R_{112}^2 = -\frac{\dot{R}^2 + k}{R^2} = -R_{121}^2$ (19)

And with the corresponding symmetry properties

$$R_{121}^2 = R_{131}^3 = R_{232}^3 = \frac{\dot{R}^2 + k}{R^2} \quad (20)$$

The Ricci Tensor $R_{ab} = R_{abc}^c$ then results in $R_{00} = 3\frac{\ddot{R}}{R}$, $R_{11} = R_{22} = R_{33} = -\frac{\ddot{R}}{R} - 2\frac{\dot{R}^2 + k}{R^2}$

$R_{12} = R_{23} = R_{31} = R_{01} = R_{02} = R_{03} = 0$ (21) and the curvature scale $R = \eta^{ab}R_{ab}$ to

$$R = R_{00} - 3R_{11} = 6\frac{\ddot{R}}{R} - 6\frac{\dot{R}^2 + k}{R^2} \qquad (22)$$

Thus the following follows for the components of the Einstein Tensor (G = c =1)

$$R_{ik}-\frac{1}{2}g_{ik}R=-G_{ik}-g_{ik}\Lambda \quad (23)$$

$G_0^0=-3\dfrac{\dot{R}^2+k}{R^2}+\Lambda$ (24); $G_1^1=G_2^2=G_3^3=-2\dfrac{\ddot{R}}{R}-\dfrac{\dot{R}^2+k}{R^2}+\Lambda$ (25) remaining equal zero.

For ideal liquids, the Energy Impulse Tensor T_{ij} has the form of a

$$T_{ij}=\begin{pmatrix}\rho & 0 & 0 & 0\\ 0 & P & 0 & 0\\ 0 & 0 & P & 0\\ 0 & 0 & 0 & P\end{pmatrix} \quad (26)$$

and we can use $G_{\mu\nu}=8\pi T_{\mu\nu}$, T_0^0 and T_1^1 in the Field Equations. Together with the cosmological constant Λ the following results

$$\left(\frac{\dot{R}}{R}\right)^2=-\frac{k}{R^2}+\frac{8\pi}{3}\rho+\frac{\Lambda}{3} \quad (27); \qquad 2\frac{\ddot{R}}{R}+\left(\frac{\dot{R}}{R}\right)^2=-\frac{k}{R^2}-8\pi P+\Lambda \quad (28);$$

Or the whole corresponds with c and the gravitational constant G follows

$$\left(\frac{\dot{R}}{R}\right)^2=-\frac{k}{R^2}+\frac{8\pi G}{3}\rho+\frac{c^2\Lambda}{3} \quad (29)$$

$$2\frac{\ddot{R}}{R}+\left(\frac{\dot{R}}{R}\right)^2=-\frac{k\cdot c^2}{R^2}-\frac{8\pi G}{c^2}P+c^2\Lambda \quad (30)$$

and together $$\frac{\ddot{R}}{R}=-\frac{8\pi G}{3}(\rho+3\frac{P}{c^2})+\frac{c^2}{3}\Lambda \quad (31).$$

Speed of radius at border R = R_U now should be constant c. Curvature k and the cosmological constant should cancel each other out so $k=\frac{1}{3}\Lambda R^2$ and the average total density is $\rho=\dfrac{M_U}{4/3\pi R_U^3}$. Then follows from (29) $\dot{R}^2=\dfrac{2GM_U}{R_U}=c^2$ (32).

Thus the Schwarzschild condition results at the edge and since with this approach both the mass and the radius should rise continuously, the speed at the edge remains constant with c. The universe thus remains closed as desired.

From (31) and the condition that the velocity remains constant and the universe as a whole is pressure-free, we obtain the value

$$\Lambda = \frac{8\pi G}{c^2}\rho \quad (33)$$

This results at border again at corresponding total average density $\Lambda = 3R_U^{-2}$ (34). Thus this constant was not constant in the beginning, but very large and is today infinitesimally small. However, it is only important for the overall structure and can today be regarded as constant over normal periods of time. The curvature k would then be equal to one (k = 1) in relation to the whole.

The curvature should also be constant one, if one moves into the universe, but keeps the time.

For the movement of the size $\dot{R}$ within the universe at a position $R_1 << R_U$ the following then applies

$$\left(\frac{\dot{R}}{R_1}\right)^2 = -k\frac{c^2}{R_1^2} + \frac{8\pi G}{3}\rho_1 + \frac{c^2}{3}\Lambda \quad (35)$$

The density of the corresponding spherical sphere is at a mass of one M_{Uo} each on a R_e thickness at a sphere size of R_1, at $\rho_1 = \frac{M_{U_0}}{4\pi R_e R_1^2}$. Then applies $-k\frac{c^2}{R_1^2} + \frac{2GM_{U_0}}{R_e R_1^2} = 0$ (36) and only the terms $\left(\frac{\dot{R}}{R_1}\right)^2 = \frac{c^2}{3}\Lambda$ (37) of (29) remain. Assuming that we treat only manageable times Λ can be regarded as a constant and we can write $\left(\frac{\dot{R}}{R_1}\right)^2 = \frac{c^2}{3}\Lambda = \frac{c^2}{R_U^2} \Leftrightarrow \dot{R}_1 = c\frac{R_1}{R_U}$ (38). This could be interpreted in such a way that the space moves slower and slower according to its distance to the edge, which again would fit to the big bang theory.

However, the starting position is completely different from the conventional model. In the universe as a whole, we are not dealing with a black hole created by a larger world in it - falling into it - or with a universe like standard model, which was created from a very small area of space, where space and time were existent almost from the very beginning. Here, particles, time and space sizes are created outer, and develop from one dimension to the other and from the outer to the inner. The overall process is fixed, but the development of its individual elements runs from an exactly ordered simple state at the edge to an increasingly networked, complex after the corresponding time.

The new particle is installed at a fixed position with a fixed size to match the whole. But at first it has only one connection to the counter-particle which moves away with the edge. Thus, it does not "see" any other particle. If we assume that the influence of the rest of the universe is not yet present except in the R_U-direction, then it does not yet "know" anything about the three possible dimensions. In addition, it is still in the timeless infinite state and cannot move for the time being, even if the particle is very unstable.

If we define according to the Mach´s Principle that the inertia of the particles is linked to the connection to all other particles in space, then the initial situation of the particles is completely different from that of the Big Bang. If the particles condense from the total energy at the Big Bang, then they have connections to each other from the beginning, they are dense and the energy of the outward motion is drawn from the whole. In this model, however, we are dealing with stationary particles that are not yet connected to each other, which have a mass equivalent m_t, but which are only emitting to the edge.

Let us look at the planes of the spheres. For the corresponding boundary surface of the universe only the heavy information of the m_t -particle has to arrive, but the curvature of a 3-dim sphere is in the overall structure and it does not matter at the boundary whether the information is split inside or not, or has been temporally stretched on its way. If the amount remains the same, then the prerequisite exists that the particle can move away from its basic position at all. Furthermore, for the longest part of time, the size of the universe is so large that a movement in the near range of the particles is very small in proportion. The influence of the edge, a small back acceleration, is not noticeable in the near field. If we go further and say that the inertia is related to the cross-linking to other particles, then we have mass information for the entire system (a "heaviness"), but still no inertia between the particles, i.e. in the individual system. According to Newton, the inertia is determined by the fact that the mass resists a change in motion. If this cross-linking and thus the inertia are missing, an arbitrarily small impulse leads to a maximum movement. A particle in the spherical plane would therefore jump directly to velocity c and together with its mass information would have an energy value of $E_{kin} = \frac{1}{2} m_t c^2$ from the total system. If it meets then another particle, then for this direction, this dimension with this second particle the inertia is realized, the two particles react according to the impulse energy theorem accordingly. This energy is available only for the inner system as a whole, the balance remains unaffected. Each particle brings this energy with it. It becomes visible for one of the three dimensions for the inner particles when it moves for the first time and it is available for each of the three dimensions. It does not work as in a networked three-dimensional space system, which is dependent, but the first time its amount is a whole energy value independent of the other dimensions.

Although the energy splits with each impact and with each interaction on more and more particles, so that the change in velocity continues to decrease on average, the sum of the energy density in the respective R_U radius range remains constant and should be formally assigned to the cosmological constant.

$$\left(\frac{\dot{R}}{R}\right)^2 = \Lambda\frac{c^2}{3} \quad (39)$$

In the Big Bang model $\dot{R}$ is interpreted as a movement of space, but here $\dot{R}$ should stand for a total energy value, which should show up in a general indeterminate movement of the individual elements. This energy then depends on the radius shell and on the total radius.

$$\frac{\dot{R}_U^2}{R_U^2} = \frac{c^2}{R_U^2} = \Lambda c^2 = \frac{\dot{R}_1^2}{R_1^2} = \frac{v_1^2}{R_1^2} \qquad (40)$$

or $\qquad v_1 = c\frac{R_1}{R_U}$.

v_1 could thus stand for a kinetic energy comparable to a density in space, which increases linearly with each shell and is distributed over the individual movements of all particles in all directions of this shell.

In the spherical shell plane the inertia at the beginning is zero, i.e. the particle jumps, if it gets an arbitrarily small impact, directly to the limiting velocity c, similar to a light quantum. The motion must be such that the edge still seems to see a particle at its origin with its associated mass. If the laws of conservation are kept, then the edge sees only the sum of the divided movements and the universe remains closed.

At an inner position at R_1 the velocity equivalent, which a particle has due to its position in relation to the whole and which is an expression of the cross-linking, should have a size of $v_1 = 3c\frac{R_1}{R_U}$ (41) and a corresponding energy value of $W_{kin} = m_t\dot{s}^2 = \frac{9}{2}m_t c^2\frac{R_1^2}{R_U^2}$.

So the new particles are supposed to connect from their resting position to other positions via collisions. The energy value in the system with lambda is transformed into a particle movement of inertia. The particles change their motion over a period of time that depends on the exchange and the number of contacts. In addition, the motion is directionless and therefore statistical in the long run. This system leads to a certain uncertainty of the possible position determination in space.

If we refer the accuracy to the size of the locally sharp particles, which should lie at R_e and which represents an expression of a basic size for this universe, then the velocity blur of a particle m_t applies: $\Delta v_1 = 3c\frac{R_1}{R_U}$ this leads with $\hbar$ to the uncertainty relation:

$$\frac{3M_{U_0}R_e{}^2 c}{R_U} \equiv \hbar \quad (42)$$

A locally sharply defined particle of size R_e on the sphere changes its velocity when it exchanges with another particle in the range of Δv_1. This velocity is determined by the different direction of the connections or cross-links in space as well as by their number. The number of connections increases with the number of collisions, i.e. with the age of the universe, but has a less and less proportional effect, so that the quantities M_{Uo}, R_e, c and R_U are almost like constants that can be summarized as $\hbar$.

According to the uncertainty relation, for a mass particle that is fixed at a location of size ΔR_e, an uncertainty of the velocity applies that lies at Δv_1 and, according to this approach, has to do with a velocity change that is composed of the cross-linking and the size of the momentum exchange. The particles are then less cross-linked towards the edge and have a correspondingly higher velocity. The particles have a center of gravity that lies at the origin of their formation. Their initial kinetic energy with v =c was distributed differently to more and more particles in all three spatial directions.

A particle thus undergoes a change of velocity in space at regular intervals, because it has connections to different particles, which run one after the other according to the conservation laws. A mass particle shows a motion blur or together with its mass an impulse blur, which leads to a trembling motion, an indeterminacy of motion. Since a long period of time has passed since the formation and the particles have pushed endlessly, this movement can only be statistically followed and it seems that this is in the range of a principal quantum.

The uncertainty range of an electron at its mass, its fixed R_e size and its speed change is much larger than that of the proton. Nevertheless, the electron is strongly bound to the nucleus by the electrical interaction. $\hbar$ is than the area of space resulting from this interaction of motion change due to the networking and that of the electrical forces.

The Robertson-Walker Metric will again be used as a further basis and the movement of individual particles or photons will be considered, which can move freely falling in the R-direction. With the General Relativity Theory and according to the variation principle $\delta\int L d\tau = 0$ (44) with $L = c^2\dot{t}^2(\tau) - S^2(t)[\dot{\chi}^2(\tau) + r^2(\chi,k)(\dot{\vartheta}^2(\tau) + \sin^2\vartheta\dot{\varphi}^2)]$ under condition $d\tau^2 = ds^2/c^2 = dt^2 - S^2(t)[d\chi^2(\tau) + r^2(\chi,k)(d\vartheta^2(\tau) + \sin^2\vartheta d\varphi^2)]$ (45) with the corresponding Euler equations $d/d\tau(\partial L/\dot{x}^\alpha) = \partial L/\partial x^\alpha$ (46) applies:

$$c^2\ddot{t}(\tau) = -S\frac{dS}{dt}\left[\dot{\chi}^2(\tau) + r^2(\dot{\vartheta}^2(\tau) + \sin^2\vartheta\dot{\varphi}^2(\tau))\right] \quad (47)$$

Reclassified to $\frac{d}{d\tau}(S^2\dot{\chi}(\tau)) = S^2 r\frac{dr}{d\chi}(\dot{\vartheta}^2(\tau) + \sin^2\vartheta\dot{\varphi}^2(\tau))$ (48)

Under the conditions $\dot{\varphi} = \dot{\vartheta} = 0$, the equation is converted to

$$S^2(t)\dot{\chi}(t)(1-S^2\dot{\chi}^2(t)/c^2)^{-1/2} = \mathrm{co}\,nst \quad (49)$$

With the radial velocity of the particle $dl_\chi / dt = S(t)d\chi / dt = v_\chi$ (50) and the

radial pulse $p_\chi = m_0 v_\chi (1-v_\chi^2/c^2)^{-1/2} = m_0 S(t)\dot{\chi}(t)(1-S^2\dot{\chi}^2/c^2)^{-1/2}$ follows the conservation law

$$pS(t) = const \quad (53)$$

which not only refers to particles, but also to photons and with $p = h \cdot v / c$ becomes

$$v \cdot S(t) = const \quad (54).$$

In a homogeneous and isotropic universe the direction vector can be omitted.

If we now interpret this result, then we see at today's size of the universe and our position, at great distances also an apparently isotropic universe, but not with the condition that the light from distant galaxies shows us a smaller universe. The light from distant galaxies originated at a larger radius and has not changed since. Light arriving here is seen at a similar S(t) as at the time of emission. The influence of a universe that is of a larger form at the time of the arrival of the radiation is outside the event horizon for our position. At the time of the emission of the radiation and our time is valid then $S(t_0) = S(t_{em})$ and thus $p(t_0) = p(t_{em})$ and related to a photon $v_{em} = v_0$.

The frequency of a photon does not change afterwards because the massless impulse of a photon does not change. The frequency does not change after this approach because the space between the communicating particles has expanded. The space between the particles should remain constant over time. What changes is the inertia of the particles or their change of motion from shell to shell. On the one hand, the particles should become more and more networked over time and on the other hand, the particles in the older, lower shells should only move more slowly.

If we stick to the formulation $m_t = M_{U_0} / k = M_{U_0} R_e / R_t$ and the velocity $v_t = cR_t / R_U$ then it applies $p = m_t v_t = M_{U_0} R_e / R_U = const$ that the velocity decreases linearly towards the center as the mass of the particles increases.

The momentum of a massless particle remains the same but the time in the deeper shells runs faster because the kinetic energy of the elementary particles and atoms is smaller. As the influence of the mass of an elementary particle on time is too small, but the kinetic energy is very high in relation to the speed of light, the frequencies of the distant galaxies in our inertial system look red shifted, but not proportional to the distance d.

First be the four speed $u = \gamma \begin{pmatrix} 1 \\ \beta \\ 0 \\ 0 \end{pmatrix}$ of the light source, with the 1st axis placed in the direction of motion of the emission source. $(\beta = \frac{v}{c}; \gamma = \frac{1}{\sqrt{1-\beta^2}})$

Due to the covariance of the wave equation $\Phi = 0$, the wave vector k of the wave transforms like a four-vector. Then Lorentz Transformation follows

$$L = \begin{pmatrix} \gamma & -\beta\gamma & 0 & 0 \\ -\beta\gamma & \gamma & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \quad (55)$$

For the wave vector, the system is selected so that k_3 is 0. Then the wave vector can be written as $\vec{k} = (k_0 \cos\alpha, k_0 \sin\alpha, 0)$ (56), where the angle between the movement of the source and the emission propagation direction is.

For the wave vector $k' = Lk = k_0 \begin{pmatrix} \gamma - \beta\gamma\cos\alpha \\ -\beta\gamma + \gamma\cos\alpha \\ \sin\alpha \\ 0 \end{pmatrix}$ (57) then follows.

In the resting system, the light has the frequency

$$k' = k_0\gamma(1-\beta\cos\alpha) \Leftrightarrow k_0 = \frac{\sqrt{1-\beta^2}}{1-\beta\cos\alpha} k_0' \quad (58).$$

This results in the following for small β Taylor developers

$$k_0 = \left[1 - \beta\cos\alpha - \beta^2\left(\frac{1}{2} - \cos^2\alpha\right) + O\left(\beta^2\right)\right]k_0' \quad (59),$$

we rewrite this to $z = (\lambda_0 - \lambda)/\lambda_0)$ as follows

$$z = \frac{v}{c}\cos\alpha + \frac{v^2}{c^2}\left(\frac{1}{2} - \cos^2\alpha\right) + O\left(\beta^2\right) \quad (60).$$

That means in the R-direction we have the known Doppler shift to blue or red, perpendicular to it with $\alpha = \pi / 2$ we get $z = \frac{1}{2}\beta^2$ (61).

This is the transverse Doppler Shift that occurs only relativistic. In our case ´z´ is always red-shifted, but only in the 2nd order and not linear to the distance as required. Since after (40) v only decreases linearly with R, this cannot be the reason for the observable linear redshift.

According to the Big Bang Theory, if light is sent off at one time t_{em}, then the universe has enlarged by $S(t_{em})$ to our size $S(t_0)$ up to our time t_0. With the assumption that $v \cdot S(t) = const$ is valid with the series development

$$S(t) = S(t_0)\left[1 + H_0(t - t_0) + \frac{1\ddot{S}(t_0)}{2S(t_0)}(t - t_0)^2 + ...\right] \quad (62)$$

Or $z = H_0(t_0 - t_{em}) + (1 + \frac{q_0}{2})H_0^2(t_0 - t_{em})^2 + ...$ (63)

with d as the present distance of the galaxies follows for the redshift

$$z = \frac{H_0}{c}d + \frac{1 + q_0}{2}\left(\frac{H_0}{c}\right)^2 d^2 + ... \quad (64).$$

Afterwards, the redshift in the lowest order is proportional to the current distance d, which is also observed.

And for the time-dependent Hubble parameter H(t), according to the Big Bang Theory, the relationship $H(t) = \frac{\dot{S}(t)}{S(t)}$ (65) applies with the general scale factor S(t).

If we now assume a fixed time t_0 according to this model, then $H_0 = \frac{\dot{S}}{S} = const$ is valid and can be written according to our approach with (40) to $H_0 = \frac{\dot{R}}{R} = \sqrt{\frac{\lambda}{3}}c = \frac{c}{R_U}$ (66)

which with a universe time of 13.7 billion years leads to the same result of redshift as an expansion of space.

In this structure, not every point of view is equally excellent. There is a spatial sequence, a center and an outer area. We then find ourselves in an unimaginably large space more at the center about 400 million years away from it, which corresponds to the size of the Virgo Cluster and is supposed to belong to the close-up range. Areas further out were also formed later. The information in the light then shows past events, but not a universe that is younger and smaller than our world. It must therefore always be larger than 400 million years old (except in the near range).

A distant galaxy, whose light arrives here, then lies in a universe over the same radius. It does not show the universe for example 10 billion years ago, but lies in our universe, which has a size of 13.7 billion years, at a distance of 10 billion years. So our universe is now 13.7 billion years large. And also the light of the distant galaxy belongs to the radius over 13.7 billion years. Thus the quantum is preserved from our point of view, $\hbar$ changes with R_U, but related to a fixed position $\hbar$ changes for all the same, so that we see a constant.

The vacuum energy Lambda Λ then corresponds to the energy that is in the cross-linking and this shows up again in an inertia of the particles.

The interpretation that S(t) is related to the space size of the universe and that $\dot{S}(t)$ is the expansion of space on large scales, which in turn shows itself in a movement of the galaxies away from us, is a possible explanation, but not the only one.

Let's assume that the new particles are the first resting position points and that space in quantized sizes only begins here. The size of an initial particle, R_e and its surface $A_e = \pi \cdot r_e^2$ defines a position and a space step size. The second position, which is now used in fixed time steps, separates from the first and moves away from the inner particle at the speed of light like the edge. The further away the boundary position moves, the larger the space in between and the greater the number of Possibilities.

For reasons of symmetry, the source particle inside should be represented by two planes of size A_e at distance $d \le R_e$, which represents the positive mass particle M_t and a second pair of planes representing the negative electron with mass M_e. Let us consider further the place of origin of the individual M_t, so the planes of the M_t particle shift according to the mass. In the distance R_1 on our shell the M_t particle has the mass $M_t = M_{U_0} / k_1 = M_{U_0} / (R_1 / R_e)$ and the distance of the planes has increased to $d = k_1 \delta_0$. The particle that continues to run outside does increase its distance of the planes with each R_e-step the inner opposite particle in the resting state not. The distance d represents then an energy value that's slowly running out.

The outer planes are initially at distance $d = \delta x_0 k$ and move away from each other by a small displacement δ_0 with each step in the R_U direction. The step size should always correspond to the same energy value that is needed to shift one M_t particle one R_e further and this should cause the shift in the electrical potential,

then applies $\delta x_0 = \dfrac{e^2}{4\pi\varepsilon_0 M_{U_0} c^2}$ (67).

The position on the universe radius determines the size of the displacement δx_0. At this point $R_1 = k_1 R_e$ the displacement is corresponding $d_1 = k_1 \cdot \delta x_0$ (68).

So if a particle at R_1 is added completely new, then the planes already have the displacement d_1. Further, space should always come up only between the area of the new particle and the distant edge of the universe. At the edge, the corresponding counter-position should lie, again a pair of planes, which, starting from distance d_1, shifts further with increasing R_U.

Since the position R_1 creates the space size there anew and thus determines it, the same wavelength of a distant particle shows us a correspondingly extended length to space.

The elongation or redshift is then proportional to the distance and corresponds to a velocity v, which is also exactly c as required at the edge.

If δx_0 is the smallest step size, then the electrical potential energy $E = \dfrac{e^2}{4\pi\varepsilon_0 k \Delta x}$ (69) with k as the position on the universe radius in relation to R_e is valid.

This energy corresponds to the energy needed to move a basic particle M_t one R_e shell further $E = \dfrac{M_{U_0} c^2}{k^2}$, or to move the second position at the edge one step further, the energy $E = k\dfrac{M_{U_0} c^2}{k^2}$ is needed. This means that the two position points inside and at the edge are mutually dependent. To the extent that the planes move one step further at the edge, the energies in the inner point must be drawn from the electrical potential. Thus a maximum energy of $R_e = \dfrac{M_{U_0}}{M_e}\delta x$ (70) steps are available inside, only then the potential is exhausted.

Space movement outer is c, inside particle rests for now, however space is shifted corresponding to its inner position.

Outer, movement is fixing at R_U with speed c exactly in R-direction. Inside, the particle can change its inner space or time processes by redistribution. Time has become countable finite and the space between the inner and outer particle can be stretched. It can change the distances of the planes and thus influence the position to the whole and the speed in detail. A shift δx_0 is the smallest possible speed change. This shift causes a continuous shift of the position in space over time.