Chapter 4

Improved Relativity Theory (IRT)

In 1904 Hendrik Lorentz formulated his Lorentz Ether Theory (LET) by introducing the Lorentz Transformations (the LT). The math of LET is based on the following assumptions:

1. There exists an immobile ether occupying space.
2. Every LET observer assumes the rest frame of this immobile ether to derive the LT.
3. Absolute Motion of an object in this immobile ether should be detectable.

Numerous experiments were performed to detect the absolute motion of an object in this immobile ether and they were all failures. Most noticeable of these was the Michelson–Morley experiment (the MMX). The null results of the MMX appears to rule out the existence of the ether. However, Lorentz and George Francis FitzGerald came up with the concept of physical length contraction to save the LET. They envisaged that the arms of the MMX contracted physically by the right amount in the direction of the Absolute Motion to give the MMX null results.

Einstein formulated his theory of Special Relativity Theory (SRT or SR) in 1905 based on the following postulates:

1. The Laws of Physics are the same for observers in all inertial reference frames.
2. The speed of light in a vacuum has the same value c in all directions and in all inertial reference frames.

Einstein derived the same LT as LET from these two postulates. The concept of flexible time and geometric projected length contraction were introduced to explain the LT equations.

However, the idea of flexible time and projected length contraction gives rise to many paradoxes and the most famous of these is the familiar twin paradox. Instead of two identical human twin I will explain the paradox using two identical clocks "A" and "B". "A" remains on earth and "B" accelerated away to a distant star and return. Upon returning, the traveling "B" clock will accumulated less clock seconds (younger) than the stay at home "A" clock. But according to SRT "B" can claim that "A" is moving away from him return and thus "A" should accumulate less clock seconds than "B". This is the essence of the twin paradox. Physicists explain the twin paradox by pointing out that when "B" experienced the initial acceleration and at the turn-around the symmetry between "A" and "B" is broken. That's why "B" accumulated less clock seconds than "A" when they meet again.

The relevant question at this juncture is: why does LET and SRT have the same math? The answer to this question is surprisingly simple. The two SRT postulates can be reworded as the ether frame postulates as follows:

1. The Laws of Physics are the same in all locations in the immobile ether.
2. The 'speed of light in the immobile ether is a constant c as measured in all locations in the immobile ether.

These two ether frame postulates can use the same derivation procedure as SRT to derive the same LT equations. That's why LET and SRT have the same math and they are summarized as follows:

Clock Time Retardation (LET) or Time Dilation (SRT):
$\Delta t' = \gamma \Delta t$...4.1

Physical Length Contraction (LET) or Projected Length Contraction (SRT):

$\Delta L' = \frac{\Delta L}{\gamma}$..4.2

Lorentz Transformation Equations from the Primed Frame:

$\Delta x = \gamma(\Delta x' + v\Delta t')$ 4.3

$\Delta t = \gamma(\Delta t' + v\Delta x'/c^2)$............................. .....4.4

Lorentz Transformation Equations from the Unprimed Frame

$\Delta x' = \gamma(\Delta x - v\Delta t)$. 4.5

$\Delta t' = \gamma(\Delta t - v\Delta x/c^2)$ 4.6

These SRT and LET Transformation Equations are used by every SRT and LET observer. They assume that the unprimed frame is in a state of rest and that the primed frame is moving in the unprimed coordinate system. These assumptions are the reason why every SRT observer claims that clock moving with respect to him runs slow and thus gives rise to the dubious concept of mutual time dilation.

Improved Relativity Theory (IRT)

The Model Mechanics description of the current universe is summarized as follows:

All of the pure-space in our universe is occupied by a substance called the E-Matrix. Subsequently, the E-Matrix is perceived by us as space. The E-Matrix, in turn, is composed of E-Strings. The diameter of an E-String is not known. It is probably in the region of Planck length that is defined by current physics as the smallest length that has any meaning and its value is in the region of 10^{-33} cm. The length of an E-String is not known. It could be a big loop and in that case the diameter of the loop is not known. Away from matter, E-Strings are oriented randomly in all directions, but near matter, E-Strings are more organized: some emanate from the matter, and the number of these passing through a unit area at a distance 'r' from the matter is inversely proportional to r^2. Matter particles will follow the local geometry of the E-Strings as they travel in the E-Matrix. In turn, the motions of matter particles in the E-Matrix will distort the geometry of the E-Strings locally. These provisions are responsible for the peculiar properties of the gravitational force. Also, it explains why the propagation of light and gravity obeys the inverse square law.

The E-Strings exert a repulsive force on each other. This force is fundamental. This means that there is a compacting force that is compacting the E-Strings together to form the E-Matrix and this compacting force is also fundamental. The compacting force and the repulsive force between the E-Strings are in a delicate equilibrium and this equilibrium is self-restoring when it is disturbed by the motion of particles in the E-Matrix

The above Model Mechanics description of the current state of our universe gives rise to the following unique properties and these unique properties enabled me to formulate a new theory of relativity called Improved Relativity Theory (IRT). The assumptions of IRT are as follows:

1. A photon is a wave-packet in neighboring E-Strings.
2. The speed of light is isotropic in all frames of reference.
3. Motions of objects in the E-Matrix are unimpeded.
4. Every object in our universe is in a state of absolute motion in the E-Matrix. This means that every IRT observer must include the possibility that he is in a higher state of absolute motion than the observed object (the observed frame).
5. Wavelength of an elementary source is a universal constant.
6. Absolute time is the only time that exists. Clock time (a clock second) in the frame of the clock represents a specific interval of absolute time. The amount of absolute time

contained in a clock second is dependent on the state of absolute motion of the clock.

7. The speed of light is not a universal constant.
8. Material length of a meter stick is a universal constant.
9. The light-path length of a moving meter stick is observer dependent.
10. The light-path length of the observer's meter stick is assumed to be its material length.

IRT eliminates the SRT constant light speed postulate in all inertial frames. This, in turn, eliminates all the paradoxes derived from this postulates. The equations of IRT are valid in all environments, including gravity. Therefore IRT can be used to replace GRT in all applications.

The IRT Postulates:

1. Every object in our universe is in a state of individual absolute motion in the E-Matrix. There is no rest frame for any observer.
2. Relative motion between two objects in the E-Matrix is the vector difference of their absolute motions along the line joining them.
3. The measured wavelength of a standard elementary source is a universal constant in all frames of reference.
4. The speed of light in the frame of the standard elementary source is isotropic.

The Consequences of the IRT Postulates:

1. The local speed of light is the product of the local measured frequency of the standard elementary source and its measured universal wavelength.
2. Light from a source moving with respect to the observer becomes a new light source in the observer's frame. The arriving speed of incoming light from a moving elementary

source is the product of its measured incoming frequency and its universal wavelength.

3. There is no physical (material) length contraction. The physical (material) length of a meter stick remains the same length in all frames of reference. However, the light path length of a moving meter stick is observer dependent.
4. The rate of a clock is dependent on the state of absolute motion of the clock. The higher is the state of absolute motion the slower is its clock rate.
5. Absolute time exists. The relationship between clock time and absolute time is as follows: A clock second will contain a different amount of absolute time in different states of absolute motion (different frames of reference). The higher is the state of absolute motion of the clock the higher is the absolute time content for a clock second. There is no absolute time dilation. The observed clock time dilation is the result of a clock second contains a different amount of absolute time in different frames.
6. Simultaneity is absolute. If two events are simultaneous in one frame, identical events will also be simultaneous in different frames. However the absolute time interval for the simultaneity of identical events to occur will be different in different frames. This is due to that different frames are in different states of absolute motion.
7. The postulates of IRT allow that the rate of a clock moving with respect to the observer can be running at a slower or faster rate compared to the observer's clock. Also the light path length of a meter stick moving with respect to the observer can be longer or shorter compared to the light path length of the observer's meter stick which is assumed to be the physical (material) length of the meter stick. These consequences lead to two equations for the time rate of an observed clock and two equations for the light-path length of a meter stick moving with respect to the IRT observer. Also they lead to two sets of

transformation equations from observer A′s frame to the observed B frame.

It turns out that if the observed frame is in a higher state of absolute motion than the observer all the IRT predictions will be identical to the SRT and LET predictions. That′s why the math of SRT and LET is a subset of the math of IRT.

The Math of IRT:
The existing SRT and LET equations are converted to IRT equations when the observed frame B is in a higher state of absolute motion than the IRT observer A. New IRT equations are developed when the observed frame is in a lower state of absolute motion than the IRT observer. The conversion factors from observer A′s point of view are as follows:

$v = \lambda_a (f_{aa} - f_{ab})$ Relative Velocity

$c = \lambda_a f_{aa}$ Local speed of light (x)

$c' = \lambda_a f_{ab}$ Incoming speed of light

$c' = c\{\frac{\lambda_a}{\lambda_{ab}}\}$ Incoming speed of light

$$\gamma = \frac{F_{aa}}{F_{ab}} = \frac{\lambda_a}{\lambda_{ab}} \qquad \frac{1}{\gamma} = \frac{F_{ab}}{F_{aa}}$$

λ_a = Wavelength of the standard elementary light source used as measured in observer A′s frame.

λ_{ab} = Transverse wavelength of the standard elementary light source in B′s frame as measured by A.

f_{aa} = Instantaneous frequency measurement of A′s standard elementary light source as measured by A.

f_{ab} = Instantaneous frequency measurement of B′s standard elementary light source as measured by A.

$F_{aa} = f_{aa}$ = Frequency of a standard elementary light source in A's frame as measured by A.

F_{ab} = Transverse Doppler Frequency of an identical standard elementary light source in B's frame as measured by A.

The behavior of clocks A and B in relative motion:

$$\Delta T_{ab}^{'} = \frac{F_{aa}}{F_{ab}} \Delta T_{aa} \qquad (4.7)$$

This equation applies when the observed clock B is in a higher state of absolute motion than observer A's clock. It shows that the passage of an interval of clock time ΔT_{ab} on the observed B clock corresponds to the passage of $(F_{aa}/F_{ab})\Delta T_{aa}$ on observer A's clock. However, both of these clock time intervals represent the same amount of absolute time. This means that the rate of passage of absolute time is independent of the absolute motion of the clock.

$$\Delta T_{ab}^{''} = \frac{F_{ab}}{F_{aa}} \Delta T_{aa} \qquad (4.8)$$

This equation applies when the observed clock B is in a lower state of absolute motion than clock A. It shows that the passage of a clock time ΔT_{ab} on the observed B clock corresponds to the passage of clock time interval of $(F_{ab}/F_{aa})\Delta T_{aa}$ on observer A's clock. However, both clock time intervals represent the same amount of absolute time. This means that the rate of passage of absolute time is independent of the relative or absolute motions of the clocks.

It is noted that only one of these two equations is valid for any pair of clocks in relative motion. If the observed clock B's absolute motion is higher than the observer A's clock then Eq. (1) is used and if the observed clock B's absolute motion is lower than observer A's clock then Eq. (2) is used. In accelerator design applications Eq. (1) is used exclusively. The reason is that acceleration will increase the state of absolute motion of the accelerated particle.

Light path length of a moving meter stick:
The light path length of observer A′s meter stick is defined to be its physical or material length. The following equations predict the light path lengths of B′s meter stick. The following equation (4.9) is used to predict the light path length of B′s meter stick when B is in a higher state of absolute motion than A.

$$L'_{ab} = \frac{F_{ab}}{F_{aa}} L_{aa} \qquad (4.9)$$

When B is in a lower state of absolute motion than A the following Eq. (4.10) is used to predict the light path length. of B′s meter stick.

$$L''_{ab} = \frac{F_{aa}}{F_{ab}} L_{aa} \qquad (4.10)$$

It is noted that the physical or material length of a meter stick is a universal constant in all frames of reference. However the light path length of a meter stick moving with respect to the observer is observer dependent. Also it is noted that only one of these two equations will provide the correct prediction. If the state of absolute motion of B compare to A is not known then both calculations are made and the result that agrees with observation is chosen.

IRT Transformation Equations:
Equations (4.11) and (4.12) are used when the observed frame B is in a higher state of absolute motion than observer A.

$$\Delta x'_{ab} = \frac{F_{aa}}{F_{ab}} \left[\Delta x_{aa} - \lambda_a \left(f_{aa} - f_{ab}\right) \Delta t_{aa}\right] \qquad (4.11)$$

$$\Delta t'_{ab} = \frac{F_{aa}}{F_{ab}} \left[\Delta t_{aa} - \frac{f_{aa} - f_{ab}}{\lambda_a f_{ab}^2} \Delta x_{aa}\right] \qquad (4.12)$$

Equations (4.13) and (4.14) are used when the observed frame B is in a lower state of absolute motion than observer A.

$$\Delta x_{ab}^{''} = \frac{F_{ab}}{F_{aa}}\left[\Delta x_{aa} + \lambda_a\left(f_{aa} - f_{ab}\right)\Delta t_{aa}\right] \qquad (4.13)$$

$$\Delta t_{ab}^{''} = \frac{F_{ab}}{F_{aa}}\left[\Delta t_{aa} + \frac{f_{aa} - f_{ab}}{\lambda_a f_{ab}^2}\Delta x_{aa}\right] \qquad (4.14)$$

Momentum of an object:

$$p = M_o \lambda_a\left(f_{aa} - f_{ab}\right) \qquad (4.15)$$

Kinetic energy of an object:

$$K = M_o \lambda_a^2 f_{ab}^2\left(\frac{f_{aa}}{f_{ab}} - 1\right) \qquad (4.160$$

Energy of a single particle:

$$E = M_o \lambda_a^2 f_{ab}^2 \qquad (4.17)$$

Gravitational red shift:

$$\Delta F_{aa} = F_{aa}\left(1 - \frac{F_{ab}}{F_{aa}}\right) \qquad (4.18)$$

$$\Delta F_{aa} = F_{aa}\left(1 - \frac{\lambda_{aa}}{\lambda_{ab}}\right) \qquad (4.19)$$

Gravitational time dilation:

$$\Delta T_{aa} = T_{aa}\left(1 - \frac{F_{ab}}{F_{aa}}\right) \qquad (4.19)$$

$$\Delta T_{aa} = T_{aa}\left(1 - \frac{\lambda_{aa}}{\lambda_{ab}}\right) \qquad (4.20)$$

The IRT procedure for determining the perihelion recession of Mercury without recourse to GRT is:

a. Set up a coordinate system for the Sun and Mercury.
b. Use the IRT coordinates transformation equations to predict the future positions of the Sun and Mercury.
c. The perihelion shift of Mercury will be revealed when these future positions are plotted against time. The value of the shift can be determined from the plot.

The IRT Concept for Gravity Lensing and Gravity Bending of Light:

The E-Strings surrounding a massive body are curved. Therefore light from distant stars will follow these curved E-Strings on its way to the earth to give the observed lensing effect. Similarly, the E-Strings surrounding the Sun are curved. Therefore light from distant stars will appear to be bended around the Sun as it reaches the earth.

IRT math includes SRT and LET math as subsets when the observed frame is in a higher state of absolute motion than the observer. IRT math includes the possibility that the observer is in a higher state of absolute motion than the observed frame. Therefore different math were developed to include this possibility. This IRT interpretation eliminated all the paradoxes encounter by SRT. In addition IRT provides physical explanation for dark matter, dark energy and the observed accelerated expansion of the universe. There is no GRT explanation for these observations. The equations of IRT have an unlimited domain of applicability and therefore they are valid for use to replace GRT in all cosmological applications.