Outline of the Tridias Couplet Model

1. Conceptual Motivation

I will start with the motivation for my model. Imagine that we are observing the universe from the point of view of a photon. Further, suppose that the universe consists of two classes of objects: light and matter. What will we observe? To me it seems that we should observe all matter to be moving at the speed of light relative to us.

How would we observe other photons? In ordinary space, there is no way in which we can choose a precise speed at which two photons are moving relative to each other. We also cannot determine any unique choice for the relative energies and momenta of the photons. My hypothesis is that from our frame of reference on the photon, we would observe a three dimensional space. Each photon would exist just as a particle of matter would in normal space. So we would have no way of determining that we were actually on a photon. The laws of physics would appear exactly the same as if we were a particle of matter.

So we could consider a transformation from the frame of reference of a particle of matter to one of a particle of light. Clearly, information would be lost. All information on relative positions of the particles of matter would be lost. Relative energies of the particles of matter would become unknown.

Now, consider ourselves to be in the frame of reference of a particle of matter. From our frame of reference, we do not appear to be moving. So I will loosely say that a particle of matter is "stationary in space." However, a frame of reference cannot be chosen such that we are stationary in time. No matter what, we will always observe time within ourselves to move at a constant rate. Now think about what it means to move through time. We have a precise way to define an interval of time. We can simply define the interval of time between two events as the distance that a particle of light travels between these two events divided by the speed of light. So the flow of time is a manifestation of the movement of light. But, from the frame of reference of the photon, the photon itself does not appear to be moving. So for now I will loosely say that a photon is "stationary in *temper*." (I use this word to distinguish from time, which I will use for the more intuitive notion.) But if the laws of physics remain invariant under a transformation between light and matter, we could consider temper as a three-dimensional object identical to space, and consider a photon as an object that is stationary in temper in the exact same way as a particle of matter is stationary in space. All photons have relative energies and momenta, but that information is lost in transforming to the frame of reference of a particle of matter. Similarly, a particle of matter moves at a constant rate through temper, but cannot garner information on direction of motion, and so only observes one dimension of temper, which corresponds to time.

Let us now consider a thought experiment. Suppose that we are standing on the ground watching an airplane moving past us at near the speed of light. A beam of light is shone from the floor of the plane towards a sensor directly above on the ceiling of the plane. In order to maintain the constancy of the speed of light, while the passengers on the plane observe the beam to be travelling directly upwards, we observe the beam of light to be travelling at some angle off of the vertical axis. Now, if we assume that we do not know the speed that one photon observes another photon to be moving at, then similarly the photon cannot determine the relative speed of two particles of matter. But then the photon cannot know the difference in angle that each particle observes the photon to be moving at. Hence, the photon does not know how fast the airplane is

moving relative to the ground, and so even if it were to know that it is travelling straight upwards from the point of view of the airplane, it would not know what direction it is travelling relative to the ground. But then the photon cannot know what direction the ground is travelling relative to it. But this means that if we consider things from the point of view of a particle of matter, we cannot know what direction a photon is actually moving in. Instead, there must be a fundamental uncertainty built into the universe as to what direction it is moving from our point of view.

2. Hypothesis on What the Model Will Look Like

In order to facilitate discussion, I define a *tridias* (from the Latin prefix tri- and the Greek word $\delta\iota\grave{\alpha}\sigma\tau\alpha\sigma\eta$ for dimension) as an object that can either be space or temper, and assume that a tridias is a three-dimensional object. The *Tridias Couplet* will refer to the combined entity of space and temper.

We know that when a particle of matter accelerates, special relativity is inadequate. A beam of light no longer follows a straight line, and so in general relativity we represent space-time as something that changes geometry in the presence of acceleration. The effects of gravity are hypothesized as identical to the effects of acceleration. And so the gravitational field around a particle is really just a region of curvature in space-time.

While it would take a significant amount of work to develop the Tridias Couplet model formally, I present the following diagrammatic approach as an aid in visualization. Note that it is only an aid to visualization, and not a formal depiction.

Figure 1 depicts empty space-time. Space is depicted on the horizontal axis. Time (temper) is depicted on the vertical axis. Only one dimension of each tridias is depicted. The time axis "slides" along the space axis at the speed of light, and the space axis "slides" along the time axis at the speed of light.

Figure 2 depicts a motionless particle of matter. The particle of matter exists at a single point, and the space axis around the particle asymptotically approaches a parallel with the time axis. From the point of view of a frame of reference in time, the particle appears to be moving at the speed of light. From the point of view of a frame of reference in space, because the space axis is not perpendicular to the time axis, some "test particle" on the space axis would appear to move along the space axis.

Figure 3 depicts a motionless (in temper) particle of light, which is the same as a motionless (in space) particle of matter, only with the axes switched.

Figure 4 depicts a particle of matter with kinetic energy, which is equivalent to a particle of light with *tempus energy*—tempus energy causes movement through time as kinetic energy causes movement through space.

As I have alluded to, there are two types of energy in the Tridias Couplet—kinetic energy and tempus energy. Kinetic energy corresponds to movement though space, and tempus energy corresponds to movement through time. A particle of matter's total energy is equal to its tempus energy, and a particle of light's total energy is equal to its kinetic energy. Hence, if a particle of matter has kinetic energy, its tempus energy is equal to the potential energy it would have if it were at rest *plus* its tempus energy.

There are four variables that a particle has which determine its kinetic and tempus energy. These are its rest mass, its speed in its own tridias, its number of particles in the other tridias, and its wave frequency in the other tridias. Observe that the speed of movement and the wave

frequency are relative, and depend on the frame of reference that they are being observed from. Also observe that it is not clear how a tridias transformation affects these four variables. For example, from a spatial frame of reference, we observe a single photon of a given frequency, but we do not know the rest mass or speed of the photon in temper. The speed depends on the frame of reference in temper, and is hence not uniquely defined. We could hypothesize a simple model where there are only photons and electrons, and then hypothesize that the rest mass of the photon in temper would be that of an electron in space. Nonetheless, it is not clear that the number of photons directly translates to a number of electrons. It is possible that one photon could be equivalent to varying numbers of electrons, and vice versa.

There are three kinds of interactions that the model must explain. First is the gravitational interaction of two particles of matter in space. Second is the gravitational interaction of two particles of light in temper. Third is the interaction of a particle of matter and a particle of light in space and temper.

First, the gravitational interaction of two particles in space should be explained as an extension of Einstein's Theory of General Relativity to the Tridias Couplet, and will likely not differ mathematically from gravity in Minkowski space.

Second, my hypothesis is that the gravitational interaction of two photons in temper will be able to explain the electromagnetic force. To understand this, observe that when gravity pulls two particles of matter towards each other, potential energy, and hence tempus energy, is converted to kinetic energy. This must correspond to tempus energy being converted to tempus energy in temper. Similarly, when gravity pulls two particles in temper together, the two particles must acquire tempus energy. This must correspond to tempus energy, and hence potential energy, being converted to kinetic energy in space. My hypothesis is that the interaction of electrons with "virtual photons" is a manifestation of this interaction. A formal model would be needed to explain this more clearly.

Finally, I hypothesize that the interaction of particles of matter with particles of light manifest in two ways. First is the apparent gravitational pull of a photon by a particle of matter, which corresponds to the interaction in space. Second is the apparent electromagnetic interaction of a photon with an electron, which corresponds to the interaction in temper. Again, a formal model would be needed to explain this more clearly.

In summary, the Tridias Couplet model is based on a simple geometric structure, and will naturally possess elements of both general relativity and quantum mechanics. It may also lead to a natural explanation of both gravity and electromagnetism. It could be a useful step in the quest towards finding a single Theory of Everything.

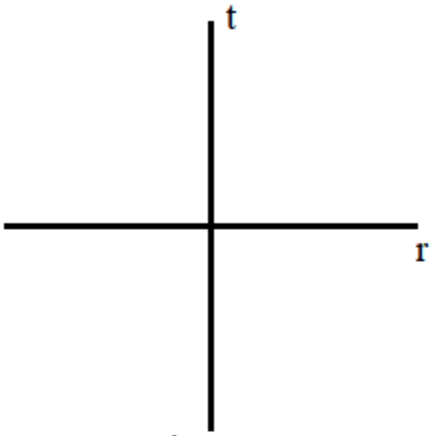

Figure 1

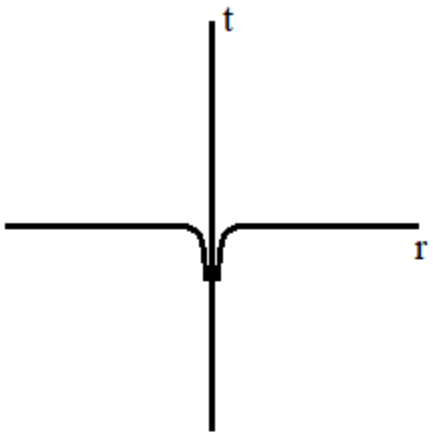

Figure 2

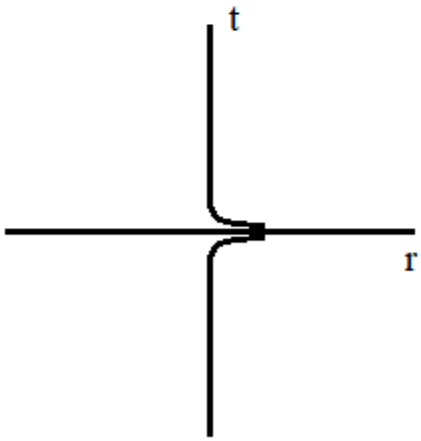

Figure 3

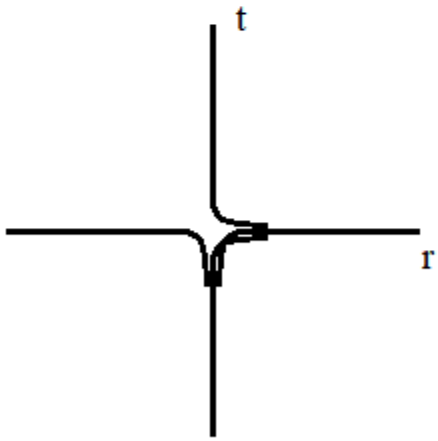

Figure 4