Prologue©

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These reasonings are based on a three component model in measurement and modeling that was deduced to be the philosophical basis underlying the scientific studies of physical systems. The idea came to me in my final undergraduate year and was further pursued over an approximate five year period. The three components include the observer and the observed, with the addition of a component defining the standards of measure for the physical system. It was reasoned that these three components completely defined the physical system. It seemed like a sound idea but initially did not lead to any significant, novel result. There were later attempts to get more substantive results without success. Only a simple explanation for the twin paradox resulted as an internal report at Atomic Energy of Canada where I was employed as a research scientist.

When considering a three component model, there needs to be an expression for the state of each component with a way to establish the relationship between them. This was sensibly labeled the "context" of the problem and was expanded to states of these three components in all scientific studies and a number of fundamental principles that became part of the definition of context. There are approximately twenty of these fundamental principles, depending on how they are separated, though none seem to be particularly significant at first glance. For example, the scientific process uses standard metrics to parameterize the properties of a physical system, and this became one fundamental principle. There are natural calibrations for all measurements in nature, this became another fundamental principle as did the principle that all measurements in science are some factor of a standard metric.

In my early 50's, I again turned serious attention to the idea while considering the action at a distance phenomenon of gravity, particularly, from a relativistic viewpoint. The motivation came out of an intuitive revelation that it is distance and not mass from which the phenomenon of gravity finds it's roots. This turn out to be true in that gravity defines our universe in a cartesian space while gravity is a second order form of energy/momentum which is mass times distance—with distance being some higher order differentials of distance as we normally view it.

How can that be? In an energy regime, the physical laws could be the source of the mass component. Since the gravitational constant is central to the physical laws of Newton, as it establishes the energy states to the space, it could very well be the source of the mass component with properties expressed in the cartesian space.

I brainstormed on the philosophical level and followed by the related mathematical constructs, all over a period of about six years, writing down thoughts as they came. The result was a large incoherent document. The next step was to focus on a section of the document and following the philosophical principles with the supporting mathematics, to produce a substantive argument for the selected topic. The topic was Newton's Laws and the Law of Gravity, as they seemed a good target for philosophical arguments based on standardized metrics. This turned out to be very true and many original deductions on the fundamental nature of Newton's Laws and Gravity were the result. This was the work for the next three years and reached a reasonable representation of these laws of physics, derived based on the preceding philosophical developments.

The scientific process uses both measurement and modeling strategies with their own distinct mathematical structures and this became a higher level principle. This being higher in the sense these representations include the measurement and modeling strategies centered on methods of measurements and results represented in the models. As a conjecture, I included as a fundamental principle—that the laws of physics are the transformations between the measurement space and the modeling space. Both are generally represented using vector spaces.

That these vector spaces are different, can be seen when considering gravity in Newtonian mechanics. With gravity, the measurements are made as an action at a distance along a line intersecting the two elements of interest–co-linear radii. However, our everyday life takes place in a three dimensional Cartesian coordinate system. As well, the Newtonian problem is cast in a metric system based on normalized standards of measure—of arbitrarily selected dimensions all assigned a value 1—one second, one meter, one gram. This seems of little significance, but, consider the implications. In this context, it is taking measurements along radii and representing

the positions of the objects in a normalized cartesian system spanned by orthogonal basis vectors of standardized metrics. If the states of the three elements of this physical system under context, is based on the relative radial distance between them as it is under gravity, how does this translate between the model space and the measurement space and ultimately under the three component model, what are the consequent transformations that account for the observed laws of physics?

The representation seems simple, but it is not. The state of each component of the three in the three component model of measurement, includes position, velocity, acceleration, and all nth order differential states from zero to infinity. This differs from conventional wisdom in that it is only the center of mass, dependent on position and the emperical laws of physics that account for the defining features of a physical system under study. In this new regime, to fully understand the properties of a physical system, it is necessary to establish the center of context of the study which expands on the center of mass–that of conventional wisdom—to all differential orders of state.

To understand the Newtonian representation, we think in terms of normalized distance—when we travel a distance in Newton's world, we only think in terms of the spacial positions and separations in the model space representation. The vector space is spanned using distance metrics in 3 dimensions. Under context, a physical system encompasses all nth order states—giving credence to the idea of context in terms of all differential orders of position. But, it must consider that energy states are distinct properties of physical systems, thus, a metric space spanned by distances only, will not be complete, unless the laws of physic established in that context are suitably formed from observation. A quantum system is defined on a vector space, but, spanned by basis vectors representing an infinite number of energy states that are calibrated to natural dimensions.

If the laws of physics in the Newtonian system are considered in the context of the center of mass in cartesian coordinates then expanding the context to the center of system context in an infinite order cartesian system, that is to say there are infinitely many 3-dimensional spaces each one a differential order, then if a physical system that is in a common context but studied in terms of different laws of physics, can be directly related by way of some mathematical transformation. If one believes in context, that the laws of physics are determined by context, then one believes the laws of physics in Newtonian mechanics can be directly related to quantum mechanics based upon some transformation that can be derived by purely mathematical operations.

Initially, I followed geometric arguments looking for this relationship. I was successful using an irregular three dimensional trapezoid and treating it in a manner similar to Serpinski's Triangle. It was an expression of the gravitational constant using Planck's constant and a number of mathematical constants derived in a recursive operation. Taking the recursive relationship to infinity and summing the results for each step, the gravitational constant emerged. It also emerged that both gravity and Newton's Laws have expressions in every differential order and that they are the multiplicative inverse to each other.

The result of this derivation is a modular form and as such has treatment in number theory. The form of the defining series is related to many mathematical objects, most notable being Pythagron's Theorem and its inverse and the harmonic series. With these evidences, I have turned to approach this and other purely mathematical problems of the Riemann-Zeta functions. The result of that initiative is posted here as well.