About the Description of Nature*

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(comments welcome)

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Abstract

I develop a variable-speed-of-light model as an alternative to the astronomical standard model. It combines quantum and relativistic physics.

Contents

1 Introduction

I start with a simple enough question: Say, you have a measurement of a dimension (distance, time, mass and such). What do you do with it? This sounds like a stupid question. You use it in your mathematical model, of course. But since there are no stupid questions, i will rephrase it: Are you allowed to use the measurement in your mathematical model?

That question is not as trivial as it seems. Every mathematical model requires some mathematical properties of the objects it uses. The measurement, however, is an object of reality. It has no mathematical properties by itself. Those properties must be ascribed. Ascribing the wrong properties will lead to any number of problems, later. Generally, the use of a measurement goes through three stages:

1. **Transformation.** In the first stage mathematical properties have to be ascribed to the measurement. In this stage additional modifications might be performed to leave out complexity in the second stage.
2. **Use in model.** In the second stage the—possible modified—measurement can be used with the mathematical properties ascribed to the measurement. The result of this stage is a prediction value.

3. **Inverse transformation.** Since we have allowed modifications of the measurement in the first stage, we must assume, that the prediction value of the second stage must be transformed into a value, which can be compared to an observation.

Usually, all three stages are done implicit by the direct use of a measurement value. The necessary mathematical properties are usually asumed, but not proven. One exception is the use of the LORENTZ transformation ([1]). It performs all three stages.

Our perception is a space-time-continuum, where a distance x can be associated to a time t with the light-speed c_v by

$$x = c_v \cdot t \tag{1}$$

which is the time a photon needs to reach the distance. The author calls this equation "space-time equivalence" in accordance with the mass-energy equivalence of EINSTEIN's famous formula([2])

$$E = m \cdot c_v^2 \tag{2}$$

However, our perception of space and time might not agree with reality. We may have a distorted view on nature. The author asumes, that reality does not fit into human preconceptions. That is the reason, the author calls the contents of this article "Reality-Sucks Theory".

2 Measurements

Let's start with the transformation. Here we have to distiguish between dimensions measured with units and without. In the latter case, the transformation is simple. The measurement is a number and can be used as such. However, the only dimension measured without an unit is the angle. It is measured relativ to the unit circle. All other dimensions are measured with a unit. We need to provide mathematical properties of the unit to use the measurement in a mathematical model.

In physics, the mathematical model is usually based on a vector space ([3]). The tuple $(V, \oplus, \odot)$ with V a non-empty set, the set S a field and the two binary operations vector addition (or simply addition) $\oplus : V \times V \to V$ and scalar multiplication $\odot : S \times V \to V$ is called a vector space over S, if V is an abelian group under addition and the scalar multiplication defines a ring homomorphism from the field S into the endomorphism ring of this group. The tuple $(S, +, \cdot)$ with S a non-empty set and the two binary operations addition $+ : S \times S \to S$ and multiplication $\cdot : S \times S \to S$ is a field, if S is an abelian group under addition with zero as the additive identity, the non-zero elements are an abelian group under multiplication with one as the multiplicative identity and the multiplication distributes over addition. We call the elements of V vectors and the elements of S scalars. Usually, we use the measurement as a scalar. The crucial definition is the multiplication of the field $\cdot : S \times S \to S$, which must map into S.

For a general dimension K (length, time, mass), which is measured in a unit κ (meter, second, kilogram) a measurement x_κ is an element of the set $K = \{x_\kappa | x_\kappa = r_\kappa \cdot \kappa\}$, with the real number (or element of some other field) $r_\kappa \in \mathbb{R}$ the measurement value. We write '$1m$'. For the dimension angle we can asume 1 as a unit.

2.1 Direct Use

To use a measurement as a scalar, the properties of a field must be provided. As mentioned above, a formal definition of the addition is possible. However, if we try to multiply two measurements $x_1 = r_1 \cdot \kappa$ and $x_2 = r_2 \cdot \kappa$, we get

$$\begin{aligned} x_1 \cdot x_2 =& r_1 \cdot \kappa \cdot r_2 \cdot \kappa \\ =& r_1 \cdot r_2 \cdot \kappa^2 \end{aligned} \tag{3}$$

The multiplication does *not* map into K, but $K^2 = \left\{x_\kappa | x_\kappa = r_\kappa \cdot \kappa^2\right\}$. A necessary operation does not exist. As a consequence we no longer can asume the distribution of multiplication over addition, i. e.,

$$x_1 + x_2 = r_1 \cdot \kappa + r_2 \cdot \kappa \tag{4}$$

$$\neq (r_1 + r_2) \cdot \kappa \tag{5}$$

We can *not* use a measurement with a unit as a scalar, regardless of the vector space. We know that $1m \cdot 1m = 1m^2 \neq 1m$. However, it can be used as a one-dimensional vector over $\mathbb{R}$. It is an abelian group under addition and the scalar multiplication defines a ring homomorphism from the field $\mathbb{R}$ into the endomorphism ring of this group. The unit κ could be used as a basis of the dimension.

2.2 Classic Transformation

The classic way to deal with this problem is, to ignore it. We use units formally, as if they would be numbers. We have proven in the previous section, that generally, they are not. However, in a certain range of measurement values, they might approximate the behaviour of numbers well enough.

In the schema of section 1 we need a transformation and it's inverse. The formal division of the measurement with the unit results in the measurement value, $x_\kappa / \kappa = r_\kappa$. The measurement value is a number, element of a field and can be used as a scalar. The inverse operation is the formal multiplication with the unit of the intended dimension.

We already know two other approaches, to address the problem of using a measurement as a scalar: the relativity and the quantum theory.

2.3 Relativistic Transformation

For every dimension, for which we have a maximum measurement, we can define a relativistic transformation. The methods to cope with a maximum are already developed by the special relativity theory. If we already have a maximum measurement (like the observable space of the universe), we *must* use a relativistic transformation. The mathematical model must be able to describe the maximum value. The transformation presented here is a generalisation of the rapidity used in special relativity theory ([5]). We notate the maximum of the dimension K as c_κ in accodance to the notation of light speed c_v.

Given a measurement x_κ and the maximum of the dimension c_κ we can transform the measurement to it's relativistic representation by first calculating the relative value $r_\kappa = x_\kappa / c_\kappa \in [-1, 1]$. To use this value as a scalar, we need a field. The range $[-1, 1]$ does not provide a field, the complete set of real numbers $[-\infty, \infty] \in \mathbb{R}$ does. We need an invertible mapping of the range into $\mathbb{R}$. Any will suffice mathematically, as long as it is invertible. The inverse hyperbolic tangent $\operatorname{artanh}(r_\kappa)$ does ([6]). We can use the fuctions artanh and tanh to map the range into the real numbers and back, again. We can calculate the relativistic value θ_κ as

$$\begin{aligned} \theta_\kappa &= \operatorname{artanh}(x_\kappa / c_\kappa) && (6) \\ &= \operatorname{artanh}(r_\kappa) && (7) \end{aligned}$$

use this value in the calculations and transfer it back with

$$\begin{aligned} r_\kappa &= \tanh(\theta_\kappa) && (8) \\ x_\kappa &= r_\kappa \cdot c_\kappa \\ &= \tanh(\theta_\kappa) \cdot c_\kappa && (9) \end{aligned}$$

to obtain the real-space value, again. The maximum value of the desired dimension must be used in the inverse transformation. For small $x \ll 1$ both, the $\operatorname{artanh}(x) \approx x$ and $tanh(x) \approx x$ approximate to the value and the transformation degenerates to the classic case of section 2.2.

Instead of the equation (4) we get for a sum of two measurements x_1 and x_2

$$\begin{aligned} x_1 + x_2 &= \tan\left(\operatorname{artanh}\left(\frac{x_1}{c_\kappa}\right) + \operatorname{artanh}\left(\frac{x_2}{c_\kappa}\right)\right) \cdot c_\kappa \\ &= \tan\left(\operatorname{artanh}(r_1) + \operatorname{artanh}(r_2)\right) \cdot c_\kappa \\ &= \tan\left(\operatorname{artanh}\left(\frac{r_1 + r_2}{1 + r_1 r_2}\right)\right) \cdot c_\kappa \\ &= \frac{r_1 + r_2}{1 + r_1 r_2} \cdot c_\kappa \\ &= \frac{x_1 + x_2}{1 + \frac{x_1 x_2}{c_\kappa^2}} && (10) \end{aligned}$$

The result is identical to the velocity addition of the special relativity theory ([7]), but developed to satisfy mathematical properties. Or better, the first half of it. If we have redefined the addition, we must redefine the multiplication distributing over the addition to provide a field. That is the operation, the special relativity theory is missing.

The multiplication must be defined for different dimensions. The measurement x_1 is of dimension K_1 and the measurement x_2 is of dimension K_2. The maximum measurement of dimension K_1 is c_1 and the maximum measurement of dimension K_2 is c_2. Then the multiplication of x_1 and x_2 with the addition above is defined as

$$x_1 \cdot x_2 = \tan\left(\operatorname{artanh}\left(\frac{x_1}{c_1}\right) \cdot \operatorname{artanh}\left(\frac{x_2}{c_2}\right)\right) \cdot c_1 c_2 \qquad (11)$$

or with $r_1 = x_1/c_1$ and $r_2 = x_2/c_2$

$$x_1 \cdot x_2 = \tan(\operatorname{artanh}(r_1) \cdot \operatorname{artanh}(r_2)) \cdot c_1 c_2 \tag{12}$$

The field with the definitions of the addition and multiplication above does no longer support the space-time and mass-energy equivalences. The value of the relativistic light speed $\theta_v(c_v) = \operatorname{artanh}(1) = \infty$ will always result in ∞, when used as a factor in $\theta_x(r) = \theta_v(c_v) \cdot \theta_t(t)$ and $\theta_E(E) = \theta_M(m) \cdot \theta_v(c_v)^2$, which yields the maximum distance c_x and the maximum energy c_E and could be though as any location and any energy. All relativistic effects are no longer existence in this field. We will see the replacements in section 3.

This is an all-or-none schema. If a maximum value for one dimension exists, a maximum value must exist for all dimensions. We already know the light speed as a limit. The other values must be determined. The relativistic transformation is a linearisation. It converts the non-linear measurement unit to a linear entity.

We are living in a universe, where the observation of *all* dimensions is limited. The maxima of the dimensions can be called "horizon" of the dimension.

2.4 Extending the Transformation

Before we determine the maximum values of the other dimensions, we must discuss the other approach to the problem of using a measurement as a scalar, the quantum theory and how we can use it in the schema of section 1. As we will see, both approaches are coupled.

A quantum is the minimum amount of a dimension, of which only integer multiples exist. If we have a quantum, we can easily define a mapping from the measurement into a field. We can count the amount of quantae to reach the measurement and get an integer number. The set of integers $\mathbb{Z}$ is not a field. The counts can be interpreted as elements of the rational numbers $\mathbb{Q}$, which is a field under the usual addition and multiplication. A quantum can be interpreted as a natural unit.

This has severe impacts on the model equations. The domain and codomain of all operations must be the rational numbers. Neither the circle number π nor the EULER constant e have an exact representation as a rational number. They and all operations using them must be approximated. An exact calculation is not possible in this field.

This is a all-or-none schema like the relativistic transformation of section 2.3. All dimensions must be representable as rational numbers. The quantified dimensions must be representable as integers, all other as rational numbers. We already know the PLANCK constant ([8]) as a quantum and suppose the PLANCK time ([9]) as a minimum or quantum, which is in debate.

If the model results in a rational number not an integer for a quantified dimension, the result must be discarded as invalid. It can never be observed. There is no way to predict, if the result of an equation in $\mathbb{Q}$ is an integer. It must be tested for each set of numbers. If the model uses trigonometric or natural exponential operations, the model is not exact and it can no longer be distiguished between a result as integer or no result, because not an integer. An exact prediction is no longer possible.

As another obstacle to use this transformation, a measurement always has an error. The error measured in the count of quantum yield to a very large number. The measurement itself measured in counts of the quantum is a very huge number. The sheer number of numbers to test the model, if it results in an integer, makes it impossible to calculate the model completely. That is the reason, why the quantum mechanics uses another approach.

I have classified this transformation as an extension. It depends on some measurement, which can be divided by the quantum. The division might be performed classical as in section 2.2 or relativistic as in section 2.3. In the latter case you get a relativistic quantum model.

2.5 Quantum Mechanics

The quantum mechanics ([11]) uses the measurement as a vector. As mentioned in section 2.1 the measurement can be used as a vector. The theory is formulated in various specially developed mathematical formalisms. In one of it, it is a wave function.

Interpreting that with the schema of section 1, the representation of the measurement is a transformation. If in the transformation only standing waves ([13]) are considered, the vector can be interpreted as a representation of integer numbers. For a standing wave the interval spawned is divided into an integer multiple of a part of the wave length.

The result of the model can be interpreted as a density function of integer solutions of the model. Asuming an even probability of all solutions, this is identical to the probability of an observation.

This is just a diffent interpretation. It has the advantage, that there is no wave-particle dualism ([14]). The observable is represented differently in mathematics, but stays the same in reality. The wave is not a particle wave, but a mathematical construction to represent integers. Like the transformation of section 2.4 it can be combined with the relativistic transformation of section 2.3 to yield a relativistic quantum mechanic theory.

3 Determining the Parameters

In section 2.3 we required a maximum value. A maximum value of the dimension K is notated as c_κ. In section 2.4 we required at least a minimum value, possible a quantum. The minimum value (or quantum) for the dimension K is notated as h_κ.

Some of the values are easy to identify. The light speed c_v ([15]) is the maximum a velocity may have. The age of the universe c_t ([16]) is the limit, a time may have. For the minimum of the time h_t we can assume the PLANCK time ([9])

$$c_v = 299792458\,\frac{m}{s} \tag{13}$$

$$c_t \approx 13.787 \cdot 10^9\,y \approx 4.350 \cdot 10^{17}\,s \tag{14}$$

$$h_t = \sqrt{\frac{h \cdot G}{c_v^5}} \tag{15}$$

$$\approx 1.351 \cdot 10^{-43}\,s \tag{16}$$

In (15) $h = 6.62607 \cdot 10^{-34} kg \cdot m^2/s$ is the PLANCK constant and $G = 6.67430 \cdot 10^{-11} m^3/(kg \cdot s^2)$ is the gravitational constant ([10]). I used the definition suggested by PLANCK. Modern physics is replacing the PLANCK constant h by the reduced PLANCK constant $\hbar = h/(2\pi)$.

With the space-time equivalence we determine the limits of length c_x and h_x to

$$c_x = c_v \cdot c_t \approx 1.304 \cdot 10^{26}\,m \tag{17}$$

$$h_x = c_v \cdot h_t$$

$$= \sqrt{\frac{h \cdot G}{c_v^3}} \tag{18}$$

$$\approx 4.051 \cdot 10^{-35}\,m \tag{19}$$

That explains, why the space-time equivalent does not exist with the relativity transformation (see section 2.3). If $x = c_v \cdot t$, then $r_x = x/c_x$ is equal to $r_t = t/c_t$, not equivalent. The same must apply to the mass-energy equivalence (see the law of relative identity (41)).

From the definition of the frequency $f = 1/T$ with T period time ([17]) we can obtain the maximum frequency c_f and the minimum frequency h_f. The smallest possible period time is h_t and the largest is c_t

$$c_f = 1/h_t \approx 7.399 \cdot 10^{42}\,s^{-1} \tag{20}$$

$$h_f = 1/c_t \approx 2.298 \cdot 10^{-18}\,s^{-1} \tag{21}$$

This also means, the possible frequencies are limited on the upper end, if the time is quantified. The next lower observeable frequency to c_f will be $c_f/2$, because the frequencies in between do not have a corresponding period time. If they exist, they will be perceived as noise and not as periodic.

The slowest speed h_v could be determined with the smallest distance h_x and the largest time c_t to

$$h_v = \frac{h_x}{c_t}$$

$$= \sqrt{\frac{h \cdot G}{c_v^3 \cdot c_t^2}} \tag{22}$$

$$\approx 4.051 \cdot 10^{-35}\,\frac{m}{s} \tag{23}$$

We will determine the maximum mass c_m and the minimum mass h_m with the uncertainty principle. It was originally formulated as $h \approx \Delta_x \Delta_p$ with Δ_x the precision of the location and Δ_p the precision of the momentum measurement ([18]). The momentum is defined as $p = m \cdot v$ with m the mass and v the velocity ([19]). We get the relation

$$h \approx \Delta_x \cdot \Delta_m \cdot \Delta_v \tag{24}$$

which we will use as an equation instead of an approximation.

There can be no larger error for the distance than c_x and there can be no larger error for the velocity than c_v. Setting theese errors into (24) we obtain the required minimum mass $\Delta_m = h_m$

$$h_m = \frac{h}{c_x \cdot c_v} \tag{25}$$
$$= \frac{h}{c_v^2 \cdot c_t} \tag{26}$$
$$\approx 1.694 \cdot 10^{-68} kg$$

With the mass-energy equivalence we obtain the smallest energy h_E

$$h_E = h_m \cdot c_v^2 \tag{27}$$
$$= \frac{h}{c_t} \tag{28}$$
$$\approx 1.523 \cdot 10^{-51} \frac{kg \cdot m^2}{s^2} \tag{29}$$

Equation (28) is identical to the energy of a photon having the largest period time c_t ([20]). This is the reason i use the old or original formulations of the PLANCK time and the uncertainty principle. We get reasonable equations.

There can be no smaller error for the distance than h_x and there can be no smaller error for the velocity than h_v. Setting theese errors into (24) we obtain the required maximum mass $\Delta_m = c_m$

$$c_m = \frac{h}{h_x \cdot h_v} \tag{30}$$
$$= \frac{h \cdot c_t}{h_x^2} \tag{31}$$
$$= \frac{c_v^3 \cdot c_t}{G} \tag{32}$$
$$\approx 1.756 \cdot 10^{53} kg$$

That yields to the maximum energy c_E

$$c_E = c_m \cdot c_v^2 \tag{33}$$
$$= \frac{c_v^5 \cdot c_t}{G} \tag{34}$$
$$\approx 1.579 \cdot 10^{70} \frac{kg \cdot m^2}{s^2} \tag{35}$$

If we divide h_v by c_v we get the relation

$$\frac{h_v}{c_v} = \frac{h_x}{c_v \cdot c_t} \tag{36}$$
$$= \frac{h_x}{c_x} \tag{37}$$

If we divide h_m by c_m we get the relation

$$\frac{h_m}{c_m} = \frac{h}{c_x \cdot c_v} \cdot \frac{h_x \cdot h_v}{h} \tag{38}$$
$$= \frac{h_x}{c_x} \cdot \frac{h_v}{c_v} \tag{39}$$
$$= \frac{h_x^2}{c_x^2} \tag{40}$$

This leads to the law of relative identity

$$\frac{h_t}{c_t} = \frac{h_x}{c_x} = \frac{h_v}{c_v} = \sqrt{\frac{h_m}{c_m}} = \sqrt{\frac{h_E}{c_E}} \tag{41}$$

Space, time and velocity are relative identical to their limits, mass and energy are relative identical by the square root. The calculation of a relative value can be interpreted as a weighting making the dimensions comparable.

If you asume the minimum time h_t a quantum, the minimum distance h_x must be a quantum, too. If you asume the minimum mass h_m a quantum, the minimum energy must be a quantum, too. If you asume a discrete time, you will get strange effects, if you interpolate to use operations on a continous set. You may misinterpret the differences as results of forces. If you have the leisure, you can compare the results of this effect to that of the weak ([21]) and of the strong ([22]) interaction. The scale is small enough, that a quantifycation of space, time, mass and energy matter.

The limits of the other dimensions can be obtained similar with definitions above.

With limits to all dimensions, the equation of classic physics must be rewritten, to be used in the relativistic field of section 2.3. In equation (refeqn:relmul) the relativistic value of the PLANCK constant θ_h or the gravitational constant θ_G might be required.

Both constants can be converted by their value. The PLANCK constant has the value $h = 6.62607 \cdot 10^{-34} kg \cdot m^2/s$. To transform it into the relative value r_h, we transform the units.

$$\begin{aligned} r_h &= 6.62607 \cdot 10^{-34} \frac{(kg \cdot c_m^{-1}) \cdot (m^2 \cdot c_x^{-2})}{s \cdot c_t^{-1}} \\ &= h \cdot \frac{c_t}{c_m \cdot c_x^2} \end{aligned} \tag{42}$$

and with equation (31)

$$r_h = \frac{h_x^2}{c_x^2} \tag{43}$$

With the law of relative identity (41) the relative value of the PLANCK constant becomes identical to a relative energy quantum.

$$r_h = \frac{h_E}{c_E} \tag{44}$$

$$\theta_h = \operatorname{artanh}\left(\frac{h_E}{c_E}\right) \tag{45}$$

Doing the same for the gravitational constant G yields in a relative value $r_G = 1$ and becomes the relativistic value ∞. That is correct. As can be seen in equation (32), the effects of gravitational constant are removed by the transformation. NEWTON' s law of the gravitational force F

$$F = G \cdot \frac{m_1 \cdot m_2}{r^2} \tag{46}$$

with m_1, m_2 the masses of the object and r the distance is transformed to

$$\theta_F = \frac{\theta_m(m_1) \cdot \theta_m(m_2)}{\theta_x(r)^2} \tag{47}$$

in the relativistic field of section 2.3. The gravitational constant is part of the field, a property of the space and is transformed to 1.

4 Classic Redshift

Until now, we have interpreted the light speed as a constant in time. It is generally thought thought of as a physical constant ([15]). There is no known effect, which suggests otherwise. It might be unknown, because nonbody has analysed an effect accordingly, yet. Variable speed of light theories are nothing new ([23]).

In astronomy we observe a redshift of objects of most distance ([24]). It is explained by the expansion of the universe with HUBBLE's law. A parameter used to describe the relation between the redshift z and the distance r is the scale factor $a(t)$ ([26]) with t the time as

$$a(t) = \frac{1}{z+1} \tag{48}$$

The redshift z of an electro-magnetic wave with the observed weave length λ_o and the emmitted weave length λ_e is defined as ([24])

$$z = \frac{\lambda_o}{\lambda_e} - 1 \tag{49}$$

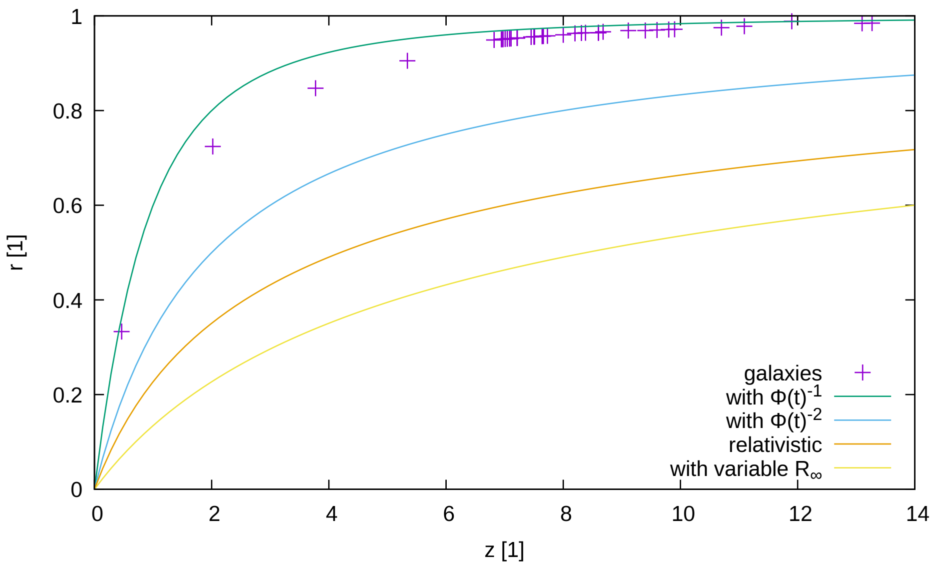

Figure 1: Relative distance r as a function of the redshift z. Displayed are the estimations of the distances of some galaxies with the standard model (see appendix A), the distance using $\phi(t)^{-1}$ and $\phi(t)^{-2}$ in the classic model of section 4, the results of the relativistic model of section 5.3 and the results using a variable RYDBERG parameter R_∞.

The weave length lambda of an electro-magnetic weave with frequency f is defined as ([27])

$$\lambda = \frac{c_v}{f} \tag{50}$$

Using a variable light speed $c_v(t)$, the emitted wave length $\lambda_e = c_v(t)/f$ and the observed wave length $\lambda_o = c_v/f$ in equation (49) yields to

$$z = \frac{c_v}{c_v(t)} - 1 \tag{51}$$

and reformulated

$$\frac{c_v(t)}{c_v} = \frac{1}{z+1} \tag{52}$$

The right hand side of both, equation (48) and equation (52), is identical. We can not differ between a result of the expansion of the universe or the variation of the light speed. In equation (52) the quotient $c_v(t)/c_v$ must decrease with larger t.

Using $\phi(t)^{-1}$ of equation (65) as the quotient

$$\frac{c_v(t)}{c_v} = \frac{1}{\phi(t)} = \sqrt{\frac{1-r_t}{1+r_t}} \tag{53}$$

we get from equation (52)

$$\sqrt{\frac{1+r_t}{1-r_t}} = z+1 \tag{54}$$

or reformulated

$$r_t = \frac{(z+1)^2 - 1}{(z+1)^2 + 1} \tag{55}$$

Figure 1 shows the result of that estimation compared to the estimation of the distance of some galaxies estimated with the standard model of astronomy. The estimation is a little bit farther, but correlates quiet well. In addition the results for using $\phi(t)^{-2}$ and $\phi(t)^{-3}$ are shown. In the first we obtain less distance. The latter is identical to the results of the relativistic calculation in section 5.3.

5 Relativistic Redshift

If we asume a variable speed of light, we must asume a variable maximum for all dimensions in the relativistic transformation of section 2.3. All measurements of all dimensions must have a shift in time, if considered relative to their maximum.

Given a measurement $x_\kappa(t)$ of dimension K at the time t, the observed measurement x_κ, the maximum at time t of the dimension $c_\kappa(t)$ and the maximum at observation time c_κ we want the relative value stay invariant in time

$$\frac{x_\kappa(t)}{c_\kappa(t)} = \frac{x_\kappa}{c_\kappa} \tag{56}$$

This definition preserves the law of relative identity (41).

5.1 Progression of Parameter

We want to scale the measurement in time, but do not want to distort them. There should be a factor, a dimension scales, but the relation of the minimum and maximum should persist in time. We neither want to gain nor loose quantae. The parameters of all other dimensions depend on the light speed. We expect for the progression of the light speed (and all other velocities) some progression $\phi(t)$ defined later in section 5.2

$$V(t) = \frac{c_v(t)}{c_v} = \phi(t) \tag{57}$$

Here the time axis is reversed, as usual in astronomy. Time values greater than zero are of the past.

For the time we can use equation (15) and get the progression

$$T(t) = \frac{h_t(t)}{h_t} = \frac{1}{\sqrt{\phi(t)^5}} \tag{58}$$

This leads to the progression of frequencies

$$F(t) = \frac{1}{T(t)} = \sqrt{\phi(t)^5} \tag{59}$$

We preserve the space-time equivalence by using

$$X(t) = V(t) \cdot T(t) = \frac{1}{\sqrt{\phi(t)^3}} \tag{60}$$

as the progress for distances.

The masses we progress with equation (25). We want to preserve the PLANCK constant in time (see equations (44) and (45)) and use

$$M(t) = \frac{1}{X(t) \cdot V(t)} = \sqrt{\phi(t)} \tag{61}$$

To preserve the mass-energy equivalence, we use for the progress of energies

$$E(t) = M(t) \cdot V(t)^2 = \sqrt{\phi(t)^5} \tag{62}$$

The progress of the limits for all other dimensions can be obtained similar, using theese relations.

5.2 Determining $\phi(t)$

What is left, is defining the progress of velocities $\phi(t)$ (see equation (57)). The model developed in this section is on target. It is identical to the inverse of a relativistic longitudinal DOPPLER effect ([28]). If You do not like it, provide another. Actually, it is pure speculation but provides reasonable results.

We expect from our experience, that each second the time horizon c_t will increase by exactly one second. Looking backward, we get for the relative time $r_t = t/c_t$ the time dependend time horizon

$$c_t(t) = T(t) \cdot c_t = (1 - r_t) \cdot c_t \tag{63}$$

If you compare equation (63) with equation (58) you may observe, that reality has a distorted opinion, on what is right and proper for a time progression in time.

As a model for the space, we asume looking at a globe. We parametrize with an angle α and asume, that r_t is the sine of that angle. With $\cos(\alpha) = \sqrt{1 - \sin(\alpha)^2}$ we get for the time dependend space horizon

$$c_x(t) = X(t) \cdot c_x = \cos(\alpha) \cdot c_x = \sqrt{1 - r_t^2} \cdot c_x \tag{64}$$

If we asume $c_x(t)$ and c_x as vectors, then $c_x(t)$ rotates in time until it becomes vertical to c_x and thus, invisible.

The progress of time (aka $\phi(t)$, equation (57)) is observed by the division of the progress of space and time

$$\begin{aligned}V(t) =&\phi(t)\\ =&\frac{X(t)}{T(t)}\\ =&\frac{\sqrt{1-r_t^2}}{1-r_t}\\ =&\sqrt{\frac{(1+r_t)(1-r_t)}{(1-r_t)^2}}\\ =&\sqrt{\frac{1+r_t}{1-r_t}}\end{aligned} \tag{65}$$

This model seems to yield reasonable results. To adjust it to observations, it might be necessary to switch to an ellipsoid instead of a globe. Unlike the progression needed by equation (52), this progression increases with time. With the law of relative identity (41) the parameter r_t can be replaced with r_ν (as used as an inverse relation for the relativistic longitudinal DOPPLER effect, [28]) or r_x.

5.3 Calculation

Now we have all ingredients to calculate the fully relativistic redshift. We can use equation (60) directly in equation (49) and get

$$z = \frac{\lambda_o}{\lambda_e} - 1 \tag{66}$$

$$= \sqrt{\phi(t)^3} - 1 \tag{67}$$

reformulated

$$\sqrt[3]{(z+1)^2} = \phi(t) \tag{68}$$

With the $\phi(t)$ of equation (65) we get

$$\sqrt[3]{(z+1)^2} = \sqrt{\frac{1+r_t}{1-r_t}} \tag{69}$$

$$\sqrt[3]{(z+1)^4} = \frac{1+r_t}{1-r_t} \tag{70}$$

and finally

$$r_t = \frac{\sqrt[3]{(z+1)^4} - 1}{\sqrt[3]{(z+1)^4} + 1} \tag{71}$$

Figure 1, page 8, shows the result compared to estimations with the standard model and the classic calculation. Compared to the standard model, it tends to a denser and more homogenous distribution of objects.

However, the calculation asumes, that the sended spectrum is identical as of today. The electromagnetic spectrum of an atom is anti-linear to the RYDBERG constant R_∞, $\lambda^{-1} \sim R_\infty$ ([29]), which is a parameter in time and not constant at all. It has a unit of an inverse distance and progesses inverse to $X(t)$ of equation (60). Since the wavelength is anti-linear, the wavelength progresses as of $X(t)$. We have a combined redshift z

$$z = z_1 + z_2 \tag{72}$$

with z_1 the redshift caused by the shifted spectrum and z_2 the redshift caused by the distance between sending and receiving. Both are identical. We get for the redshift

$$\begin{aligned}z =& z_1 + z_2\\ =&\sqrt{\phi(t)^3} - 1 + \sqrt{\phi(t)^3} - 1\\ =&2\cdot\sqrt{\phi(t)^3} - 2\end{aligned} \tag{73}$$

This changes equation (68) to

$$\sqrt[3]{\left(\frac{z+2}{2}\right)^2} = \phi(t) \tag{74}$$

and equation (71) to

$$r_t = \frac{\sqrt[3]{\left(\frac{z+2}{2}\right)^4} - 1}{\sqrt[3]{\left(\frac{z+2}{2}\right)^4} + 1} \tag{75}$$

As is shown in figure 1, the distances are reduced further compared to thoose of the standard model.

6 Mass Loss and Time Gain

The progress of section 5.1 applies to all dimensions, not just the distance. Say, we have weighted a mass at time t ago and obtained the result $x_m(t) = r_m(t) \cdot c_m$. Now we weight the mass anew and obtain the result $x_m = r_m \cdot c_m$. We get from equation (61)

$$\begin{aligned} r_m =& \frac{r_m(t)}{\sqrt{\phi(t)}} \\ =& r_m(t) \cdot \sqrt[4]{\frac{1-r_t}{1+r_t}} \end{aligned} \tag{76}$$

or reformulated with $\delta = r_m(t)/r_m$

$$\begin{aligned} \frac{r_m(t)}{r_m} =& \sqrt[4]{\frac{1+r_t}{1-r_t}} \\ r_t =& \frac{\delta^4 - 1}{\delta^4 + 1} \end{aligned} \tag{77}$$

The equation (76) yields to a loss of mass in time. It is about $1 - \sqrt{\phi(1y)} \approx -3.62 \cdot 10^{-11}$ relative per year. The Reality-Sucks theory is the only theory predicting such a mass loss. However, the measurement is difficult to observe. Any other mass to compare with progresses identical. The mass loss must be observed indirectly with the comparition with other dimensions, like the density of a substance. The density progresses with $\phi(t)^8$, which leads to a change of about $-6 \cdot 10^{-10}$ relative per year.

If you are looking for "dark matter" or "dark energy" the equations (61) and (62) will give you some. In addition the more homogenous and dense distribution of objects (section 5.3) may have an effect.

As any other dimension time has a progression in time. If you observe a period time of a cepheid star ([31]) you must apply equation (58) to the observed period time. This may help with the problems of using cepheids as standard candles ([32]). With equations (56) and (58) we get for a sended period t_1 sended a time t ago

$$t_1 = \sqrt{\phi(t)^5} \cdot T_1 \tag{78}$$

The observed period has gained time.

7 Conclusion

Sometimes it is astonishing, where science leads you. All i wanted, was solving the riddle about the mathematical properties of measurements (section 2). What i got is a model of the universe combining relativistic and quantum theories. This will surely get me into trouble with the science. Nobody will believe that. It was an accident, really.

The model presented in this article is mathematical correct (or should be) and uses consistent asumptions. Unlike the models used today, which asume properties of measurements they do not have (see sections 2.1 and 2.2). There is some possability, that the weak an strong interaction (see section 3), "dark matter" and "dark energy" (see section 6) vanish. I do not have enough knowledge of the matter, to prove this.

When looking at the universe, we look at a globe of discrete space, distorted in time. It is a small wonder, that we have difficulties to describe such a universe. It is outside of all our experiences. I for one am unable to imagine such a universe and propose publicy the hypothesis, that reality sucks. The proof you just have read. You do *not* want to live in such a universe.

It's fun, though. Do with that, what you like.

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A Table of Galaxies

Since i neither have the knowledge nor the experience to evaluate astronomical data bases, i have copied the distances and redshifts of some galaxies from Wikipedia.

Name	**Redshift**	**Distance** $[10^9 Ly]$	**source**
3 C 295	0.464	4.6	[33]
3 C 9	2.0194	10	[34]
PKS 2000-330	3.773	11.7	[35]
RD1	5.34	12.5	[36]
PSO J172.3556+18.7734	6.82	13.107	[37]
LAE J095950.99+021219.1	6.944	13.126	[37]
IOK-1	6.964	13.129	[37]
G2-1408	6.972	13.13	[37]
BDF-521	7.008	13.135	[37]
A1703 zD6	7.045	13.14	[37]
ULAS J1120+0641	7.085	13.146	[37]
BDF-3299	7.109	13.149	[37]
GN-108036	7.213	13.164	[37]
SXDF-NB1006-2	7.215	13.164	[37]
GS2_1406	7.452	13.195	[37]
A1689-zD1	7.5	13.201	[37]
z8 GND 5296	7.51	13.202	[37]
J0313-1806	7.64	13.218	[37]
z7 GSD 3811	7.66	13.22	[37]
EGS-zs8-1	7.73	13.228	[37]
BoRG-58	8	13.258	[37]
GRB 090423	8.2	13.3	[37]
MACS0416 Y1	8.31	13.311	[37]
A2744 YD4	8.38	13.318	[37]
UDFy-38135539	8.6	13.317	[37]
UDFy-33436598	8.6	13.317	[37]
EGSY8p7	8.68	13.346	[37]
MACS1149-JD1	9.11	13.382	[37]
GRB 090429B	9.4	13.383	[37]
MACS1149-JD1	9.6	13.398	[37]
A2744-JD	9.8	13.412	[37]
SPT0615-JD	9.9	13.419	[37]
MACS0647-JD	10.7	13.467	[37]
GN-z11	11.09	13.508	[37]
UDFj-39546284	11.9	13.6526	[37]
GLASS-z13	13.1	13.593	[37]
HD1	13.27	13.599	[37]
CEERS-93316	16.7	13.687	[37]