**Supplementary Material**

My first paper “ Modified Field Theory” 2004, Journal of Theoretics was a kinematic analysis of STR with an improvement upon it. My second paper “Intrinsic laws of motion are invariant” 2011, Physic Essays came into being when I received a lot many comments on the first paper that I should have a relativistic approach to my view point as well. On the second paper through High beam research, EBESCO host, ASO/NASA ADS, Cross Ref and in conferences, I received comments and suggestions that instead of using Lorentz transformation I should go more fundamentally to come out with a transformation law of coordinates that supports complex velocity vector and under which Maxwell equations and Space Time should be invariant. My proposed paper is all about it.

**Fist paper(Modified Field Theory) in nutshell :** When a particle is accelerated towards the velocity of light, its mass increases. It is assumed that the energy used in accelerating the particle i.e. energy content gets added to its rest-mass proper to increase its mass while it is in motion. In this theory the question is raised about the energy used in acceleration, if all of which is fully convertible into mass of the particle, the particle should experience retardation because there left no energy even for the velocity with which the particle was in motion prior to application of such force moreover when it is now massive(weighty). However it is seen that whenever force is applied, acceleration does take place though not proportionately and this is what signifies the increase in mass for which relativistic forces are required. In this theory we conclude it with a viewpoint that the interaction between field and matter is not one-way traffic but two-way. For which our justification is that the process of interaction wherein the entire energy gets converted into its mass is true but at the same moment some part of the matter also dissolves into energy. The part of matter converts into energy is termed Relativistic decrease and conversion of energy into matter is termed Relativistic increase. Since relativistic increase is always greater than relativistic decrease the moving mass each time measures higher than its rest mass proper. This relativistic decrease will be responsible for the accelerative tendency of the particle’s motion even when it is massive. At c where the particle receives infinite field buildup the same moment relativistic decrease will come down to zero. Any number compared with infinity is zero. The particle’s instinct stilled in it furiously resists any such buildup but can’t resist infinite one. Now an infinite field buildup with zero rest-mass the product of the two is indeterminate and this signifies the transformation of matter into field quanta I.e. photon. We know if rest-mass of a particle is zero and whose moving-mass is indeterminate at c; is none other than photon. So any matter at c will transform it into photon. And at the transformation the wavelength of the emerging photon can be determined using de Broglie relation  , at c  i.e. at the time of transformation of material particle into photon, its mass will influence the wavelength of the emerging photon. The massive is the particle shorter will be the wavelength of the emerging photon. If electron and proton at c transform them into photon; the latter one will emit much harder gamma rays of much shorter wavelength because it is more massive than electron. Now in supernova, ejecting material if any point of time due to mammoth radial thrust instantly attains c, according to this paper it will transform it into photons and if massive are the particles using de Broglie relation they receive the shorter and shortest possible wavelength thus emitting much harder Gamma rays which could be seen in GRBs.

In the process of mass increase at higher velocity when half of particle’s mass transfers to field as a relativistic decrease the anti-matter takes birth because the process is just reverse mass is going to field instead field is being pumped into particle, a short-lived particle comes into being. The reverse process is the mirror image of the particle, the sign the new particle receives would certainly be opposite to the parental particle. For electron: positron; for proton: antiproton

**Gist of second paper(Intrinsic laws of motion are invariant):** in an isotropic universe which is filled with baryonic and non-baryonic matter throughout, rest and motion are identifiable terms. They can be relative terms only if universe is confined to two objects leaving no scope for the third one. In that case also only single magnitude will remain common between the two frames. Only one can share it as a real velocity for it in the single event, the other frame cannot use it as real velocity at the same point both in space and in time in the same event. However, since only two frames are assumed that constitute the universe, it will be difficult to identify as to which frame really possesses it. In such a case we have no option except to say that both are in motion relative to one another with + v and –v real velocities.

But when we have references throughout which is the most empirical approach, we must dismiss the ambiguity and should put forth the facts. If third frame is introduced as a reference relative to which one is at rest and the other is in motion, we see that only one is moving with real velocity be it (-ve or +ve) and the moving one when looks back the first one at rest it appears moving from the moving one and that too it remains in motion. The moment it stops, this phenomenon disappears or even being in motion when it refers to third one it concludes that it is motion but the first one is at rest.

It is obvious since there is only single common magnitude between the two frames in the single event, only one frame can have real velocity using it the other frame cannot share the same magnitude at the same point of time for its real velocity in the same event. The mere appearance of motion cannot be the real velocity but it could be imaginary. So, relative motion cannot be just direction reversal with real velocities but a synthesis of both real and imaginary velocities. If one frame possess v velocity the other one will have –iv. It may be vice versa i.e. –v and +iv.

When this pair of real and imaginary replaced the pair of v and –v, we obtained the mass velocity relation in the form of  and time dilation relation in the form of 

Both show de-reciprocity. The basic principle of relativity is that one cannot feel any change by oneself without comparing it with the other in the other’s state. So any change increase or decrease in vectors will be direction reversal. For example *B* recedes from *A* with +*v* velocity, if B feels motionless at any moment, to him *A* appears to recede with –*v.* If +*v* is an increase, –*v* will be a decrease in vector. So, from both the actions reciprocity is reflected because both feel receding. However, in inherent scalar quantities which are free from directions, any increase or decrease will only be in the magnitude of the quantities. For example, *A* at rest observes that *B* increases his mass while in motion however if *B* does not feel any change in him, to him mass of *A* at rest appears decreasing. Here inherent scalar quantities show de-reciprocity.

We can understand through some day to day experiences: if two twins A and B departed for some time and met again during the period A puts on some fat while the B remains unchanged. For B A is fatty. But if A does not feel any change in him his reaction would be about B is that he has become thin during the period of time.

When an observer at rest looks to his counterpart moving with velocity v relative to him and finds that mass of his counterpart is increasing in comparison with himself. The moving observer however, disowns any such change in him and thus on comparing him with that of at rest finds that the rest one decreases his mass.

The same way the observer in the rest frame compares his watch with that of moving one and concludes that the watch in moving frame is losing time (dilating). But if the observer in moving frame dismisses any such changes he will conclude that in rest frame the watch is gaining(concentrating) time. Thus relativistic increase and relativistic decrease will be the part of the process wherein reciprocity has no place. In other words in purely scalar quantities de-reciprocity is reflected. However vector quantities and those scalar quantities that are obtained through the dot product of vectors will reflect reciprocity.

 From the above relation, it is clear that an observer in stationary frame observes time is dilating in the moving frame simultaneously the observer in the moving frame observes that the time is concentrating in stationary frame. This corroborates the well-known asymmetry of Doppler’s shifted images, where the asymmetry between the earth and the space ship is manifested by the fact that more blue shifted(fast aging) images are received by the Ship and more red-shifted (slow aging) images are received by Earth. Had there been any reciprocity effect, either the Earth should have received blue shifted images or the Ship should have received red-shifted ones. Even due to the Doppler’s effect, the composite of both the Doppler and Time dilation must have been received in a different color by the Earth. Nevertheless, Earth receives more bright blue shifted images, which clearly indicates that reciprocity has no place in the case of Time dilation. Thus, this provides a means to identify inertial frames, yielding a simple resolution to the twins’ paradox of relativity theory in such a universe where only two frames are in consideration without refereeing to third reference point such as distant star, which is the basic requirement Einstein proposed in STR. One can easily measure applying the proposed relation that which one of them is at rest. If one calculate the time intervals in his own frame and compare it with the intervals in the frame which is in motion relative to it. If his clock is running faster comparing with that of the other, he concludes that he is at rest and vice versa. We also find solution in the above-mentioned case of decay of unstable particle where the decay accelerates when particle’s velocity increases, instead of being slowed down as experiment shows. This is now possible since the decay of the particle in one frame shows time dilation the non-decay laws of the same particle when seen from the moving