deBroglie's Speculations [1] and the Big Bang House of Cards *

Erik A. Cerven*

**www.scienceandresearchdevelopmentinstitute.com*

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Abstract

The author's quantitative model of the universe comprised of a one-dimensional frame of observation by Lorentz-transformations connected to a non-local frame of observation is further evaluated against the background of some elements of de Broglie's theory of mass-wave duality. The relativistic frequency clock in the latter theory appears here as a result of length contractions of Planck's constant given in geometrized units corresponding to a line increment per unit length equal to the local Hubble expansion rate. Compounding the local (Doppler) and the non-local (relativistic) observer yields an almost linear astrophysical redshift. The local observer appears on a squared element of circumference whereas the non-local one appears at the origin. The astrophysical redshift, which is interpreted in Standard Cosmology as a literal expansion of space, instead appears to be caused by the emission phase of a one-dimensional non-local particle as if rotating over a gravitating object. Some other known and anticipated astrophysical examples of this geometry are indicated and the location of phase space identified.

1 Introduction

In the previous papers in this series, e.g. [2] [3] [4] [5] [6] a non-standard cosmology has been developed comprising theory as well as quantitative results. Its quasi-topological framework is constituted by an observer of momentum in one dimension connected by Lorentz-transformations to a non-local observer who only measures time. Various established processes and laws in physics have previously successfully been clad in this framework [7] [6]. This paper will build on the recent discovery [8] that the thermal Planck distribution and rotation velocities of stars in galaxies thus can be put in forms that are analogous in every respect. The thermal distribution was written

$$(\overline{\Delta q})^2 \ (\frac{ec_{SI}}{\alpha})^2 \ exp(\frac{-h\nu}{kT}) = \frac{\pi}{2} \ c^5 \ U(\nu) d\nu^{-1} \ \tau^2 \ Ampere^2 \Big(1 - exp(\frac{-h\nu}{kT})\Big) \tag{1}$$

where the radiation's intensity is made into a function variable and the actual physical process taking place, represented by a light quantum on the left side, becomes the function value. $\overline{\Delta q}$ is the apparent

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Hubble expansion rate in geometrised units in the current epoch, $7.714 \times 10^{-27}s^{-1}$, determined theoretically 15-20 years ago by the author consistently with recent observations [9][1]. The exponential term is expanded as

$$\Big(\frac{ec_{SI}}{\alpha}\ \Big[\frac{1}{Ampere}\Big]\Big)^2 \Big[\frac{1}{c^2}\Big]\ \frac{\nu 2\pi\overline{\Delta q}^2}{\frac{r_p\ r_B}{\Delta q\ m}\ E_{particle}} \tag{2}$$

where r_p is the proton's radius, r_B is the Bohr radius and m is the SI-unit of length. Eq. 1 is analogous to the Schrödinger equation wherein similar substitutions have been made [10] [8]. At the transition from Thompson to Compton scattering at $1.2964 \times 10^{26}s^{-1} = 4.324 \times 10^{17}\ Hz$ when the radiation starts to behave as particles $\overline{\Delta q}^2 \rightarrow \overline{\Delta q}\ \overline{\Delta q}\times 1.2964\ \times 10^{26}s^{-1} \rightarrow \overline{\Delta q} \times 1m/s$. Whereas $\overline{\Delta q}$ is the local apparent expansion rate, $1m/s$ is that obtained at the universe's relativistic horizon by linearly adding line increments contained in each unit length along the line of sight. $\overline{\Delta q}$ was anticipated previously to interact with the atomic nucleus and bosonic matter in the local 'material' frame and $1m/s = c_{GU}$ with the non-local orbiting electron cloud. Hence, $\overline{\Delta q}$ and $1m/s$ are analogous to respectively the baryonic rotation velocities and the flat velocity of rotating galaxies (cf. [8] [11] [12]). The former is the stars' orbiting velocity at some radius and the latter is the outermost rotation velocity. In eq. 1 the term $\pi\overline{\Delta q}^2$ was previously encountered in tentative W and Z boson resonance calculations anticipating that these particles might in an oscillatory fashion stabilize the proton *via* their known interactions with the u and d quarks.

With little more than some quantitative hints to support such a notion [13] [6] it was encouraging to find that applying the proposed quasi-topological approach to the Schrödinger equation made the line increment appear at the atomic nucleus [7] [10]. Now that the term $\pi\overline{\Delta q}^2$ indeed appears in the oscillatory part of the exponential factor (eq. 2 one is led back to the matter-wave duality originally proposed by de Broglie [14] [1]. According to de Broglie, any moving particle, including light[2], exists both as a particle and as a wave provided the particle has an internal oscillatory phenomenon that was in phase with the wave at some origin. This phase locking between the particle's internal oscillator and the wave is preserved throughout the particle's journey. In order to ascertain the phase locking it was necessary to postulate that the internal oscillator transforms in relativity like a ticking clock [14]. Hence, a wave packet like $h\nu$ should transform like $h\nu\sqrt{1-v^2}$ and not as expected like a frequency $h\nu/\sqrt{1-v^2}$ [15]. Also the classical energy of a massive particle transforms like the frequency but this is not considered relevant for electromagnetic radiation, which is assumed in contemporary physics to be mass-less and disconnected from sub-luminal velocities.

Now returning to eq. 2, if $\overline{\Delta q}$ were Lorentz-contracted and the frequency were transformed as expected then the product of all transformations effective on $h\nu$ of Planck's original equation would be just as de Broglie postulated. In the present theory (see below), this comes about by identifying $\overline{\Delta q}$ as a geometrical element derived from Planck's constant, which, similarly, has dimension m^2. In the classical thermal distribution [16], relativistic transformations might appear at three locations, A, B and C:

$$A\ U(\nu)\ d\nu^{-1} = \frac{8\pi\ B\ h\nu^3}{c^3}\ \frac{1}{exp(C\ \frac{h\nu}{kT}) - 1} \tag{3}$$

As for Boltzmann's constant and the temperature, it is still not known if they are relativistically

[1]Furthermore, e is the electric charge, c_{SI} is the velocity of light in SI-units, α is the fine structure constant such that ec/α is twice the magnetic charge, h is the non-reduced Planck's constant, ν is the frequency of the radiation, k is Boltzmann's constant, $U(\nu)d\nu^{-1}$ is the radiation's intensity per increment of frequency and τ is the radiation's oscillation period.

[2]the recent discovery that neutrinos have mass in spite of being mass-less according to theory might be relevant to photons that are also mass-less according to theory

transformed [17] [18] [19] and it will be assumed here that any longitudinal relativistic length effects on the thermal agitation will cancel, that transverse lengths are relativistically mute and that neither the particle number, being invariant, contributes *via* k. The relativistic behavior of temperature is obviously an important problem, particularly in the context of astrophysical observations. Applying de Broglie's recipe yields $A = 1/\sqrt{1-v^2}$ on account of the contracted volume harboring the radiation's intensity, $B = 1/\sqrt{1/v^2}$ and $C = \sqrt{1-v^2}$. This makes the blackbody radiation appear hotter as can easily be checked quantitatively on any pocket calculator equipped with graphics. The apparent hotter temperature of the black body, *per se*, is consistent with some astrophysical observations of absorption spectra coming from remote locations. The apparent shift of its frequency peak towards higher values is opposed to the well-known redshift of remote signal sources in the universe.

Therefore, consider only the term $h\nu$ in the context of the geometrical framework leading to eqs. 1 and 2 as recalled in Appendix I. In the local frame of observation, there are no relativistic effects at all, everything appears perfectly straight and linear. This observer appears to be located at the circumference of a circle (or the surface of a sphere) as described in the Appendix. However, the present geometry allows two observers, the one at *origo* who is non-local and the one just mentioned who is located at the edge of the universe. In order to get the relativistic effects on $h\nu$ one simply has to switch the two's perspective and conclude that the rest frame allows both observers at the same time - the world is dual. Even though a line increment does not exist in the non-local frame where only time can be measured (Appendix I) the local observer can easily compute the equivalent of any line or line increment in that frame by reference to the radius of the universe, which is length-contracted there. This should account for the length contraction factors in eq. 3. Since thermal radiation is a local phenomenon it might not be appropriate to apply any further corrections to these factors. In order to get the correct magnitude of the observed large-scale cosmological red-shift one simply has to implement the geometry's duality, combine the two observers' perspective and multiply a Doppler factor (cf. e.g. [21]) into de Broglie's frequency clock:

$$h\nu_{observed} = \frac{\sqrt{1-v^2}}{1+v} \times h\nu_{emitted} \tag{4}$$

In the present geometry, the Doppler factor comes from adding a line increment to each unit length along the line of sight. Eq. 4 gives a nearly straight line that bends off towards lower energies as the relativistic horizon is approached. The behavior of blackbody radiation and apparent temperature *versus* other instances of Planck's constant should be possible to evaluate by astrophysical observations. On top of thermal radiation in astrophysics there are also instances of molecular absorption, synchrotron radiation and curvature. An approach to such phenomena unbiased by cosmological model would be interesting although there is always the possibility that not only the radiation is affected by relativistic transformations but also the internal oscillations of the molecules themselves, following de Broglie's ideas. In the present model, the redshift does not imply any literal cosmological expansion, it only gives information about at which phase of the oscillatory phenomenon the electromagnetic radiation is emitted. This is further clarified below in some attempts to test whether or not this theory is at odds with contemporary physics.

Consider first the local observer who only measures straight and equally pitched line segments. This corresponds to the Galilean reference frame, known for several hundred years. A peculiarity, however, is that the local observer appears to be situated at the periphery of a circle as if we existed at the edge of the universe [10]. This seems less perplexing when identifying the local frame of observation, the laboratory frame that is, obtained from the geometry with the flat velocity of stars in rotating galaxies (cf. [8] and discussion below). Namely, if the apparent acceleration of the entire universe turns out to be a tenable observation (still under debate though, [20]) then this acceleration would be geometrically equivalent to the effect of so called 'dark matter' halos surrounding the galaxies, flattening the outermost stars' rotation. One might even suspect that the Solar System could fit into such a geometry since it is surrounded by Oort's cloud, the persistent location of which appears to have been an astrophysical challenge for some time. Such observations hint at the possibility that the local frame of the entire universe is on the circumference of a circle (a circle element squared, possibly a sphere).

Following up on the above, consider a particle rotating so fast at the horizon of a black hole that it stays on its surface. Then put the particle in the rest frame and let the black hole rotate around it. If the particle has a (one-dimensional) spatial orientation that does not follow the rotating black hole it will experience oscillations of gravity along its spatial orientation. Along with these gravity oscillations there will be oscillations of measures of acceleration that will cause velocity increments along the line of sight when the particle's orientation is parallel to the gravitational field, just like in the present theory. The particle will infer that along its line of sight the acceleration appears to be an operator (cf. [7]) from its non-local component (which follows a tangential path around the black hole) to its momentum part directed along its orientation such that the further away along its orientation it looks (computes, that is) the more oscillatory energy there is and the more elongated is its own narrow 1-D space. This black hole -model of the actual universe ('Gedanken-experiment') illustrates that the apparent cosmological redshift not necessarily has to be caused by any literal expansion of space. The model also cautiously suggests the possibility of radial oscillations within black holes (jets?) and other heavy objects or that some of the equations in Appendix I could be squared with advantage.

The plausibility of the model can also be evaluated by reference to the non-local frame, which carries the phase of the radiation. Even though the phase appears to reside in the longitudinal momentum frame in textbook illustrations it is not until the radiation transfers momentum that its phase is revealed. The entire wave-front carries the phase of one quantum and when the momentum is transferred (transversely by dipole effects or longitudinally by some other mechanism) the phase information instantly disappears from the entire wave-front of the quantum. This phenomenon takes place perpendicular to the radiation's propagation so it is not constrained by the limiting velocity of light. From the point of view of a 1-dimensional observer measuring longitudinal momentum (e.g. radial increments upon atomic absorption) the transverse components of the radiation are non-local just because they have to be. Whether or not the frame perpendicular to momentum is local or non-local *in deed* can be evaluated by asking the question: Why should it be local [3] when an intelligent observer anyhow determines by slit interference and other similar experiments or theory (e.g. [22]) that it is non-local? So the issue boils down to the meaning of non-locality, which obviously is important for correctly understanding electromagnetic radiation. The non-locality of the 'yonder' frame in the present theory has previously been evaluated extensively [23] and it is the only geometrical construct known to the author that exhibits such non-locality in so many different physics contexts (cf.[7]). The separation of local and non-local terms as in the present geometry recurs in a number of contexts in physics ranging from microscopic quantum to macroscopic [7] [10] as if the radiation and the matter sets it up at the moment of coming into existence, then not only bringing the geometry with it wherever it goes, also forcing any observer to accept it as a condition for observing.

Considering the above, shall we be witnessing the waves of influence of the most respected scientists of the past century coming into shallow waters?

[3] by 'local' is intended here that the frame carries distances between points that allow bringing into palpable contact material objects at different locations like in one spatial dimension of the Cartesian coordinate system or Hilbert or Minkowsky space. In a restricted sense only the palpable locality of the particle's immediate environment counts as 'local' since this is the range at which the atom defines its momentum axis.

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2 Appendix I (from [10], see also [24], [25])

The instant of observation has a special significance in the quantum world since it accommodates the processes that cause the quantum observer to change from the ignorant state to the observed state. One approach to characterizing the instant of observation is to perform a Lorentz transformation of the inverse of the number-flux vector at discrete time coordinates -1 and 0 defining an interval of observation:

$$(q_0, t_0) = \left(\frac{\sqrt{1-\frac{v^2}{c^2}}}{v} \frac{m^2}{s}, 0 \right); \qquad (\overline{q}_0, \overline{t}_0) = \left(\frac{1}{v} \frac{m^2}{s}, -s \right) \tag{5}$$

$$(q_r, t_r) = \left(\frac{\sqrt{1-\frac{v^2}{c^2}}}{v} \frac{m^2}{s}, s\sqrt{1-\frac{v^2}{c^2}} \right); \qquad (\overline{q}_r, \overline{t}_r) = \left(\frac{1}{v} \frac{m^2}{s} - vs, 0 \right) \tag{6}$$

$$\overline{\Delta q} = -vs \ , \qquad \overline{\Delta t} = \overline{t}_r - \overline{t}_0 = s \quad \Rightarrow \frac{\overline{\Delta q}}{\overline{\Delta t}} = v \tag{7}$$

$$\Delta q = 0 \ , \qquad \Delta t = t_r - t_0 = s\sqrt{1-\frac{v^2}{c^2}} \quad . \tag{8}$$

Here, m is the unit of length and s the *geometrized* unit of time [4]. This system of equations defines two observers located at origo (un-barred) and at radius distance from origo (barred observer). The latter observer is capable of observations along the momentum axis, $\overline{\Delta q}$, and of measuring the unit of time while the observer at origo only is aware of time and recognizes an angular velocity v. The two observers are space-like separated.

The directions of the axes is defined by analogy with the unit circle, $(\cos x)^2 + (\sin y)^2 = 1$, as

$$q_r{}^2 + \frac{1}{c^2} \frac{m^4}{s^2} = \frac{1}{v^2} \frac{m^4}{s^2} = \overline{q}_r{}^2 \tag{9}$$

or

$$(\frac{\Delta t}{s})^2 + (\frac{\overline{\Delta q}}{m})^2 = 1 \tag{10}$$

so that line increment and time interval are perpendicular. The time interval measured by the momentum observer is also perpendicular to the momentum frame where it defines the tangential velocity as shown in eq. 7c.

The sign of the line increment (cf. eq. (7) shows that the radius of the observed object decreases. This corresponds to the observer at origo computing a contracted radius $\overline{q}_0$ similarly to the Fitzgerald case, $q_0 = \overline{q}_0\sqrt{1 - v^2/c^2}$. Hence, the geometry can be understood as a circle space-like separated from a peripheral

[4] using non-standard (not SI) notation for the purpose of distinguishing the two units

observer who detects it in the form of a line increment in the direction of observation (equivalent of a contraction of its radius) after the passage of one unit of time. Furthermore, the axis of linear momentum may also be thought to harbor axial vectors. In physics, line increments in the direction of observation are known from the Bohr atom and the cosmological expansion.

For observations towards origo along the radius, the magnitude of the line increment is amplified from $\overline{\Delta q}$ per unit radius to the unit length, m (this may also be seen from eq. (5b) and (7a)),

$$\frac{-\overline{\Delta q}}{m} = \frac{m}{\overline{q}_0} \quad , \tag{11}$$

which yields

$$\overline{q}_0 \; \overline{\Delta q} = -m^2 \approx \overline{q_r} \; \overline{\Delta q} \quad , \tag{12}$$

whereby the velocity of light, m/s, limits the radial extension of the geometry to $|\overline{q}_0|$ ($v \leq c$ as required by $\sqrt{1 - v^2/c^2}$). Because of eq. (7) and (8), observations can only be made from the laboratory frame at the periphery towards the origin of space and time coordinates. The observer at origo is non-local in the sense of performing all observations solely on the time axis (eq. (8b)) and can only access the observation *via* eq. 10.