

## PREFACE

**D**ark matter was not a mystery by the time of early twentieth century. Existence of non-luminous matter in the form of faint, cool and cold stars, clouds of gases, macroscopic and microscopic solid bodies etc. was viable and evident – the only unsettled issue was the quantitative estimation of this type of ‘dark matter’ and the proportional existence thereof with respect to normal luminous matter. Already there were theories and methodologies concerning how to infer presence of hidden, dark or non-luminous forms of matter by spotting rotational or orbital motion of the luminous matter in particular locality. Using these techniques, scientists had successfully discovered ‘hidden’ planets like Neptune and Pluto. Based on similar calculations, indications were that there should be another planet closer to the Sun beyond the orbit of Mercury. That supposed planet (Vulcan<sup>1</sup>) could not be found. Meanwhile Einstein presented a new type of calculations and his General Relativity equations resolved the apparent anomaly in the orbit of Mercury without requiring the existence of another planet that was not found. The successful resolution of orbit of Mercury was dubbed as victory of General Relativity and Einstein’s equations were therefore declared as accurate and complete whereas Newton’s Theory labeled as ‘approximate’ method that could still be employed for the problems where greater precision was not the matter of concern. Newton’s theory also had the implication that light could be bent under the influence of gravity but calculations based on General Relativity showed that angle of deflection of light should be almost double to the one taken from calculations based on Newton’s Theory. The point of view that General Relativity is complete and precise theory was authenticated in year 1919 experiment when during solar eclipse starlight passing nearby eclipsed Sun exhibited the angle of deflection that was consistent with the theory of General Relativity. By that time, few other scientists were attempting to estimate the quantity of dark matter and by the year 1930, some of them including Oort had figured out that dark matter should not be more than 50% of the available luminous matter.<sup>2</sup> This was the overall context when in year 1933, Fritz Zwicky announced a leading-edge ‘discovery’ that actual dark matter could be as high as 400 times<sup>3</sup> the quantity of available luminous matter. Zwicky had calculated rotation of a cluster of galaxies named ‘Coma Cluster’ using classical mathematical technique of ‘Virial Theorem’ and noted

that calculated rotation speed of cluster was too high for the observable luminous matter to hold individual galaxies stay as part of the cluster. So far, the concept of dark matter was the same non-mysterious or ordinary matter with the only shortcoming of having too low luminosity or absence thereof.<sup>4</sup> Only after three years, similar anomaly was noted by Sinclair Smith in respect of Virgo Cluster and later on Edwin Hubble, after citing work of Smith, also regarded the discrepancy between the masses of galaxies inferred from the dynamics of clusters and those from the rotation of galaxies to be “real and important”.<sup>5</sup> But he only acknowledged the existence of problem and did not endorse the proposal of out of proportions presence of dark matter. Almost same was the response of overall scientific community but with the passage of time ‘evidence’ for the greater proportional existence of dark matter was mounting through a different line of observations that outer parts of spiral galaxies were not exhibiting Keplerian drop-off<sup>6</sup> as outer parts of spiral galaxies were found to be rotating at extraordinary high velocities. The type of rotation curves of galaxies ‘implied’ existence of far greater quantity of dark matter that could be verified through all the possible means. Although these results were obtained by employing classical theories and calculations but more ‘precise’ theory was after all General Relativity thus whole credit of anomalous findings was assigned to the ‘precise’ theory and we also must assume that scientists might have verified those calculations by actually applying General Relativity also. Scientists made all the efforts to find the extraordinary quantity of dark matter but such high quantity was never traced. Primarily, scientists did not cherish doubts on those calculations as their theory was already proven correct and successful. By the time of last two decades of twentieth century, scientists had accumulated enough ‘evidence’ for the existence of such large quantities of dark matter that could not be found in the real world. Instead of putting their theories under serious review, they drastically changed the concept of ‘dark matter’. Now onwards the same term ‘dark matter’ would imply an entirely different thing. The non-mysterious type of ordinary dark matter would now be categorized as part of normal baryonic matter<sup>7</sup> and to cover up the remaining large discrepancy, new meanings were assigned to the term ‘dark matter’ that it is not simple ‘dark’ in usual or familiar sense but actually it is completely invisible as it does not interact with light or even whole spectrum of electromagnetic radiations and also does not interact with ‘strong force’. This ‘dark matter’ interacts only with ‘weak force’ which is gravity. We can detect this dark matter only through the gravitational influence that it draws on normal matter. Under every kind of light, this dark

matter remains invisible and under every kind of test other than influence of gravity test, it remains undetectable. Upon first encounter, this 'dark matter' may sound like an insignificant ad hoc placeholder type of concept; like a sort of due acknowledgement that something is yet unknown. However, close interaction with Physicists would reveal that it is 'real' thing that actually exists despite being not directly traced. Dark Matter is not merely an idea or acknowledgement of our lack of knowledge rather is a bold assertion that we do know more than what observations could support. Equations of Einstein (General Relativity or 'GR') are perfect. Unexpected observations of galactic rotations did not imply that GR equations could be incomplete. Equations were impeccable and comprehensive – there had to be more than observed 'matter' out there – only then more than calculated speed of galactic rotation could be justified. Our mathematics cannot deceive – only observation can misguide us. What if an observable thing i.e. 'matter' cannot be observed? That 'matter' somehow must exist – though in unobservable format. We do not even need to review our equations as they already have passed 'all' the tests.

To the mainstream Modern Physics, dark matter is not actually an insignificant ad hoc or placeholder type of concept. It is real 'matter' that cannot be observed on account of the 'fact' that it does not interact with light because it has no EM (electromagnetic) property. Anyhow, the need to write this book arose at a time when I started planning to write second edition of my book 'A Philosophical Rejection of The Big Bang Theory'. My main work on 'Epistemological Realism' is under progress and I am also experiencing the post publication scenario of my book on the Big Bang Theory. The response so far to my first book is in the form of increased interaction with qualified physicists such that at least some of them are listening to what I am saying despite whether do they openly accept my points or not. Meanwhile I also kept on constantly evaluating the whole subject from certain unconventional angles whose analysis must be added to the book; hence the need to write second edition invoked. One of those unconventional angles however warranted a separate project which is now realized in the form of this short book which also can serve the role of Volume-II of my first book.

The general readers are apprehended enough that they avoid reading core knowledge stuff coming from non-authoritative source like me. But I am writing with the hope that some right person will eventually pick the point and my writings will serve the purpose. My first book

categorically denied the notion of expanding universe and this book will also downright refute the existence of any such thing as (invisible) 'dark matter' whereas the actual non-mysterious dark matter is not on the hit list of this book as normal dark matter is a reality because after all we can see it when it is brought under light or can detect its presence using other suitable method but same is not the case with modern concept of dark matter which cannot be seen even if brought under light and cannot be detected except through gravity based calculations. I had the option in this book to first show the possibility that after all equations of gravity might not be complete or free from errors. But then I decided to frame the case against 'dark matter' by not discussing the way how actually those equations were developed. Let us accept that (GR) equations were proven successful for solar system dynamics at least. The argument of this book will be that galaxies are subject to different dynamics and solar system tested equations just could not work for the different dynamics of galaxies. The actual dynamics of galaxies would cause them to rotate exactly like they do – and without necessitating the existence of anything like 'dark matter'.

Our Physicists now rely on mathematics equations so much that they do not apply commonsense despite not being senseless, junkies or anything like that. They are basically against using commonsense. Due to certain intellectual mistakes, or may be only to maintain authority on subject, they love and promote their 'counterintuitive' theories and openly degrade commonsense. This book will show that actual high rotation speed of galaxies could be easily explained on commonsense grounds within the framework and accepted meanings of Newton's Theory of Gravity but Physicists do not like to come to the real Physical World and only want to stay in their comfort zone of equations of their choice. Let them stay there and know through this book that there is no 'dark matter' anywhere in the real world. And off course there is connected issue that Newton's Theory of Gravity is now regarded only as an 'approximation' of the more accurate and precise theory of General Relativity. Once we see that General Relativity terribly failed to account for actual rotation behavior of galaxies that could be easily explained in the light of Newton's theory, then it will also be clear regarding which theory is 'approximation' and which one is utterly far from capturing reality. It is also appropriate to highlight, as already has been mentioned, that scientists usually employ calculations based on Newtonian Dynamics but give credit of any sort of findings to the GR equations. The same has happened in the case of Dark Matter when first time in 1933 Fritz Zwicky employed classical mathematics and noted anomaly in

the dynamics of a cluster of galaxies named Coma Cluster. He categorically floated the proposal of dark matter on ground that more than visible mass was needed to account for the observed dynamics. His proposal was not taken seriously at that time but later on similar anomalies were noted, using classical laws of Kepler (Newtonian Dynamics), in rotation patterns of individual galaxies and proposal of dark matter acquired a serious status while the credit of 'discovery' of dark matter was assigned to the GR equations. This book has no intention to reassign the 'discovery' of dark matter to Newton's Theory. The point of this book will be to show that Newton's Theory was not rightfully applied and the noted anomaly was only due to the incorrect application of Newton's Theory. The correct application of the theory required a little bit application of commonsense which Physicists do not officially use. They do not even develop proper rationale or visualization of the theory or concepts rather they look at the matters only from the point of view of balancing the equations of mathematics. In the case of noted anomalies in rotation behaviors of galaxies and clusters of galaxies, scientists, as such, only tried to balance the equation. There were two options; either to propose significant addition of mass or to add a fitting parameter or modification to the equation and both these methods were ad hoc solutions basically. Scientists have adopted both these methods in separate streams i.e. those who added more mass did not introduce new parameters or modifications in equations and those who added fitting parameters or modifications did not add more mass. The first group i.e. the mainstream group is represented by dark matter regime and the second group that is a minority group is known as MOND (Modified Newtonian Dynamics) regime. We see that a minority regime was allowed to modify Newtonian Dynamics with official recognition of their work; perhaps no one had the courage to directly review the 'all time successful' GR equations because any such attempt would not have been recognized. Anyways, those who added mass, they added fitting mass and those who added new parameters, they added fitting parameters. The achievement of both the groups was only that somehow equations were conveniently balanced. Now both groups will carry out expensive experiments – First group will try to find dark matter in galaxies or universe and second group will try to find supportive evidence other than galactic rotations because their parameters were fitting for galactic rotations only. In case any of the groups finds supportive material, the same will be announced as victory of mathematics. We will be told that unknown realities can be dig out only through 'rigorous' mathematics. Anyhow, the problem is that scientists look at the matters only from the point

of view of how to balance the equation and then pursue supportive real data through costly experiments. The underlying belief is that finding realities of Physics is beyond the scope of commonsense and as such they avoid using commonsense. The subject matter of this book i.e. proper explanation of galactic rotations or rotation of clusters of galaxies was within the scope of commonsense. Off course, the already developed mathematics by Newton was to be applied but not in a way of simple fitting parameter but as a proper decision after rationalizing the whole problem. To counter the allegations against commonsense, first chapter of this book will present a case for commonsense with the objective to demonstrate that commonsense is able to dig out realities of physical world. In the later chapters the nature of the problem, rationalization, solution and conclusion shall be presented. The end of this book will be a goodbye to ad hoc regimes of dark matter and MOND both.

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## I. WHY DID PHYSICISTS SETTLE WITH A GHOST SOLUTION?

### I.I. PHYSICISTS RELY ONLY ON MATHEMATICS AND- REFUSE TO EMPLOY COMMONSENSE

It happened that scientists tested their (GR) equations within solar system dynamics. Those equations passed the test with flying colors and acquired the status of authority. Now 'scientists' must surrender, better to say, abandon their commonsense and must submit to the authority of equations. When we have worked out 'correct' equations then there is no need to apply commonsense. Direction or line of action suggested by the commonsense is to be ignored and results of the equations must be accepted whether they make sense or not. Several areas of today's Modern Physics are thus officially regarded as 'counterintuitive'. We are told that human commonsense has been defeated by the Modern Physics. Now theories of Modern Physics belong to supra-commonsense realm and while they need not make sense from the perspective of rational scrutiny, they are correct on authority of mathematics alone. The love of Physicists for 'un-commonsense' can be seen from following comments of a senior Professor of Theoretical Physics<sup>8</sup>:

In trying to understand the universe at both its smallest and biggest scales, physics and cosmology have embarked on a new age of exploration. In a sense we are attempting to cross a larger uncharted sea than ever before. .... To tell them to stay within the boundaries of common sense may be like telling Columbus that if he goes more than fifty miles from shore he'll get hopelessly lost. Besides, good old common sense tells us that the Earth is flat. .... Physicists have had no choice but to rewire themselves. Where intuition and common sense failed, they had to create new forms of intuition, mainly through the use of abstract mathematics: Einstein's four dimensional elastic space-time; the infinite dimensional Hilbert space of quantum mechanics; the difficult mathematics of string theory; and, if necessary, multiple universes. When common sense fails, uncommon sense must be created.

--- Leonard Susskind (Professor: Theoretical Physics, Stanford)

Here, the question arises is that how come Physicists realized that they should rewire themselves? Had they really figured out that 'space-time' is 'elastic'? Or had they actually affirmed the existence of Dark Matter through their mathematics? Have scientists really 'rewired' themselves?

Professor Susskind is senior Professor of Theoretical Physics and author of a series of expert level books whose topics range from Classical Physics to Quantum Mechanics and Black Holes. Dark Matter specifically is not on the list of his topics of interest however he is resilient demonstrative of mathematics based counterintuitive science and offers almost official retort of science against commonsense based criticism. Theoretical Physics is generally regarded as modern transformation of centuries old 'Natural Philosophy' that was represented by works of Galileo, Newton and their successors and the tradition continued up to the early phase of Einstein. Therefore, before responding to the points of Mr. Professor Susskind i.e. a 'Theoretical Physicist', let us here figure out what this Theoretical Physics is all about and how exactly it differs from Natural Philosophy as practiced by Aristotle, Galileo, Newton and others till the time of Einstein. Well, Natural Philosophy of pre-counterintuitive era of Physics was concerned with philosophical study and interpretation of natural phenomenon where basic data could come from direct observations or reported observations and those observed facts used to be duly analyzed and explained using logic that also included mathematics. Thus Natural Philosophy used to analyze natural phenomena such as physical motion, force, energy, gravity, real orbital dynamics of planets, spherical shape of earth etc. Even hypothetical things could be proposed and explained in Natural Philosophy. For example based on Newton's corpuscular theory of light, John Michell, a Natural Philosopher, first time in year 1783 proposed<sup>9</sup> the existence of 'dark stars' which are now known as 'Black Holes'. Likewise John Dalton also had proposed the existence of atom i.e. hypothetical entity by way of doing Natural Philosophy where he logically inferred the existence of smallest particles out of observed facts that chemical reactions occur only with determined quantitative ratio of elements and compounds involved. We see that hypothetical entities could be proposed in Natural Philosophy but that all remained within the domain of rational logic and commonsense based judgments. Transformation from Natural Philosophy to Theoretical Physics took place in successive steps where at first, for instance, Lorentz proposed hypothetical entity 'length contraction' by giving real status to another hypothetical thing 'Aether' whose physical existence was not confirmed through experiments. This tradition of authenticating hypothetical entities on the basis of other hypothetical entities was going to be continued in the upcoming discipline of 'Theoretical Physics' where interrelated and interdependent scheme of many hypothetical entities would be regarded as 'Mathematical Modeling' and the forthcoming real

observations would be going to be 'interpreted' on the basis of already known 'Mathematical Model'<sup>10</sup>. Here comes the first difference with Natural Philosophy where inquiry used to be started from observations and the fallouts used to be concluded in the form of explanatory theories whereas our Modern Theoretical Physics now takes start from already held theory (Mathematical Model) and 'interprets' new observations in the light of that already held theory. This upside down difference is more complex because the old 'Natural Philosophy' was more like 'Science' whereas the modern 'Theoretical Physics' is more like 'Philosophy'. Apart from the fact that Theoretical Physics keeps on proposing hypothetical entities on the basis of other hypothetical entities, its methodology is also structured like 'Rationalism Philosophy' comparable to the Philosophy of René Descartes. The 'Theoretical Physics' has emerged in 20<sup>th</sup> century at the time when Philosophers themselves, from the platform of Analytical Philosophy (Linguistics, Logical Positivism), were dumping Philosophy by imposing undue limits on doing Philosophy. Apparently they were favoring 'Scientific Methodology' for the study of natural phenomenon but meanwhile a new 'Rationalist Philosophy' i.e. 'Theoretical Physics' was emerging under the name and pretense of science. Philosophers abandoned doing most of the Philosophy and Scientists started doing bad Rationalism Philosophy by the name and style of 'Theoretical Physics'. It happened in a way that there was an apparent real problem that electrodynamics were not seemingly obeying accepted relativity principle of that time. Then Einstein provided a theoretical framework where the problem could be resolved through Lorentz type transformation keeping in view the second postulate of his Special Relativity where he provided that relative speed of light remains constant for every reference frame. The problem of electrodynamics was real and the proposed solution, whether or not correct, should be categorized as Natural Philosophy. Thus apparently or actually, the problem was solved and the Special Relativity was viewed as a theoretical framework that provided relativity principle equally applicable to general motion and electrodynamics both. The solution had come with packaged modifications in the fundamental concepts of time and space. Within one decade Einstein further managed to present a theory of gravity in the form of 'Field Equations' that were not only consistent with his Special Relativity but also regarded as more accurate than Newton's theory of gravity. Einstein called his new theory as "General Theory of Relativity" and the science community eventually regarded it (over time) as a general framework within which every physical phenomenon should be described. But time proved that quantum level

phenomenon could not be described within the framework of General Relativity and a separate framework (set of equations) to deal with quantum level phenomenon was independently emerged.

Given the fact that scientists got two sets of equations which they regard two independent frameworks to deal with any inquiry concerning their respective domains, they actually received two independent 'first principles' or 'axioms' whereupon they started building castle of 'Theoretical Physics' by placing a peer reviewed publishing system whose main function was to ensure that no further (official) work should start from outside of the two basic frameworks and also should remain within the accepted framework. Juan Miguel Campanario and Brian Martin (2004) write following:

The system of examinations and degrees is a sorting process; the physics PhD screens out most of those who question orthodoxy (Schmidt 2000). Once students are committed to the basic principles of the field, then it is possible to begin research and to question, **within implicit limits, prevailing ideas.** (*Journal of Scientific Exploration*, vol. 18, no. 3, Fall 2004, pp. 421-438)

Thus, researchers have to, or at least pretend to start from and remain within one of the two basic frameworks which are like first principles of this modern day's Rationalism Philosophy. Rationalism of René Descartes starts from axiom or the first principle and rest of the things are logically deduced. We have seen that modern Theoretical Physics has also worked out first principles<sup>11</sup> and there is also a 'peer reviewed' system in place whose function is that every next thing should come by way of 'mathematical derivation' from those first principles or from the previous mathematical derivations from the same. **Exactly this is the methodology of René Descartes whose philosophy starts from first principle and every next thing comes from logical deductions. Modern Theoretical Physics has only replaced 'logical deductions' part with 'mathematical equations' and this is not the vital difference.** By all means, modern Theoretical Physics is a Rationalism Philosophy whose ambitions cross the boundaries of Natural Philosophy, Physics or even Science and enter into the realms of Metaphysics where now they have claims to have figured out the details of events that took place after passage of tiny fraction of first second after the so-called Big Bang start of the Universe. In contrast with topics of Natural Philosophy that were like physical motion, force, energy, gravity, real orbital dynamics of planets, spherical shape of earth, existence of atom etc. the topics of Theoretical Physics are typically hypothetical and out of proportions

extraordinary big claims like Expanding Universe, Inflationary Expansion of Early Universe, Accelerating Expansion of Universe, Expansion of Space, Multiverse, Wormholes, Multi-dimensions, Infinitely dense singularities, Age of Universe, Dark Matter, Dark Energy, Quantum fluctuations, Quantum Entanglement, Quantum Locality and other like things. Most of these hypothetical entities are interlinked and interdependent of other hypothetical entities. At this point it seems appropriate to provide reliable references that tell the authentic meaning and scope of old Natural Philosophy and present day's Theoretical Physics. Following two quotes are from Newton's Principia Mathematica that comprehensively describe the method of Natural Philosophy:

In experimental philosophy we are to look upon propositions collected by general induction from phenomena as accurately or very nearly true, notwithstanding any contrary hypotheses that may be imagined, till such time as other phenomena occur, by which they may either be made more accurate, or liable to exception. This rule we must follow, that the argument of induction may not be evaded by hypotheses. (English Translation "Principia Mathematica" – First American Edition (2007) – Page 385)

Following second quote from same book further explains the actual method of Natural Philosophy as practiced and described by Newton himself:

In this philosophy particular propositions are inferred from the phenomena, and afterwards rendered general by induction. Thus it was that the impenetrability, the mobility, and the impulsive force of bodies, and the laws of motion and of gravitation, were discovered. (English Translation "Principia Mathematica" – First American Edition (2007) – Page 507)

To trace the authentic or accepted point of view about Modern Theoretical Physics, I start with Elon Musk who stated during an interview that Physics teaches to reason from first principles and that reason is not analogical (i.e. the reason then must be deductive or mathematical).

Well, I do think there's a good framework for thinking. It is physics. You know, the sort of first principles reasoning. Generally I think there are — what I mean by that is, boil things down to their fundamental truths and reason up from there, as opposed to reasoning by analogy. (Interview with TED Curator, Chris Anderson)

Elon Musk is a successful businessman and one of his business fields relates to Astronomy and thus Physics. He is not Physicist proper but during verbal interview, he correctly

described the actual method of (modern) physics which he is accustomed to and must be dealing with. Wikipedia article titled “Theoretical Physics”<sup>12</sup> has described this method in following words:

Theoretical physics is a branch of physics that employs mathematical models and abstractions of physical objects and systems to rationalize, explain and predict natural phenomena.

The point of Elon Musk explains that Theoretical Physics is first principle based system of reasoning. The Wikipedia article tells that Theoretical Physics starts with mathematical models and ends with ‘prediction’ of natural phenomena. This is exact opposite to the Natural Philosophy of Newton which starts from Phenomena and ends with the discovery of theory.

Following is yet another interesting definition of “Theoretical Physicist” as described on CERN website<sup>13</sup>:

Theoretical physicists are rather typical scientists. If you imagine them as absent-minded, egg-headed, bizarre characters scratching their chins while deeply engaged in thought... Well, most of the time you'd be right.

What these people do is to try to figure out how Nature works. That is, why the stars shine, why water is fluid and the sky is blue, what you are made of and why does "it" weigh that much, why the universe expands, or what energy and matter actually are...

Thus CERN’s take on Theoretical Physics also accepts that basically it is thought process though it is not clarified whether it is first principle based or not. MS Kirsten Hacker<sup>14</sup> (PhD Accelerator Physics) tells<sup>15</sup> that Elon Musk is right in telling that Theoretical Physics is first principle based system of reasoning:

Musk is correct that modern physics teaches you to reason from first principles, but I would add that by reasoning from first principles, one ends up in a devil’s circle with a sophistic, solipsistic, Einsteinian conflation and confabulation of basic definitions of space, time, mass, and speed.

Here, MS Kirsten Hacker not only affirms the first principle based nature of modern Theoretical Physics, she is also pointing out consequences to which she does not agree. To another PhD Physics person and a former research scientist Mr. David Cousens, I pointed out that being first principles based reasoning system, Theoretical Physics is a form

of Rationalism Philosophy. To this, he humbly offered justification in the favor of Theoretical Physics in following nice words:

Aristotle's approach of only deducing reality from first principles has been missing from science and physics for a long time. The problem with that is knowing what are the correct first principles from which to start. The first principles behind GR and QM are not just dreamed up. They arise because nature didn't behave the way we expected it to behave on what were previously assumed to be first principles or the underlying mechanisms. If the prediction is wrong then the model does not incorporate all the mechanisms which we assume to be present in the real world so we modify the model. I disagree however the modern physics is an example of "rationalism philosophy" which assumes that reason is the chief test of the validity of knowledge. In physics, observation and experiment are the ultimate test of the validity of knowledge, not reason. Reason is only a mechanism by which we arrive at something to test against what we can observe. That said some individual theoretical physicists may be so entranced by the beauty of what they have constructed they begin to believe that it necessarily has to be the way the world works. However in the scientific community at large this only lasts until experiment and observation can confirm or refute their predictions. Most theoretical physicists I have met are usually acutely aware that their reasoning may have started from one or more false assumptions, but they don't know a priori which assumptions are necessarily false, so they have to explore the consequences of each assumption to decide which should be rejected and which should be retained. Science as it is practiced is a constant interplay between rationalism and empiricism not simply one approach or the other but I suppose essentially rationalist in that the underlying basic assumption is that there is something we can understand even if we do not yet understand it.

Here, Mr. David Cousens is accepting that modern GR and QM are first principle based reasoning systems though he does not accept them to be form of Rationalism Philosophy because in "Physics", the ultimate test of validity of knowledge is observation and experiment. Actually for obvious reasons, we should not expect that any Physicist is openly going to accept that Theoretical Physics is a form of Rationalism Philosophy. When asked about what is the difference between a Theoretical Physicist and an Armchair Thinker, the maximum they tell is that Theoretical Physicists do lot of mathematics and that they do not indulge in analogical reasoning<sup>16</sup>. Actually there is lack of clarity among supporters of Theoretical Physics regarding what it actually is and exactly how it differs from Philosophy. I asked on a famous questioning website quora.com that why theoretical physicists are not armchair thinkers<sup>17</sup>? I got only two replies so far. The first one posted picture of renowned Theoretical Physicist Richard Feynman who was sitting on an armchair. The other reply was

a counter question “who said that Theoretical Physicists are not armchair thinkers?” Then by exploring the related questions and replies thereon, I found such answers that Theoretical Physicists do lot of mathematics and also abstain from analogical reasoning (that’s why they are different from armchair thinkers).

Now we know that Rationalist Philosophers also do lots of deductions and abstain from analogical reasoning, so the only key difference between Theoretical Physics and Rationalism Philosophy is that of mathematical and deductive reasoning. And this is not crucial difference because essentially, deductive logic and mathematics are same. The other sign of Rationalism Philosophy is the presence of first principles. But mere existence of first principles does not make any system of research or inquiry into Rationalism Philosophy. The ultimate test of Rationalism Philosophy is to see whether those first principles serve only as starting point or also form a boundary or a limit on the scope of inquiry? In case those first principles also form hard boundary and set out limitation on the scope of inquiry, then it is a definite and conclusive indication of Rationalism Philosophy. And basically Mr. David Cousens has shown disagreement with regards to the Rationalist Philosophical nature of Theoretical Physics on point that though Theoretical Physics is first principles based system of reasoning but unlike Rationalism Philosophy, the reason is not the chief test of the validity of knowledge as according to him, “**In physics, observation and experiment are the ultimate test of the validity of knowledge**”.

We have already seen in the previous quote of Juan Miguel Campanario and Brian Martin (2004) that there do are **implicit limits** on questioning the prevailing ideas of physics. They further write in the same paper (*Journal of Scientific Exploration*, vol. 18, no. 3, Fall 2004, pp. 421-438):

The **most common view about how science works** is that new ideas are judged on the basis of **evidence and logic**: if a new idea explains more data or provides more precise agreement with experiment, this counts strongly in its favor.

Karl Popper claimed that science advances by falsification (Popper 1963). In his view, it is the duty of scientists to attempt to disprove theories, confronting them with experimental data and rejecting them if they do not explain the data. Theories that cannot be falsified are, according to Popper, not scientific. Many scientists believe in falsificationism.

These conventional views were challenged by Thomas Kuhn (1970). Kuhn argued that scientists - and physicists in particular, since most of his historical examples were from physics - adhere to a paradigm, which is a set of assumptions and standard practices for undertaking research. If an experiment gives results contradictory to theory, then instead of rejecting the theory altogether, alternative responses include rejecting the experiment as untrustworthy and modifying the theory to account for the new results (Chia 1998; Chinn and Brewer 1993).

Above quote makes it clear that yes most common view holds that observations and experimental results should be the chief test for the validity of knowledge but within the actual circles of science authorities, now it is an outdated concept. Now there is paradigm in the form of accepted frameworks which not only serve as first principles, they also form a solid boundary crossing which even experiments can be declared invalid being untrustworthy. In no way the framework can be rejected altogether – only theory shall be suitably modified to account for the new experimental results. While many Theoretical Physicists might be honestly doing research under the outdated impression that experiment and observation is the chief test for the validity of knowledge, the actual prevailing thing is a paradigm that intends to perpetuate and more informed scientists do call Physics as a conservative tradition where they are not going to altogether abandon their accepted frameworks rather they will only reinterpret already existing things and every contrary experimental result will be shown in conformity with the prevailing paradigm. And now it is clear that it is not science going on. They say that it is not Rationalism Philosophy because chief test is observation. Actually Rationalism Philosophy is a closed system of knowledge where you start from first principles, then you close eyes as every next thing will come through logical deductions in mind and thus there will be no role of observations. Now Theoretical Physics, being a form of Rationalism Philosophy, is also a closed system. Instead of emphasis on logical deductions, there is importance of only mathematical derivation. Since there is no essential difference between logical deduction and mathematical derivation, so to this extent Theoretical Physics completely follows the footsteps of Rationalism Philosophy.

But they insist that chief test in Theoretical Physics is observation. To this, I accept that yes there is slight variation in Theoretical Physics but I do insist that just like Rationalism

Philosophy, eyes have to be closed basically. In Theoretical Physics, you open eyes not to observe new things but only to celebrate that your 'predictions' have come true.

When, in year 1929, Edwin Hubble found a new observed fact of linear relationship between redshift and distance of galaxies, it was not even treated as a new observed fact. It was treated as 'prediction coming true'. Eyes were closed – Scientists were only repeating this mantra that we already 'knew' this truth out of our 'mathematical derivations'. They opened their eyes just for a while only to celebrate the success of their so-called earlier mathematical derivations. Similarly, finding of CMB was not treated as a new observation. That was not a new thing at all as it was also already 'mathematically derived'. This is how things are 'observed' in modern Theoretical Physics. When you already know the reality in your mind then you tend to observe the actual reality through your colored spectacles. The most obvious or even concrete form of colored spectacles which Theoretical Physicists have adopted are their equations that contain speed of light in virtually every formula and give the hard result that no other speed can be shown greater than speed of light. Here I am not challenging that anything cannot acquire speed equal or greater than speed of light. But their equations i.e. the colored spectacles, will not let even hypothetical things to acquire speed greater than the speed of light. Let's say we suppose something is moving at speed greater than speed of light, their equations won't even accommodate this supposition. Here mathematics is unnaturally greater than ability to suppose anything. Given this thing any real thing cannot be shown as having speed greater than speed of light even if it is detected in real experiment. They are already just interpreting results of experiments in the light of already held framework and they will improve the colors of their spectacles to deal with more challenging experimental results. The colored spectacle thing is true for Rationalism Philosophy and this is also true for Theoretical Physics or any other ancient mythology.

Natural Philosophy of Newton had started from axioms which are his three laws of motion. But afterwards there is no requirement of keeping your eyes closed. You independently observe the reality and logically or mathematically conclude the things. In Theoretical Physics, the purpose of observations is not to see new things. Here, the purpose of observations is only to celebrate that 'predictions have come true'. Within next few years NASA is going to launch James Webb Space Telescope that shall be 100x more powerful

than Hubble Space Telescope. What is the purpose of that 100x extra power? Will this telescope show us some new things?

Not at all (for practical reasons). NASA already knows all the things through mathematical derivations. NASA already knows that no galaxy beyond this much distance will be seen and that after that distance there was a dark era and within this darkness was the time of creation of universe. So all the things are already known. Purpose of observations is only to celebrate the already known things.

Mr. David Cousens has further accepted that **some individual theoretical physicists may be so entranced by the beauty of what they have constructed they begin to believe that it necessarily has to be the way the world works.** However, he states further, that in the scientific community at large this only lasts until experiment and observation can confirm or refute their predictions.

MS Sabine Hossenfelder<sup>18</sup>, a Theoretical Physicist and Research Fellow at Frankfurt Institute for Advanced Studies has identified that problem of theoretical physicists getting entranced by the beauty of what (mathematical) they construct and start believing that it necessarily has to be the way the world works, is a common or large scale problem. In fact, title of her book is “Lost in Math: **How Beauty Leads Physics Astray**”. The description of the book<sup>19</sup> says it all which is following:

Whether pondering black holes or predicting discoveries at CERN, physicists believe the best theories are beautiful, natural, and elegant, and this standard separates popular theories from disposable ones. This is why, Sabine Hossenfelder argues, we have not seen a major breakthrough in the foundations of physics for more than four decades. The belief in beauty has become so dogmatic that it now conflicts with scientific objectivity: observation has been unable to confirm mindboggling theories, like supersymmetry or grand unification, invented by physicists based on aesthetic criteria. Worse, these "too good to not be true" theories are actually untestable and they have left the field in a cul-de-sac. To escape, physicists must rethink their methods. Only by embracing reality as it is can science discover the truth.

In short, the actual prevailing method of modern Theoretical Physics is far from that of good old day's method of Natural Philosophy. MS Sabine Hossenfelder writes in the book:

The Philosophers are certainly right that we (Theoretical Physicists)<sup>20</sup> use criteria other than observational adequacy to formulate theories. That science operates by generating and subsequently testing hypotheses is only part of the story. Testing all possible hypotheses is simply infeasible; hence most of the scientific enterprise today—from academic degrees to peer review to guidelines for scientific conduct—is dedicated to identifying good hypotheses to begin with. Community standards differ vastly from one field to the next and each field employs its own quality filters, but we all use some. In our practice, if not in our philosophy, theory assessment to preselect hypotheses has long been part of the scientific method. It doesn't relieve us from experimental test, but it's an operational necessity to even get to experimental test. In the foundations of physics, therefore, we have always chosen theories on grounds other than experimental test. We have to, because often our aim is not to explain existing data but to develop theories that we hope will later be tested.

Thus we see that modern Theoretical Physics has not only improved upon Rationalism Philosophy, it has also taken ancient stoicism philosophy to the modern dimensionality where sense of beauty is serving as a proper method of inquiry. Basically I have no objection on this methodology as we see, that MS Sabine Hossenfelder explains, that practical difficulties determine the actual methodology and practices. I have objection only in calling these practices as 'scientific methodology'. Essentially, these are the methods of different forms of philosophies. Not only the method, we see that topics of Theoretical Physics are also typically hypothetical and out of proportions extraordinary big claims like Expanding Universe, Inflationary Expansion of Early Universe, Accelerating Expansion of Universe, Expansion of Space, Multiverse, Wormholes, Multi-dimensions, Infinitely dense singularities, Age of Universe, Dark Matter, Dark Energy, Quantum fluctuations, Quantum Entanglement, Quantum Locality and other like things. Most of these hypothetical entities are interlinked and interdependent of other hypothetical entities and these "too good to not be true" theories are actually untestable and thus belong to 'Metaphysics' branch of Philosophy. Theoretical Physicists however claim that they know about these things at scientific level which has been possible through the use of mathematics and that commonsense is not helpful within this realm. They 'know' the exact age of whole Universe while not precisely knowing whether Universe is finite or infinite. One 'important' thing which they admittedly do not know is the detail of events which occurred within first quantum level moment after their Big Bang. Ideas of Big Bang and Dark Matter relate to 'General Relativity' based framework of Theoretical Physics therefore they could not figure out what happened within the very first quantum level tiny moment after Big Bang. Therefore, they have left this

task open for evaluation to Quantum Mechanics based framework branch of Theoretical Physics who so far have not completed this task. Our Professor Leonard Susskind actually belongs to this second branch<sup>21</sup> of Theoretical Physics therefore here our analysis of his pro-counterintuitive points will have nothing to do with Dark Matter, the specific topic of this book, hence we shall be dealing with his points in general sense as equally applicable to our topic. He is saying that need to 'rewire' arose during the attempt to understand smallest and biggest scales. Well, truth is that humans have been struggling to go beyond natural limits on understanding since long but the need to 'rewire' has come along quite recently. Before the time of Einstein, science was viewed as a refined form of commonsense and that was the accurate position. But now, with the emergence of Theoretical Physics, there are claims of having knowledge of those things where refined form of commonsense also fails. Acquisition of such knowledge has been possible because now scientists have been 'rewired' with supra-commonsense tools. At first they realized that their commonsense failed at solving biggest and smallest scales and then they 'created' un-commonsense to 'successfully' deal with those matters. And the 'un-commonsense' is not actually more than just to keep the equation balanced even if, let's say, unobservable or even untraceable mass has to be added to the deficient side of the equation. Moreover, the methodology belongs to the clan of already familiar Rationalism Philosophy whose futility in the chase of ultimate reality or final truth about Universe is confirmed.

It is also shocking to see that Senior Professors of Theoretical Physics take 'flat earth' as example of 'commonsense'. We should ask them why they not differentiate between commonsense and refined commonsense. Yes it is true that at first instance, commonsense verdict is that earth is flat. But refined commonsense is not restricted to the first or single glance. Commonsense, which this book intends to advocate, works on two things which are (i) Amount of available information and; (ii) logic. A refined form of commonsense is the one that extracts logical inferences out of maximum available or latest correct information in hand and does not remain confined to the framework of any axiomatic first principle though axioms can be employed as starting point but not as hard boundaries which is the case with Theoretical Physics as well as Rationalism Philosophy of René Descartes. Commonsense is also not limited to logic of mind which is the case with Rationalism Philosophy where a logical framework is knitted out of deductions from accepted first principle. A form of Rationalism Philosophy i.e. Theoretical Physics pretends that it is not limited to logical or

'mathematical framework' as it is fully supported by observations. Fact is that some fundamental aspects might have been confirmed through observations but on the whole observations are being 'interpreted' within mathematical framework. It is like first principle has come from or have been confirmed through observations but rest of the things are mathematically derived and those derivations are 'confirmed' by interpreting forthcoming new observations within the parameters and assumptions of already developed mathematical model and this is all about Theoretical Physics. Commonsense, on the other hand, is broader and may go beyond strictness of deduction or mathematics but final test, in true sense, is always observation because real observations are capable to defy pure logic of mind or any already held preferred framework. As a matter of fact, pure logic of mind could not reach to the truth that heavy and light objects fall towards ground at same pace. Real observations can actually be counterintuitive but once an observation has been noted, experienced or recorded then it becomes part of commonsense. Galileo was telling a counterintuitive reality to his opponents but that was not un-commonsense because it could be easily confirmed through observation. Once observed successfully then it no more remained counterintuitive as well. Moreover commonsense never tries to interpret new observation in fitting way only to make it compatible with already held ideas or models. This is done by anything other than commonsense and that anything includes Theoretical Physics. Within commonsense, role of new observation is more thrilling as it changes the previous outlook as well as provides better clarity and accuracy about the underlying natural phenomenon. Rationalism Philosophy is a closed system of knowledge where there is no role of new observations because first principle was already known and every next thing was to be logically deduced. Theoretical Physics accommodates slight variation where new information itself is not thrilling as the actual 'excitement' is that it was already 'predicted' by their Mathematical Model and the prediction has come 'true' by way of fitting interpretation of that new observation. As stated already, mere logic of mind could never figure out that heavy and light bodies fall at same pace towards ground. But after having equipped with direct observations of double-slide experiment, projectile motion and behavior of pendulums, claim of Galileo that heavy and light objects fall with same rate does not cross boundaries of commonsense. Rather than working with any first principle or staying within a preferred framework, commonsense works simultaneously with direct or reported observations and logic of mind both and it may even include the role of axioms as adopted

by Newton in his Principia. Mere logic is not commonsense and simple observation that earth looks flat is also not commonsense. The flat earth verdict is right example of correct commonsense for only those ancient times when extent of information was limited only to the immediate surroundings. But holding the view that Earth is flat was not the example of commonsense for those times when it was known that (i) Earth casts curved shadow on moon during Lunar Eclipse and (ii) During long Sea Journey towards south, some new constellations appear on Southern Sky while some others disappear from Northern Sky. For the times when above two facts were known, flat earth view would belong to the regime of ignorance rather than commonsense. In fact, historically spherical earth was figured out by commonsense on the basis of above two and few other similar delicate observations of that time. In our philosophical or scientific discussions and writings, commonsense means refined commonsense and not the 'commonsense' of ignorant folks who apply raw judgments, may be logical, on the basis of incomplete information. Flat earthers of today are not predecessors of good old commonsense idea of flat earth. Those ancient flat earthers had correct commonsense inference about flat earth that could be extracted out of best information available of that time. But flat earthers of today tend to infer flat earth because available textbooks on physics do not present complete theory of Newtonian Motion. I have seen few Youtube videos of modern flat earthers and I understand that, in part at least, their reasoning comes from incomplete exposure to right available theory of Motion. Many modern flat earthers even present twisted logic and as such they act like promoters of a form of clever agenda and thus they are not representatives of commonsense.

Likewise, with regards to the existence of dark matter, application of commonsense is not as trivial as to only reject the notion on sole ground that it is not physically observed or directly traced or that it was introduced only to balance the equation. Commonsense, here, will be equipped with available theories of motion and gravity; only thing being that it will not surrender itself before the unsubstantiated authority of mathematics alone. For a Physicist, since equations 'predicted' slower rotation of galaxies from edges hence actual observation of higher rotation speed of galactic edges automatically implies presence of more but unobservable matter because 'already tested' mathematics could not be wrong. The Physicist is equipped with the latest available theory (GR) of gravity and he also finds that an old theory i.e. 3<sup>rd</sup> law of Johannes Kepler, also apparently verifies that in a rotational system held together by gravitational attraction, the objects farthest from the center will

revolve more slowly than those closer in. Our Physicist 'knows' that Newton's Theory of Gravity is only an 'approximation' of his beloved and 'more accurate' theory of General Relativity. However, he would use the same incomplete theory for the ease of calculations due to simplicity of the theory. He would obtain the result from simple theory but assign credit of results to more 'accurate' and 'precise' theory of General Relativity. During this process, he would wrongfully apply an important aspect of the 'simple theory' because accurately using that aspect of the simple theory would require little bit application of commonsense. Now he only knows that the result so obtained is not so precise therefore he would assign the credit of result to his beloved theory of General Relativity; partly also because he needs to project himself as talking from within the boundaries of his theoretical framework. The credibility of the result has been improved in this way. **He has the claim that he fully understands his beloved theory of General Relativity. But he will not realize that he merely interpolated an incorrect and misleading result derived out of wrong application of an important aspect of the simple theory to his more accurate and precise theory.** In fact he would obtain the same result if he had not even employed the simple theory. Therefore he is confident that he obtained right results from equations and the results must be certain because his beloved equations have already passed 'all' the tests. He would first be surprised by noting that actual observations did not tally with his results. He would call it an 'anomaly' and would propose that actually more than observable matter was present to which he would assign the name of 'dark matter'. He would not listen to the error message notified to him by his own commonsense. He 'knows' that he is dealing with matters that belong to supra-commonsense realm therefore he must ignore notifications of his commonsense. Not only that, he may also prefer to ridicule those who raise commonsense based objections on his finding of 'dark matter'. "They are living the life of good old days of commonsense but we the Physicists have been successfully rewired to deal with things that we don't actually understand", he would 'sensibly' justify his departure from commonsense. "We are now able to extend our theories to new dimensions without feeling the trouble that we don't actually understand them. Though our eyes are closed, we cannot fall since we are walking with the great support of 'mathematical walking stick'. We are blindly following our mathematics because our eyes can deceive us and our commonsense will cause troubles and will not let us move further in the direction that we don't actually understand." But he won't clearly accept that he does not actually understand his 'counterintuitive' theories. He

would shut up the mouth of skeptic by saying that he i.e. the skeptic needs to take some advanced courses in mathematics and then he will understand. As if he himself understands official 'counterintuitive' stuff after having been 'rewired' through mathematics. Following are the words of Professor Susskind on this point on the same page:

Instead of dyspeptically railing against what he (i.e. the skeptic whom Prof. Susskind is replying) plainly does not understand, Horgan (i.e. name of that Skeptic) would do better to take a few courses in algebra, calculus, quantum mechanics, and string theory. He might then appreciate, even celebrate, the wonderful and amazing capacity of the human mind to find uncommon ways to comprehend the incomprehensible.

--- Leonard Susskind (Professor: Theoretical Physics, Stanford)

Here Prof. Susskind is coming up with bold but, rather a regularly repeated claim, that 'incomprehensible' can be 'comprehended' only through mathematics. Well, it is routine experience that we do not comprehend most of common life experiences with only few encounters or instances and it is through effort and constant evaluation that eventually we do 'comprehend' many things that were originally 'incomprehensible'. The underlying fact is that those things were not basically 'incomprehensible' in the first place. Only the sufficient evaluation was needed coupled with the individual's ability and exposure to related information to reach at the stage of reasonable comprehension. Human reasoning, whose nickname is 'commonsense', is not less powerful than mathematics. There is only one extra power of mathematics. Mathematics is not even a separate entity apart from human reasoning and logic. In fact, mathematics is 'quantitative extension' of same human reasoning and logic. Only thing that mathematics can do that simple reasoning and logic cannot do is quantitative precision. Whereas commonsense is able to sort out, keeping in view the essence of best available information, that speed of galactic rotation should be high or low but commonsense cannot tell the exact speed of rotation. Off course only mathematics can tell or 'predict' the exact speed of rotation that can be verified with measurement tools. We have seen that it was commonsense (i.e. refined commonsense) who successfully sorted out that earth is spherical and not flat. It means that logic or reason has the ability to uncover hidden truths of nature. In fact, humans possess only two forms of knowledge which are (i) observational knowledge and (ii) reason based knowledge. Examples of observational knowledge are that earth looks flat, that earth casts curved

shadow on moon at the time of Lunar Eclipse and that during long journey towards south, some new constellations appear on Southern Sky while some others disappear from Northern Sky. Reason based knowledge is actually a proper synthesis of available chunks of observational knowledge and example of reason based knowledge is that Earth is a large sphere. Fact is that so called mathematics based knowledge is also reason based knowledge because mathematics is nothing but a quantitative extension of same human reason and logic. And yes it is true that results of mathematics are 'certain' – but they are certain only within the framework of abstract mathematics. For example it is certain that sum of series of odd numbers is always a perfect square. However when mathematics attempts to describe the behavior of physical world, then results of mathematics are not certain and always need experimental verification despite the level of elegance or beauty of the theory of mathematics involved. It is through reason that we cross the boundaries of observational knowledge and here reason includes mathematics. But modern Physicists tell us that it is only through mathematics that we move beyond observational knowledge. And while reason takes us beyond observational knowledge by way of proper synthesis of available observational knowledge, mathematics, as claimed by Physicists, needs no synthesis with the observational knowledge. Unreasonable stance of Physicists is that mathematics magically rewires us and elevates our natural abilities to understand unknowable things. Therefore, with magically acquired abilities to understand, now Physicists properly 'understand' the role of 'dark matter' not only within observable universe but they also claim to know the role of dark matter towards as remote things as structure formation after (so called) Big Bang.

Now there are two basic questions that we must sort out or resolve. First question is that can mathematics find unknown facts without synthesizing observational knowledge? And (ii) Do Physicists actually understand their 'counterintuitive' theories after having been 'rewired' through mathematics?

Claim of the rationality is that unknown facts can be figured out in the form of reason based knowledge which is actually a proper synthesis of available observational or already existing reason based knowledge such that mathematics is also a form of reason and logic. Claim of Physicist is different. He favors only mathematics and even ridicules rationality. He has a shallow idea of commonsense which he equates with holding flat earth type views. He is

working on biggest and smallest realities or entities after having been rewired through the un-commonsense tools of mathematics therefore insane results of his research or inquiry do not bother him. He 'knows' that reality may not make sense. What he seems to not know is that if anything is not making sense then his so called knowledge of that thing remains questionable. He is having the claim that he has correct knowledge of those things that make no sense and he ridicules those skeptics who raise objections on his (mathematical) fantasies. Those skeptics belong to an outdated evolutionary epoch whereas our Physicist has been rewired to get correct knowledge of unknowable. Within the domain of the topic of this book, the remarkable fact is however that dark matter was not even predicted by his mathematics. If dark matter were rightly 'predicted' by his beloved equations then he should have expectation of observing fast rotation speed of galactic edges specifically due to the involvement of extra mass. But actually his expectations were defied by the real observations. Rather than trying to find mistake in his beloved equations, he denied the real observations. Off course he did not deny the actually observed speed of galactic rotations. He denied the observed actual quantity of available matter and suggested the presence of such extra matter that could not be observed only to match the results of equations with the observed speed of rotation. For the case of dark matter at least, his un-commonsense tool of mathematics did not even work yet he has the claim that unknown reality of dark matter is figured out through mathematics. We note that this is utterly false claim.

If unknown reality of dark matter were figured out by (GR) equations then those equations should have predicted faster rotation speed of galactic edges despite apparent low quantity of visible matter and the 'prediction' of GR equations should have been in contrast with the 3<sup>rd</sup> law of Johannes Kepler. But no one noted the oddity between two theories simply because the two were not at odd with one another. It means that nothing new was figured out by the mathematics. Only the real observation of galactic rotations brought a new fact to limelight that galactic rotations neither obey Kepler's 3<sup>rd</sup> law nor do they care anything about GR equations. The new fact was precisely this and source of the new fact was not even mathematics. We see that for the case of core subject of this book, mathematics had found nothing new. But for the sake of general conception we should carry on to resolve our first question. The answer to the first question is that mathematics is nothing but a quantitative extension of human reason and logic. If logic and reason cannot lead towards hidden realities without synthesizing already known facts then mathematics also follows the

same mechanism. It is not true that every mathematical possibility must be physically possible as well. Mathematics can describe physical reality and mathematics also can describe what is physically not possible. The same thing is true for human reasoning, logic and imagination as all these things are capable to describe physical reality and all these things are also able to describe or visualize what is not possible physically. The scope of logic and reason is not restricted as logic and reason can explain every truth which, according to the claim of Physicists, only mathematics can explain. Logic and reason can explain every technology or scientific theory. Logic and reason also can attempt to explain abstract things like logic, love, beauty etc. which technology, science and mathematics cannot explain.

There is however a class of fundamental facts of nature, natural processes and natural life that are so far outside the scope of reason and logic. Nature is logical but logic of nature works differently than logic of mind. Logic of nature works at the scale of attaining physical symmetry and equilibrium at sub-atomic particle levels. Logic of mind does not work even on visible scale objects. Logic of mind works on non-physical models or theories that cannot even physically interact with one another. It is due to this reason that whatever humans have already constructed whether mathematics, science or technology; all such things can be logically explained because method i.e. working with non-physical models (or theories) is the same. But what natural processes have not been understood, they cannot be logically explained because method of both these processes is not the same. Mind does not work directly with physical objects rather works with symbols, models or abstract theories that only 'refer' to those physical objects. Physicists, scientists or mathematicians – all of them work with 'models' and 'theories' who refer to ordinary objects for the cases of visible scale matters. For the cases of largest and smallest scales, both mathematics and logic work with models or theories that refer to hypothetical objects. For example, 'atom' is hypothetical object of very small scale. Theory of atom refers to this hypothetical object and works reasonably correct logically, mathematically and also confirms to experimental observations of visible phenomena being rightly interpretable by considering the logical and mathematical implications of the concept of atom. But 'dark matter' is such hypothetical object that does not belong to smallest or largest scale. If dark matter is major component of galaxy than just like galaxy, it also belongs to visible scale category of objects. To overcome this difficulty, Physicists often 'theorize' that it could be a large quantity of special non-detectable type of

tiny (sub-atomic) particles that spreads out all across the galaxy or anywhere. To move further from this point, I want to add only little comments that this is a simplified approach to overcome or resolve difficulties. Even small children are expert at this strategy. My little daughter (when she was 4 years) told us that something (in market) is 100% off (on sale). We replied that things don't get 100% off – it should be 30% or 50%. But she insisted that she saw 100% off 'very far away' that others could not see and only she saw 100% off written somewhere. So here our 'innocent' Physicists also try to justify their inability to see very large chunk of matter with the help of innocent childish cover up strategy. In the case of my daughter, it was surfaced that actually she had seen '100% pure medicine' instead of 100% off (on sale). But it also turned out that she could not understand the meaning of 'pure medicine' and triumphantly announced that she was right and 100% off does exist. Physicists, however, should not be as innocent as a real innocent child can get and they must show us or at least provide conclusive evidence of the existence of huge chunk of matter that exists only according to them. Their mathematics has not found any unknown reality for the case of dark matter and whatever other unknown reality mathematics might have found, that has to be in the form of synthesis of available information and already existing reason based knowledge and not by way of magical effect of 'rewiring' through 'uncommonsense' tool of mathematics.

The next claim of the Physicists is that they do understand their 'counterintuitive' theories as they already have taken all the advanced courses in mathematics. We have seen previously that known mathematical knowledge is not outside the grasp of simple reasoning because both deal with models or theories and there is no fundamental conflict in the working method of mathematics and logic or reasoning. Fact is that mathematics is capable to describe reality or even fiction in the form of complex equations. Reason and logic is also capable to describe fiction by way of simple but twisted narrations. When reason or logic describes fictional things then departure from reality can be easily described again in simple narrations. However when complex mathematics describes fiction like 'n' dimensions then simple reason rightfully denies the reality of n dimensions and understands it as a form of fiction. But mathematicians manage to insist that n dimension is a mathematical reality that simple reason could not understand. Fact remains that 'n'th dimension was a fictional entity after all. Neither reason will ever accept it as a reality nor will it ever be physically found in the real world. Only because mathematically it is possible to translate 2D drawing into 3D

drawing that does have real physical counterpart does not mean that mathematics also can draw 4D drawing in same way. Off course there will be no real physical 4D counterpart to that drawing. Mathematics has crossed the limits of reality and has entered into the realm of mathematical fiction. Here reason and logic asks a valid question regarding if it is possible for mathematics to describe fiction or not? What will be the reply of Mathematicians?

If they give wrong reply that mathematics is not capable to describe fiction then mathematics becomes admittedly less capable than reason and if they give correct reply that yes mathematics is capable to describe fiction then ... then it makes sense why sometimes reason and logic refuse to accept mathematical narrations as description of reality. **It is only physical reality that does not entertain fiction because physical reality is under laws of physical objects.** On the other hand, mathematics and reason are under laws of 'models' or 'abstract theories' and as such are free to roam about reality and fiction both. Now the claims of Physicists that they do know complex reality in the form of insane mathematical interpretations and they also 'understand' those insane interpretations are false claims. It is like a fiction writer having the claim that his fiction describes physical reality in such way that only experienced fiction writers can understand this fact and actually it is nothing but a baseless claim. We are bound to conclude that wherever mathematics comes up with the claim of having described reality; that must be verified through reason and experiment both. Otherwise there will be great possibility of we all being drifted towards dark, blue or red zones of fiction under the guise of reality.

We conclude this section with remarks that mathematics is indispensable for science as it helps in detailed planning and executions concerning quantitative precision involving matter, space and time. The subject of this book i.e. dark matter was however not sorted out by the mathematics. Dark matter was not even a fiction created by the mathematics. Unfortunately, this fiction was created by commonsense under the guise of mathematics. Given this fact the excuse is not accepted that there is rewiring effect due to which only mathematicians or physicists can understand that dark matter is real and that even if it were the case of mathematical fiction, again it would only be a lame excuse because there is no such thing as rewiring effect that is able to extract hard realities out of the things that make no sense.

There is however an actual and physical rewiring effect which I have already described in section I.II of my in-process book "Descriptive Knowledge, Mind and Reality; a case of

Epistemological Realism". This actual 'rewiring' comes from perception system of mind. In simple words, perception is meaningful exposure to sense data where 'meaning' comes from previous experience or exposure to same or similar things. If there is no 'meaning' there is no perception. If there is no previous exposure, there is no meaning. The 'exposure' of anything new gives us 'meanings' for the future. In a way, the exposure to new things or information gives the genuine 'rewiring' effect and enables us to 'perceive' and deal with same or similar things in future. The point has already been explained in my other work, though not published so far, I here only quote the relevant portion which is as under:

Experience not only improves vision, it also creates vision. It is a common occurrence and must be in the notice of all the readers. Some might have identified this phenomenon already but it will make more sense if I give it a little emphasis. It is like asking to ourselves regarding exactly what do we receive physically out of our getting experience of new things. Do we gain weight or just our vision gets improved? Definitely the vision improvement is appropriate answer. But more to this, new information or experience of new things actually gives us a sort of physical eyesight. Like we physically come to light from previous state of darkness and become able to watch the things which were around us already but were invisible to us. Through the mechanism of sense perception, relevant past memory is called upon to give us understanding of the ongoing current situation. Now suppose there is no relevant past memory of a particular object which is present within the field of sensory vision. It is likely that attention will skip it and it will go unnoticed. Once a successful focus of attention is achieved through experience, likelihood for now onwards is that it will not go unnoticed by the attention. Often it happens that we learn some concept or vocabulary for the first time. Then afterwards, we frequently encounter with same concept or vocabulary etc. Now how come that it took ages to have first introduction of that concept or vocabulary but then suddenly it got a normal frequency of getting noticed? Most of the times the reason is that it already had been around us but due to our lack of formal introduction with that vocabulary or concept, our attention always missed it. Once formal introduction has succeeded; then onwards it came under visible spectrum of attention. I explain it with simple example. When I first time came to know that on every car bonnet, there is logo of relevant car manufacturing company; it was only after it that I became familiar to different car logos. These logos already had been around me and I always failed to notice their presence until I somehow succeeded for the first time to get their formal introduction. I told this phenomenon to my cousin and he also shared his experience that he had started learning car driving on a Suzuki Cultus car. He told me that previously he did not know about Suzuki Cultus car but then onwards he became able to see many Suzuki Cultus cars around him. Again, those cars were already around him but due to lack of formal introduction

of particular makes of cars, his attention was simply skipping taking notice of them.

---Khuram Rafique (Draft: "Descriptive Knowledge, Mind and Reality; a case of Epistemological Realism").

Thus we see that a natural rewiring process does exist but has nothing to do with counterintuitive mess. The path towards unknown takes its course from first resolving and getting sense of previously unknown stuff and then new things start making sense. Knowledge comes from acquiring proper sense of the subject and does not come from acknowledging senseless stuff as 'counterintuitive reality'. We do have the ability to dig out the truth of a subject that is currently unknowable. But process of digging involves making sense of the issue by acquiring further or better factual data and information on the subject. Acknowledging anything senseless as counterintuitive reality is a form of fiction that only serves as a dead end in the process of digging out unknown realities. The noted type of the actual rotation pattern of galaxies was excellent factual information and it was a lead towards knowing previously unknown aspects of differences in the type of motion of our familiar solar system and galaxies. By knowing the actual rotation pattern of galaxies, now it was easy to dig out why apparently gravity behaves differently across the whole of galaxy. But matter was in the hands of Physicists who were believers of GR equations and they knew already that only the existence of more than observed matter could account for the different rotation pattern of galaxies. They assigned credit of 'discovery' of 'dark matter' to their beloved equations and started calling it another counterintuitive reality. With the emergence of this new counterintuitive dead end, the right path towards discovering previously unknown realities was blocked – but the path was blocked for only pro-counterintuitive Physicists and their supporters. The task of this book is to start moving towards right direction by breaking the hard obstacle of counterintuitive dead end.

Now we come to the second question i.e. do Physicists really understand their counterintuitive stuff or not? Well, they do pretend that they understand but this book will sufficiently show that they do not actually understand what is counterintuitive by character or nature. For example they pretend that they understand this counterintuitive reality of 'dark matter'. They already have built enormous sand castles of so called high profile theories of

Physics where crucial role is assigned to the unsubstantiated notion of dark matter. It is so because they do not regard it as 'unsubstantiated' notion – they only call it 'directly not observed reality'. Even a number of direct experiments who failed at finding dark matter do not bother them because after all they regard it as 'directly not observed reality'. The focus on 'reality' is due to their insistence that they do understand their counterintuitive stuff. Now question is that what will happen to their claim of having understanding of counterintuitive stuff if it is proved beyond doubt that dark matter could not be observed simply because it did not exist? If it is demonstrated that there is no dark matter may be in not observable format – this book is going to do after all – then it will also be confirmed that no one actually knew or understood this counterintuitive notion of dark matter. Therefore, the answer to the second question, i.e. 'do Physicists actually understand reality of dark matter', now goes to the judgment of readers of this book. Readers of this book will decide whether do the Physicists really knew their counterintuitive stuff when they were not even feeling trouble in getting same results from their beloved 'General' Theory of Relativity and a 'particular' law i.e. 3<sup>rd</sup> law of Kepler? Actually they had wrongfully applied irrelevant aspect of the 'simple' theory and interpolated the result taken from the faulty application of simple theory to the so called most accurate theory; their accurate theory failed in detecting that something was missing, incomplete or wrong neither did they themselves realize the same. Only thing they realized was that they had reached to another counterintuitive reality and they were having the claim that due to having been rewired through mathematics, they fully understood their counterintuitive mess.

#### I.II. DARK MATTER WAS SEEN AS A HANDY SOLUTION TO COMPLEX PROBLEMS OF THEORETICAL PHYSICS

The initial proposal of unexpectedly high proportional existence of usual and non-mysterious Dark Matter put forwarded by Fritz Zwicky (1933) somehow conveyed to the scientific community that an anomaly existed and that 'problem' was real. The proposal itself got serious status when upfront observations of individual galaxies started pointing out the fact that galactic rotations do not obey Keplerian Drop-off in velocities at greater distances from center. If Kepler's third law was applicable to rotation of galaxies then the type of galactic rotation was a real problem. Scientists committed the mistake of considering Kepler's third

law to be applicable to galactic rotations whereas it was not applicable. The mistake was 'justified' because the 'accurate' theory of General Relativity was also (supposedly) showing the same anomaly in the rotation curves of individual galaxies. Actually no one was taking it as a mistake. They were only noticing anomalous results of galactic rotation curves that were not obeying third law of Kepler and even latest 'correct' theory of General Relativity. Scientists did all the efforts to get as accurate data of galactic rotations as possible but they did not review the applicability of their theories to the type of problem. For them, theory was applied accurately and the anomaly was real; there had to be presence of far greater quantity of dark matter than could be traced through all the possible means. Meanwhile scientists started relating different other kinds of unsolved observed facts with this baffling idea of dark matter. Scientific research papers 'successfully' explained tiny fluctuations of temperature of CMB and possibility of structure formation after so called Big Bang on the basis of unsubstantiated notion of dark matter. With so many problems being addressed at once, scientific community eventually assigned status of hard reality to otherwise unconfirmed mysterious form of dark matter that could not be traced in the real world except through a deviation of results of gravity equations with actual observations. Scientists however do not call it as deviation of equations with reality – they only regard it deviation of possible effects of weak force (gravity) with observed reality. For them, more real than reality are the unconceivable and fanciful things like Big Bang and Dark Matter because they are results of equations of mathematics. The resultant 'best' mainstream model of Cosmology is 'Lambda CDM' where CDM stands for 'cold dark matter'. In this mainstream model, real matter accounts for only 5% and rest of 95% unknown reality is 100% known as our scientists 'know' the exact percentage of dark matter and dark energy as well as their functions and they also 'know' the exact moment of Big Bang Creation of Universe. With 95% unknown regime being 'fully known', this is clearly counterintuitive regime that will definitely be regarded in the history of science as proper dark era of science.

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<sup>1</sup> [https://en.wikipedia.org/wiki/Vulcan\\_\(hypothetical\\_planet\)](https://en.wikipedia.org/wiki/Vulcan_(hypothetical_planet)) – This hypothetical planet was thought to exist between orbit of Mercury and the Sun.

<sup>2</sup> Gainfranco Berton and Dan Hooper “A History of Dark Matter” – Page 11 (<https://arxiv.org/pdf/1605.04909.pdf>)

<sup>3</sup> Fritz Zwicky “The Redshift of Extragalactic Nebulae” – Page 10 (<https://arxiv.org/ftp/arxiv/papers/1711/1711.01693.pdf>)

<sup>4</sup> Gainfranco Berton and Dan Hooper “A History of Dark Matter” – Page 14 (<https://arxiv.org/pdf/1605.04909.pdf>)

<sup>5</sup> Gainfranco Berton and Dan Hooper “A History of Dark Matter” – Page 15 (<https://arxiv.org/pdf/1605.04909.pdf>)

<sup>6</sup> SIDNEY VAN DEN BERGH “The Early History of Dark Matter” – Page 4 (<https://arxiv.org/pdf/astro-ph/9904251.pdf>)

<sup>7</sup> <http://astronomy.swin.edu.au/cosmos/B/Baryonic+Matter>

<sup>8</sup> [https://www.edge.org/conversation/john\\_horgan-in-defense-of-common-sense](https://www.edge.org/conversation/john_horgan-in-defense-of-common-sense)

<sup>9</sup> [https://en.wikipedia.org/wiki/John\\_Michell](https://en.wikipedia.org/wiki/John_Michell)

<sup>10</sup> <https://bbtrejected.wordpress.com/2018/04/09/unscientific-methodology-of-science-within-the-big-bang-cosmology/>

<sup>11</sup> In fact Newton’s Principia also starts from ‘axioms’ or first principles which are his three laws of motion. But he has used those axioms only to derive various theorems and the axioms do not serve as boundary wall rather only provide a starting point for his work. Modern Theoretical Physics has however bounded itself within the scope of basic framework and mathematical derivatives thereof. For them knowledge does not exist outside of this boundary. According to them this book also does not exist. They have made their Theoretical Physics into a cartoon character who has big and long nose. For the character only nose exists and any other thing does not exist.

<sup>12</sup> [https://en.wikipedia.org/wiki/Theoretical\\_physics](https://en.wikipedia.org/wiki/Theoretical_physics)

<sup>13</sup> <https://home.cern/news/series/in-theory/what-theoretical-physicist>

<sup>14</sup> <https://www.quora.com/profile/Kirsten-Hacker>

<sup>15</sup> <https://www.quora.com/Do-you-agree-with-Elon-Musk-when-he-said-physics-teaches-you-to-reason-from-first-principles-rather-than-by-analogy/answer/Kirsten-Hacker>

<sup>16</sup> <https://www.quora.com/What-is-the-difference-between-a-theoretical-physicist-and-an-armchair-physicist/answer/Cencio-Farre>

<sup>17</sup> <https://www.quora.com/Why-are-theoretical-physicists-not-armchair-thinkers>

<sup>18</sup> <http://backreaction.blogspot.com/p/about.html>

<sup>19</sup> [https://www.amazon.com/gp/product/0465094252/ref=dbs\\_a\\_def\\_rwt\\_bibl\\_vppi\\_i0](https://www.amazon.com/gp/product/0465094252/ref=dbs_a_def_rwt_bibl_vppi_i0)

<sup>20</sup> Bracket added by me.

<sup>21</sup> Recently Professor Susskind also has presented the idea that QM and GR are equal.