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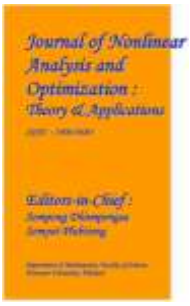

QUO VADIS THEORETICAL PHYSICS AND COSMOLOGY? FROM NEWTON'S METAPHYSICS TO EINSTEIN'S THEOLOGY

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ABSTRACT

The crisis in modern theoretical physics and cosmology has its root in its use, along with theology as a ruling-class tool, since medieval Europe. The Copernican revolution overthrowing the geocentric cosmology of theology led to unprecedented social and scientifi c developments in history. But Isaac Newton's mathematical idealism-based and on-sided theory of universal gravitational attraction, in essence, restored the idealist geocentric cosmology; undermining the Copernican revolution. Albert Einstein's theories of relativity proposed since the turn of the 20th century reinforced Newtonian mathematical idealism in modern theoretical physics and cosmology, exacerbating the crisis and hampering further progress. Moreover, the recognition of the quantum world - a fundamentally unintuitive new realm of objective reality, which is in confl ict with the prevailing causality-based epistemology, requires a rethink of the philosophical foundation of theoretical physics and cosmology in particular and of natural science in general.

INTRODUCTION

Newton's mathematical idealism-based, metaphysical law of universal gravitational attraction; arbitrarily formulated in violation of the observationally established celestial dynamics of Kepler, Brahe, Leibniz, and later Hegel's dialectics; was in fact an attempt to restore Ptolemaic Epicycles and God's rule over the heavens, which was disrupted by the Copernican revolution. Newton's metaphysical law, even more, reinforced by Einstein's equally idealist theories of relativity, since the turn of the 20th century has led to reductionism in modern theoretical physics and cosmology to fi nd progressively simpler and unifying principles for the fi nal truth of the universe, making physics a part of theology. There is little wonder that theology, like the medieval times has gained an increasingly prominent role in modern theoretical physics and cosmology. This would be evident from what Geoffrey Burbidge [1], a prominent astrophysicist had to say about the "Big Bang" theory: *"By 1982 when a conference on cosmology was held at the Vatican, a new approach was taken. The radicals around, such as F. Hoyle, V. Ambartsumian, and this speaker (to mention a few) were not even invited. The conference was confi ned completely to Big Bang cosmology and its proponents. In fact, in the introduction to the published volume of the proceedings of the meeting (Pontifi cal Academy of Sciences, 1982) it was emphasized that only believers (in the Big Bang) were present; and that there*

was clearly a deliberate decision of the organizers".

The perception that all the phenomena of the universe are systematically interconnected drives natural science to prove this interconnection throughout, both in general and in detail. The essence of positive knowledge is to progressively reveal as a never-ending process; the fi ner details of the workings of the universe - Nature, Life, Society, and Thought; through social/ historical practice, investigation, technology, etc. – making science essentially a practical and dialectical epistemology. Any existence is a contradiction and as Hegel pointed out, *"…it is only in so far as something has a contradiction within it that it moves, has an urge and activity"*. The resolution of the contradiction in each level of existence; through the negation of the negation and mediated by chance and necessity; gives rise to the phenomenology of the universe. The objective truth (positive knowledge) therefore, consists in revealing how dialectical contradictions resolve themselves in the details of Nature.

Metaphysics (causality and formal logic-based epistemology), on the contrary, seeks to "understand" the phenomena gleaned through human sense perception, without any regard for objective reality or the ontological underpinning of the issues; which remain a mystery or at best as the Kantian unknowable things-in-themselves. If follows, therefore, that metaphysics only deals with essentially arbitrary subjective idealism; unifying concepts conceived in thought (formal logic/mathematics), which can lead only to scholasticism and mysteries. These two approaches to celestial dynamics have given rise to two exactly opposite views of the universe – a metaphysical one (of Newton and Einstein) that posits a fi nite universe ostensively created about fi fteen billion years ago, through a single act of a cataclysmic event; caused by an omnipresent and omniscient God and a dialectical one; which posits an infi nite, eternal and ever-changing universe; mediated by chance and necessity. The two world-views (- metaphysical and dialectical) also leads to two exactly opposite views about the origin, the evolution, morphology and the formation of galaxies and other cosmic bodies in the universe. The fi rst one, which is mainly based on mathematical idealism and is generally accepted; views galaxy formation as deterministic and an essentially unidirectional condensation of diffuse matter created through the primordial Big Bang explosion, The second view (dialectical and quantum electrodynamical), based on (limited) observational and empirical evidence asserts a rather intrinsic origin of the cosmic bodies, where new galaxies are formed from material ejected and/or dissipated from the core of the existing galaxies; where new matter-antimatter is created as a resolution of the ontological contradiction "Being Nothing" [2]. The following discussion would reveal the crucial methodological difference between the two worldviews. The dialectical view insists that contradiction of the unity of the opposites is the essence of any existence and matter in eternal motion and the resolution of the contradiction through the negation of the negation; is the basis of all phenomenology. Metaphysics on the contrary is essentially reductionist, absolutist and axiomatic; asserting stasis, unity a geometrical and quantitative approach at human scale; leading to arbitrary formulation of theories, paradoxes and mysteries.

Isaac Newton It is a historical fact [3,4] that in a long controversy with Leibniz's Vis Viva and centrifugal force

in the planetary system, Newton wanted to bring back the rule of God (class rule) in the heavens and the earth; after the Copernican revolution disrupted it and brought a threat to theology. Empowered by the British imperial dominance, the Church and his own position as the President of the Royal Society, Newton appropriated to his credit the works of his contemporaries like Hooke's mechanics, Leibniz's calculus as his own and imposed his idealist and perfect circular (modifi ed Epicycles) orbits in the solar system, in defi ance of the correct physics of the elliptical orbits of Kepler and Leibniz. The same tradition continues till today. The importance of centrifugal force is much more wide ranging than is usually thought. It is vehemently denied by offi cial physics and cosmology. But it is one of the main factors in the difference between offi cial (Newtonian/Einsteinian)

physics/cosmology and the dialectical physics/cosmology of Leibniz and Hegel, (as the following discussion and the references would indicate). Leibniz's Vis Viva formulation rather than Newton's one forms the essential basis of practice in astrophysics and space exploration efforts. The essential difference [5,6] between offi cial (Newtonian/ Einsteinian) physics and dialectical physics involve the following issues: difference in terrestrial and celestial mechanics and gravity; the difference between geometrical approach to physics by Descartes (continued by Newton, Einstein), and the dialectical one of Leibniz and Hegel; the difference between conserved momentum as mv of Descartes and mv^2 of Leibniz; the difference between purely mechanical motion and Vis Viva; the ontological questions of matter and motion etc., plus lots of deep "thinking-thought" (philosophy) not just ordinary thought used in good old common sense, formal logic and mathematics – the pabulum of offi cial physics. Only in terrestrial classical mechanics; the two approaches roughly (but not exactly) correspond, but in the extraterrestrial macrocosm and the quantum microcosm the two approaches vary widely and in fact quite the opposite of each other. Vis Viva is active in terrestrial mechanics, but not apparent, as it is dominated by earth's gravity and is dissipated either as heat or in the internal structure of matter. The following symbols apply: r = distance, t = time, v = velocity, G = the Newtonian gravitational constant, M = mass of the sum, m = mass of any planet in the solar system. **A. Momentum and force** Descartes: force x t = mv; applies anywhere in the universe Leibniz: force x r = mv^2; subdued on a cosmic body like earth, but is more forceful in outer space Ratio: mv^2/mv = v (Vis Viva), which represents the extra v term in Leibnizian momentum, centrifugal force etc. **B. Nature seems to follow power laws (in gravitational, electric, magnetic, nuclear, luminosity etc., phenomena) Galileo:** r/t^2, dominant on or near the surface of a cosmic body **Kepler:** r^3/t^2 active in outer (planetary) space **Ratio:** r^3/t^2 / r/t^2 = r^2, relevant to Hegel's absolute sovereign motion of matter! **C. Gravitational potential between the sun and any planet in a two body system Newton:** E = - GMm/r, includes only central force, applies everywhere in the universe **Leibniz:** E = mA/r^3 - GMm/r, where A is a constant and includes both central and centrifugal force; active anywhere in the universe. **Total dialectical (Leibniz, Newton and Hegel) Potential:** E = mA/r^3 - GMm/r – mCr^2, [5] (where A, C are constants), is more appropriate for any cosmic formation; planetary, star clusters, galaxies etc.

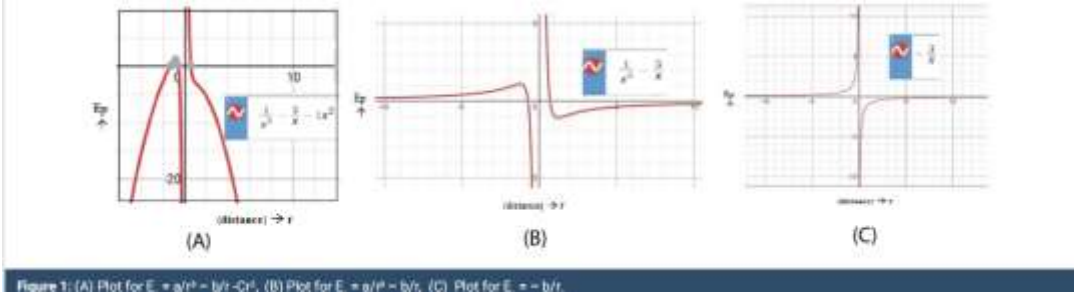
The solar system The Figure 1 shows the simple Desmos Plot (without

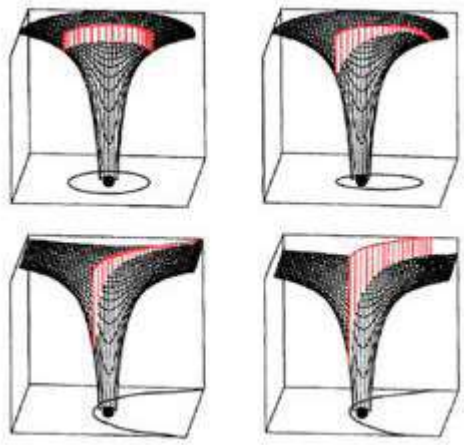
considering the constants) of the total potential = mA/r^3 - GMm/r – mCr^2, vs. distance, Figure 1(a); Leibniz's potential = a/r^3 – b/r vs. distance, Figure 1(b); and only Newton's potential = 1/r vs. distance (Figure 1(c). It is obvious from these fi gures that considering only the Newtonian potential as Figure 1(c), requires much more critical requirements for distance than the other two cases for a metastable planetary orbit; indicating a dialectical contradiction in planetary motion.

The galactic system The virial theorem provides a very simple relation between the total potential and kinetic energies of stars within a galaxy, or other system of stars, that has settled down into a steady state. A basic principle known of the virial theorem states that for any system of particles bound by an inverse-square force law, the time-averaged kinetic energy T and the time averaged potential energy U satisfy the relation 2 T + U = 0, for a steady equilibrium state. T will be a very large positive quantity and U a very large negative quantity. Of course, for a galaxy to hold together, the total energy T + U < 0; the virial theorem provides a much tighter constraint than this alone. In practice, many systems of stars are not in a perfect fi nal steady state and the virial theorem does not apply exactly. Despite this, it does give important, approximate results for many astronomical systems. The virial theorem provides an easy way to make rough estimates of masses, because velocity measurements can give T. Figure 2 shows approximate virial diagram of the distribution of stars in a galaxy showing the difference between a circular and elliptical orbit of various eccentricities; using only the Newtonian potential. In the case of purely circular orbit no outfl ow is indicated; while in the case of the elliptical orbits; there is an increasing outfl ow of objects as the eccentricity increases, pointing to the dialectical nature of the motion of the stars. It is expected that using Leibniz's and Hegel's terms in the total potential can account for the high velocity of the stars at the periphery of the galaxies or of the galaxies at the periphery of their clusters, without considering mystical "dark matter" of offi cial astrophysics. The dialectically conceived orbits also explain the possible outfl ow of stars or star clusters beyond the gravitational infl uence of the galaxies. Astronomers have spotted [7,8] a faint cosmic glow, that may come from stars that fl oat adrift between galaxies. This discovery suggests that as many as half of the stars in the universe lurk outside the galactic boundaries [7]. This fact alone aside from other factors corroborates the dialectical view of the universe.

Albert Einstein Meanwhile during the long period from Newton to Einstein, both the Newtonian cosmology and Christian theology (and hence the ruling idea) had lost much of their glamour with the subsequent development in astrophysics and biology (Darwin) and particularly fatally, with the recognition of the Evil Quanta; which destroyed all notions of causality, certainty, determinism, symmetry, mathematical consistency etc., on which offi cial physics made claims to its highest merit. Newton's theory of gravitation and Maxwell's theory of electromagnetism, which formed the backbone of theoretical physics, cosmology and classical materialism and also the ruling idea of a class society; was shattered with the recognition of the quantum phenomena at the turn of the 20th century. All certainty, continuity, determinism, cause and effect, formal logic, mathematical methods etc.; the foundation of the old epistemology suddenly became undone overnight. The earthquake of the quantum phenomena – a totally unthinkable,

unimaginable and a new revolutionary aspect of objective reality, the reverberation of which is still strongly felt today, after more than a century of its discovery; defi nes the conundrum of offi cial science and the ruling order of monopoly capitalism and resurgent theology. At the same time, the discovery of the photoelectric effect and related quantum phenomena raised new question about the nature of light as a particle or a wave; about the nature of objective reality, space and time and other ontological questions in general - questions which were of little or no signifi cance in previous history. In addition to the heightened crisis due to its own internal contradictions; the recognition of the quantum phenomena (in both realms of microcosm and macrocosm) infl icted a





devastating blow to the continued rule of the capitalist world order in its modern monopoly form. The crisis of capitalist world order, in both the economic and ruling front continues unabated till to this day. The reaction to the revolutionary developments in physics and cosmology on the one hand was one of dismay and disbelief, because it shattered the old notions of certainty, continuity, causality etc., on which the old societies functioned. This dismay is palpable from the following words of Einstein, *'Many physicists maintain - and there are weighty arguments in their favour – that in the face of these facts (quantum mechanical), not merely the diff erential law, but the law of causation itself - hitherto the ultimate basic postulate of all natural science – has collapse"'* [9]. And on the other hand, this discovery prompted vigorous attempts to deny and to discredit the reality of the quantum phenomena altogether. This effort continues in two front a) to revamp the old theories of Newton's gravity and of Maxwell's electromagnetism; which ruled physics for few centuries; b) to reinterpret the quantum phenomena to make it to conform within the old epistemology of causality, and formal logical, mathematical categories of subjective idealism a la Emmanuel Kant. Long after the Copernican revolution, natural science once again found itself in a paradigm changing crisis like never before. A repeat of history took place with "Sir" Arthur Eddington, after an Anglo-American alliance became the dominant world power at the turn of the fateful 20th century. Meanwhile (from Newton to Eddington), both Newtonian cosmology and Christian theology (and hence the ruling idea) had lost much of their glamour. Eddington found the opportunity to strengthen the ruling idea (cosmology) by promoting the esoteric theories of relativity of Einstein.

Eddington brought an obscure Einstein to world fame overnight, by the false claim of proof of Einstein's GR (a practice that continues till today!). As stated above, "Big Bang" creation theory of cosmology (an idea of the Belgian Priest Lemaitre) was adopted at a conference in the Vatican that excluded the major astrophysicists of the time. Einstein, with his theories of relativity led the efforts of offi cial physics to refi ne and extend the old theories; namely, Newton's theory of universal gravitation and Maxwell's theory of electrodynamics; ostensively, to counter the essence of quantum uncertainty and quantum electrodynamics. All-out efforts continue by offi cial science to fabricate a so-called "theory of everything" in God's Kingdom; at the enormous cost of intellectual, technological, natural etc., resources of the modern society.

Einstein's purported contributions (the greatest ever in re-establishing God's Kingdom) came mainly in three fundamental ways: a) the exact quantitative prediction of the unaccounted for, 43 arcseconds (0.076%) of Mercury's periheli on advance; b) the exact account of the famous Morley Michelson experiment that the velocity of light c is a universal constant in any reference frame – the fundamental premise of Einstein's special relativity (SR) and Lorentz's Transforms (LTs); which formed the basis of electrodynamics and c) the quantitative prediction of the bending of starlight by the sun - the most fundamental aspects of Einstein's theory of general relativity (GR) that established his premise of the "equivalence principle" uniting gravity with accelerated motion. Einstein's GR is supposed to give a better account of celestial dynamics and gravity; better than those of Newton; and constitutes the most dominant theory of modern astrophysics and cosmology. The most peculiar aspect of this enterprise in defending the ruling order is that subjective mathematical idealism, arbitrary and even faux mathematical tools, contrived experimental "proof" lured by the promise of fame, fortune and funds etc. are used to establish the most spurious aspects of the old theories of physics, of Newton, Maxwell and of Einstein.

As revealed by recent reports! [5,6,10-12], Newton's theory of gravity and Maxwell's theory of electromagnetism are wrong, because these are idealized mathematical description of observational and experimental data hence of a distorted reality and Einstein's theories of relativity are abstract geometrical constructs that have absolutely no basis in objective reality! On the contrary, quantum physics not only led to an increasingly unprecedented understanding of the micro-world of atoms and molecules; fl ourishing of previously unimaginable technologies etc., in particular; but also opened the way for a scientifi c understanding of the ontological questions of the universe in general; refuting the Fairy Tales that offi cial physics fostered at the great cost to humanity. The quantum phenomena revealed that objective reality at micro-level is inherently, discrete, uncertain and of unstable nature - coming into being and passing out of existence, mediated by chance and necessity. The macro (human) level of existing entities is only the gross, averaged-out and overall collective effects of the quantum processes eternally going on at the sub-level of quantum reality! [13,14].

Mercury's perihelion advance Long after Newton's law of universal gravitation was generally accepted as the basis of the planetary motion in the solar system, the French astronomer Le Verrier in 1859 announced (based on

many years of careful observations and calculations) that the perihelion of the planet Mercury evidently undergoes precession, at a slightly faster rate than can presumably be accounted for by Newtonian mechanics, given the known distribution of the planets and the other objects in the solar system. Since Newton's laws allows only a unitary and centrally directed force, an explanation for Le Verrier's fi nding was arbitrarily attributed to a perturbation

caused by the secondary effect of the gravitational forces from other planets; but did not explain why the precession rate varied with different planets, especially the high precession rate of Mercury. The perihelion precession of Mercury is 5,600 arcseconds (1.5556°) per century relative to the Earth. Newtonian mechanics, presumably taking into account all the effects from the other planets, predicts (without strong basis, since it is a very complex many-body problem) a precession of 5,557 arcseconds (1.5436°) per century, but the rest 43 arcseconds (a mere 0.076%!) remained un-explained. In 1898 a German school teacher named Paul Gerber [15] wrote a paper in which he proposed a velocity-dependent propagation of gravity that predicted non-Newtonian 43 arcseconds advance of orbital perihelia per revolution given by the expression $k\pi M/(Lc2)$; where c is the posited speed of propagation of gravity, M is the sun's mass, L is the semi latus-rectum of the orbit, and k is a constant depending on the precise form of the assumed potential. Although there are controversies about this formulation, Gerber showed successfully that a value of the constant k = 6 gave the correct additional 43 arcseconds of Mercury's perihelion advance. A lbert Einstein in his 1915 - 1916 publications [16,17] claimed to have given a precise account of the discrepancy of precession of Mercury, and deduced Garber's above relation based on his newly proposed theory of general relativity (GR). The understanding that Einstein's GR based on impeccable mathematics and a totally different and novel perspective of space and time gave an exact account of the expression given by Garber for the non-Newtonian precession of Mercury; became an instant cause of celebration by Einstein himself. This purported achievement by Einstein is considered [18] a poetic marvel in modern physics and the strongest "proof" of GR. Einstein retroactively admitted (after questions were raised) that Gerber obtained the correct expression for Mercury's perihelion advance before him. But Einstein dismissed any possibility that someone could explain the additional 43 arcseconds precession of Mercury or that Gerber's expression for it could be obtained, without using his theory of general relativity

According to Einstein [19], *"Mr. Gehrcke wants to make us believe that the Perihelion shift of mercury can be explained without the theory of relativity. So there are two possibilities. Either you invent special interplanetary masses. [...] Or you rely on a work by Gerber, who already gave the right formula for the Perihelion shift of mercury before me. The experts are not only in agreement that Gerber's derivation is wrong through and through, but the formula cannot be obtained as a consequence of the main assumption made by Gerber. Mr. Gerber's work is therefore completely useless, an unsuccessful and erroneous theoretical attempt. I maintain that the theory of general relativity has provided the fi rst real explanation of the perihelion motion of Mercury. I have not mentioned the work by Gerber originally, because I did not know it when I wrote my work on the perihelion motion of Mercury; even if I had been*

aware of it, I would not have had any reason to mention it." Einstein's claim of Mercury's perihelion advance was contested by so-called "100 authors against Einstein" led by Philipp Lenard, Gehrcke, Silverstein, Reuterdahl et all, who opposed Einstein's theories accusing him of many things, such as incorrect formulation, plagiarism etc., and questioned his priority. Ironically, W.W. Engelhardt in his recent publication [20] uses similar reasoning like Einstein and raised the controversial issue that Gerber's expression cannot be derived from Einstein's GR. Engelhardt claimed that instead of GR, Einstein used a modifi ed Newtonian theory to derive Gerber's expression and not from his theory of general relativity; hence contest the justifi cation of the claim by Einstein of the proof of his theory of relativity. Engelhardt using purported Einstein's modifi ed Newtonian mechanics derived an expression for the Gerber's equation, which is one-third of Gerber's formula.

Lorentz transforms, theories of relativity - Special and general In addition to reinforcing Newton's theory of universal gravitation as discussed above, consolidating Maxwell's theory of electromagnetism was deemed to be another tangible way to counter the notion of quantum uncertainty in Nature. As the constant velocity of light c seemed to be a fundamental aspect of Nature as it is indicated in Maxwell's theory; it became a rallying-cry in defence of the existing epistemology against the shock intrusion of the quantum uncertainty. The problems of the measurement and the theory of the propagation of light c of classical electromagnetism, became a great passion and preoccupation of the post-quantum theoretical physics and cosmology at the turn of the 20th century. Renewed interest was focused on the works of Ole Rømer and Christiaan Hugens on the velocity of light, Doppler's Effect, Aberration in the motions of the cosmic bodies etc., in efforts to extend Maxwell's electromagnetism to moving systems. The fact that the Michaelson-Morley experiment produced a null result, became the celebratory achievement of modern physics; which in turn gave rise to the much-admired Lorentz Transforms and Einstein's theories of relativity. In a recent publication retracing the original sources, Engelhardt [21] clearly demonstrated that the accepted form of the Lorentz Transforms (LTs) arose from a mistake committed by Woldemar Voigt [22] in developing his "Theory of Doppler's Principle"]. Einstein [23] along with Minkowski, used the notion of the absolute constancy of the velocity of light to derive the LTs and so-called "spacetime', an abstract geometrical construct supposedly with tangible material, mechanical and metric attributes, which forms the basis of objective reality and the theories of relativity – special and general. It is now been shown [10,13] conclusively by this author that LTs and "Spacetime" are contrived and dozy mathematical constructs that have no relevance to objective reality.

The quantum phenomena In spite the general rejection of quantum uncertainty, Quantum Physics not only led to an increasingly unprecedented understanding of the micro-world of atoms and molecules; development of various types of spectroscopies; fl ourishing of previously unimaginable electronic, chemical and biochemical etc., technologies, in particular; but also opened the way for a scientifi c understanding of the ontological questions of the universe in general. The quantum phenomena revealed that objective reality at micro- level is inherently, discrete, uncertain and of

unstable nature - coming into being and passing out of existence, mediated by dialectical chance and necessity. The macro (human) level of existing entities is only the gross, averaged-out and overall collective effects of the quantum processes eternally going on at the sub-level of quantum reality! [13,14]. After long denial but still being unable to contend with the evil quanta; the problem has now been transferred to the "Thought World" where the acrobatics of mathematics and dazzling fantasy substitute for science. Efforts are being made to drown the "Evil Quantum" into the "continuous" and syrupy fl uid "fi elds" (spacetime, quantum, Higgs etc.); to exorcise the uncertainty, spookiness of the Evil Quanta. Mega projects in the realms of both microcosm and the macrocosm continues unabated to "prove" contending esoteric theories at the enormous cost of social resources.

CONCLUSION

It seems safe to speculate (in retrospect) that the revitalization of the classical theories of Newton and Maxwell was a deliberate, reactionary and retrograde effort to discredit the notion of quantum uncertainty in Nature. The exclusive focus to re-establish the old theories in modifi ed form and the denial of the quantum phenomena as a determined efforts to save the outdated notions of the established order is at the root of the crisis in modern theoretical physics and cosmology and has enormously harmed the development of quantum electrodynamics, whose laws are the direct manifestation of materialist dialectics, which pervades any material existence from the microcosm to the macrocosm of the universe [24]. This work concretely demonstrates the notion of materialist dialectics that the ruling ideas of a historical epoch are the ideas of its ruling class. In modern history from Newton to Einstein to the present; the neat and apparently unguided manifestation of this phenomena can be clearly discerned/delineated from the developments in theoretical physics and cosmology. It started with Newton's obviously forcible imposition of an ideal circular but wrong celestial dynamics on the solar system at the behest of the ruling order and theology; in defi ance of the scientifi c and correct formulation of an elliptical one of Kepler and Leibniz. Newton asserted this ruling authority in the very fi rst sentence of the Foreword [25] of his Principia, *"Now that (since Bacon) the substantial forms (of Aristotelian materialism) have been abandoned from natural philosophy, mathematics should replace them to the maximum possible. Extent."*

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