CORRECTING THE GREAT MISTAKE

- AN ALTERNATIVE LIGHT SPEED SOLUTION: RELATIVE VELOCITY IN AN EXPONENTIAL UNIVERSE

40 AA M.D.Earl 2023

In the 19th century, experiments showed that light speed had the same value regardless of the motion of the observer or source, contrary to Galilean and Newtonian relativity. The light speed problem was resolved when constant universal light speed was accepted, became a postulate of special relativity, and time became variable. It has remained unchallenged for over 100 years. But is it possible that there is another consideration that will explain the counter intuitive measurements made by Michelson/Morley and others? Is there just one method to explain the light speed problem? Relativity has supposedly been proven countless times, but it is proposed herein that a different approach may refute these proofs.

Acceptance of time dilation and other relativistic effects is second-natured today. But when it was initially presented, special relativity was as radical as any crazy theory we have today. Exponential expansion (XPXP) suggests that scientists have been “perfecting an incorrect theory”.

A mathematical understanding of an exponentially expanding universe provides an alternative answer to the light speed problem. Consideration of the exponential math of movement for both light and the observer shows that light speed is always measured as a constant, because both are increasing exponentially. If light speed is not constant, then the present standard model must be abandoned.

A description of the cosmic flow based upon the Hubble/Lemaitre Law (H/L) shows an exponentially expanding universe. This possibility was dismissed in the early 20th century in favor of relativity, which was based upon non-exponential math of Lorentz and others. Only a mathematical understanding of an exponential expansion, especially with regard to light speed, will provide an alternative (and more logical) description of how the universe works.

In order to formulate a method to measure relative speeds in an exponentially expanding universe, conventional mathematics must be rejected. If standard model math, derived in an inertial frame of reference, is used to solve universal problems, accurate answers cannot be expected. The XPXP universe presented here must be described with exponential mathematics, and cannot be described with conventional mathematics. It will be seen that the incongruity in the galactic distance/velocity graph is caused, not by a problem with the H/L Law - but instead by the incorrect astronomical mathematics of the standard model.

Both Special Relativity and XPXP approximately agree with Newtonian mechanics at lower speeds. Both e^Hot and the Lorentz gamma approximate 1 under normalconditions. The approximate correctness of the standard model has led scientists to assume that the standard model is basically correct, but is occasionally in need of only minor adjustments. This is wrong. Relativity must be abandoned, and a corrected description (XPXP) of the universe must be accepted.

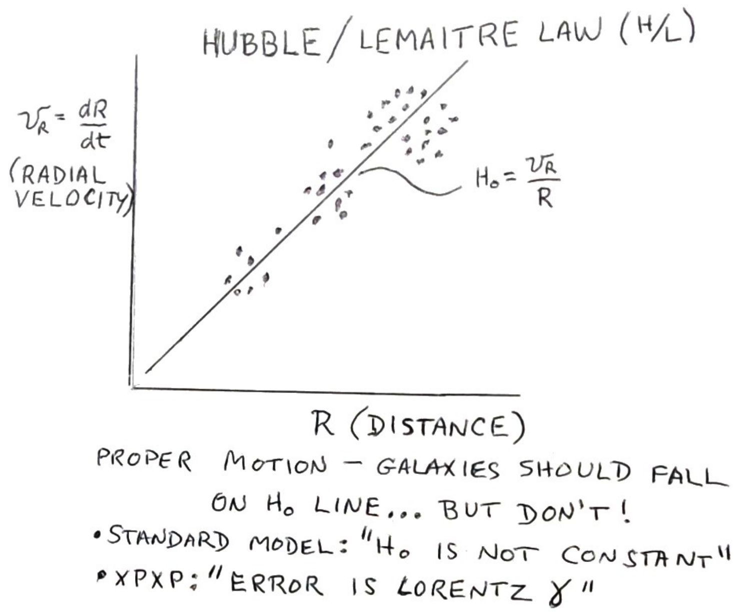
It is asserted that the very basis of S.R. (constant c and variable time) has created a model which is fundamentally incorrect and pervades all aspects of astronomy and cosmology. The methods of exponential mathematics are not intuitive and are difficult to accept, especially for those who have devoted their lives to relativity. Common assumptions must be abandoned. Simple concepts such as the distance formula, **distance = velocity x time**, are wrong.

Historically, the "GREAT MISTAKE" of cosmology was the acceptance of relativity with the assumption that light speed is a universal constant. The Lorentz factor, which was derived in the 19th century (essentially using the Pythagorean theorem), was used by Einstein to formulate the effects of special relativity. It is a major stumbling block for the true exponential nature of the universe. The Lorentz gamma:

$$\gamma = \frac{1}{\sqrt{1-(\frac{v}{c})^2}}$$

The Hubble/LeMaitre (H/L) law conflicted with relativity (see distance/velocity diagram, Figure 40- 1.). It was abandoned because the galactic distances did not strictly agree with the relativistic velocities predicted using the Lorentz γ . Therefore, Ho became a "parameter". An XPXP model addresses this issue with the argument that, in the non-exponential standard model, astronomical measurements for a distance/velocity graph are flawed.

Figure 40-1. Velocity/distance diagram



With knowledge of the mathematical principles of XPXP, it will be shown that light speed is measured as a constant from any proper or peculiar frame of reference. This offers an alternative to the GREAT MISTAKE (i.e. simplistically assuming constant universal light speed).

At a minimum, showing this mathematical alternative to the light speed problem should cause physicists to question the present thinking.

THE THREE XPXP MOTIONS:

A working knowledge of the concepts of an exponentially expanding universe is required before a comparison can be made to the λCDM model.

XPXP states that there are three types of motion in the universe: proper, peculiar, and light. All are exponentially increasing, so that a calculation of their relative speeds is not as simple as conventional subtraction. Certain considerations must be made, involving a little deeper thought.

A basic premise in the measurement of comparable XPXP speeds is that, when measuring one speed relative to another, BOTH MUST OCCUPY THE SAME POSITION. This requirement becomes obvious when considering that, in the XPXP model, all motions are increasing and accelerating and only an instantaneous measurement is valid. A mathematical method for describing each of the motion types must be presented. Beginning with the H/L law, these formulas may be derived.

The XPXP equations (Ho constant) for PROPER position and velocity are:

$$R_{proper} = R_0 e^{H_o t_{proper}} \qquad v_{proper} = H_o R_0 e^{H_o t_{proper}}$$

These equations were derived directly from the Hubble/LeMaitre Law as follows:

HUBBLE/LEMAITRE LAW $$dR/dt = HoR$$

CROSS MULTIPLY $$(1/R)\, dR = Ho\, dt$$

INTEGRATE $$\int (1/R)\, dR = \int Ho\, dt$$

$$\ln (R/Ro) = Ho\, t$$

EXPONENTIAL $$R/Ro = e^{Ho\, t}$$

POSITION $$R = Ro\, e^{Ho\, t}$$

VELOCITY $$V = HoRo\, e^{Ho\, t}$$

In order to differentiate and integrate exponential expressions, an exponential constant must be identified for the expression, so that expressions for position, velocity and acceleration may be calculated. These are the 3 exponential motions, with the associated exponential constants for each motion:

Proper : Ho
Peculiar: Ho
Light: 2Ho

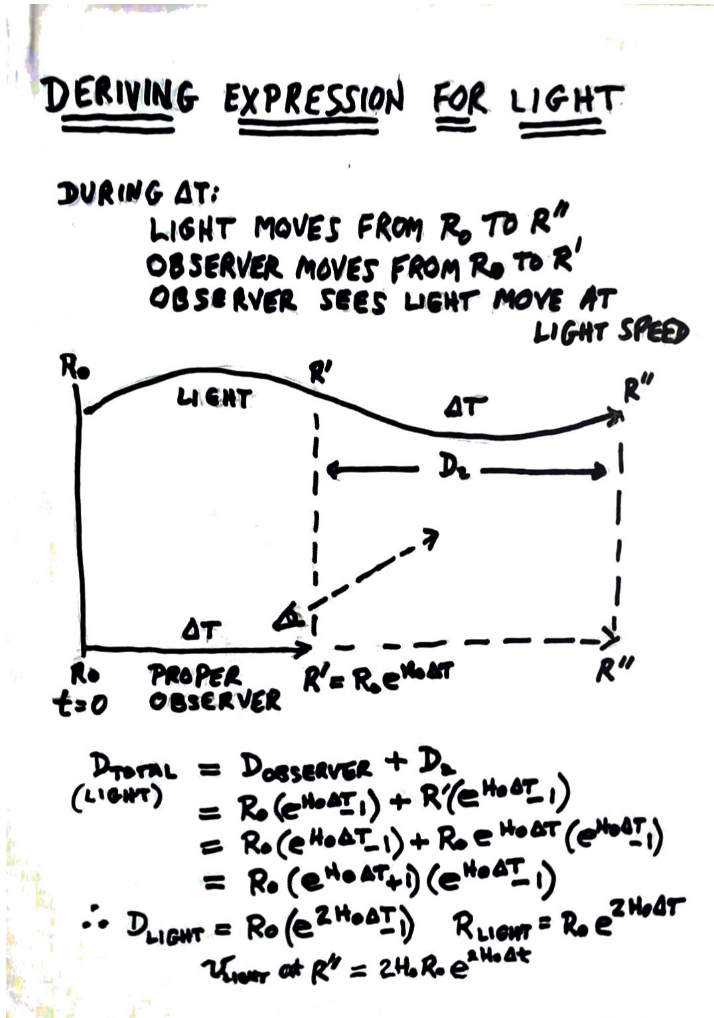
LIGHT -

The XPXP equations for LIGHT position and light velocity are:

$$R_{light} = R_0 e^{2H_o t_{light}} \qquad v_{light} = 2H_o R_0 e^{2H_o t_{light}}$$

These equations were derived previously by considering light speed from the perspective of a properly-moving observer as shown in Figure 2.

Figure 40- 2. DERIVATION OF XPXP EXPRESSION FOR LIGHT



The exponential constant for differentiating light is 2Ho, while the exponential constant for proper motion is Ho. In Figure 40- 2, an observer in proper motion is unaware of his/her motion. While this observer moves during Δt, light moves (exponentially) at light speed ahead of him/her. A simple calculation yields the exponential expression for light speed:

$$v_{light} = 2H_O\, R_0\, e^{2H_o\, t}$$

In order to measure light speed in XPXP, a proper observer and the light must occupy a common position, and the values at that position are instantaneous. This is reasonable, because light is moving significantly faster than a proper observer. A photon cannot be accurately measured by the observer once it moves beyond. Figure 40-2. shows the exponential manner by which both light and proper motion progress as a function of time. It is (once again) noted that the exponential expansion constant for light is 2Ho, and that of proper (and peculiar) motion is Ho... therefore light moves significantly farther than a proper observer moves during the same time interval.

An assumption is that any light passing any position moves at light speed regardless of its origin; if light is emitted from a source at any position in the cosmos, the travel time to the measurement position from the source will determine its speed there. In short, whether light is emitted or passing through a position, it is moving at light speed.

Because both light speed and a proper observer's speed are exponentially increasing, determining the relative speed of light involves finding the *proper* speed at a position occupied by both (instantaneous), and thereafter finding the speed of *light* at that same position (and instant). By comparing the result, it will show a constant relationship between the two speeds, suggesting an alternative reason for the constant light speed assumption of early 20th century physicists .

During an equivalent time interval, light propagates farther than either proper or peculiar motions. In order to find a common position, the time necessary for each form of motion to reach a common position must be determined. Starting at an arbitrary position, Ro, the time it takes for a proper object can be described as Δt_{proper}, and the time that it takes light to reach that same position can be described as Δt_{light} (which is intuitively significantly less than Δt_{proper}). To describe both at the same position, the relationship between the proper time interval and the light time interval can be calculated by equating the two distance expressions, as below:

$$\boldsymbol{R}_{proper} = \boldsymbol{R}_0 e^{H_0 \Delta t_{proper}}$$

$$\boldsymbol{R}_{light} = \boldsymbol{R}_0 e^{2H_0 \Delta t_{light}}$$

$$\boldsymbol{R}_{proper} = \boldsymbol{R}_{light}$$

$$\boldsymbol{R}_0 e^{H_0 \Delta t_{proper}} = \boldsymbol{R}_0 e^{2H_0 \Delta t_{light}}$$

$$\boldsymbol{H}_0 \Delta t_{proper} = 2\boldsymbol{H}_0 \Delta t_{light}$$

$$\Delta t_{light} = 1/2 \ \Delta t_{proper}$$

In short, light will reach a position in 1/2 the time that a proper object will. Just as the fastest runner in a footrace will pass a slower runner at one location, then another runner at a different location, etc. - light speed can be measured at any position along the route. This is not time dilation, as in relativity, but a measurement of the absolute time interval to reach a position for any of the motions. By using this time relationship between light and proper motion it can be determined that any proper observer will measure instantaneous light speed as approximately 3x10^8 meters /sec. at the observer's location. The same procedure is also used to find the velocity of light as measured by a peculiarly-moving observer. According to classical Galilean physics, the measure of the speeds should be additive, giving differing relative values for approaching and receding sources, etc. The constant light speed measurements of 19th century led to a counter-intuitive theory of Relativity. Comparing peculiar speed with light speed at a common position shows that the relative speed of light is always measured as a constant 3x10^8 meters /sec.

Figure 40-3a. The THREE XPXP MOTIONS :

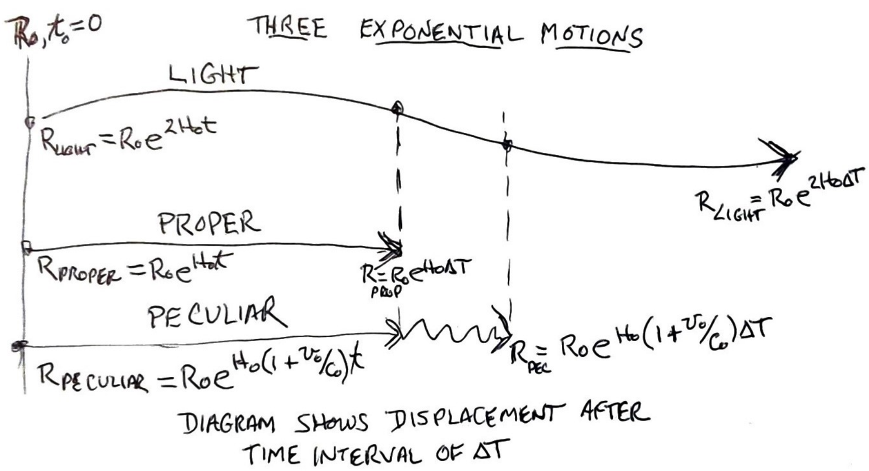
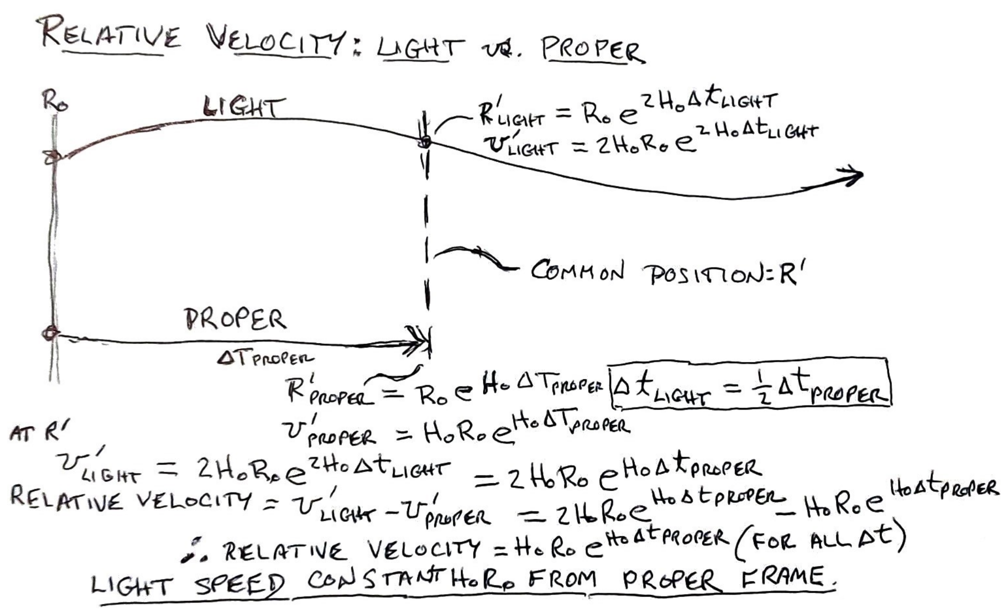


Figure 40- 3a. shows a simplified illustration of the three motions...proper, peculiar, and light.

To simplify, all motions are in the same direction in Figures 3a, 3b, and 3c . More complicated motions prove to be mathematically consistent.

Speeds at a common position, using exponential mathematics, show that light speed is measured as a constant HoRo (with a common exponential term) as seen by all observers in proper and peculiar motion. To show this, a position and velocity must be determined for both motions, so that comparing proper speed and peculiar speed with light speed shows that light speed is <u>measured</u> as a constant, but it is not a constant with respect to a stationary universe, as in the standard model. The consequences of this concept are substantial, affecting all aspects of physics.

Figure 40-3b. RELATIVE VELOCITY: Light vs. Proper motion



Comparing movements at position R′ (a position common to both light and a proper observer) the relative speed is determined to be the Hubble proper speed, as measured by the observer. In a calculation of relative light velocity for both proper or peculiar motions, it is seen that light, either emitted or passing through Ro, has an instantaneous velocity of 2HoRo·e^2Hoto = 2HoRo.

PECULIAR MOTION

To find relative light velocity for an observer in peculiar motion, the same method may be used, i.e. determine the XPXP velocity of each at a common position. The peculiar position of the observer can be stated as:

$$\boldsymbol{R}_{peculiar} = \boldsymbol{R}_0 \, e^{\boldsymbol{H}_0(1+(v_0/c_0))\Delta t_{peculiar}}$$

To determine the time relationship of peculiar motion and light, begin by finding the position expression for light at the same position as the peculiar observer from a common “starting” position, Ro. By equating the distance of each from position Ro, the time relationship may then be found:

$$R_{light} = R_0 e^{2H_0 \Delta t_{light}}$$

$$R_{peculiar} = R_0 e^{H_0(1+v_0/c_0)\Delta t_{peculiar}}$$

$$R_{peculiar} = R_{light}$$

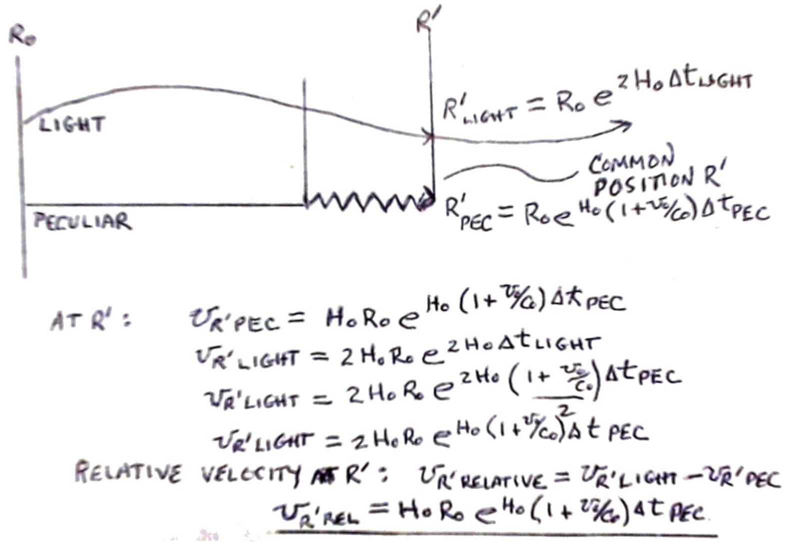
$$R_0 e^{H_0(1+v_0/c_0)\Delta t_{peculiar}} = R_0 e^{2H_0 \Delta t_{light}}$$

$$H_0(1+v_0/c_0)\Delta t_{peculiar} = 2H_0 \Delta t_{light}$$

$$\Delta t_{light} = \frac{(1+v_0/c_0)\Delta t_{peculiar}}{2}$$

This relationship holds for any position common to light and an object moving peculiarly at some constant speed vo.

Figure 40- 3c. RELATIVE VELOCITY- Light vs. Peculiar motion



Determining the relative velocity between light and proper or peculiar motion is made by subtraction at a common position. This is possible when the two velocities have identical exponential factors. Figure 40- 3c. demonstrates that a peculiar observer will see light moving exponentially at twice the light speed of the observer's unrealized (exponential) peculiar motion, and would measure it as "light speed". The result of these processes show that light speed will be measured as a constant HoRo by any proper or peculiar observer (both have the same exponential factor).

ACCORDINGLY, ANY OBSERVER MEASURES LIGHT SPEED AS CONSTANT.

<u>ASSUMING THAT LIGHT SPEED IS A UNIVERSAL CONSTANT IS REFUTED BY THE XPXP MODEL</u>. **RELATIVITY HAS MISGUIDED PHYSICS FOR OVER 100 YEARS. (THE "GREAT MISTAKE")**