Discussion on the *Derivations* of *Newton's Laws*, *Law of Gravity*, and the *Gravitational Constant* as founded on *Fundamental Philosophical Principles* and *Formulated* using *Geometric* and *Numeric Reasonings* ©

Guye S. Strobel

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Expanded Abstract

Discussed here are Strobel's derived expressions for *Newton's Laws*, the *Law of Gravity*, and the *Gravitational Constant* (G^c) as based upon *Most Fundamental Defacto–Apriori Philosophical Principles* and *Higher Level Ipso–Facto Principles—Context* and the *Fundamental Equation* (*FEq*)—supporting *Geometric* and *Numeric* operations on *Standardized Metrics* of *Differential Orders* of *Generalized Momentums* and *Generalized Positions*. Derivations start with *Geometric* constructs from the *Euclidean Distance* as the *Space Metrics* with *Numeric Methods* applied to *Infinite Series* and their *Partial Sums* evaluated in their *Infinite Limits*.

These *Metrics* are defined in the *Newtonian Mechanics Context* with *Normalized Magnitudes* in all *Differential Orders* and follow *Quantum Mechanics* type *Constructs* being *Forward* and *Inverse Operations* between two particular *Standardized Metric Spaces*. One is *Calibrated* and the other *Normalized*. The calibration from the *Mathematical Construction* into the *Physical* realm uses the *Universal Calibration Constant* for *Mass* (m) determined from *Planck's Constant* and a reduced form for *Einsteins Mass—Energy Equation*. The *Context* of these derivations is the *Center of Mass Context* which is in many ways analogous to the *Center of Mass Reference Frame* from *Classical Mechanics*. The *Space Metrics* are based on the "*Distance from Origin*" *Standardized Metric* as an *L–Function Equivalent* to a *Modular Form*. They are calibrated to the *Physical Domain* using the *Universal Calibration Constant* for *Mass* (m) determined from a reduced form for *Einsteins Mass—Energy Equation*. The terms of the general form approach *Zero* at appropriately low *Order* in the *Newtonian Mechanics Context*. These are generalized expressions for all *Contexts* having *Primary Constants* of *Mass*, *Distance*, and *Time* calculated using *Standardized Units* and with *Newtonian Mechanics* being one particular application.

Two G's are considered—the *Conventional Emperically Determined* (G^c) and that *Derived* by Strobel (G^d). G^c in this discussion becomes a *Context Dependent Universal Constant* and not generally *Universal*—as believed in *Conventional* treatments. Introducing *Constraints*—namely those of the *Center of Mass Context*—makes it a *Universal Constant* for *Standardized Derivations* in all *Contexts* subject to those *Constraints*. G^d is a *Universal Constant* that can be calculated for any *Calibrated System* of *Measure* and converted to any other *System of Measurement* using only the conversion factor for the *Units of Measure* for *Mass*. For example: $1.000...lb = 0.453592...gm$ converts between FPS *Units* and SI *Units*. G^d is the prediction of the *Emperical Value* for G^c subject to the *Constraints* of the *Center of Mass Context*.

A value for G^d in SI units for *Mass*/*Time* ($gm/\sec$), is calculated with *Planck's Constant* implicit in it's *Emperical Value* from the more *Fundamental Universal Constant* for *Mass* m. A second, independent calculation for G^d is obtained using empirical FPS values for h and c and the conversion factor for *Mass* between *pounds* and *grams*. The variance between these two completely independent calculations for G^d from independent measurements for h is roughly of the *Order* of 72 parts in one-billion.

G^d is a *Transcendental Number*. *Planck's Constant* is the computed value in the *Inverse Operation* and is *Transcendental* and a *Universal Constant* based on it's *Conventional* treatment in *Center of Mass Contexts*. The *Mathematical Equivalent* for G^d is a *Most Fundamental Construct* (N) that *Transforms* between two *Normalized Metric Spaces* as contrasted to G which *Transforms* between a *Normalized Metric Space* and a *Calibrated Metric Space*. Every *Physical Equivalent* G is directly related to this *Normalized Value* by some *Calibration Constant* for the *Principle Standard Metric* of the *Context*.

By reasonings of *Context* and assuming bodies with *Homogeneous Density Mass Distribution*, the *Bulk Masses* for *Planets Modelled* in this simplest of cases are calculated to be half that accepted under conventional analysis. This prediction is supported with comparisons against *Bulk Densities* calculated from prevalent densities of each *Planet* in the *Solar System*.