<u>THE MISSING MATTER</u>

(In this paper, it will be presumed that the reader is familiar with the material under sections II and III presented in the paper The “Groundwork” for Answering Some of Physics Most Confounding Problems. To read that paper, familiarity with the paper An Intensive Scrutiny of the Atom is expected.) Since the solution to the missing matter has already been presented, this paper will only serve to make a few necessary commentaries pertaining to the missing matter.

As the reader is well aware, analysis of the motions of stars and galaxies dictate that there should be far more matter in the universe than we currently observe (in relation to the gravity inducing these specific stellar/galactic motions). What is the approximate number of neutrinos required in order to induce the requisite gravitational effects when explaining this phenomenon. Precise numbers cannot be presented now. However, one thing can be stated. When dealing with neutrinos propagating in space, the number required to exert the same gravitational effect as the neutrinos on a stationary mass is *significantly* larger. (The precise reason for this was stated in the section on quantum gravity in the first paper mentioned at the beginning of this paper.) As an example, let's assume we have "x" number of neutrinos on the surface of a planet exerting a gravitational force. Would "x" number of *free* neutrinos exert the same gravitational effect? Absolutely not. As was stated in the section on quantum gravity, the coupling mechanism of neutrinos that are in constant motion is inefficient. Consequently, it would require neutrinos which are (presumably) at least a few orders of magnitude larger than "x" to induce the same gravitational attraction as "x" neutrinos on the surface of a planet (as stated, precise numbers cannot be presented at this time). Therefore, when dealing with the missing matter, the number of neutrinos required to induce a measurable gravitational effect is significantly larger than the number of neutrinos on a stationary mass. This factor must be taken into consideration in potential further developments of the intricacies and dynamics of the missing matter.

When contrasting free neutrinos with neutrinos that are a part of mass, it would be appropriate to delve into one other thing. When the theory of quantum gravity was outlined, it was stated that neutrinos are the true source of gravity. To state that gravity is induced by mass is fundamentally correct, yet simplistic. However, it is imperative that there be clarification of this point.

For gravity to be present there *must* be mass despite the theory that neutrinos are the true source of gravity. Or to be more specific, *there must be stationary neutrinos*. In order to illustrate this principle, let's present a hypothetical scenario. Let's assume the universe is comprised of nothing but neutrinos. There is not even a milligram of mass anywhere in the universe. If this situation existed, would there be gravity in the universe? No, there would not. How can this be possible if the new theory dictates that neutrinos are the true source of gravity? The answer has already been previously alluded to in the section on quantum gravity. Neutrinos are relativistic and in constant motion. This constant motion results in the coupling mechanism between them being highly inefficient. To develop this one step further, given the fact that they are relativistic, there wouldn't be any coupling mechanism at all if the universe were comprised *exclusively* of neutrinos. There will only be gravity if mass is present. This will result in stationary neutrinos and, at least at distances close to the mass, a reasonably efficient coupling mechanism (it is only as distance from the mass increases that the coupling mechanism among the free neutrinos becomes increasingly inefficient and the force of gravity weakens). This shows that although neutrinos are the true source of gravity, mass *must* be present for gravity to exist. Therefore, this is another way in which the best components of Newtonian gravity are incorporated into the theory of quantum gravity. It also shows that Newtonian gravity cannot be completely dismissed and must continue to be taught even though it is highly simplistic in explaining gravity.

There is one final point pertaining to gravity, the missing matter (free neutrinos), and general relativity. These free neutrinos *may be* the gravity waves predicted in general relativity. If a *sufficient number* of free neutrinos interact with *stationary* masses, it may induce the effects of gravity waves that are predicted by general relativity. However, I don't believe the number of free neutrinos propagating here on earth is sufficient to induce measurable effects on a *macroscopic level*. In other words, the effects would be so infinitesimally small that our current level of technology would be too primitive to detect two masses being drawn closer together. The rationale behind this would be as follows.

When dealing with general relativity, there will only be a *significant* curvature of space if the mass in question is inordinately large (i.e. a planet). Although smaller objects do curve space (as outlined in the section on quantum gravity in the paper The "Groundwork" for Answering Some of Physics Most Confounding Problems), the curvature induced by smaller objects is minimal. By way of analogy, we know that an object is curving space if the geometry of certain objects on that space is "awry" (as an example, the internal angles of a triangle don't equal 180 degrees). Although a piece of paper does curve space, the internal angles of a triangle *do* equal 180 degrees as geometry is only measurably "awry" on a very large scale. In a similar way, if we place two objects at a precise distance from each other here on the earth and hope to have them come slightly closer to each other (as a result of gravity waves/neutrinos), I think it is virtually impossible that this effect will be witnessed. Again, this is because the clearly measurable effects of general relativity will only take effect with large scale objects. In spite of this fact, this doesn't necessarily mean that gravity waves are undetectable. Since this web site has presented a theory of quantum gravity, it may be possible to detect gravity waves/neutrinos on a *quantum* level as opposed to a macroscopic level.

The first paper in the physics section is an analysis of the Heisenberg uncertainty principle. Section IV of that paper delves into the theoretical possibility of measuring a quantum entity without collapsing its wave function. The principle being advocated towards the possible achievement of this effect was passive detection. (It would be redundant to repeat the arguments presented there. Therefore, it would be most judicious if the reader read that particular section for himself.) No specific details were being presented as the primary purpose of that section was to challenge the alleged impossibility of measuring a quantum entity without collapsing its wave function. However, if one day new concepts were developed which enabled us to achieve this effect, it may be possible to extrapolate these concepts to the detection of gravity waves/neutrinos.

When dealing with the two-slit electron interference pattern, it is within the realm of possibility that the wall with the two slits could be comprised of some technologically advanced substance which would enable us to detect an electron (*via the concept of passive detection*) when it went through a certain slit. In other words, there is some type of "effect" within the wall itself which enables us to know that an electron passed through a particular slit. An example of said "effect" would be an increase in the coulomb repulsion among the atoms/electrons of the particular slit as a direct result of the additional electron propagating through. (The reader's immediate question is, what would this advanced substance be? For the time being, I am oblivious to an answer. These are only the most rudimentary concepts which will require an inordinate amount of development.) If something of this nature were developed, then it may be possible to extrapolate it to the construction of larger masses which do not detect a change in coulomb repulsion, but some type of change induced when a large number of free neutrinos (gravity waves) interact with the neutrinos on the electrons of the atoms.

As has already been stated, these are only rudimentary concepts. We shall have to wait to see what future discoveries may be made that may enable the achievement of such technology. The germane point (as it pertains to gravity waves) is that existing tests would not enable us to detect gravity waves as small objects (which is what would be utilized when searching for gravity waves) induce a minimal curvature of space. However, it may be possible, in one respect or another, to detect gravity waves on a quantum level.