Abstract May-15-2014

This is a very brief abstract for my E-book with the rather long title “Gravitation, Quanta and Quantum Gravity - On Transcending Tautology & The Question of Reality and Knowledge in Theoretical Physics.”

This E-book represents the results of my analysis up to Oct. 2011 and published originally on my website postmodernphysics.ca until Oct. 2013 through the help of my good friend Ken Letkeman. Since then, some aspects of this analysis have become much clearer. As a result the representation in the upcoming hard cover version is more rigorous but also easier to understand. It has become convincingly clear since, the issue of quantum gravity, the cosmological constant problem and the issue of the unreasonable effectiveness of mathematics in the physical sciences, popularized by Wigner’s in his 1960 article, are not technical but interwoven epistemological issues.

This abstract give only the essence of the manuscript previously published on the postmodernphysics.ca website, made available again on this site through the help of Ken.

The fundamental starting point is a point of logic w.r.t. language and perception. The quantitative foundation of physics as a science is the quantification of the concepts of mass, length and time. In the context of mathematics these are used as linear variables. The logical analysis carried out here is based on the following point of logic.

Defining and quantifying the concept of *mass* using gravitational phenomenology makes that concept ineligible as an explanation of this phenomenology. This operational definition only provides an arbitrary quantitative standard, a benchmark, for the concept of *force per mass* w.r.t. Newton’s laws of motion. This forms the basis for the quantitative mathematical modeling of natural phenomena. Regardless of the progress of physics and the concurrent development of its technical language, in its current form, in the logical context, physics is descriptive and not explanatory.

Assuming that good mathematical modeling explains something is an illusion. I think Planck's introduction of h is an appropriate example. The illusion results from being trained to think and interpret quantitative data in a standard manner within existing conceptual and mathematical structures. The introduction of h had of course consequences for the conceptual structure interpreting the new model. It led to the notion of quanta whose properties were then explored quantitatively and described in terms of the existing language. This enables physicists to accumulate and expand their knowledge base w.r.t. what works and what does not in the physical world. This makes physics the valuable quantitative science it its, a quantitative knowledge base.

A statement such as "every body in the universe attracts every other .." is clearly not a scientific statement. It is a dogma and, as everyone with a high school education knows, not true. However, to make it true the term *body* is redefined so the statement becomes true but context dependent. When that runs into trouble w.r.t. existing conceptual and mathematical structures, because of new quantitative data, the tendency is to invent stuff to insert into them to make them fit better and be consistent with what already exists. The cosmological constant Λ is a good example. It was invented by Einstein to make a model stable w.r.t. gravitational collapse, and discarded by him when the conceptual structure changed as a result of Hubble's discovery of the velocity-distance relations among extra-galactic nebulae.

Because the existing mathematical models have in the context of logic no explanatory value to start with, making the concepts of mass, length and time functions of themselves relative to the speed of light, or inventing new terms to make models fit and giving them names such as dark energy or quintessence makes fundamentally no difference to our understanding of nature.

The analysis presented here addresses this issue head on. Instead of defining and quantifying our intuitive notions of mass, length and time by physical phenomenology, and then using these definitions in the mathematical context to describe phenomenologies, in this analysis I use three stable kinds of quanta as physical standards to lift the veil of context dependent and tautological language.

This is a powerful methodological tool because quanta, as objects, have more than one physical property quantitatively described by physics. This makes it possible to transcend the logical error of assuming mass explains gravitational phenomenology, or that it tells space-time how to curve and space-time tells mass how to move. Therefore, this analysis leads to quantitative results neither derivable nor easily understandable within the domain of the current conceptual structure of theoretical physics to which this analysis applies. The details are laid out in the manuscript.

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