

**Spiritual Applications Research Center (*SpARC*)**

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# ***Applications of Karma Spirituality***

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## Preface

I was introduced to *Brahma Kumaris* by my parents in 1983. Later in that year, our family attended a Rajyog shivir in Madhuban, Mount Abu. Right from beginning, I was intrigued by the concept of *World Drama Cycle*, with events repeating in identical cycles every 5000 years. As a teenage lad, it was immediately clear to me that this was at variance with the scientifically popular concepts of "*Big Bang model of physics*", and "*Darwin's Theory of Evolution of Life*". However, **experience of deep peace and serenity during meditation**, led me to put away my scientific doubts, and dwell deep into the knowledge propounded by "Shiv Baba" through "Prajapita Brahma".

I was encouraged by senior brother B.K. Jagdish Chander Hasija ji, to channel my curiosity into research on scientific aspects of Brahma Kumaris' system of philosophy. This book is a compilation of articles written by me over the period 1991-97. Some of them have been published in the Brahma Kumaris' magazines of "*Purity*" and "*The World Renewal*" – but much of the material is new. These articles emerged from thoughts aimed at giving a modern scientific footing to "*long lost and now found again*" ancient spiritual concepts of consciousness and time.

The article entitled "Eternal Sun", was especially liked by both brother Jagdish Chander ji (editor of "The World Renewal") as well as brother Brij Mohan Anand ji (editor of "Purity" - in which this article was published). They both individually discussed it at length with me, in Madhuban in 1994. Subsequently There was an hour long meeting between Dadi Prakashmani ji (administrative head of Brahma Kumaris), brother Ramesh Shah ji, brother. B.K. Brij Mohan ji, and myself – on research linking science with spirituality – as a prelude to formation of **Spiritual Applications Research Center**. The name itself was finalized by Dadi Gulzar going into trance and getting Baba's message.

Under the leadership of senior brother B.K. Ramesh Shah ij and his Yugal B.K. Usha Behen ji, we formed "*Spiritual Applications Research Center (later abbreviated as SpARC)*", at hall number 13, International Center of Higher Learning, in Gyan Sarovar Academy for a Better World in Mount Abu - in 1995.

In December 1997, I gained admission for PhD programs at both the Physics, as well as the Mathematics, Departments of Indian Institute of Technology (IIT), Kanpur, India. I choose physics. Dadi Prakashmani ji, was instrumental in providing me a scholarship for the PhD in physics. I was telephoned on the evening of the auspicious day of 18th January 1998, by Brother Arun of SpARC, of the scholarship decision.

During the period since then, I have published a number of papers in national and international scientific journals - further elaborating the ideas given in this book - and bringing

out their mathematical and physical aspects. Texts of many of them, as well as youtube videos are available on the internet.

I also take this occasion to express my profound gratitude to senior brother B.K. Nirwair ji for the alokik paalna I received from him. Thanks also to Brother Ashok Gaba ji and brother Mohan Singhal ji, of Scientists and Engineers' wing of Rajyog Education and Research Foundation - for encouragement. My very special thanks to Brother Karuna ji, for providing the golden opportunity of a life time, of becoming a Madhuban Nivasi (yes! I was there from September 1994 till January 1997). Profound thanks also to Dadi Hridyapushpa ji, who was the spiritual mentor of our family in Bangalore.

The front cover of this book shows photo of the rare early morning solar eclipse of 18<sup>th</sup> March 2007, taken by myself, from the terrace of my flat in IIT Kanpur - a couple of days before the date of my PhD Thesis defense. The day before, I read in the news paper that a partial solar eclipse would be occurring. On next day morning, as I woke up around 6 AM, and walked onto the terrace, I saw a cut in the golden disk of the morning sun. I immediately realized what was happening - and rushed back in, got the camera and started clicking. At that time, sun was not bright and could be seen with the naked eyes. With in a few minutes it became too bright and I used an MRI film as a filter. I guess it was my lucky day!

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## **A Note on the Present Compilation**

1. Thanks to the ocean which is the internet - I have been able to refer the readers to appropriate links - in the references. A large number of such references are to wikipedia. Some links are to youtube videos.
2. A soft copy (word) of the book can be requested from the SpARC (sparcwing@bkivv.org) or the author (msmodgil@gmail.com). This is to ease reference to internet. From the soft copy - command of copy and paste can be used for navigating to the site.
3. With in the book references are indicated as a number in the square brackets, e.g. [4], indicates the 4th reference at the end of the chapter.
4. Figures are placed at the end of chapters.
5. The last chapter entitled - "Does Science Prove Existence of God or a Super Power?". has been contributed by late Dr. H. N. Bhargava, Department of Chemistry, Gorakhpur University. He reviewed the first draft of this book, and was motivated to write it. We decided to include it with in the book. He and his family have visited Madhuban and were deeply impressed by BKIVV.
5. In the present compilation, additional material has been added to some chapters. Some mistakes have been corrected.

## Chapter 1: Churning the Ocean of Science and Silence

There is an interesting story in the ancient Indian scriptures, regarding the time when both the Deities and the Detayas (devils), decided to join hands and churn the ocean [1], [2], [3]. The mountain Sumeru was selected for the churning and Vasuki (King of snakes - wound around Shanker's neck), was coiled around it as the churning rope. Now the mountain would keep sinking in the ocean, and so Vishnu himself assumed the form of a huge tortoise, to prevent the mountain from sinking, and thus supported the churning. Lots of poison also emerged in churning, which was swallowed by Lord Shankar. The poison was stopped within the throat of Shanker, as a result of which the throat became blue - and so Shankar is called "Neelkant - the one with blue throat". The Amrit (Elixir of eternal life) which emerged from the churning was entrusted to Lakshi, who started distributing it, to Deities first. By the time, the turn of Detayas, came, the Elixir was over. Author would like to interpret this story, in context of present time of world transformation, known as confluence age - the meeting of Golden and Iron ages.

The question is what was that churning, and why did Deities and Detayas join hands in churning? What is the significance of Vasuki - as the churning rope? And why did god Vishnu assume the form of a tortoise and support the churning? And what does the Mount Sumeru, as the churning pivot represent? What was that ocean? Finally, what was the Elixir which emerged from churning, and why did only the Deities get it and not the Detayas?

Spiritually speaking, all churning is that of knowledge. It is true that spiritually inclined people do churning over various aspects of spiritual knowledge, including implications of spiritual knowledge for other fields like science. Churning is also done by scientists in their quest for truth. A short visit to any good science library is enough to convince, that knowledge of science has assumed the form of ocean.

The next question, is what was the topic of the combined churning done by deities and detayas, that they had to join hands to churn? And how it is related to use of Vasuki Nag as the churning rope? Nag is also a symbol of time, and Shesh nag represents the time remaining within the time cycle, or the wheel of time. Today we see, that on one hand most of scientists have formulated their theories with a belief in linear nature of time, while on the other hand spiritualists feel that time is circular, and that the physical theories need modification. Scientists themselves are finding that their concepts are inadequate to express various aspects of reality in a consistent and coherent manner. Thus the churning described in scriptures, is an enchanting depiction of present process of validation of true knowledge, in which, both scientists and spiritualists are equal partners. And the significance of Vasuki Nag, as the churning rope, is just that, nature of time itself, is the common subject of churning. If you mentally picture the mechanical process of churning, you find that the churning rope is elongated, then coiled, then

again elongated and again coiled.... This represents the mental process of evaluating, which concept of time is true, linear or circular.

And its well known that Mount Sumeru of scriptures is nothing but Mount Abu, the Spiritual Headquarters of Brahma Kumaris World Spiritual University, who propogate very strongly, the concept of circular time.

Finally, why did God assume the form of a tortoise, to support churning, without which, the mountain used to keep sinking? Tortoise is a symbol of power of withdrawl, retaining the essence. All mighty God Father Shiv Baba, Ocean of Knowledge, could have revealed, the knowledge in a fashion which would have convinced the scientists of circular nature of time. However, he choose to reveal only the essence and thus supported the churning by encouraging his children to discover the details for themselves.

The elixir which emerged from this churning represents the fruits - the flying machines, gadgets etc., which were based on the newly discovered laws of nature which emerged from the combined churning; the failproof, pollution free means of comfort of deities in golden age. Naturally they lasted half a kalpa, and by the time, the turn came for detayas to be reborn they were over.

## References

1. Wilson, Horace Hayman (1840). *The Vishnu Purana*.
2. <https://www.wisdomlib.org/hinduism/book/vishnu-purana-wilson>
3. [https://en.wikipedia.org/wiki/Samudra\\_manthan](https://en.wikipedia.org/wiki/Samudra_manthan)



## Chapter 2: Knowledge Based Perception of Soul

Karl Popper, the noted contemporary German philosopher of science, has developed a theory of perception, in which all perception, is knowledge based [1]. Till then, it was usually held by philosophers and even scientists, that one's perceptions were primary, on which one had to build one's world view, scientific theories. However, Popper showed, that the very structure of sense organs, such as eyes, and processing of the information conveyed onto brain by nerves from the senses, required a certain fundamental knowledge, inbuilt into the organism's structure. Thus, the Popper argued, one's perceptions were actually based on this inbuilt knowledge, within the brain and sense organ's structure. This knowledge, he hypothesizes came about via natural selection, in the course of evolution. His argument is strong and cogent enough to convince, noble prize winning neuro-biologist Sir John C. Eccles, who initially subscribed to the view, that sense data was primary. Turn around of Eccles's stance is depicted in "Self and its Brain", a book jointly authored by Eccles and Popper, in records of their oral conversations [2].

Another interesting view-point is that of linguist Noam Chomsky of Massachusetts Institute of technology [3]. Chomsky has shown that, linguistic development is possible in a child, only if there is an in-built kernel of linguistic knowledge, within the new born infant. He speculates, that the 6000 odd dialects and languages current in the world today [4], are but different material realizations of this inbuilt kernel of linguistic knowledge. Hunting for a material basis for lingual capability of new born infant, Chomsky turns to genes, natural selection and evolution - just like Popper. However, genetists find his ideas inconcievable, for they find no mechanism of storage of such an information on genes. Thus the possibility exists, that the kernel of linguistic knowledge resides within the non-material soul, which is latter copied onto the brain and neurons, as the child learns to speak.

Our third view-point is the emerging trends in artificial intelligence - notably the expert systems and neural networks [5]. In expert systems, one gathers the thumb rules evolved by an expert over a life time, to solve a class of specialized problems, and programs them onto a computer. Such an artificially intelligent expert system is than able to guide novices to solutions of problems in that field, which they would not have been able to solve otherwise. Such systems are called Knowledge based systems (KBS), as they are based on knowledge of a human expert, in that field. Neural networks are an attempt to mimic working of biological brains. They consist of a large number of interconnected, units, and are designed such that, given a particular input, the network responds with the required output. This is achieved by iteratively adjusting the strength of inter-connections, (by a programmer, or a program written by a programmer) till the desired output is achieved.

Thus, in the above mentioned three fields of perception, lingual comprehension, and artificial intelligence - there exists need for inbuilt knowledge, for the desired process to occur.

Without the required knowledge, development of the required capability is not possible in the human or machine system. Knowledge thus becomes primary, and sense data secondary. With these, points, we are ready to face, the materialists, who are unwilling to face "the fact of existence of soul", which cannot be seen by untrained eye. Neither, do they accept existence of a soul world, where the souls reside before taking their first material birth on earth, within the time cycle. And the same argument is put forth for existence of subtle body as well as the subtle worlds. Our reply to the materialists, is that perception is knowledge based. Perception of soul, soul world, subtle body, subtle world, time cycle, the three worlds, or even utopia (golden age of perfection), is knowledge based. This is the concept put forth in scriptures, as the third eye of knowledge, without which even perception, lingual comprehension or intelligent functioning will not be possible. The third eye is not an eye with cornea, iris, lens and retina, and acquired in a physical operation, but is the eye of true spiritual knowledge. Then, with this knowledge, perception changes - and one is able to see the non-material soul - the spark of divine light, residing at centre of forehead of living humans, and acting, comprehending, feeling through the physical body. One is also able to see the soul world and God father Shiv Baba in soul world. This is knowledge based perception of soul and supreme soul.

## References

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2. Karl Popper and Sir J. C. Eccles: *The Self and Its Brain: An Argument for Interactionism*, 1977
3. [https://en.wikipedia.org/wiki/Noam\\_Chomsky](https://en.wikipedia.org/wiki/Noam_Chomsky)
4. <https://www.ethnologue.com/guides/how-many-languages>
5. [https://en.wikipedia.org/wiki/Expert\\_system](https://en.wikipedia.org/wiki/Expert_system)

## Chapter 3: Eternal Sun

In an eternally existing, civilized cosmos, eternal existence of stars such as sun is a must. However, this contradicts, currently accepted views on, "what makes the sun shine?". The traditional view is that, within the sun, nuclear fusion is occurring, in which hydrogen atoms are fusing and forming helium atoms, and liberating energy in the process [1], [2]. Such models, estimate the age of sun to be around 5 billion years, and likely to last another 5 billion years. Its very clear, that this model is out of place, in a universe which repeats in identical cycles, every few thousands years. If this eternally repeating cosmos is the true model of physical universe, as claimed by Brahma Kumaris World Spiritual University, - then what is the mechanism which makes the sun eternal, and what is wrong, with the traditional scientific view on source of solar energy. These are the two issues with which this paper deals.

Firstly, I highlight, two paradoxes of the sun - one is called the solar neutrino problem [3], and the other, the coronal temperature problem [4],[5]. Astrophycists, have calculated, that if source of solar energy is indeed nuclear fusion, then a type of elementary particle called neutrino should be liberated, in the process, and a particular quantity of these solar neutrinos should be detectable at earth. Such experiments were indeed mounted in sixties, and have been going on since, almost three decades. It is a profound surprise to physicists, that number of solar neutrinos being detected are hardly one third of the calculated value. This anomaly between observation and theory has yielded varying reactions - ranging from speculative ideas, on something happening to solar neutrinos, on their way to earth, on one hand, while on the other hand the possibility considered has been, that perhaps, the solar models, governing equations, values of certain empirical constants, require modification.

The coronal temperature problem is still more intriguing. You see, while temperature of surface of sun as obtained from its surface brightness, using black-body radiation formula is hardly 6000 degrees centigrade, the temperature of its thin tenuous atmosphere - the so called "solar corona" (Figure 3.1) is one and a half million degrees centigrade! Solar corona extends into free space, upto a distance of more then three times, the radius of sun, and is seen during full solar eclipses, as a beautiful, fibrous halo surrounding sun. This value of temperature is obtained by noticing the presence of unique light (spectral lines) of iron atoms (ions to be more precise), in which upto thirteen electrons have been removed from the atoms. If the source of solar energy is inside the sun, and energy is flowing outwards from within, the natural expectation would be that outside should be cooler. The coronal temperature problem has another part-2 to its story. There exists a factor 2 discrepancy between temperature of ions (atoms with some electrons removed), and temperature of free electrons within corona [6]. While there is no doubt about value of ion temperature of one and half million centigrade, there exists, certain scope in improvement of calculation of temperature of free electrons within solar corona. You see there are various types of equations which can be used for calculating the temperature of electrons within corona. If the energy is flowing from within the sun, outwards, one has to use one type of equation. On the other hand, if energy is not flowing from inside,

but is in a sort of equilibrium, then one uses a different equation. The problem is that the first method, in which energy is flowing from within the sun, outwards, one obtains a value for electron temperature which is half of what is required. On the other hand, if the equation used is, one in which, such a energy flow is not there, then the value of electron temperature obtained as such, is exactly the required value. Only hindrance to using this equation is that, it does not mesh in with the conventional solar model, of energy source being within sun.

Now that the two main solar problems, namely the solar neutrino problem, and solar coronal problem are understood by the reader, I would like to propose, an "eternal sun" model. It is well known to physicists that space-time curvature can make trajectory of particles, deviate from a straight line. There exist models of universe, in which the universe is closed in such a manner, that one returns to one's original starting point, by continuing to move in a straight line, without turning back. One can conceive of an eternally repeating cosmos, in which space-time curvature is such that, if time period of repetition is N years, then light returns to its starting point after traveling N light years. The reader might be aware that a light year is distance traveled by light in one year. In such a space-time, all the radiation being emitted from sun will return back to sun, and the sun will thus be continuously replenished, by returning fluxes. The returning radiation will be confined to outer part of sun, namely the corona. Bulk of energy will thus be within corona, which will blanket the sun's surface from returning radiation (Figure 3.2). This may be the reason for, temperature of corona being 200 times higher than that of solar surface. In this model, the second equation for determining electron temperature, which yields the right value for electron temperature (!), will be applicable! Further, now one need not postulate hydrogen fusion, as source of sun's energy, and thus one does not require, detection of previously calculated high number of solar neutrinos!

This "eternal sun" model, in which solar energy returns to its starting point, due to space-time curvature, resolves the two solar problems, while at the same time is compatible with Godly Knowledge, being expounded by Brahma Kumaris World Spiritual University. **The guiding philosophy behind development of such models is to look for fundamental paradoxes prevalent in various areas of physics and other sciences, and churn on their possible resolution using principles of Godly Knowledge, and its implications.** This churning will have to be a combined effort between scientists and spiritualists, analogous to mythological tale of deities and Demons, joining hands to churn the ocean (of knowledge), using a giant snake (Vasuki Naag - symbol of time) as churning rope, with Mount Sumeru (Abu) as the churning axis, supported by, god Vishnu's incarnation as a giant tortoise (symbol of withdrawal into essence).

## References

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2. <https://en.wikipedia.org/wiki/Sun>
3. [https://en.wikipedia.org/wiki/Solar\\_neutrino\\_problem](https://en.wikipedia.org/wiki/Solar_neutrino_problem)
4. <https://science.nasa.gov/news-articles/the-mystery-of-coronal-heating>
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*Figure 3.1*

*Solar Corona as seen in a full solar eclipse*

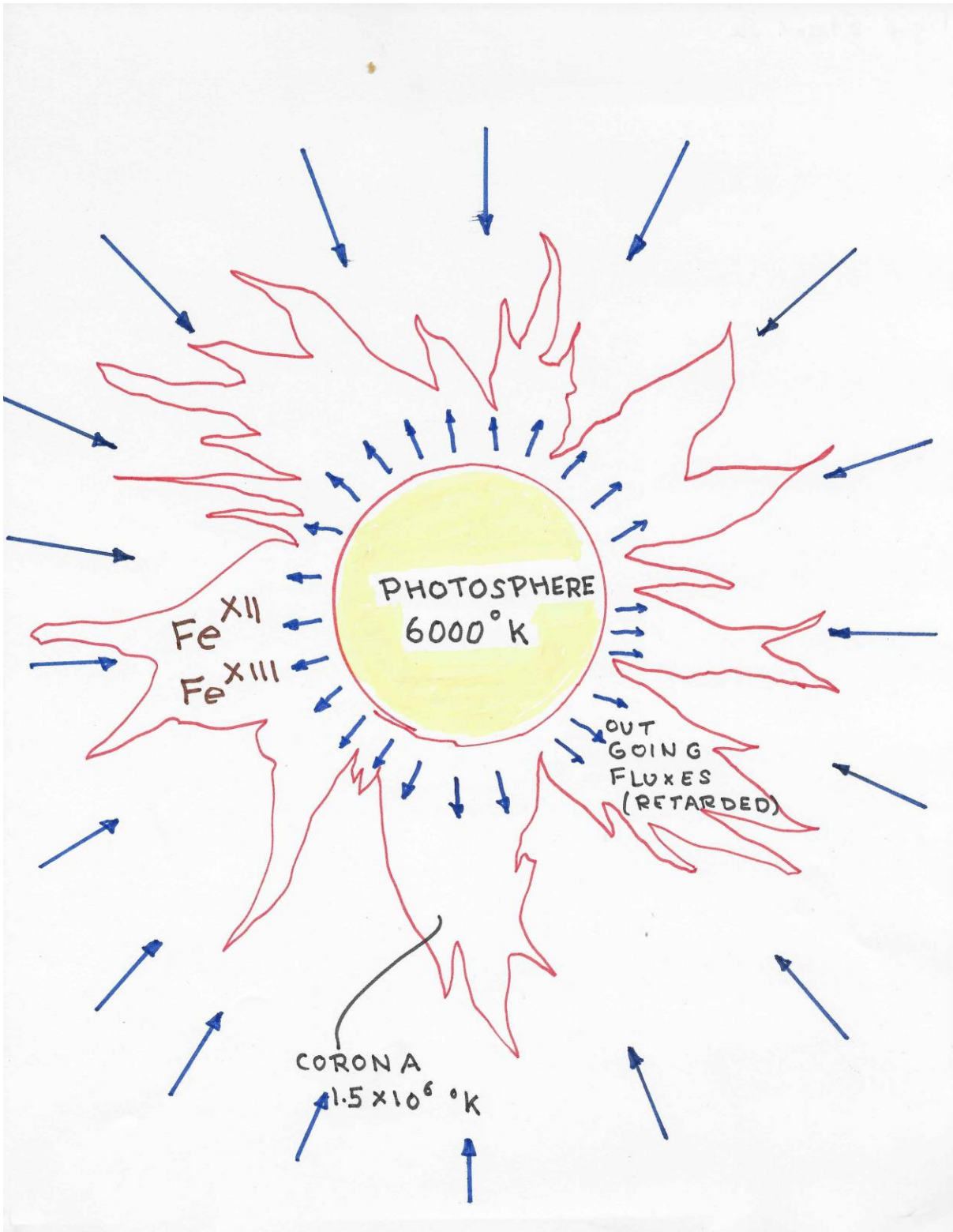


Figure 3.2

*Model of Sun proposed by author – in which returning fluxes interact with outgoing fluxes.*

## Chapter 4: On Non-Duality

Founding Father of Brahma Kumaris World Spiritual University, in his spiritual discourses has emphasized that their philosophical system is based on non-duality - Advait mat - in Hindi. While God is not considered omnipresent in philosophical system of Brahma Kumaris, therefore, this use of concept of non-duality, is at variance, with that of Adi Shankar, founding father of Sanyas Dharam of medieval India. Non-duality means absence of distinction between pairs of opposites, such as hot-cold, cause-effect, fast-slow, darkness-light, day-night, pain-pleasure. Adi Shankar's concept of non-duality essentially rests on his premises of omnipresence of God, while concept of duality is conventionally associated with a non-omnipresent God. It therefore is paradoxical, as to how Brahma Kumaris Spiritual Philosophy system (hence forth abbreviated as BKSPS) can be considered as based on non-duality. This paper examines this issue from modern scientific view-point, and uses the concept of cyclic time, which plays a dominant role in BKSPS. Essentially, I will show that, cyclic time makes cause and effect equivalent, and as a result, they cannot be regarded as opposite pairs.

First I will introduce the concept of equivalence relationship, taught in high school mathematics classes, - specifically in the set theory [1]. Cantor, considered father of set theory, defined set as - collection into a whole of objects of our intuition or thoughts [2]. One can define various types of relations between members of a set. Mathematicians formalize these relations into three categories - (1) reflexive, (2) symmetric, and (3) transitive, which I explain below. Consider the types of relations humans can have with each other. For example, if 'A' is brother of 'B', and 'B' is brother of 'C', then it follows that 'A' is brother of 'C'. Thus, the relation of being brother is transitive, i.e., the relation transfers from first pair (A,B) to second pair (B,C). If, if 'A' and 'B', are brothers, then both the following statements hold true -

- (1) 'A' is brother of 'B',
- (2) 'B' is brother of 'A'.

This relation is an example of a symmetric relation. However if 'A' and 'B' are brother, and sister respectively, then though 'A' is brother of 'B', but 'B' is not brother of 'A'. Thus relationship of being brother is not symmetric, if 'A' and 'B' are brother and sister. Concept of reflexive relation can be exemplified, by considering the relation between an employer and employee. The relation is not symmetric, since, if 'A' is employer of 'B', then 'B' is not an employer of 'A'. However, the relation can be transitive, in the sense that, if 'A', is employer of 'B', and 'B' is employer of 'A', then in a sense, 'A' is also employer of 'C', though indirectly through 'B'. Now, in the special case of self-employment, i.e., when 'A' is self employed, one can state, that 'A' is employer of 'A' - rather trivial way of stating the obvious, but that's how mathematics works- unflinching attention, to precision and detail, which pays when things get complicated. Thus, in the, last case of 'A' being self employed, the relation can be considered reflexive.

These examples clarify, that a relation between two entities, can have either, one of these properties - reflexive or symmetric or transitive; or two of these properties - reflexive and



symmetric, or symmetric and transitive, or transitive and reflexive. In the special case, when a relation is having all three properties of being reflexive, transitive, and symmetric, the relation is given a special status and called an equivalence relationship. In such an equivalence, relation, all three properties - reflexivity, symmetry, and transitivity hold, and the objects connected by such a relationship, can be considered equivalent. The concept of equivalence relation, thus provides, a clue to understanding concept of non-duality, or non-distinction between opposite pairs.

Now consider the utopian case, when all humans are well wishers of each other, and consequently of themselves. Now, here, if 'A' is well wisher of 'B', then 'B' is also well wisher of 'A'. Therefore the relation of being a well wisher is symmetric, in this special circumstance. If 'A', is well wisher of 'B', and 'B' is well wisher of 'C', then 'A' is also well wisher of 'C'. Hence the relation is also transitive. Finally, 'A' is also well wisher of 'A', in the sense that one is one's own well wisher - something along the lines, that if you are good to others, you are being good to yourself. Thus the relation of being a well wisher, is an equivalence relation. In such a Golden Age, all humans are equivalent in the sense, of having similar positive qualities, attitudes, actions, etc..

Next consider the Hellish scenario, where everybody hates everybody. Evidently, if 'A' hates 'B', 'B' also hates 'A', hence the symmetry. Next, if 'A' hates 'B', and 'B' hates 'C', 'A' hates 'C' (kind of strange, since, normally one considers enemies of ones enemies, as ones friends) - hence transitivity. Finally, 'A' hates 'A' - i.e., one hates one's self, hence the hate relation is reflexive. Since, the hate relation is also having the three properties of reflexivity, symmetry, and transitivity, it follows that the relation is an equivalence relation. In such a hellish scenario, all humans are equivalent in the sense of being universally filled with negative qualities. Both the love relation outlined in the previous paragraph, and the hate relation outlined in the present paragraph, are equivalence relation. They reflect the cliché, that as the individual, so the society, and as the society, so the individual - the two are inseparably interlinked, having common destiny, and modes of transformations. Thus in a sense the individual and society, also, though regarded conventionally as dual or complementary, are actually non-dual.

Next consider the nature of cause and effect, specifically in context of geometry of time - cyclic and linear. One normally assumes that cause and effect relation satisfies transitivity, i.e., if 'A' causes 'B', and 'B' causes 'C', one concludes that 'A' also causes 'C'. This property of being transitive, can be assumed to hold in both cyclic and linear geometries of time. In cyclic time, all the events can be represented as lying on a circle, while in linear time, all the events can be represented as lying on a straight line, which may be finite or infinite. By contrast, cyclic time is always of finite duration. Certain physicists regard infinite linear time, as cyclic time of infinite duration! However, causal structure of cyclic and linear time is remarkably different (Figure 4.1). For example, in linear time one cannot assert, that -

(1) 'A' causes 'A', - reflexivity, or

(2) If 'A' causes 'B', then 'B' causes 'A', - symmetry.

Thus, the causal relation in linear time, is not an equivalence relation, as it has only the transitivity property, and lacks the property of being symmetric, and reflexive. Finite linear time, also suffers from two other causal pathologies, in the sense, that the first event is causeless, and the last event is effectless. Certain theologians, evoke God at these two temporal singularities, the birth (first event) and death (last event) of universe. These two causal singularities of finite linear time, can be avoided by closing the time and hence making it cyclic, by the additional assertion that the last event causes the first. This approach has a certain appeal in the sense, that it does not evoke God as a non-causal agent. This last assertion makes cyclic time an equivalence relation, by imparting it the properties of reflexivity and symmetry, whose proof is as follows.

For simplicity, let the set of all time events be represented by, 'A', 'B', 'C',..., 'X', 'Y', 'Z'. In both cyclic and linear times, one has the statements - 'A' causes 'B'; 'B' causes 'C'; 'C' causes 'D',..., 'X' causes 'Y', 'Y' causes 'Z'. In finite linear time there is no cause for 'A', and no effect for 'Z'. Thus 'A' and 'Z' are causally singular in finite linear time. However, in cyclic time, one has the additional statement that 'Z' causes 'A'. Thus the causal singularity of 'A' and 'Z', present in finite linear time is removed in cyclic time. Since the property of transitivity holds, one has statements like,

- (1) Since, 'A' causes 'B', and 'B' causes 'C', therefore it follows that 'A' causes 'C'.
- (2) Since 'A' causes 'C' (shown above), and 'C' causes 'D', it follows that 'A' causes 'D'.
- (3) Since 'A' causes 'D' (shown above), and 'D' causes 'E', it follows that 'A' causes 'E'.

Using the idea outlined above one can proceed to show that 'A' is also causing all other events, such as -

'A' causes 'X',  
'A' causes 'Y'  
'A' causes 'Z'.

The chain stops here in finite linear time. However, in cyclic time, because one has the additional assertion, 'Z' causes 'A', therefore one has -

- (1) 'A' causes 'Z', and 'Z' causes 'A'. Hence symmetry holds for causal relation in cyclic time.
- (2) Because 'A' causes 'Z', and 'Z' causes 'A', it follows that 'A' causes 'A', i.e., 'A' is causing itself! Thus the causal relation is also reflexive in cyclic time.

Hence cause and effect become an equivalence relation in cyclic time. Hence all time events are causally equivalent. None can be distinguished as good or bad. All events are causally related to each other! No event can be judged independently of all other events, or made to

stand alone! In contrast in finite linear time, one can trace all events to the first event, where the chain of reasoning comes to a stand still.

The fact in cyclic time that cause and effect are equivalent, i.e., causality is an equivalence relation, allows resolution of certain other paradoxes such as that concerning effort and destiny. In cyclic time, all events are pre-destined, in the sense that they have already occurred innumerable times in past, and will also occur innumerable times in future. Thus, one is led to doubt the validity of any effort one may be considering, to improve one's situation etc.. However, as effort and reward are causally related, and cause and effect are equivalent, it follows that effort and reward are a non-dual, indistinguishable, pair in cyclic time. Similar chain of reasoning can be worked out for whether what happens is good or bad.

In above considerations one has only considered nature of time. However, in physics, and general relativity, for one space-time event to causally influence, another space-time point, a causal light signal has to propagate from the first point to the second point. Thus one not only has to consider the geometry of time, for determining structure of causality, but also, the structure of space. It can be shown that there exists a class of space-times in which light rays return to their starting point in a single time cycle, after encircling the closed universe. These ideas have previously been explained by me in the articles 'Eternal Sun', and 'First law of motion in cyclic time'. The conclusion that causality is an equivalence relation in cyclic time, can be shown to hold true even in these space times (Figure 4.2). For example, since light ray from any point is returning to its origin, after a single time cycle, it follows that each point can causally influence itself, - by using the signal generated in previous time cycle! Thus the causal structure is reflexive. Similarly if, one point lies in future of another point, the point in future can influence the past by a light signal which circles the universe, and arrives at the past in next time cycle! Thus the causal structure is also symmetric. And transitivity always hold, in the sense that if one can send one light signal to second point, and another light signal from second point to a third point, then it follows that one can use light signals to causally influence third point from the first point. Thus causality is an equivalence relation in these special class of general relativistic space-times. This fact allows resolution of what is called as EPR paradox, originally formulated by Einstein, Podolsky, and Rosen in 1937, to show incompleteness of quantum mechanics [3]. They showed that, certain events showed that apparent faster than light communication was occurring in particle pairs during quantum measurements, in the sense, that one particle appeared to be knowing, almost instantaneously, what was happening to the other particle. However, in cyclic time, the same set of events would have occurred in last time cycle. The signal from quantum measurement performed in last time cycle, would circle the universe, and would influence or inform the second particle of outcome of past cycle's measurement, in the present time cycle. Thus faster than light communication need not be invoked, to explain, how the particle pairs were exchanging information apparently instantaneously. The signal that the particles pick up is actually, from last time cycle!

Time, and causality are among the more important concepts in physics, and conventionally have been regarded as linear, along with other parameters of physical interest such as temperature, velocity, energy, etc.. Is it possible, that the linear geometry, which one attributes to parameters of physical interest is wrong, and the actual geometry of physical parameters is a circle? If we are attributing cyclic geometry to time, as a fundamental postulate, why not also attribute a cyclic geometry to temperature, velocity etc. Already, it has been verified that velocity of physical particles (relative velocity to be precise) , is bounded from below (zero speed) and above (speed of light), which is compatible with velocity vector being described by a circle, rather than a straight line. In such a scenario, distinction between slow and fast vanishes, making them an equivalent, non-dual pair - since what is considered fast, is slow in another frame of reference, as follows from special theory of relativity! Situation regarding tachyons (faster than light particles) may be more complex. Similarly, temperature scale also has a lower limit of -273 degree centigrade, the so called absolute zero of thermodynamics. Matter exhibits certain very peculiar properties near this temperature, such as superconductivity (flow of current without any resistance) [4], and superfluidity (flow of fluids, without viscosity) [5]. Recent experiments have shown that this absolute zero of temperature scale is equivalent to very high, or infinite temperatures, thus hinting at a circular geometry for temperature. In such a situation, distinction between hot and cold, also vanishes - some more non-duality for you!

It is unlikely that these ideas would have occurred to a lay reader of churnings of founding fathers of Brahma Kumaris World Spiritual University. However, behind the simple assertion of the Founding fathers that their philosophical system is based on non-duality, lies tremendous physical insight. It is duty of scientific minded intellects, to go into the depth of these churnings and emerge with hidden treasures. However, some readers may feel that such an exercise may be an exercise in futility, in the sense, that by the time, a complete scientific formulation of spiritual concepts is ready, it may be too little, too late, - in the sense that time of world transformation or world destruction will be at hand. However, this new science is among the instruments identified by the founding fathers, for world transformation, alongside natural and spiritual power. Thus world transformation, is causally linked to this research, and going by the arguments outlined in this paper, can occur only, in hand in glove with this research. Any research, as such, therefore, cannot be regarded as waste of time, rather its a decrease of time - in the sense, that it can only become transformation closer - the two are linked by an equivalence relation. Whatever, be the new concepts emerging from this churning, I am sure Reader would only be reminded of the age old assertion 'truth is stranger than fiction'.

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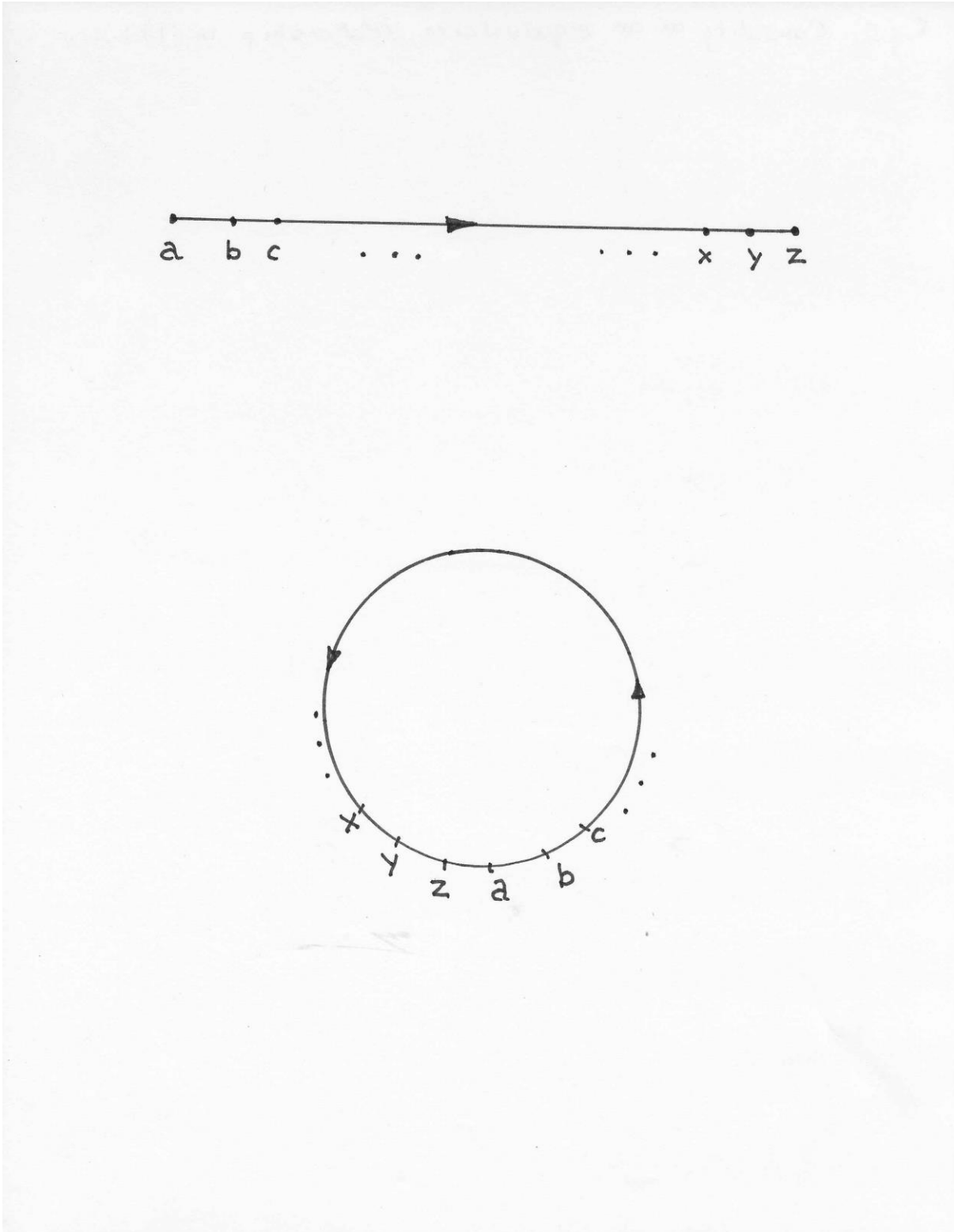


Figure 4.1  
Events in Linear Time and Cyclic Time.

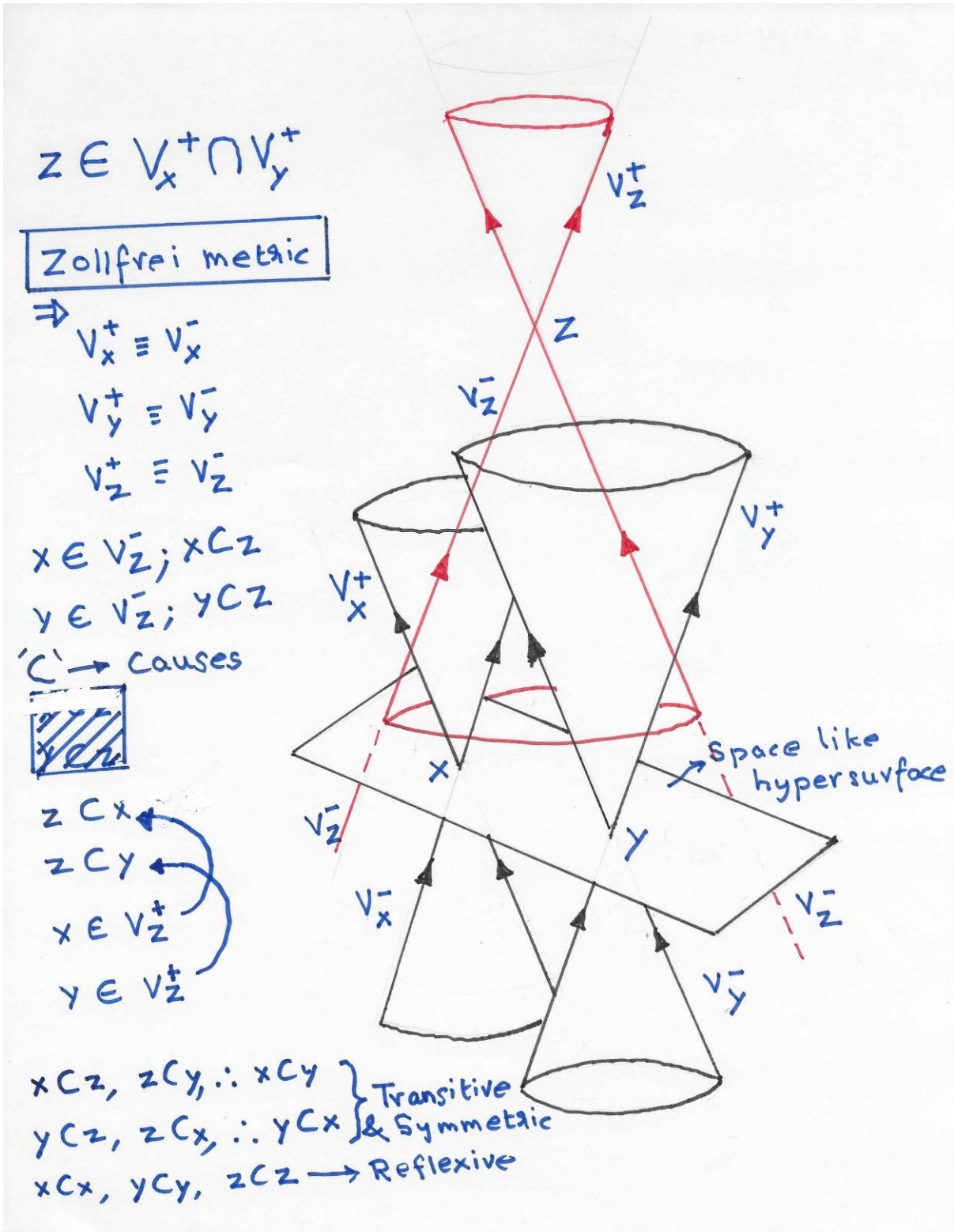


Figure 4.2  
Resolution of EPR paradox in terms of light cone structure.

## **Chapter 5: Biology of Pure Procreation**

### **1. Wearer of Peacock Crown:**

There is an interesting anecdote regarding peacock, India's national bird, in villages of north India, concerning its manner of procreation [1]. During mating season, the male peacock spreads its glorious tale and dances, with his eyes glistening with tears and drops occasionally rolling off his eyes. The peacock hen waits nearby, carefully searching ground for fallen tear drops which she ingests. Sometimes she is able to catch the tear drops in mid air as they fall off the male's eyes. Apparently, the tear drops contain the vital male procreation element and result in her pregnancy, completely unlike other birds and animals.

This same peacock's beautiful tail feather is shown adorning crown of Shri Krishna, the first prince of golden age and the first human deity to have pure birth.

In this paper, we shall examine the biological possibility of pure procreation, alternative routes to conception, with the aim that experimental verification of these ideas, will reawaken the sleeping spiritual giant in Bharatwasis, and inspire them to adopt purity as a lifestyle.

### **2. Awakened Kundalini:**

The concept of upward movement of energy from base of spine, with associated improvement in physical, mental and spiritual prowess has been a topic of fascination in tantra and spirituality through ages in India. The sperms do move from testes to thin walled Ampulla, their storehouse near Prostate gland and seminal vesicles in all male humans, stored for some time and then lost from the body [2]. Perhaps, if sperms are allowed to accumulate in Ampulla in sufficiently large numbers, because of consequent higher pressures, they may be able to diffuse through the thin walls of Ampulla and enter blood stream. Could it be that secretion of Prostate gland and seminal vesicles also play a role in diffusion of sperms through walls of Ampulla into blood stream. Perhaps resulting presence of secretions of these two glands, and sperms, in blood will make the pituitary and hypothalamus (the seat of soul) react in a way leading to inhibition of emergence of certain secondary sexual characteristics such as facial hair under action of excess testosterone and androgen. Male human dieties are shown lacking facial hair. The sperms after all are almost like a single celled organism, with a well developed locomotive facility in the form of a long and strong tail. Who knows what role they may play, once they are within blood stream, where they will have a constant supply of glucose, oxygen and other nutrients. In the rich environment of blood stream, they may undergo certain other



benevolent changes and emerge stronger and more efficacious. With their locomotive facility, they will probably be able to make their way into all tissues and organs of human body, and may be, aid the immune system, help in body maintenance and repair, and arrest ageing. Perhaps the sperms are the elusive AIDS vaccine. The sperms could also make their way into - eyes and tear glands, like the case of peacock; lungs and mucus membrane lining the interior of mouth and nose, and emerge out through breath; and brain where they may be helping in neural repair. Incidentally, both neurons and sperms are extremely specialized, protein rich and incapable of further self reproduction [3].

### **3. Garden of Allah:**

Once the sperms lodge into lung moisture or tears or mucus membrane, they may be capable of launching themselves into air through the whip action of their strong tails. Once in the air, the single isolated sperms are just like any other bacteria or virus floating in the atmosphere, with the difference that they are having a locomotive unit. The forces acting on them in air will be - gravitational pulling them downwards; buoyancy pushing them upwards; impact of air molecules resulting in Brownian motion; diffusion; general air currents; their own locomotive effort; aerodynamic drag opposing their motion resulting in limiting their velocity in any direction to terminal velocity. Definitely, their velocity in an extremely low viscosity fluid such as air will be much higher than that in viscous fluid like the seminal fluid. The end result of all these will be that sperms will rapidly diffuse and spread into atmosphere. The process is reminiscent of diffusion of pollen grains in air, resulting in pollination of plants. No wonder the pure deities are described as flowers of garden of Allah.

### **4. Loveful Eyes:**

Moistening of loveful eyes, deep sighs are a well understood occurrence. These same sperms floating in atmosphere will enter the body of nearby human through inhalation of air by lungs or maybe by diffusing into the tears of a moist eyes, and perhaps play the part they played in their parent's costume or body. One notes the importance of constant companionship of the consort in this process. Perhaps the host's immune system will welcome, rather than reject, them. And if the conditions are right (ovulation, for example may be occurring only twice or thrice in feminine diety's body costume - when the desire for varis or inheritor is there), lead on to conception of a divine human baby's costume.

### **5. Experimental Verification:**

All the ideas expressed here are easily amenable to experimental verification. Sperms, are already a subject of scientific investigation - below, we describe possible studies on sperms which could verify these ideas.

(1) What happens to sperms once they enter the blood stream. This can be studied by injecting a subject's own sperms in his own blood stream and observing their subsequent behavior. What are the tissues and organs to which they home on? Do they have any particular preference? How long will they survive in blood stream, where they will have constant access to glucose, oxygen and other nutrients? Do they undergo any structural and functional modifications in blood stream? How do they interact with other body tissues and organs such as muscles, bones, bone marrow, neurons, arteries, fat deposits etc.? What effect they have on ageing? Do they aid immune system? Are they the AIDS vaccine?

(2) This concerns locomotive prowess of sperms. How do they move and with what speeds in fluids such as water, blood, tears, cerebrospinal fluid, air etc.? Can they jump phase boundaries such as water to air and air to water, alternatively, from blood to air and from air to blood in lungs or from tears to air and from air to tears in eyes? Can they propel themselves across barriers such as thin walls of Ampulla stretched under pressure? This can be checked for an organism by surgically preventing sperms from moving from Ampulla to prostate. How much should the Ampulla be stretched, so that sperms could diffuse across it? How will sperms move about in lung tissue? How will the Pituitary and hypothalamus react to presence of sperms, and secretions of Prostate gland and seminal vesicles in blood stream and what effect this presence have on human body in general, and emergence of secondary sexual characteristics in particular?

(3) How do sperms behave in body of another person? Are they immediately attacked by immune system, or is sperm, like the AIDS virus immune to host's immune system? Will sperm's locomotive unit help it evade host's immune system if attacked? Can presence of sperms in female blood induce conception?

Naturally, scientists would like to conduct these studies on animals before trying them out on humans. Certain other studies such as locomotive prowess can be done immediately on human sperms in artificial environments.

Finally the author would like to caution, that though these ideas are his own and written few months back; but a recent revise course murli (29-10-91) of Sakar BapDada, has expressed similar ideas [4]. BapDada gave example of Peacock, that how the conception occurs via medium of tears. He also gave example of male and female Papaya trees, how just proximity of the two leads to creation of progeny (through pollination of course). BapDada further said, if these insentient creatures could do this in Kalyug (Iron Age), what couldn't the conscious human beings do in Satyug (Golden Age).

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## Chapter 6: Structure of Time

First I introduce mathematical notion of group [1]. We start with an example - the so called group of motions. One can move from point A to point B, and then move from point B to Point C. These two motions - first from A to B, and second from B to C, are equivalent to the motion from A to C. Thus product of two motions is also a motion. Next, any motion, also has an inverse, e.g., inverse of motion from A to B, is the motion from B to A. Finally, one has the concept of identity, or null motion, which is equivalent to not moving, i.e., staying at A itself. Any collection of objects, entities, satisfying these three properties of product, inverse and identity, form a mathematical group. For example set of all numbers also forms a group as follows -

*Product of any two numbers is also a number. Any number has an inverse, such that product of a number and its inverse is one. Finally, the number 'one' is the identity, since multiplying any number by one, leaves it unchanged.*

It turns out that notion of group plays an important part in mathematical physics. There is a beautiful theorem called Noether's theorem, which states that corresponding to any group structure in physics there exists a conservation law [2]. For example, corresponding to the group of motions described above, the conservation law is that of linear momentum. Similarly, group of rotations in space also forms a group. For example, product of any two rotations is also a rotation. Corresponding to any rotation, there exists its inverse rotation. Finally, the identity element is null or zero rotation. The conservation law corresponding to group of rotations is that of angular momentum. Law of conservation of energy, which is among the most important physical laws, is related to group structure of time, from Noether's theorem. Time can have group structure as follows -

Time translation from moment A to B, followed by time translation from moment B to C, is equal to movement of time from A to C. Hence time satisfies the product requirement of being a group. Corresponding to time movement from A to B, there should exist an inverse movement from B to A (time flowing backwards). Finally, there should exist the null movement, which would correspond to same movement being repeated again and again (time standing still).

One assumes that time has group structure, because group structure of time is related to energy conservation, which is a verified fact. But given our subjective experience of flow of time, from past to future, how is the group structure of time getting created [3]? Time does not stand still, therefore how does null element come about, alternatively, how can the same moment be repeatedly generated? Similarly, time does not flow backwards, so how does inverse movement from B to A (indicated above) get generated? Clearly, if time is linear (straight line), and its flow unidirectional, this cannot happen. Physicists try to wriggle out of

this conundrum, by making their equation, time symmetric, i.e., they allow bi-directional flow of time - a sort of two way traffic. This is clearly incorrect, because time flow is one way traffic. However, in cyclic time, group structure of time is preserved, even with unidirectional flow of time. This is easily seen as follows.

Time being cyclic, means each event has infinite number of copies in past and future. Each event has occurred infinite number of times in past and will recur infinite number of times in future. Thus null element or identity does exist for cyclic time, because there exist movements which repeat the same event, - after integral multiples of time cycle. Also for any movement from event A to B, there exists the inverse movement from event B to A, via transiting over the complete remaining cycle. Thus time has group structure if it is cyclic, even though its flow is unidirectional. Clearly, linear time does not have group structure, with unidirectional flow of time. This is a very important observation, for it establishes cyclic nature of time, on the principle of energy conservation, and irreversibility of arrow of time.

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## Chapter 7: Hypnosis of Body-Consciousness

Hypnosis is a state of consciousness induced by suggestion, in which the subject exhibits altered behavior, perception and thinking [1]. Method of coming out of hypnosis is somewhat similar to that of going into it - namely through suggestion. Under influence of hypnosis its possible to develop such high tolerance to pain that even medical operations, child birth can be carried out painlessly, without anesthesia. Such is the potential of personality transformation by hypnosis, that in stage shows by professional hypnotic entertainers, mature sedate middle aged men end up strutting and pouting on stage like rock stars. Even one's perception can be so altered, that instead of humans one sees sheep. One's response to external stimulus can be so altered so as to appear totally unconventional or extra-ordinary. Positive side of hypnosis is that one can use it to successfully overcome negative personality traits such as shyness, phobias etc.. Bed-rock of hypnosis is invioable faith by the subject, in the suggestion offered to him by the hypnotist. It is well known that children are specially susceptible and make good hypnotic subjects.

Hypnosis has been used by Freudian psycho-analysts to regress a patient to his or her early childhood, and re-live the experiences which made a deep emotional impact on him or her. The therapists then tries via suggestion to alter patient's response to those long past, traumatic experience, which are now a source of misery in patient's adult life. Some professional hypnotists claim to have the ability to take the subject back to relive his or her experience in womb and beyond - the previous births [2]! However, not all statements made by subjects regarding their evoked memories of past births appear to make sense, and it is regarded by some that the subject is subconsciously trying to please the hypnotist, and is actually inventing the memory of past life. The subject is interesting and debatable.

Title of this paper brings out the idea that one's concept of oneself, as imprinted onto one's mind during one's childhood, by repeated suggestion by parents, elders, relatives, siblings, friends, etc., - as a body with hands, legs, eyes, face etc., is nothing but a form of hypnosis carried out unwittingly by the above mentioned parties, and accepted, unquestionably by the trusting child. Neither are the parents and others to be blamed for that, because in their childhood, they themselves were subjected to the same treatment, and are themselves under "hypnosis of body-consciousness". It follows, that this is a socio-historical phenomena, which has made inroads into human society, over a period of few thousands years, as each one's original awareness of one's true form, identity and qualities diminished, and one had to rely on external sources of information for developing identity.

How's one to come out of "hypnosis of body-consciousness", and establish oneself in one's true identity, as a soul, as a non-material, imperishable, point of divine light. The process of coming out of hypnosis, as mentioned earlier, is same as that of falling into it - by repeated

suggestion and reinforcement - that I am a soul, a point of light, a powerful pure being, with all positive qualities, the conqueror of senses and sensual pleasure. This is also the method of conquering the vices, which are created by body-consciousness. This is the best method for having true lasting happiness, bliss and peace. While Brahma-Kumaris are occasionally criticized that their method of meditation is a form of self-hypnosis, they counter that they don't even know what is hypnosis or have never studied it. However, the right answer to such criticism is that, their method is the means of breaking out of hypnosis of body-consciousness - alternatively awakening from the deep hypnotic sleep of mistaken identity with body. Its not "hypnosis", but "breaking the hypnosis", into which the soul fell, firstly in early childhood of this birth, and proclivity for which, was there in the past births. Any claims of resemblance as such, to process of hypnosis, are therefore, a result of incomplete perception or understanding, of cure of disease of soul.

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## **Chapter 8: Applications of Karma**

### **1. Introduction.**

Here in is story of how karma operates in life [1]. It may be regarded as speculative application of karmic theory, (in a variety of settings and relationships), - and speculative because the examples quoted are either hearsay or a creation of imagination, rather than direct experience. Nevertheless, the logical justice of karma is brought out. It is based upon karmic philosophy of Brahma Kumaris World Spiritual University, which pre-supposes that for settlement of human karma, human souls can only be reborn in human bodies (and not that of other species)!

### **2. International Karma, and Demographics.**

Current demographic trends indicate small, stable or slowly growing populations for advanced countries, and large, rapidly growing populations of third world countries [2]. Accordingly, one has a relatively comfortable life in advanced countries, and a difficult life in third world countries. As per the philosophy of spiritual university, reason for increase in world population is influx of fresh souls from soul world (paramdham), onto earth, to play their pre-destined parts in the world drama - based upon this mind silencing theory of karma. One asks in which type of countries, would the souls take rebirth, given the fact that the new souls do not have any negative karmic accounts, and are destined to have a good beginning, in the first birth of their circle of rebirths? These new souls will have fresh keen intellects, strong healthy bodies, and an inclination to enter into family relations (karmic bondage) with like fresh souls. Its likely that the new souls take birth in developed countries, and as the soul gets degraded, it subsequently migrates into less affluent countries, in subsequent (human) re-incarnations. Coming into world drama play, at the fag end of world cycle, the new souls would rapidly pass through the various stages from that of complete purity, health, wealth and happiness, into a state of impurity, ill health, unhappiness, impure (ill-legal) or little wealth. This is rebirth and karma in international demographic trends with a spiritual base.

The fact that a big chunk of Indian population lives below poverty line, is a statement of bankruptcy of Indian souls [3]! India being an ancient country, its citizens of many births, have a vast and complicated history of slow built up of negative karma, which shows up as a poor life style, and which now has to be rapidly settled in a very short time. Frequent child deaths, foetal deaths in late pregnancy, are examples of rapid settlement of negative karma. On the whole this speaks of a rather bleak immediate national future, unless there is mass spiritual awakening of the Indian Souls, and they make efforts to settle their negative karmic debts through Rajyoga meditation [4].



Another possible speculative example of International Karma is the second world war, and the Hitler episode [5]. Europeans in past three centuries, had wreaked havoc on ancient societies of Africa, Asia, North and South Americas, in their attempts of colonization, world domination, driven by insatiable greed [6]. It is likely that the souls which had suffered in hands of Europeans, died with revenge in their minds, and collectively molded the mind set (collective consciousness) of the German nation, in a future collective reincarnation, when they matured before the time of second world war... Interestingly, Germany was one nation which did not participate in European colonization program, and thus the German nation became instrumental in rapid settling of huge negative karma of certain European nations. It is possible that Hitler's soul was actually that of the Indian Brahmin, who instigated the first Indian revolt of 1857, against Britishers, by soldiers of Indian army, when it was discovered that rifle cartridges being supplied by Britishers were coated with animal fat, which was sacrilegious to the prevailing Indian (Hindu) religious sentiment! Even now, there is a ban by Indian government on use of animal fat as emulsifier in chocolate, which is not the case with western chocolates [7]! Wrath of Hitler against Jews then becomes understandable, because the colonization missions were funded behind the scenes by rich Jews [8]! Use of Swastika on the Nazi flag designed by Hitler, is also a prominent pointer – to his Indian origin.

### **3. Tainted Talent.**

One usually acknowledges, that talent, intelligence, beauty, strength, etc., are God given gifts, to be used for welfare of all. However, there exists complete scope for their misuse, under the influence of evils of lust, anger, greed, attachment, ego, jealousy, hatred, etc... The karmic law is that any talent, increases through proper use and vanishes through disuse. For example criminal use of intelligence (the case of perfect criminal, or the perfect murderer), can lead to karmic providence with-holding gift of intelligence to the concerned soul in future rebirths. Same is the case with physical strength. There is an interesting real life case of a person who was born without right arm. He always used to wonder, why the providence had given him this handicap since birth. When he came in contact with Brahma Kumaris, and started practicing rajyog meditation, he was touched one day, that in his past life he was a butcher, and had been beheading animals whole his life, with his right hand, and was therefore reborn without a right hand!

A beautiful girl or woman, who misuses her beauty for personal gain, is likely to lose it in future births. Even during her present birth, decline of her beauty would be rapid, though she may try to arrest the decline through make up or even plastic surgery, which is the fashion among the old rich today.

### **4. Circuit of Love.**

Mixed doubles are among the better sights on tennis circuit. A recent Wimbledon mixed doubles champion pair was interviewed, and they were asked, about their love lives. They replied “why spoil a good thing?”. Though they hug and kiss after winning a match, but they know the line which should not be crossed. Though they both have their independent boy-friends and girl-friends, they refrain from indulging in sex with each other. Sex would spoil the friendship and rapport they have with each other, and their sporting performance would suffer. Its a tacit admission, that sex is negative karma. Sex short-circuits true love.

Next consider the case of a beautiful, ambitious, young girl, who wants to come up in life quickly, enjoy the good thing of life, so to say. She is likely to be drawn to a rich, powerful old man, because she clearly senses, that he has the money to supply her with her wants. In the process, she is likely to reject love of even talented, upcoming, young men, because she cannot wait for the young man to earn and become rich, while the best years of her life fly by. After, her marriage to the rich old man, when her material demands are satisfied, her heart would continue to yearn for tender love of her youth, and she would be tempted to get rid of the old man. The mind shivers to think about the things people do for a bit of gold, diamond, and bank balance. Here is an example of negative nexus, when lust and greed enter into a perilous partnership. Emergence of prostitution, as a social phenomena, is explainable on the basis of this negative nexus of lust and greed [9]. It has side effect of jealousy and anger in the heart of young man, who with a glass of drink in his hand, plans murder. How many murders, suicides, have occurred because someone gave his or her heart to another? Apparently, being influenced by another persons’ look, character, etc., is a negative karma, and will surely lead to suffering.

It would appear that heart is even more precious than life! One has life insurance companies, and even medical insurance for heart surgery, but there is no emotional insurance against a broken heart! History of human heart since past two and half thousand years is littered with these sad examples of treachery by loved ones. Thousands of songs, stories, movies, etc., have been based on this theme. If a person's beloved wife runs away with another man, the husband is heartbroken. He is likely to turn into a misogynist. In his future rebirth, he is likely to abhor the very idea of marriage, and would have a tendency towards sanyas (ascetic life). This is probably the main reason, why many saints have said that female is the doorway to hell. They are actually giving vent to their hurt feelings, by making a rather unbecoming generalization. The same would apply to the case of a devoted wife, whose husband leaves her for another woman. She would be very angry, and likely to seek refuge as a nun, rather than risking a marriage, in her next life. Thus rebirth and karma, tends to explain certain behavior patterns, discernible since childhood. Such tormented souls give rise to moving pieces of poetry, music, paintings, which bring silent unexplainable tears in eyes of a sensitive audience.

A major reason for discord in relationship of husband and wife, is when one senses the spouse flirting with another person. At the present fag end of world cycle, all of us have subconscious memories of faithlessness of someone we loved truly, in a past birth. Hence slightest indication of flirtation in a life partner, sets uncontrollable emotional tidal waves

rolling in the heart. This is probably the main reason for escalating divorce rates the world over! In turn, the pain of a person, on treachery of a beloved is a source of settling of severe karmic account. Thus, if a soul wanted to inflict severe pain on another, it would be become a beautiful lovable wife who runs away! I know the case of an Indian mathematician of international repute, who has become a mental case, because his wife ran away with another. Father of an acquaintance of mine committed suicide because he could not bear the thought that his wife had left him and was staying with her childhood sweetheart. Another friend of mine had to seek a painful divorce, when her husband insisted on spending nights with a former sweetheart. Ground for innumerable cases of divorce is faithlessness or adultery on part of partner. In this world where the slogan of souls seems to be to give sorrow and take sorrow, it would be foolhardy to take emotional risk of giving one's heart to another, with heartbreak guaranteed. The world has become "Hotel Heartbreak" so to speak. The correct response will be to treat one's partner (if one has any) as an actor in world drama play with her or his independent part, on which one has no control, and practice detachment inwardly. Even if the partner is faithful till life's end, death is definitely going to separate the hearts, leaving the surviving one with painful bitter sweet memories, from which death would be a welcome respite. That's why Baba (founding father of brahma kumaris) used to say "to eat sweets when mother dies, and to eat sweets when the wife dies/runs away". It makes sense to make God as one's sweetheart, because his love is pure, and free from impure desires.

These are examples, of settling of karmic accounts through man-woman relationship. Karmic accounts are also settled through other relationships. Consider the example of a perennially sick child of rich parents. They spend an untold amount on medical treatment of their child, who finally dies young leaving behind heartbroken parents. You see rebirth and karma provide beautiful, imaginative ways for settling of interpersonal accounts. What court of justice could enforce such punishments!

## **5. Rebirths of Revenge.**

One hears stories of gang rapes, in which a woman is abducted by a gang and repeatedly raped [10]. She either dies in the process or is latter killed when the lust of rapists is temporarily satiated. This is one scenario. Another scenario is that of the psychopathic serial killer, who abducts young girls, rapes them and then murders them. There was a recent English movie "Silence of the Lambs", based upon this theme. Both scenarios are mind numbing but are repeatedly flashed in newspapers. Is there a logical karmic connection between the two? Consider the mental state of the woman who dies during the gang rape. With what state of mind would her soul have left the body, and what kind of life it would subsequently lead after rebirth. Similarly, her killer rapists, would be reborn a few years after her death, and will be much younger in bodily age, in the next birth, as compared to the present bodily age of the soul who left the body during gang rape. It is likely that the woman's soul who left the body during gang rape, is reborn in a male body, and matures into a psychopathic serial killer of young girls, who

are actually the reincarnations of past birth's gang rapists! My, My! Looks like, police and law are like dummies when it comes to settling of karmic accounts!

There is the interesting story of a teenage girl in Orissa, India. She was abducted, raped and killed by three boys, when she responded negatively to advances of one of the three boys, because she was in love with another. Though the body was found the very next day, there was no clue to her killers. The soul of this girl entered the living body of her younger sister, and informed the police about her killers, and where they were hiding. The police followed the tip, and confronted the boys, where upon they confessed to their heinous crime! This is an example of soul seeking revenge through par-kaya-pervvesh (entering another's body)!

Another (ghost) story is that of a young newly married couple, who were traveling on a highway on a new motor-cycle which was gifted to the groom as part of dowry. The husband was not a very confident driver, and on a turning the motorcycle skidded and they fell. Husband survived but the young wife died on the spot. A couple of days latter, the grief stricken husband was traveling alone on the same motorcycle on the same road. On approaching the accident spot, he suddenly noticed a young bride sitting on the road and crying. He applied brakes, skidded, fell and died on the spot! (Marvelous, but who is telling the story?) Strong unfulfilled desires, sometimes make it impossible for soul to be reborn, and it wanders in the ether aimlessly, in a vain attempt to vicariously fulfill desire through a body which no longer exists.

## **6. Epilogue.**

To err is human, to forgive divine. Theory of karma suggests that there is complete scope of settlement of all accounts, without returning bad by bad. As the God says in Bible "revenge is mine". However, the karmic settlement of accounts is through the family, economic, mental and physical circumstance of future and present reincarnations. There is no need for God to subject the erring soul into a hellish fire. Right attitude to a brother soul, who is doing wrong to me is good will, co-operation and forgiveness. These elevated vibrations would fundamentally transform the other person, and their continuous practice requires unlimited patience and faith in God as one's protector. If I try to return wrong, with wrong, I am creating negative karma for myself - I can never take law into my hands. Author would like to apologize to reader, if he has disturbed his or her mind. But these are few ideas which he felt like sharing with others, and would welcome readers' comments, at SpARC, Gyansarovar, Mount Abu.

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## Chapter 9: What is Disease?

Complexity of human organism continues to baffle, the enquiring human intellect. Much though the human mind would like to bask in the warmth of past successes, but the new emergent forms of disease like AIDS [1], continue to elude solution, forcing the intellect onwards to more esoteric concepts. AIDS, as is well known, is marked by a complete failure of organism's immune system, as a result of which the diseased subject falls easy prey to infections such as pneumonia, despite the medical aid - which in normal circumstances, would have been sufficient to cure it. One wonders, then, whether the science has really understood disease after all, or there are still some aspects of the 'disease', phenomenon which require explanation.

Hahnemann [2], an 18th century German physician, and founder of Homoeopathy, went on to comment, that the cause of disease is not clear, even though he had a remedy to postpone the immediate physical suffering. Homoeopathic system of medicine [3] defies the widely accepted concepts of modern science, but nevertheless, efficacy of Homeopathy is well established - especially in the minds of the people, who had given up hope of relief through conventional allopathic medicines, but found a lasting cure through Homoeopathic treatment. Neither is this efficacy an effect of suggestion, as tests in curing animals through Homeopathy, have proved. But still efficacy of homoeopathic treatment is a source of continued wonder, to the mind trained in thinking of modern science. The fundamental point of conflict in Homoeopathy and modern science is that, when the medicine is diluted to the very high potencies, apparently not a single molecule of the original mineral should be left in the pills - still they work. And more the dilution, greater their effect. This point was the main reason for rejection of Homoeopathy by the scientific mind [4], and continues to remain - so much so that the papers on Homoeopathy are rejected by traditional scientific journals such as 'Nature', on this point alone.

Popper [5], the noted contemporary German philosopher of science has developed a philosophy of science, in which a theory is worth its weight of paper, only as long as it is not in conflict with an observation. A single observation in contradiction with theory, is enough to sound its death knell. Similarly, another noted contemporary American philosopher Thomas Kuhn [6], famous for his book 'Structure of Scientific Revolution', has commented, how new scientific ideas are a creation of new creative minds with little training in orthodox thinking prevalent at that time. These new ideas, he continues, meet stiff resistance from the conventional orthodox scientists, but are gradually accepted and assimilated by the scientific community over a period of time, as the gradual realization dawns that the new ideas are in better agreement with observation and the old set of concepts is actually in contradiction with observation. This ability to mold itself is the hall mark of scientific process and the scientific mind - but is an uncommon attribute in majority, and therefore the reason for intellectual resistance to new ideas.

When Hahnemann was developing his system of medicine, there was no well established theory of atoms or molecules - consequently no one objected that the very high dilutions that he was using would remove all traces of the original mineral. This objection to Homoeopathy is a relatively modern one. Modern atomic theory [7] of matter has come to be well established only in past hundred and twenty years or so. So the intellectual resistance to Homoeopathy is understandable in light of Kuhn's ideas, but how should one regard efficacy of Homoeopathy, keeping in mind Popper's theory for change in scientific theories? One possible logical conclusion would be that the atomic theory of matter may not be right. Other explanations have also been suggested, such as the so called 'memory of water'.

Let's examine the contrast between Allopathy and Homoeopathy, in their attitude to the disease, its symptoms, cause and cure. Homoeopathy regards the symptoms as different from the disease. Actual cause of disease verges on meta-physical in Homoeopathy. In contrast Allopathy considers disease, as being caused by Germs - bacterias, viruses. Though both systems acknowledge the role played by organism's immune system in onset of disease and its cure, but they differ on the proper action to restore health. Where as Homoeopathy tries to fine tune or bolster the immune system, Allopathy targets the germs. In Homoeopathy first there is disease, then there is lowering of immune response, which in turn leads to multiplication of various types of germs, which in turn cause the external symptoms. On the other hand, though Allopathy acknowledges that organism's immunity is lowered prior to disease onset, which allows germs to build up and cause symptoms, it contents itself to targeting the germs and disappearance of external symptoms. In recent years Allopathy has come to acknowledge the role played by mind in the disease process, manifest in the form of so called psycho-somatic diseases, especially related to stress. However, in absence of a well defined scientific theory of mind-brain interaction, there is little anyone can do, to explore the connection and its ramifications and consequences.

With this background, lets examine the fantastic phenomenon of AIDS. AIDS is especially relevant to our theme, because it is marked by the complete failure of immune system, which is universally related to disease - explicitly as effect of disease in Homoeopathy, and implicitly in Allopathy. Modern Allopathic scientific thinking has identified the so called HIV virus as the cause of AIDS. Once, the HIV virus enters a person's blood stream, body reacts by producing certain anti-bodies. However, the virus soon lodges itself in certain white blood cells, namely the so called lymphocytes and macrophages. These cells, as is well known are vital to immune system, and are responsible for killing infectious germs. At this point virus can no longer be detected in the blood, but traces of anti-bodies which were produced continue to remain, and are used in tests for detecting whether a person is sero-positive (infected by HIV) or not. Lymphocytes and macrophages cells carry the T4 protein on their cell membrane, which is used by HIV virus in entering them. After entering the cells, the virus sheds off its outer protein coat, and the viral RNA copies into host cell's DNA, using an enzyme called reverse transcriptase. Nothing seems to happen for some time after which due to certain unknown triggers (such as cell duplication, effect of ultra-violet radiation, certain infections or

growth factors) copies of HIV's RNA start getting created. This duplication rapidly leads to cell death, after which, the daughter HIV infect other cells, and the process of RNA transfer to host DNA, and latter uncontrolled duplication, is repeated. Thus a chronic shortage of these fighter cells arises, and leads to proliferation of disease causing germs and onset of AIDS. Another fact vexing research for an AIDS vaccine is that, the duplication process of HIV's RNA is not very accurate - consequently, every daughter HIV differs from its parent and sisters, in some aspects, such as protein coat etc.. So not only, an AIDS carrier (after the uncontrolled duplication of HIV starts) is having a variety of HIV viruses with different genes, which keep changing - but also the genes of HIV transmitted by an infected person to another person, differ from the genes of the viruses with which the first person was affected with. This makes it difficult to make a medicine effective against all HIV viruses, because, a medicine effective against a virus with a particular genetic makeup, would not work against those with another genetic makeup. Recently, it has been found out that there exists another HIV virus sufficiently different genetically from the previous known HIV virus, so as to deserve the label HIV2. It is suspected that a whole class of such viruses lethal to humans may be there, and in fact, there are many similar types of viruses causing diseases, even in animals. There are two points to be noted here -

- (1) HIV virus appears to be affecting the very cells which would have ordinarily killed other germs.
- (2) The period during which HIV virus is inactive, can be as much as many years, during which the infected person can infect other people also.

Now these facts are extremely intriguing. Here is an entity, a white blood cell which kills germs - a HIV virus enters it and stays quite for some time - then suddenly, one fine day this virus starts multiplying and kills it - goes into blood stream, infects other cells, and the cycle is repeated. It appears likely, that something has gone wrong with the white blood cells themselves which is allowing HIV virus to proliferate within and cause cell death, because till a certain point of time, that was not happening, in any of the infected cells. Thus if one postulates an internal cellular immune system, used by the white blood cells for self-defense, then it appears likely that in case of AIDS onset, it is this internal cellular immune system's failure, which is the problem (author's argument is reminiscent of 'wheels within wheels' and Russian 'dolls within dolls'). How do we correct this? How is it that cellular immune system of distinct and widely separated infected blood cells has failed simultaneously? What is that common denominator which is allowing cellular immune system of all the white blood cells to go hay wire? Even in other forms of disease, efficacy of white blood cells must be getting lowered simultaneously all over body, which lowers the immune response and leads to symptom onset. Since, this is occurring all over body, there must be some chemical, protein or hormone released by brain in hypothalamus-pituitary complex or some other gland, which is directly effecting efficacy of lymphocytes and macrophages. Which hormone is that? I think this can be answered by a comparison of hormones present in the blood of affected and



unaffected persons, and response of relevant white blood cells to those hormones. In fact, some of the drugs effective in delaying AIDS onset after infection, are actually proteins such as alpha interferon. Incidentally, the same hormone interferon [8], is also used in cancer treatment, a disease whose cause, modern science is slowly coming to grips with. Evidently, then a lot exists to be learnt in functioning of the human organism, and any complacency or narrow-mindedness on these issues, would only serve to delay the revelation of 'Truth'. One needs to formulate hypothesis, and subject them to experiment, to ferret, the 'hidden scientific truth'.

Hahnemann was of the opinion, that after all germs are also part of God's creation, and why should they be blamed for our troubles. He felt that blaming germs for the disease, was a result of confusing cause and effect - the disease is the cause and, the germs and symptoms are the effect. AIDS phenomenon seems to confirm Hahneman's intuition, since the infecting germ continues to be present without causing disease in healthy carriers. Same is actually the case with many other diseases. Also in diseases such as cancer, and auto-immunity diseases such as diabetes (in which insulin producing cells within pancreas - the so called islets of langerhans are destroyed by white blood cells) and certain types of arthritis (in which joints are attacked by white blood cells), there are no germs at all. Same is also the case in tumors (causing strokes) and fat deposits leading to heart attacks. Similarly, in diseases such as epilepsy, alzheimer's disease, parkinson's disease, again there are no germs, as is also the case with mental disorders such as neurosis, schizophrenia and psychosis. Evidently, germ theory is only applicable to a specific class of 'disease', and a broader explanation of 'disease' is required, so as to be applicable to general disorders of the human organism. From a scientific point of view, it will be therefore better to state that - fundamental cause of disease continues to remain unknown, though one does has certain cures and remedies, at the present state of human knowledge.

It is at this point, that one feels the need for an alternative explanation of the 'disease' phenomenon. May be the origin of disease is not physical at all - just like the origin of human personality is not the physical body or brain, but the metaphysical soul, regulating and acting through the body 'machine'. One would be tempted to state that disease is a worn out state of this body 'machine' through use, misuse, over use - that it is a natural consequence, just like wear and tear of car is a natural consequence of use over a period of few years. However, one finds the young and new borns also suffering, and infections and disease can occur in pre-natal period also. The 'used car theory' of disease therefore is misleading. One common observation pertaining to all disease, is the associated suffering of the person - the sheer pain and agony. Mind's ability of association leads one to wonder, whether the associated pain can give a clue to the origin of disease. It is through pain that the person becomes aware that something is wrong, and patient's description of pain is used by doctors for diagnosis. Now pain is something which the science fails to understand, even though it is among the causes which lead to emergence of the medical science. There is no instrument which measures pain of a heart attack, though there are instruments which measure the blood pressure, heart beat etc.. Therefore, pain appears to be the key to understanding the 'disease', because almost invariably, 'where there is disease, there is pain'. And when one experiences pain, of almost any kind, one

wonders, what did I do that I have to suffer this. Though one may not have an immediate or ready answer to this question, nevertheless, there must have been some action, some deed or mis-deed, for which this pain is the punishment. The very basis of legal systems of various types practised all over the world, is this 'crime and punishment', or 'one must pay for one's mis-deeds'. Unfortunately, the legal systems are limited in their scope of action, as they are on body-consciousness, and try to settle 'accounts' within the person's life span. The author does not have to emphasize, that numerous culprits finish their lives unpunished by law. What 'payment for their sins' did such people do? And such 'negative examples become motivation for others to keep on continuing with their 'negative tendencies'. It appears to escape one's attention, that there could be a 'natural law', unlimited in its scope, unlimited by the limitation of a single human life span, capable of acting across births, rebirths, and for which the maxim 'one cannot escape the law' truly holds - with the disease being just one means of doling out the right amount of punishment for a particular 'crime' [9].

From a spiritual point of view, the physical and mental suffering one undergoes during disease, is actually a consequence of our negative or impure past actions - and to some extent serve to relieve, the burden of past sins. A corroboration of this is the observation of Rajyogis, that they feel lighter and experience more powerful states of rajyog, immediately after, a period of sickness - suggesting that to some extent, the fire of disease served the purpose of purifying the soul. By these remarks author should not be misconstrued, to think that he heartily recommends suffering and disease. Author's point of contention is, that the physical disease with its symptoms and causes is secondary, whereas, the primary disease - the disease of soul is the false identification with one's physical self or body and its actions - and consequent thought, speech, actions, relationships and dreams, under impure possession by lust, anger, greed, attachment, ego, fear, sloth, jealousy, hatred, intoxicants and other vices. A doctrine explaining role of soul - the non-material self, in body's immune response in particular; and also the soul-body interaction, in general - is required to produce better doctors. Holistic medicine [10], is an attempt in that direction.

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## Chapter 10: Epistemology in Cyclic Time

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### 1. Introduction.

Evolution of events in identical cycles, has been a hall mark of ancient philosophical systems - right from American Indians, and Greeks, on one hand, to Indians, and Chinese on the other [1]. In more recent times, Poincare and Nietzsche attempted a mathematical formulation of the idea, which is now enshrined in mathematical physics as Poincare recurrence concept [2]. In the last quarter of twentieth century, isolated attempts to resolve certain problems of theoretical physics, using a cyclic concept of time have been made [3] - notable among them is Segal's cosmological model [4], which successfully re-interprets all observational evidence, hitherto attributed to big-bang cosmology. In this model, universe is closed - having topology of 3-sphere, and time cyclic. In this space-time, light rays return to their origin, after circling the closed universe in a single time cycle. Popper [5] cedes, that changes in knowledge occur gradually, but being an evolutionist, he feels that the changes began billions of years ago, many of which are inbuilt in the structure of our sense organs and brains - and that this series of changes in knowledge will continue indefinitely. However, provided one combines, Popper's concept of gradual change in human knowledge, with Poincare's concept of result of a series of changes being a cycle, one is lead to epistemology in cyclic time.

If one considers the possibility that human civilization has always been extant in this cyclic time, with number of generations of humans being a very large integer, then one is lead to the inescapable conclusion, that human knowledge, science and technology, also change in identical cycles. One is lead to ask the question, as to what is the driving force in this cyclic changes in human knowledge. As human knowledge arises by observation and interpretation, a function of mind and intellect, therefore, the driving force behind cyclic change in human knowledge, must be cyclic changes in perspicuity and purity of human mind and intellect.

As a striking example of evolution of knowledge in cycles (within a physical cyclic time), consider the conceptual status awarded to nature of earth, and earth's relationship with cosmos. Prior to Aristotle, as indicated in ancient Indian texts, earth was considered flat, and the universe rotating daily above this flat earth. Around about Aristotle's time the world view emerged, that various differences in Sun's latitude observed at different northern points could be attributed to a spherical earth. However, the universe continued to rotate daily around the spherical earth, in Aristotelian cosmology [6]. During the generations of Kepler, Copernicus,

and Galileo, the accumulated data on movements of astronomical bodies, lead them to conclude, that earth was not the center of universe, but was a planet, and rotated once around the sun every year, and this was the cause of seasons.

Both changes, the first one around Aristotle's time, and second one around Galileo's time, were based on the generally accepted validity of Euclidean geometry - fundamental assumption being that light travels in straight lines. However, geometry itself, underwent fundamental changes during 19th century, when it was realized, that alternatives to Euclidean geometry were possible, by modifying its axioms [7]. Notable among them was the work of Riemann, which laid foundation for Einstein's general theory of relativity [8]. One immediate result of general relativity was that light stopped traveling in straight lines, in minds of men, after confirmation of Eddington's solar eclipse experiment [9] on bending of star light near sun. Since then a number of solutions to Einstein's field equation for gravitation have been found. Einstein's original cosmological model had a 3-sphere universe, and an infinite time, and was called "Einstein's cylinder". Hopes of general relativists, that Einstein's field equations determine the universe's large scale structure uniquely were dashed to the ground by Godel's discovery of a rotating universe model [10], which though had a same local distribution of matter as Einstein's cylinder, nevertheless, differed remarkably from it in over all properties - most notable among them being that, Godel universe had closed time like curves, and it was possible for an observer to access its past in principle. Godel got around this problem of causality violation, by denying freewill to observers. Since then, a number of generalizations of Godel universe have been created, including those, in which universe is charged, and a constant electromagnetic field is present everywhere within universe [11].

Many modern physicists are of the view, that mankind is near climax of conceptual knowledge [12]. Such being the case, a believer of cyclic time, in which human observers exist eternally, is lead to ask the question, as to how, given the present state of human knowledge, will the humans revert back to the belief of universe rotating daily, above a flat stationary earth. This is an example of issues facing Epistemology in cyclic time. One possibility is that, through a series of artificial or natural calamities, mankind is reduced to a state deprived of its intellectual inheritance, and therefore, out of ignorance, such primitive world view prevails. There exists, however, an altogether, different, striking, possibility, which I find very exciting, and would like to share with you.

## **2. Rotating Universe models in General Relativity.**

As mentioned earlier, rotating Godel universe is a solution to Einstein's field equations. Behavior of light rays, in Godel universe, has the remarkable property, that light rays curve back, after traveling a finite distance perpendicular to the direction of rotation [13]. Thus imagine, a flat earth in Godel cosmology, with rotation axis perpendicular to the flat earth. A picture taken from a space-craft, above this flat earth in Godel cosmology, will show light

arriving at the camera, only from a circular patch - light from remaining parts of flat earth curving away from camera and never reaching it. This will generate illusion of sphericity, for one who assumes that space-time geometry near earth is basically Euclidean. Similarly, light from stars such as sun, will be accessible, only from a circular patch, on this flat earth, remaining parts of earth, being deprived, as the light curves away, as it approaches earth. At circumference, of this circular patch, light rays will be tangential to flat earth, thus explaining the apparent sunrise, sunset etc..

Further if such a rotating universe is charged, it will generate a magnetic field which reverses, periodically, as a result of quantum cosmological tunneling between two counter-rotating solutions of quantum gravity Wheeler-DeWitt equation [14], which describes such a universe. I have done some calculations [15] which show magnitude of this geomagnetic polarity reversal to be 157 degree, which is close to actual value measured from paleo-magnetic rock samples. My prediction of paleomagnetic intensity during transition periods also matches that observed in samples. Presentations of these detailed calculations would however, be beyond scope of this conference and paper. However, time is not cyclic in Godel universe, and universe also is not closed. These two objections can be overcome by what is called as "conformal compactification", [16] in jargon of general relativists, which make the time cyclic and universe closed, with other properties of Godel universe, such as rotation, and presence of closed time like curves, remaining intact.

Needless, to say a number of unresolved issues remain, before widespread adoption of a "quantum gravity rotating Godel universe", takes place - which will have to be tackled one at a time, as was the situation faced by Galileo [17]. Interestingly, it can be shown that notion of causality in Godel universe is actually consistent with implications of EPR paradox [18], which has been experimentally verified in recent times [19]. I am of the opinion, that if time is cyclic with eternal existence of civilized humans, then provided a catastrophe, which breaks the continuity of evolution of human knowledge, does not occur, then the quantum gravity Godel universe must be the best description of our universe. So I find epistemology in cyclic time indeed exciting, and welcome the reader to share in the churning on true nature of time (cyclic or linear) and its implications.

**Note:** *Dynamics in rotating Godel type metrics are so different from Newtonian dynamics, that if the universe is indeed having such a rotating metric, then claims of successful deep space missions, such as moon, mars landings etc., cannot be true - because if these claims are true then they are verification of Newtonian-Copernicus model!*

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## Chapter 11: Chess and Modern Thought

*Author's note: This article was written in 1995 and refers to Professional Chess Association, which existed between 1993 and 1996.*

Garry Kasparov, reigning champion of Professional Chess Association [1], says he is interested in study of how human thought has evolved through history. Such an interest is indeed becoming for the world champion of 'Chess', the most cerebral of all games. For chess, which was played in ancient India [2], has evolved through ages, alongside the changing trends in human thinking. Modern chess rules such as power allotted to pieces, are different from those in vogue 500 and 1000 years ago. One such rule is the power allotted to the piece, which is called 'queen' in western terminology, but is called 'prime-minister' or 'minister', in the original ancient Indian terminology. Previously the 'king', had significantly more powers than the 'minister' (or prime-minister), where as now, the queen or minister is the strongest piece on board.

Terminology 'queen' for the most powerful piece, in a game which is considered as intellectual substitute to physical warfare, is reminiscent of increasingly martial and dominant role being played by women, on world stage. One is also reminded in a lighter, vein of women prime-ministers such as Indira Gandhi, Margret Thatcher, and to a certain extent present American president Clinton's wife, with respect to the image of absolute power they wield, in chess board of national and international politics.

Another interesting interpretation of devaluation of King's mobility and power, and upgradation of 'prime minister's' power, in chess, is advent of era of democracy - when the King's lost their crowns and prime-ministers and presidents - elected representatives of people, became the power figures. Is it just a historical co-incidence, that this change in chess rules occurred, in a period of history co-inciding with budding thoughts of democracy in minds of men, about 500 years ago?

The version of chess recorded in the scripture Mahabharata [3], indicates the game being played by 4 persons - (two teams of 2 people - with players in same team co-operating with each other to win against the rival team). Further, the movements of pieces, or selection of the piece to be moved was governed by dice in certain versions. The level of social interaction, psychological aspects, co-operation, rivalry, risk taking, were at a higher levels in those versions. Thus not only was actual analytical skill of a person important, but his or her luck, as to outcome of the dice throw, as well as, the ability to use the uncertain outcome, in a coherent, planned manner, were also important. The ancient chess thus resembled real life, to a greater extent, than the modern version, which lacks the element of social co-operation, and inherent uncertainty. Does not this reflect, the actual change in moral values, man-kind has

undergone in past 2500 years or so - in the sense of unwillingness to accept natural course of events, or being unappreciative of another persons undesirable actions? Change from 4-person chess with two against two, to the modern 2-person chess, thus reflects emergence of intolerance, and unwillingness to live with others.

Use of dice, in ancient versions, was not merely a method of evoking uncertainty. Rather, it was an opportunity of mind controlling material uncertainty. The player had to calculate, as to which outcome of dice could be translated into a good move, and then "will" that particular outcome. His or her partner, if having a similar thought (telepathy), would then be able to mentally cooperate in willing that particular number of dice. Whereas their opponents, would try to will, a number which would force, a bad move, or not the best move. The fact is that souls, during their ancient incarnations, were purer, then they are in present modern day incarnations, and had greater controlling power over matter - elements and events.

Since events repeat in identical cycles, one can expect the ancient version of chess to reappear. It will be interesting to see, a toy or sports company undertaking marketing and advertisement of that ancient 4-player dice version of game, in these modern times. Such a version will be similar to present day card game of Poker, in its social context, to some extent - and may be called "**chess-poker**" or "choper", which surprisingly was the actual ancient name! If such an eventuality indeed happens, nobody will be able to deny that history indeed repeats itself.

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## Chapter 12: First Law of Motion in Time Cycle

Every high school student knows Newton's first law of motion, which states that every body continues in a state of rest or uniform rectilinear motion, unless acted upon by an external force. This law was actually initially formulated by Galileo [1] - Newton's original contribution lay in formulation of the second and third laws of motion. Second law states that acceleration of a body is inversely proportional to its mass and directly proportional to the applied force. While the third law states that action and reaction are equal and opposite and act on different bodies. These three laws form the basis of classical physics, based upon which other developments, of classical mechanics, celestial mechanics, statistical mechanics, have occurred. However, as shown below, this law leads to problems and conflicts when applied in conjunction with spiritual philosophy system of Brahma Kumaris World Spiritual University, which proclaims that events repeat in identical cycle every 5000 years. Cyclicity of events requires that all particles return to their original position at the end of time cycle, where as Galileo-Newton first law of motion would suggest that particles would continue to move in a straight line, and therefore at the end of time cycle, would be at a large distance from their initial starting point. How do we resolve this conflict? Clearly discussion is only for particles which do not collide or interact with other particles, throughout the time cycle, and thus are in preview of first law, which considers motion without forces.

Lets consider how the first law of motion should be modified, when the universe is repeating itself in identical cycles. Clearly, if time is cyclic, all particles should resume their original position, after completion of the time cycle. In the formulation of first law of motion, given above, this is not possible in a straight forward manner, and additional constraints are required. For example, if the universe is a higher dimensional sphere (hypersphere), with circumference such that, in a single time cycle, light particles (photons) are able to travel around the universe and return to their starting point, then at least light particles, have resumed their original position at the end of time cycle. However, particles travelling slower than light will require a longer time period to complete their circle of universe, and therefore will not be at their original position when the time cycle is completed. In a cosmological model with cyclic time, additional constraint has to be imposed on free motion of particles.

Since, incorporation of non-Euclidean geometry in physics, with advent of general theory of relativity, propounded by Einstein, concept of free motion of particles has been gradually redefined. If the space itself is curved, then straight lines do not exist. For example, on a plain, a stream of water can flow in a straight line. However, if the stream is on a mountain, it takes a curved path - the path of least resistance or obstruction. This is the concept of geodesic [2]. The curved path taken by a stream of water on a mountain is an example of geodesic motion. Thus what we require in cyclic time, is closure of all geodesics, i.e., closure of all particle paths in a single time cycle. What this means is, no matter what path a particle takes,

it should return to its starting point in a single time cycle. Thus a re-formulation of first law of motion, when no forces are acting on the particle, is as follows

*Natural particle paths are circles whose radii are directly proportional to product of particle's velocity and the duration of the time Cycle.*

The corresponding mathematical equation would be -

$$R = v T / 2\pi$$

where,  $R$  is the radius of the circle on which the particles moves,  $v$  is particle's velocity,  $T$  is the duration of the time Cycle, and  $\pi$  is the well known geometric constant - namely the ratio of circumference to diameter, of any circle. Thus the natural particle paths, or geodesics are velocity dependent circles. Now the beauty is that as the  $T$  tends to infinity (linear time limit), so does the radius of the circle. And in the limit, the circle opens into a straight line. This gives us the Newtonian straight line trajectory of the particles in linear time.

One guiding principle in this exercise of developing physics in cyclic time, is that as the size of time cycle tends to infinity, time assumes a linear character, and hence the laws, should assume a form, they have in linear time. This idea can be regarded as the correspondence principle between cyclic time, and linear time. That this happens in first law is clear, as the size of time cycle increases, size of velocity dependent circles also increases, and when time cycle size tends to infinity, the circles tend to become straight lines. Further, all the distinct possible circles, merge into a single straight line, in the limit. The law thus loses its statistical character in linear time. This suggests that the reason for controversy in understanding the probability in quantum mechanics could be because, it has been based on linear time. Even Newtonian mechanics in cyclic time is having a statistical character. A reformulation of quantum mechanics in cyclic time should be interesting.

Interestingly, ancient greeks believed, that natural paths of heavenly bodies were circles [3], rather than the Galileo-Newtonian straight lines. Their conclusion was based upon the apparent daily rotation of heavenly bodies around the stationary earth based on belief in Aristotelian cosmology. However, the Greek first law of motion, was based upon the 24 hour cycle of day and night. In contrast, our new first law of motion is based upon identical repetition of events in a 5000 year cycle also called as Brahma's day and Brahma's night, in spiritual philosophy system of Brahma Kumaris.

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## Chapter 13: Second Law of Motion in Cyclic Time

First law of motion in cyclic time states that inertial motion of particles is on a velocity dependent circle. However, what happens when the particles are interacting, colliding with each other? How is recurrence being ensured in presence of collisions, and forces, which modify geodesic motion defined in first law, which would otherwise ensure recurrence? This is purview of second law - namely, "motion in presence of forces". See [1]

It is clear, that where as some particles may interact, only a few times (such as weakly interacting neutrinos), other may interact many times (such as strongly interacting hadrons). There may be exceptional particles, which may not interact at all, due to sheer chance. Therefore, what is required is a simple rule, which will ensure recurrence, of initial position, velocity and acceleration of the particle, irrespective of how much it has interacted. This is possible by defining a second law of motion as follows -

*Disturbance of original pure motion of particle, induces a metric force on the particle, which is proportional to inverse powers of remanant time in the time cycle, and finally leads to restoration of the original configuration in a violent manner.*

What the law means is that motion of a particle after a collision is not the simple circular inertial motion defined in first law, rather, it is an accelerated motion which will restore its original position, velocity, acceleration etc., at the end of time cycle. The source of this acceleration, is attributed to the space-time metric which will define recurrence geodesic of the particle. Recurrence geodesic means, a geodesic, along which the particle's motion will lead to resotration of original configuration. Thus, the metric (defining recurrence geodesic) as experienced by a particle, will depend upon its past history, and critically on its initial configuration, at the start of the time cycle.

This disturbance of original pure motion due to interactions can be regarded as the natural mechanical entropy, which increases through out the time cycle. This mechanical entropy is reduced to original level, during the final violent movement of the particles, when the restoring metric psuedo-force becomes un-opposable by all other interactions. This final motion will be experienced as destruction, by sentient creatures. Thus in this second law, - destruction, entropy increase, as well as entropy restoration, - all are inbuilt. Entropy need not be introduced as an emperical idea in thermodynamics, which keeps increasing, but follows naturally from second law. Second law of thermodynamics (increasing entropy) [2] thus is inbuilt within second law of motion.

That this new second law of motion in cyclic time leads to conventional linear time second law, as the time period tends to infinity is also clear. Now, at any moment of linear time, the remaining time is always infinite. So a force proportional to the inverse powers of the remaning time, would be zero. In other words, as the size of time cycle tends to infinity,

restoring, metric pseudo-force will always be zero, hence subsequent motion of a particle after an interaction, will be the conventional inertial (straight line). Entropy will also keep on increasing, - there never will be a moment of entropy reduction. This new formulation also has a statistical character, in the sense, that there will exist a whole class of recurrence geodesics. It is likely, that proper development of this idea, would lead to cessation of distinction between Newtonian mechanics and quantum mechanics. Foundations of quantum mechanics therefore need to be re-examined in cyclic time.

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## **Chapter 14: Physics of the 5000 years Time Cycle**

### **1. Introduction.**

The concept of events repeating in identical cycles is strong enough to call for reformulation of known or accepted physical laws. The accepted corpus of physical laws is based on small space-time intervals, and implicitly assumes linear time. This approach even yields results which agrees quite well with experimental results. This is because for small time intervals, curvature of time may have only a small effect, and so may get hidden in error bar [1] of the experimental result. It could therefore be neglected, as a first approximation. However, we are interested in behaviour of matter over long time intervals, or rather over a time interval equaling the complete time cycle. Hence, we cannot apply linear time laws and expect to get repetition of events in identical cycles. So 'what must be laws for the world cycle', is the question that this paper addresses. Formulation of such laws is a first step towards a new physical theory, whose experimental confirmation would give scientific grounding to the world cycle concept. This would propel other branches of knowledge - biology, geology, genetics, history, linguistics, astrophysics and astronomy, towards new paradigm of 'world cycle', and usher in a scientific revolution, along the lines visualized by Thomas Kuhn in his book "Structure of scientific revolution" [2].

While, people in past have come to conclusion of possibility of universe repeating in identical cycles, nowhere, a scientific or rational attempt to estimate the size of time cycle has been made. Among the modern physicists, Poincare, championed the cause of an eternal Cosmos repeating itself in identical cycles, however, he could only establish what is now called asymptotic recurrence [3]. What this means is that given a system of finite number of particles, in a finite volume, the positions and velocities of all particles will be observed to repeat, if one waits for a sufficiently long time. This long time, could be even infinite - hence the name asymptotic (tending towards infinity) recurrence. Time period for recurrence is called Poincare period. An attempt to apply this idea to the whole universe, given the present state of knowledge of dynamical laws governing particle motions and interactions, yields astronomical high figures, of the order of billions of years at least. However, this cyclic time picture is not in complete accord with Godly Knowledge propounded by Brahma Kumaris - because the recurrence period in Godly Knowledge is only a few thousand years.

### **2. The "Correspondence Principle" between Cyclic Time and Linear Time.**

What must be the relation between laws in cyclic time and linear time? Clearly, linear time can be regarded as a special case of cyclic time, with time of repetition being infinite. This can be geometrically visualized as follows. Cyclic time is represented as a circle and linear time as a straight line. Now imagine the straight line touching this circle. As the size of circle increases, it gets closer and closer to the line. In the limit when the radius of circle becomes infinite, it coincides with straight line. This is well known geometrical result, that a line can be regarded as a circle of infinite radius. This suggests following correspondence principle between cyclic time and linear time -



*Laws of cyclic time should tend towards those of linear time, as the size of time cycle tends to infinity.*

This limit may be termed the linear time limit. This gives a clear clue to cross-check formulation of cyclic time laws, i.e., they should match the presently known linear time laws, when the size of time cycle is made infinite.

It should be clear to reader, that above correspondence principle is a most natural guiding light on this research. Other laws which follow naturally are discussed below.

### **3. Laws for Cyclic Change.**

Recurrence of all events in a finite time, means that the original configuration of universe is restored. As mentioned, this recurrence in finite time, is different from Poincare's asymptotic recurrence, which is based upon conventional dynamics. The right approach to solving the finite recurrence problem is, to re-work the behavior of particles, adopting the finite recurrence idea as a hypothesis or postulate. This yields the following dynamical laws for finite recurrence, in time period  $T$ , on which one would have to base one's equations of motions, and particle interactions -

1. *All particles return to their original position, with original velocity, acceleration etc., at the end of time cycle. This law is fairly straight forward. It also implies that -*

*(a) All particle paths are closed,*

*(b) Time taken by all particle to complete their closed paths is equal to recurrence time.*

2. *Total change of properties of any particle over a single time cycle is zero. That's how, the particle would have the initial momentum, energy etc., at the end of time cycle.*

3. *Change in movement from Point A to Point B on time cycle is inverse of change in movement from Point B to Point A. This time movement is unidirectional. Thus total change over cycle is zero.*

4. *Consider the case when Point A is very close to Point B, so that they are infinitesimally close to each other. Thus the distance between A and B is infinitesimal, while the distance from B to A is equal to complete time cycle minus an infinitesimal amount. The change between A and B can be regarded as instantaneous change. It follows from law 3 above, that this instantaneous change is reverse of change during rest of time cycle. This change could be in anything - energy, momentum etc., of a particle, during a collision or interaction and is negative of the change undergone, throughout the rest of the time cycle. That's how the total*

*change in the complete time cycle would be zero. This is an important constraint in cyclic time, but is missing in linear time.*

These laws appear to yield a basis on which a new physics compatible with new Spiritual Knowledge can be developed.

#### **4. Links between Space and Time.**

Next I consider issue of size of time cycle. I consider the special case of closed universe - i.e., in which particles do not keep moving indefinitely into space, but circle around the universe and come back to their starting point. The idea here is that -

*If duration of time cycle in  $N$  years, circumference of universe should be  $N$  light years.*

Since, light is conventionally regarded as the fastest material particle, it is required that circle of light in a single time cycle should have the size of few thousand light years. This therefore should be the circumference of the universe, in which matter exists. In turn, this figure gives a universe radius of about one thousand light years. This means all the astronomical distance calculations would have to be revised, keeping in mind curved nature of space and time, rather than assuming them to be flat.

#### **5. Size of Time cycle - Dirac's Large Number Hypothesis (DLNH).**

Dirac, one of the founding fathers of quantum mechanics, had formulated an interesting hypothesis, which follows -

*Ratio of universe radius and electron radius, equals ratio of electromagnetic attraction between electron and proton, and gravitational attraction between electron and proton.*

One obtains very large numbers when one takes these ratios. For example, universe (the biggest physical object) is much, much bigger than electron (smallest physical object), and hence the ratio is very high. Similarly, electromagnetic attraction between electron and proton is much stronger, than the gravitational attraction between these two particles. These large numbers turn out to be of the order  $10$  to power  $40$  (i.e., 1 followed by 40 zeros). While these numbers are not exactly equal, and cannot even be worked out precisely, only order of magnitude estimates are currently known. Dirac, used electron's classical radius (about  $10$  to power  $-13$  cm) in his equation, as a measure of size of electron, and obtained a figure of few billion light years for universe size. However, electron radius has recently been determined by so called Penning trap experiments [5], and yields a figure of  $10$  to power  $(-20)$  meters (decimal followed by 20 zeros).

These considerations suggest that the figure few thousand years for size of time cycle may have strong scientific grounding, which needs to be properly investigated. Main considerations to be established are the Dirac's large number hypothesis (DLNH) [4] - which as such does not have a rigorous foundation, but is only an empirical observation, and the relation between size of time cycle and size of universe. I am optimistic, that such a formulation is shortly forthcoming.

## **6. Eternal Particles.**

One may object that in this paper, we have not examined creation or destruction of particles, and have assumed particles to be ever-lasting. However, if there exist any fundamental particles, they are likely to be eternal. In any case, even Newton and others assumed eternal particles, while developing their dynamical theories, and so we can be excused in this enquiry. It may however be possible to take into account creation and annihilation of particles, at a future date.

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## Chapter 15: Faster Than Light

Einstein had suggested, following negative result of Michelson-Morley experiment [1] that speed of light was a universal constant, independent of velocity of observer, and further, no material signal could travel faster than light [2]. This postulate of constancy of velocity of light became foundation for special theory of relativity, and also lead to discovery of the famous formula  $E = mc^2$ , which became the basis for building of atom bomb. Theoretical physicists have been studying tachyons [3], hypothetical particles traveling faster than light. Tachyons have some very interesting properties, which are of interest not only to physicists, and philosophers of science, but also, spiritualists. In this paper, I narrate these properties of tachyons, and their relevance to spirituality.

Among the most interesting properties of tachyons, is that they travel, backwards in time. This special property comes, from the equations of special theory of relativity, in which time and space get mixed up, via observers' velocity and its ratio with speed of light. Among the other interesting effects of special relativity are, that as the velocity increases, the clocks slow down, lengths contract, the object becomes more massive. All these predictions have been verified experimentally [4].

The special relevance of tachyons to spirituality, is via, their superluminal (faster than light) property, specifically in the realm of thought propagation. It is felt that thought communication is not within the restriction imposed by the light speed limit, and must be superluminal. Thoughts therefore must be propagated on some sort of tachyonic waves, originating from the metaphysical soul. Baba says that thoughts of children reach him, even before they occur to the children. This statement is in complete accordance with thoughts being propagated on a tachyonic wave. Because as mentioned earlier, a particle traveling faster than light, propagates backwards in time, and therefore reaches its destination at a moment earlier than that at which it originated!

Interestingly, in brain science - there is what is known as "Readiness Potential". This is recorded on EEG (Electro-Encephalo-Gram), a few milliseconds prior to actual intent coming into consciousness - e.g. - intent of moving one's hand. Here again, backward time travel property of the Tachyons would be coming into play. The tachyonic signal generated by the soul in hypothalamus, would be affecting the readiness potential, prior to the moment, soul intends it.

Another interesting property of tachyons is in connection with what are called as black-holes. Reader may be aware, that black-holes are supposed to be holes in the fabric of space-time. In traditional physics a black-hole is created when a massive star starts contracting un-stoppably under its own weight, and finally it literally disappears from the physical universe, leaving behind a gaping hole in space, having a mass equal to that of the original star. For this to happen, the star must be more massive than what's the so called Chandrasekhar limit of stellar

mass - which is 1.4 times that of the sun. It was discovered by the Indian Nobel laureate Subrahmanyum Chandrasekhar. Indian physicist Negi and his co-workers in the Kumaun University, Nainital India, discovered that when a Tachyon falls through a black hole, it leaves this physical universe of three space-like and one time dimension, and enters a universe in which there are three time-like and one space-like dimension [5]. This happens because of so called “topological change” in technical language. This idea was used in the book “Superluminous Man” [6], by a French physicist (now late). This new meta-universe of three time-like and one space-like dimension may be identified with paramdham or soul world. This black-hole connecting physical universe with the meta-physical universe has been christened as “black-hole of Bangalore”, by an unknown editor of Mensa Newsletter, published from UK by International Mensa, while publishing one of my articles containing this idea. The route to soul world is thus through this black-hole. It appears that the sort of tunnel vision reported in certain near-death experiences, and the being of light encountered, may be experience of traveling through this black-hole. To actually emerge from the other end of this black-hole, one would have to travel faster than light, which meshes in with the experiences of high speed reported during near-death.

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## **Chapter 16: Consciousness in Cyclic Time, Axiom of Choice and Neuro-Biological Quantum Zeno effect**

*This paper accepted for poster session in "International Conference on Science and Spirituality", organized by "BhaktiVedanta Institute", in Calcutta, India - in December 1996.*

### **Abstract:**

*Role of axiom of choice in quantum measurement is highlighted by suggesting that the conscious observer chooses the outcome from a mixed state. Further, these outcomes must be pre-recorded within the non-physical conscious observers. It is suggested that psychology's binding problem is connected with Cantor's original definition of set. Influence of consciousness on material outcome through quantum processes is discussed and interesting constraints derived. For example, it is predicted that quantum mechanical brain states should get frozen if monitored at sufficiently small space-time intervals - neuro-biological version of the so called quantum zeno effect, which has been verified in domain of micro-physics. Existence of a very small micro-mini-black-hole in brain is predicted as a space-time structural interface between consciousness and brain, whose vaporization explains mass-loss reported at death during weighing experiments.*

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### **1. Introduction :**

Consciousness is probably the most difficult problem attempted by human scientific endeavor, and is developing into an eclectic discipline. In this paper, I introduce certain new set theoretic ideas (among others) in the already inter-disciplinary field of consciousness studies. As I am writing this paper as a representative of "Brahma Kumaris World Spiritual University", Mount Abu, India, and will be attempting a solution within their philosophical framework, therefore, right at the outset, I shall clearly state relevant points of their philosophical stance.

### **A. Nature of Consciousness :**

Conscious observers are different from brain and bodies, but interact through them. This is identical to the dualistic school of thought, with Eccles [1] as a representative. This apriori does not rule out emergence of temporary consciousness in matter, as a result of various postulated mechanisms [2], such as Bose-Einstein condensations, or self organizing behavior, or phase locked dynamical neural networks, strange attractors etc.. Whereas the material

consciousness is temporary (depending upon stability of the physical system), the non-material observer is eternal in time. This does not imply that observer is always conscious, or observer is conscious only in body. The term actually used by *Brahma Kumaris*, is the “*Soul*”, which is actually more accurate as consciousness and observation are temporary phenomena accompanying soul in certain conditions. Nevertheless, I shall continue to use the term, “*conscious observer*”, to represent soul, so as to be in scientific mainstream. Consciousness may thus be regarded as a common emergent property of both the observer, as well as matter. As can be seen, the stance is sufficiently flexible, so as to be compatible with many, almost diverging views on the subject, and may truly be termed as “*Non-dualistic*”. Conscious observers are distinct from each other, and inhabit the same (one) physical universe.

## **B. Nature of Time :**

It is probably unlikely that complete problem of consciousness can be solved without understanding nature of time. Time has been a subject of many monographs and papers [3] in physics. The unresolved issues here are -

I. *Arrow of Time*, i.e., its irreversibility,

II. *Origin of present moment*, alternatively the observed subjective distinction between, past, present and future, with conscious observers’ attention confined to present (light-like hypersurface), (ignoring out of body and similar psychic experiences [4], for the time-being).

III *Overall geometry of time*, i.e., cyclic or linear etc.[5].

*Brahma Kumaris* attribute *cyclic* nature to time, which modifies the structure of causality, i.e., it can be shown that cause and effect are connected by, what in set theory is called an equivalence relation [6]. However, this causal structure could be important, as it has been pointed out that EPR paradox [7], which has been experimentally verified in recent years [8], does suggest that causality is an equivalence relationship [9]. While this circular geometry of time, would appear to lead to the usual causal paradoxes of time loops in physics, such as killing one’s mother before one’s birth (or conception!) - the causal paradoxes are avoided by withholding free-will to the conscious observers or actors or participants (in the time cycle!). Thus, consciousness is only an observer of events pre-recorded within itself, in an over all cyclic time, within philosophical framework of *Brahma Kumaris Spiritual University*. Any apparent freewill is actually illusory.

Further cyclic nature of time blurs the distinction between past and future, as the two are globally connected. In introduction of his monograph, Zeh [3] quotes Lewis Carroll from the book “*Through the Looking Glass*” -

White queen to Alice “*Its a bad memory which works only backwards*”.

In cyclic time, a good or perfect memory, will be able to remember all events which the possessor (conscious observer) would have observed with in the complete time cycle.

I should add that while cyclic time has been a hallmark of ancient cosmological systems, Poincare and Nietzsche [10] did attempt a mathematical formulation of the idea at the turn of the century, and the idea has recently been evoked by contemporary mathematical physicists such as Segal, and others [11], with a view of solving certain problems of observational cosmological physics, and particle physics (macro and micro cosmos). *Idea behind introducing cyclic time concept is that if problem of consciousness is going to be solved [or the other way round], it may be so only in cyclic time - or what the mathematical physicists would call the  $S^1$  (circle) topology of time.*

## **2. Set Theoretic Connection**

Cantor defined set as “collection into a whole, of objects of our intuition or thought”. The definition is very psychological, and the phrase “collection into a whole” is of special relevance. The phrase actually implies simultaneous perception of constituent set elements as a whole. Even a sentence is understood only when perceived as a whole. Role of short term memory in verbal comprehension comes to mind when perceiving or comprehending very large sentences - here  $7 \pm 2$  chunks of short term memory are probably being used at various levels, and the sentence has to be read many times, before comprehension (collection into a whole) occurs. Interestingly  $7 \pm 2$  has been derived by statistical mechanical considerations, by developing so called Fokker-Plank equation of brain neurons [12]. I equate verbal comprehension with (verbal) perception, as such an equality is the reason for use of phrases such as “Now I see”, when verbal comprehension occurs.

While verbal perception occurring in sentence comprehension involves only a small number of elements, visual perception by contrast requires integration of a very large number of elements. Same can be said of other modes of perception, such as auditory, tactile, kinesthetic, olfactory, proprioceptive. Further, in the conscious experience of an observer, these various perceptions from different senses, are further integrated into a whole, which even has non-sensory components such as thoughts, memories, feelings, emotions. The complete momentary experience of a conscious observer is thus a set, in context of Cantor’s original definition. Further its a finite set, as it has a finite number of elements, as represented by finite number of brain neurons.

## **3. Quantum Mechanical Aspects**



Von Neumann [13] originally suggested that wave-packet reduction was occurring when the wave-packet was interacting with the conscious observer. Precise mechanism for this reduction by interaction with consciousness has never been worked out. On the other hand certain mechanisms for wave-packet reduction have indeed been worked out by physicists, e.g., -

I. Wave-packet reduction occurs when a coherent (unreduced) wave-packet approaches a system with infinite degrees of freedom (Hepp, Fakuda (14)).

II Wave-packet reduction occurs adjacent to a black-hole when a coherent state approaches it (Hawking [15]).

There exist other interpretations of quantum mechanics which try to do away with concept of wave-packet reduction all together. These include Everett's many world interpretation [16], Bohm's interpretation [17], various hidden variable scenarios [18] etc.. However, experimental evidence from quantum zeno effect [19], and EPR suggests that wave-packet reduction is a good concept to explain the results. I therefore assume that wave-packet reduction does occur, and further it is caused by conscious observer. What are the properties of consciousness which solves these quantum measurement problem? Let's refer to this set of properties of consciousness as **OM ( O - Observer, M - Measurement)**. Acronym OM has been selected, because of special significance word 'Om' has in context of search for one's true identity in ancient Indian philosophy.

von Neumann's model can be understood in terms of "*Quantum Measurement Chain*" (QMC). In this when an attempt is made to record state of say Schrodinger's cat, by a camera, the wave function of camera also passes into a coherent state. Same happens to the wave functions of film, human eyes, retina, brain neurons and so on. In von Neumann's interpretation, observer lies at the end of this quantum measurement chain, and leads to wave packet reduction of all the intermediary links (camera, brain, neurons) in this quantum measurement chain. This chain is originating at Schrodinger's cat. Its possible for more than one QMC to originate from the same system, e.g., when multiple observers are monitoring state of Schrodinger's cat. Such quantum measurement chains will be called linked.

Now, apriori there is no reason, why if consciousness is causing wave-packet reduction, it is not through the two mechanisms already outlined by physicists Hepp, Fakuda, and Hawking (above). In absence of any other description of process of consciousness causing wave-packet reduction, I accept what is not forbidden. Thus, as a conceptual agent responsible for wave-packet reduction, I attribute following properties to consciousness

**OM1** Consciousness is a system of infinite degrees of freedom

**OM2** Consciousness is associated with a black-hole.

#### 4. Black-hole in brain!

While popular notion of black-holes as massive astro-physical objects still awaits experimental confirmation, theoretical physics has moved ahead with concept of mini-black-holes, which are much less massive, and those which can be light enough to have mass of elementary particles, such as protons [20]. While the astro-physical black-holes are caused by gravitational collapse of stars whose mass exceeds Chandrasekhar limit, the concept of micro-mini-black-hole (MMBH) is more like a singularity or hole in fabric of space, i.e., its a place, where physical space ceases to exist, so to say. Its gravitational influence is negligible, being proportional to its mass, and so is its size. Its interesting because of its relativistic, quantum mechanical, and philosophical properties. The reader thus need not be alarmed, that all of his or her gray matter will be sucked down this infernal black-hole in brain.

There is an interesting philosophical reason for existence of a black-hole associated with consciousness in brain. While the soul or conscious observer, is regarded as a non-physical object, non-localizable in space-time, the present brain studies have almost localized it to be the region within brain. Black-hole provides a physical escape vehicle here for the non-material spirit. While the black-hole can be given physical co-ordinates, the area within the event horizon, of the black-hole, effectively does not belong to the physical universe - it lies beyond the physical, universe so to say. Thus conscious observer located within such a black-hole strictly speaking does not exist within physical space-time.

*In the event of physical death, the mind-body connection is severed, (e.g. Moody [21], and one experts this black-hole to dissolve, or evaporate by a mechanism, called "Hawking radiation" [22]. Its energy will be carried away by gravitational waves, and therefore will lead to a mass loss equal to mass of MMBH (few grams). Also effect of these gravitational waves generated at the moment of death, will be similar to high frequency acoustic waves, and would lead to cracking of any glass enclosure containing the physical body.*

Experiments verifying these phenomena have actually been done at the turn of this century [23]. The kind of tunnel vision reported in near death experiences, i.e., motion through a long dark tunnel, with light at the end of tunnel [21], is actually in accordance with optics near black-holes - an observer escaping through a black-hole would actually experience, similar tunnel vision!

Black-holes have many other interesting properties such as existence of local closed time like curves, [24] which could explain ability of clairvoyants to see past and future events, while existing within the physical body (by motion of point like conscious observer, on one of the local closed time like curves near MMBH). Black holes also provide a handle, or gateway to other dimension, and non-physical universes, which are of special interest *Brahma Kumaris*

and possibly other workers in *Transcendental*. Interestingly, tachyons (particles traveling faster than light) falling through a black-hole, leave the conventional physical universe of three space and one time dimension, and enter a universe with three time and one space dimension [25]. This latter universe or rather meta-universe, could be of special interest for actual meta-physical experiences.

## 5. Records within Consciousness

Apriori, von Neumann's interpretation of consciousness causing wave-packet reduction, does not determine, as to which particular outcome is actually selected. Neither do any other mechanisms such as Fakuda's Hepp's or Hawking's - all they do is reduce a coherent superposition of states into an incoherent mixture - actual outcome then being a psychological process of observation. Thus if embodied consciousness is monitoring quantum states of 10 neurons, and causing their wave-packet reductions, which leads to perception, and the complete momentary experience of that observer, then these wave-packet reductions must be recorded within the conscious observer, in a consistent fashion, and cannot be random because - random reductions, will not lead to the perceived order of the universe. Various laws of physics, such as those of continuity, conservation, invariances, etc., are result of perceptions, based upon these wave-packet reductions. Hence we can identity another property of consciousness -

**OM3** Recorded within conscious observer is outcome of all quantum measurements performed by it (as reflected in coherent brain states). These reductions are not random, but have a logical relation to each other, which is the basis for invariances observed in physics, and results of EPR and Bell's inequality experiments etc..

Now this selection of a particular outcome, from the set of all possible outcomes is another psychological process, which was encountered quite early ;in development of set theory. Its called *Axiom of Choice*. Briefly, it states that, given a set, there exists a choice function, which selects an element of the set. Only problem is, that while it is vital to almost all of mathematics, its use has lead to paradoxical *Banach-Tarski* theorems, involving duplication of spheres, and show that concept of additive measure is not sound. Details of how axiom of choice relates to quantum measurement process are mentioned in [28]

There exists another reason for records within consciousness, and evidence from it comes from following scenario reminiscent of EPR of quantum mechanics. The argument has a philosophical flavor - if distinct observers A and B separated by a space-like interval, observe state of Schrodinger's cat in an experiment at a particular instant, it is required that both should observe it either dead or alive. It should not be that observer A, finds cat alive, and observer B finds cat dead. Thus if wave function of Schrodinger's cat as represented in brain neurons of observer A is collapsing, due to a recording within A, this collapse is compatible with a similar collapse occurring in brain of observer B. To ensure this compatibility we require -

**OM4** Recording within conscious observers with respect to measurement performed on the same quantum system are mutually compatible. Alternatively, outcomes observed by observers lying at ends of distinct but linked quantum measurement chains, are compatible.

Support of EPR results of quantum mechanics for records within consciousness is as follows. Lets say that observers A and B are separated by a space-like interval, and perform measurement on a correlated photon pair. EPR results indicate that wave functions of both the photons are collapsing only at the moment of measurement, and the collapses are mutually compatible, which A and B will also notice, when they compare notes latter on. Now, there exists no way for observer A to send a signal to B, regarding his or her outcome, within the frame work of present day physics (light speed limit and all that). The question therefore exists, if the conscious observers A and B are indeed causing these distinct but correlated collapses, how is mutual compatibility being ensured? OM3 is thus related to OM4. This is also where cyclic nature of time may be playing an important role. In cyclic time, the same measurements would have been performed in all the past (infinite) time cycles, and identical outcomes would have been recorded, in all the time cycles. This geometry of time, appears to provide at least a chance for observers to compare note and correlate their outcomes. See [6] for a possible scenario of communication between observers in EPR type experiments using light like signals in cyclic time.

## **6. The Neuro-Biological-Quantum-Zeno-Effect (NBQZE)**

Readers would be familiar with ancient Greek Zeno's paradox [30], which questioned the concept of motion, by arguing that if an arrow in flight was being continuously observed, and occupied a position at every time instant, as to how could the apparent motion observed was actually possible? Though the paradox was resolved in continuum based classical mechanics, it has reappeared in grab of quantum zeno effect (QZE) - so christened by physicist Sudarshan [30]. Briefly, if a system is in state A, and about to change to state B, before it does so, its wave function (mathematical object describing its physical state), has to go into a superposition of states A and B, i.e., the system exists in a sort of (A+B) state. Now when a quantum measurement is performed on this superposed (A+B) state, the wave function collapses to either A or B. So, if the measurements are being performed sufficiently rapidly, the wave function of the system cannot evolve to first state (A+B) and than state B. As a result it remains frozen in state A. This effect is also called "watch dog effect", (thief moves only when watch dog closes its eyes), and the "boiled kettle phenomena", (kettle appears to boil over and spill, just when one's attention is diverted). Thus in terms of quantum mechanics, paradox of Zeno's arrow can be formulated and resolved as follows. Where as, wave-function of arrow, which also describes its position is evolving continuously, the actual act of wave-packet reduction, by monitoring or perception of a conscious observer, is a non-continuos phenomena. This is because the process of human perception requires a large number of photons from

Zeno's arrow to reach human eye and retina, where after a time delay, a signal is relayed to brain, and a quantum mechanical representation of arrow's (superposed) wave function is formed by observer's neurons. This quantum measurement chain of coherent (superposed) state collapses when the conscious observer perceives arrow's position, and is a non-continuous phenomena. Thus, in between these non-continuous perceptions, wave function of arrow can evolve to different positions. QZE has been verified for ensembles of atoms about to make electron transitions from a higher energy state to a lower energy state [19]. Monitoring at progressively smaller intervals, reduces actual number of atoms making the transition, in a given period of time.

Neuro-biological-quantum-zeno-effect (NBQZE), as the term suggests, implies that, if brain state of a person is being monitored at sufficiently small space-time scales, (by another person, with data being recorded onto say a computer, all of which is later examined by the experimenter), then neurons of the subject will not be able to evolve to a coherent state and make transition, to another state which would represent transitions from one perception to another. Thus person's subjective experience would be blocked. Even though external sensory stimulus may be applied, the subject would not report perception of the stimulus. The resultant state would be similar to highest states of meditation, which involve complete withdrawal of consciousness from the body and senses - effectively the consciousness has ceased to interact with the physical universe, and is no longer performing any quantum measurement - wave-packet reductions, in his or her brain are being caused by the experimenter, and are preventing brain state from evolving along with the wave function of the changing environment or universe.

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## Chapter 17: Contrast between Science and Spirituality

While it is felt that science and spirituality can be partners in progress, however there exist deep contrasts between their respective philosophies or doctrines. by "Spirituality", I mean, the Philosophical System of Brahma Kumaris. This miss-match between the two philosophical systems will have to be rectified, before a serious effort towards unification can be mounted. In this, *it is primarily the science, with its flexible approach towards creation of new concepts, which can play a more dynamic role - keeping spiritual philosophy as a guiding light.* This teleological approach unifying scientific analysis with spiritualist intuition, is likely to yield major breakthroughs. Aim of SpARC is to spiritually induce a scientific revolution. Following areas of contrast are identified with this aim. This list is by no means complete. Reader is encouraged to expand upon it.

### 1. Biological evolution.

While almost all scientists and branches of knowledge, have adopted biological evolution theory [1] as a paradigm, the spiritual framework considers an eternal civilized cosmos repeating itself in identical cycles. In spiritual framework, there is no evolution, but eternal existence of man and other species, whose characteristics change in identical cycles.

### 2. Astrophysics.

Astrophysicists [2] believe, that stars are fueled by gravitationally induced nuclear fusion reactions, and have finite life times. For example sun is supposed to be about 5 billion years old, and likely to last another 5 billion years. However, in spiritual philosophy, all stars, planets etc. are eternal. Some kind of re-cycling mechanism is required to keep stars such as sun eternally shining.

### 3. Geo-Physics.

(a) *continental drift.*

It is felt that drifting of continents apart from each other is a gradual slow moving plate tectonics phenomena, taking millions of years [3]. However, in the 5000 year cyclic time framework, the continental drift has to be re-examined. Geologists do agree, that continents have split and reunited many times, in the past. This idea has to be developed in cyclic time framework.

(b) *geo-magnetic reversals.*

Geomagnetic reversals [4] again is supposed to be a slow phenomena, with the actual process of reversal taking many thousands years. The period intervening between geo-magnetic reversals being to the tune of millions of years. However, in spiritual cyclic time framework, geo-magnetic reversals occur during transitions between day and night of Brahma. Some geologists agree that mechanism of continental drift is related to sea floor spreading, where bands of reversed polarity magnetic field exist.

(c) *Geography.*

Studying science of Geography [5], it is essentially felt, that almost complete knowledge of earth, ocean, sky, etc., has been obtained, from a conceptual viewpoint. However, in spiritual framework, it is not possible to find the ends, or limits of ocean, or earth or sky.

#### **4. Linguistics.**

(a) *Origin of Language.*

In evolution paradigm, language arose from gutterings of primitive man [6], where as in spiritual cyclic time framework, language is an eternally existing phenomena. Original single language of the united world civilization, underwent, multiple lingual evolutions, when the original world group broke apart. Some linguists do agree, that there exists evidence, for a single mother language spoken through out world, at a certain point in world history.

(b) *Infant lingual prowess.*

Presence of Universal Grammar [7] and kernel of lingual knowledge in the new born infant, is a source of mystery, occasionally attributed to genes. However, in spiritual framework the kernel of lingual knowledge resides within the non-material soul, and different languages prevalent in the world today, are material realizations of this non-verbal kernel.

#### **5. Cognitive Science.**

Cognitive science [8] is a new science combining elements of psychology, neuro-science, physics, and computer science.

(a) *Consciousness and Intelligence.*

The scientific community is divided on this issue. The views range from, the origin of consciousness and intelligence being entirely material, to their origin being entirely metaphysical, with bulk of scientific community favoring the former. Spiritual philosophy says that the two originate from the non-material soul, and require a material basis (brain) for their expression. This approach allows for development of physics of soul-matter interaction.

## **6. History.**

While traditionally mankind's past is divided into two periods - pre-historic and post historic, the dates attributed to the events clash strongly with the spiritual 5000 year frame work [9].

## **7. Political Science.**

In political science [10], it is generally felt, that democracy is the best form of government. However, as per spiritual philosophy, benevolent monarchy is the best form of government. Only when the kings become impure, do they lose their power over subjects and democracy emerges.

## **8. Cosmology.**

In cosmology [11], it is felt that universe started with a big-bang, and will end either in a big crunch, or in heat death. However, in the spiritual framework, the universe exists in eternal stability, repeating itself in identical cycles.

## **9. Extra-terrestrial intelligence.**

It is generally felt, that there exists good chance of life existing elsewhere with in the cosmos [12], and that the so called UFOs are probably space ships of a vastly advanced civilization. However, in spiritual philosophy, life exists only on earth. Souls however, in a certain sense can be regarded as Extra-terrestrial intelligence, as they come from soul world, a realm beyond the physical universe. Regarding UFOs, Carl Jung, proponent of concept of collective unconscious, identifies them as a wish-fulfillment device of collective unconsciousness, as a sort of divine rescuers of man-kind - a source of salvation of society [13], [14]. In the spiritual framework, enlightened souls will be seen as lights similar to UFOs radiating peace and bliss.

## **10. Physics.**

### *(a) Thermodynamics - 2nd law - increasing entropy.*

Second law of thermodynamics [15], says that entropy, a measure of dis-order of the system keeps on increasing. In this view, entropy of universe keeps on increasing, with local decreases of entropy being compensated with much larger increases elsewhere. This law is incompatible with spiritual cyclic time framework, because the entropy level has to remain constant after each time cycle.

### *(b) 1st Law of motion.*

First law of motion [16], states that natural particle paths are straight lines. This however, is not compatible with spiritual cyclic time framework, because particles never return to their original positions. So the first law of motion has to be reformulated as - natural particle paths are circles whose radii are directly proportional to velocity, so that all the particles are at their original position, at end of time cycle.

### *(c) Geometry of Time.*

Conventional science attributes a straight line (linear) geometry to time, where as spiritual philosophy attributes geometry of circle to time [17].

## **11. Medicine.**

### *(a) Life after Death.*

Experiences reported during clinical death, and near death experiences [18], are a source of divide in medical community - with the hard-core materialists insisting that they are hallucinations of a dying brain. However, in the spiritual framework, these experiences confirm existence of soul as a non-material entity surviving bodily death.

### *(b) Origin of Disease.*

Traditional science regards cause of disease as either biological - e.g., germs, bacterias, viruses, or non-biological (but nevertheless still material) - such as injury, accident etc.. [19]. However, in the spiritual framework, the disease, is actually nature's punishment for negative actions. This view actually comes very close to that of Homeopathy. Hahnemann, father of Homeopathy, said that, disease arose when mankind deviated from God's laws. This seed of disease he gave the name psora - which he said is increasing from generation to generation.

## **12. Philosophy of Science.**

In philosophy of science [20], it is felt that scientific knowledge was limited or nil in past, and will keep increasing with time. However, this conclusion is based upon assumption of linear time. In cyclic time scientific knowledge also changes in cycles - and there exists a point of time, when scientific knowledge is at its zenith.

## **13. Psychology.**

Present day psychology [21], attributes existence of personality to brain activity. However, in Spirituality the personality is associated with the Soul. Mind Intellect and Resolves are considered as manifestations of brain activity - where as in Spirituality they are the subtle powers of non-material soul.

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## Chapter 18: Mathematical Formulation and Physical Implications of Godly Knowledge – I

### 1. Introduction.

The esoteric knowledge revealed by Shiv Baba, can naturally be expected to have profound implications for the sciences. And it is quite probable that some of the outstanding and fundamental problems in the sciences find their natural solution, when concepts from Godly knowledge are incorporated in their formulation. Thus, explicitly working out implications of Godly Knowledge can become a means of Revelation of Baba. For Baba himself has said, that unless the Knowledge has been revealed, how can the revealer of the knowledge be revealed. Since of the three authorities (Religion, Governmental and Science), it is the authority of science which is considered as the authoritative source of information regarding true nature of reality, so such an approach, aimed at winning over the scientists, through science and silence can be very fruitful. In the course of this series, we shall be taking a grand tour of fundamental problems of physics and seeing their relationship with concepts of Godly Knowledge. A lay introduction to the needed mathematical concepts will also be given, as and where needed.

In the present paper, we shall be concentrating on topology, an abstract kind of geometry and how certain aspects of Godly knowledge can be expressed using topological concepts - i.e., topology for Rajyogis in the year of tapasaya!

### 2. Topology in the Year of Tapasaya.

Topology has been described as rubber sheet geometry, i.e. study of those properties of objects, which remain unchanged under elastic deformations, such as stretching, but not cutting and re-pasting. For example, a rubber band can be deformed, stretched etc., and still be used for tying the hair together at end of braid. However, if the same rubber band is cut or broken, it is thrown away. An intact rubber band can be deformed into the shape of an exact circle. Similarly, a broken rubber band can be deformed into the shape of an exact straight line. In the process of cutting the rubber band, the mathematicians will say, its topology gets changed from that of a circle to that of a part of st. line.

Topology of circle is represented by the symbol  $S^1$ , which means 1-dimensional sphere. Similarly, topology of surface globe is represented by the symbol  $S^2$ , which means 2-dimensional sphere. Sphere, as any school boy knows, is defined as the set of points equidistant from a fixed point, which is the centre of sphere. So on a two dimensional plane, one gets the circle  $S^1$ , the 1-dimensional sphere; and in three dimensional space, one gets the globe  $S^2$ , the 2-dimensional sphere.

Einstein was of the view that the physical universe was having the topology  $S^3$ , the 3-dimensional sphere. One property of all the spheres is that one can keep on travelling in a straight line, and still reach one's starting point, without turning back. Hence, there is the joke about the bald-headed astronomer, who once looked through a telescope and observed a strange looking planet, which on closer examination turned out to be his own bald head seen from behind. So, we can say that all straight lines on a sphere are really closed circles, reaching back to their starting point.

Topology of an infinitely long straight line is represented by the symbol  $R^1$ , the 1-dimensional Real Line. Just like one has  $S^2$ , the 2-dimensional sphere and  $S^3$ , the 3-dimensional sphere, one also has  $R^2$ , which is the flat plane, the 2-dimensional real space, and  $R^3$ , which is the 3-dimensional real space. Some scientists are of the opinion, that topology of physical space is  $R^3$ . In  $R^3$  space one can keep on going in a straight line for ever, without ever coming back to the starting point. So straight lines on a real space are not circles, unlike the case for great circles on spheres.

The straightest possible line on a space (whether a n-sphere or n-real space) is known as geodesic.

Since point is zero dimensional (the school boy's definition of point is an object that has no length, no breadth, no height), Topology of a single point can be represented both as either  $S^0$  or  $R^0$ ; as a single point whether regarded as zero dimensional sphere or as zero dimensional straight line remains a point.

Notice that one can draw circle  $S^1$ , the 1-dimensional sphere, on a piece of paper, which is two dimensional and having the topology  $R^2$ . Similarly, one can create surface of globe,  $S^2$ , the 2-dimensional sphere in 3-dimensional Real space with topology  $R^3$ . Generalizing, this to higher dimensions, one can say that a n-sphere  $S^n$ , can exist in the (n+1)-dimensional real space  $R^{n+1}$ . One may note that the letter 'S' in  $S^n$  stands for 'Sphere' and the superscript 'n' stands for number of dimensions. Similarly, the letter 'R' in  $R^n$  stands for 'Real space' and the superscript 'n' stands for number of dimensions.

The region inside globe, which is the 2-dimensional sphere  $S^2$ , is known as the 3-ball, i.e. a ball in 3 dimensions. Similarly, the region inside the circle, which is the 1-dimensional sphere  $S^1$ , is known as the 2-ball, i.e. a ball in 2-dimensions. Generalizing this to higher dimensions, interior of any n-dimensional sphere  $S^n$ , (which as pointed out in last paragraph, lies in  $R^{n+1}$ ) is known as the (n+1)-dimensional ball, or simply the (n+1)-ball in short.

The reader is cautioned that though the word 'Real' is being used in definition of  $R^n$ , but this word 'Real' has nothing to do with the actual 3-dimensional physical space in which we are



living. The terminology 'Real' is actually a hangover of the times, when mathematicians and physicists used to think that actual physical space is Euclidean, with zero curvature, and extending to infinity in all directions. Now of course their thinking is more complex, and the word 'Real' is meant only in an abstract sense for a space which is not having any curvature and is extending to infinity in all directions.

Whereas all  $R^n$  (for different values of  $n$ , e.g.,  $n=1$  or  $n=2$  or  $n=3$  etc ) are infinite in size,  $S^n$  are finite in size as  $S^n$  is the set of point at a fixed distance from centre. Both are different kinds of space. So, one can shoot the following question at those who think that soul is omnipresent in space "what is the topology of soul?". If at this point, the reader can make the definitive statement, that topology of time as per Godly Knowledge is  $S^1$  (circular), rather than  $R^1$  (linear), author shall consider himself qualified for teaching mathematics. Another possible statement is that topology of soul is  $S^0$  or  $R^0$ , (point like), instead of  $S^3$  (omnipresent in space, but finite in size) or  $R^3$  (omnipresent as well as infinite in size).

This much should do for getting started. Other concepts will be introduced as we go along.

### **3. Space-Time for Trikaladarshis and Trilokinaths.**

Everyone knows from experience that physical space is 3-dimensional, (because one requires three quantities to be specified while giving dimensions of an object - namely length, breadth and height). Similarly, time is one dimensional, because one number is sufficient to describe time. So spacetime is 4-dimensional; being the product of 3-dimensional space and 1-dimensional time.

A professional mathematician will put the concept of dimensions in the following way. Lets say that dimension of a space is the number of coordinates required to label a point uniquely. For example, a point on a straight line, the 1-dimensional space  $R^1$  can be specified uniquely by a single number. Similarly, to specify a point on a sheet of paper, the 2-dimensional space  $R^2$ , one requires 2 numbers -  $x$  and  $y$ ; while to specify a point in 3 dimensional space one requires 3 coordinates  $x,y$  and  $z$ . So the 4 dimensional spacetime requires 4 coordinates -  $x,y,z$  for physical space and  $t$  for time.

"Fine", you will say, "Dimension of spacetime is four indeed. Now will you kindly clarify what is the topology of actual spacetime in which we live".

The science is still trying to answer that question. For example, from Einstein's equations of General Theory Relativity it follows that topology of three-dimensional physical space can be  $R^3$  (open and infinite space) if energy-matter density is below a certain critical value. If the energy-matter density is above this critical value, the physical space becomes

closed and finite in size, having the topology  $S^3$ . This is something like taking a broken rubber band, and tying its ends together and making it a circle again. Contained in above remarks is the essence of general theory of relativity that energy-matter effects the curvature or geometry of spacetime. Current estimates of energy-matter density of the universe put the value about hundred times less than the critical value required for closure, but these estimates are not fool proof and could be flawed.

Topology of time is generally taken to be  $R^1$  (linear). But there have been scientists in comparatively distant past, for example Poincare and Zermelo who did consider the possibility of time being circular seriously.

Topology, Mathematics and Physics were not that well developed at that time (1900s) that their ideas could be rigourously proved or accepted by other scientists.

So, topology of spacetime is an open question as far as science is concerned. However, Shiv Baba's statement that events repeat in identical cycle suggests that topology of time is  $S^1$ . Author has derived a simple result that that if duration of time cycle is  $n$  years than size of universe should be  $n$  light years. Light as the readers must be aware travels at a speed of roughly 300,000 Kms/s. The distance travelled by light in one light year is called a light year. The topology of space (universe) in that case should be  $S^3$ , the so-called Einstein universe. So, topology of spacetime can be written as  $S^3 \times S^1$ ; where the factor  $S^3$  is indicating the topology of closed space and the factor  $S^1$  is indicating the topology of the closed time.

This is something fantastic. Just on basis of Godly Knowledge, we know topology of spacetime! And the size of universe than should be 5000 light years. This is another astonishing deduction. This also means that estimates of universe size being 10-15 billion light years (depending upon the particular observation) are actually flawed - overestimated by many orders of magnitudes; similar to the hyperboles regarding age of universe being 10-15 billion of years.

Fine so far. With this background and understanding, can we now say something about realms beyond spacetime - say about topology of Trilok.

#### **4. Topology of Trilok.**

Both subtle world and soul world are considered as existing beyond the physical universe. They also are beyond the limitations encountered in the physical universe such as that of space, time, speed, inertia etc. Again, Baba says, that subtle world has been created by Shiv Baba for the task of world transformation, and as to the question when has it been created, it cannot be answered. This is clearly because concept of time is operative only in physical world, where the point souls are playing their preordained part recorded within them. In the pictures of trilok, subtle world is shown to be in between and adjacent to both the physical and

soul worlds. To examine topology of trilok, we shall be starting with topology of physical world. To convey the idea in author's mind, first consider the circle, which is the one-dimensional sphere  $S^1$ . It has a centre, which does not lie on the circumference (naturally). And between the centre and the circumference, there exists space, which again is not part of circumference. Next consider the surface of globe or ball, which is the 2-dimensional sphere  $S^2$ . Again, it has a centre, which does not lie on the surface. And again, there exists space between the centre and the surface. Now consider  $S^3$ , the 3-dimensional sphere, which is the physical universe. It shall have a centre, which is not a part of physical universe (all points of physical universe are at equal distant from this centre, therefore, naturally, the centre of universe cannot lie within the physical universe). Similarly, there will exist space between the centre and the universe. This space is a very natural candidate for Paramdham, the Soul World. And, Dear Reader, who do you think must be at the centre. Does the answer Shiv Baba come to your mind?

This centre of  $S^3$  universe is a very natural origin for a coordinate system in which all points of universe can be assigned three angular coordinates. All motions can be defined with respect to this centre. And everything is with relationship to this special point.

So now we have a picture in which physical universe is having  $S^3$  topology, and paramdham is the interior (inside) of  $S^3$ , with Shiv Baba at the centre of  $S^3$ . Where is subtle world? A natural place for subtle world becomes, the region adjacent to physical world, extending a small distance, (may be infinitesimal) into soul world.

There exists another topology for physical universe which is consistent with all the ideas mentioned till now, and is related to  $S^3$  topology in a simple and elegant manner. For that we introduce the concept of so-called projective spaces. As before, for simplicity, we start with lower dimensions. Consider the circle  $S^1$  on 2-D plane (D is abbreviation for Dimension). Now draw a line passing through the centre. This line intersects the circumference at two diametrically opposite points. Projective 1-space  $P^1$  is the set of all such lines passing through the centre. Each of these lines connects two diametrically opposite points on the circumference of the circle. Thus, another way of defining projective 1-space  $P^1$ , is that, it is the space obtained by identifying antipodal (diametrically opposite) points on the circle. It can also be represented as a semicircle, whose ends are considered identical or joined. In a similar manner, one obtains the projective 2-space  $P^2$ , by identifying diametrically opposite points of  $S^2$ , the 2-D sphere.  $P^2$  can be pictured as a hemisphere with diametrically opposite points of the maximal circle being identified. And finally, in three dimensions, one obtains the projective 3-space  $P^3$ , by identifying diametrically opposite points of  $S^3$ , the 3-D sphere. In general, projective n-space  $P^n$  is obtained from n-dimensional sphere  $S^n$  by identifying points at diametrically opposite end. The reader may have noticed that the letter 'P' is an abbreviation of projective and the superscript 'n' indicates the number of dimensions.

Consider a particle moving in a 3-dimensional ball defined in section 2 on topology),

which is having  $P^2$  as its boundary. When the particle reaches the boundary, it reappears at the diametrically opposite end and continues to propagate within the boundary. This is the kind of behaviour encountered if the particle was moving in projective 3 space  $P^3$ . This gives a simple way of obtaining dimensional  $P^n$  from  $P^{n-1}$  is as follows: Consider the n-dimensional ball. Its boundary is the (n-1) sphere  $S^{n-1}$ , But if this boundary is replaced by  $P^{n-1}$ , i.e diametrically opposite points are identified, then the n-ball with  $P^{n-1}$  boundary becomes the projective n-space  $P^n$ .

So  $P^3$  is another candidate for the topology of physical universe. Paramdham then continues to be the interior of  $S^3$  from which  $P^3$  was obtained. Subtle world is then the area adjacent to  $P^3$ . This view has the advantage that physical world is below, or at one side of soul world (as has been shown in the original pictures drawn during Baba's time) (figure 13). Another appealing property of universe being  $P^3$ , is that such a universe appears as inside of a ball to the observers within, but that walls of this ball are such that any material particle in the process of trying to cross this wall reappears at the diametrically opposite end, and continues to propagate within the universe. It can not come out of the universe, even though the universe is finite. Only non-material souls and their thoughts (perhaps) can come out of universe and ascend to higher regions of soul and subtle worlds. Thus, with the Paramdham being a 4-ball and physical universe as  $P^3$ , the projective 3-space, the topology of cosmos (physical world plus Paramsham) becomes  $P^4$ , and we have the  $P^4$ , the projective 4-space as Trilok.

This topology of spacetime ( $S^3 \times S^1$  or  $P^3 \times S^1$ ) coupled with small universe size (5000 light years) has a number of consequences – especially for astronomy, cosmology, particle physics, quantum mechanics, solar models, relativity theory. The idea is that if we can resolve fundamental problem based on concepts derived from Godly Knowledge, then the truth of Godly Knowledge would be established in the eyes of Science community.

## Chapter 19: Does Science Prove Existence of God or a Super Power?

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Way back in 1949 or 50 when, as a student of Science, I was taught the Periodic Table of elements [1], I got the first feel of a scientific evidence for the existence of God. How come that we have a certain number of elements which could be arranged in a certain order? This was a source of immense thrill to me. Later, I came to know that it is these very elements that are found all over the universe – the planets, the sun, the moon, the stars, beside our own earth and sea.

We take it for granted such simple truths as the law of constant proportion. For example, the common salt which has the chemical formula NaCl will always have the same proportion of Sodium (Na) and Chlorine (Cl), irrespective of the place where you may find it.

Have you seen the crystals forming on evaporation of simple solutions? Once again, take the example of Sodium chloride whose solution will give cubic crystals. We have fourteen Bravais lattices [2] (see figure 19.1). All crystals have to belong to one of the seven crystal systems or one of the fourteen Bravais lattices. It is indeed interesting to know that when enough time is given to a molten salt to cool down it acquires the shape of a crystal. How does this happen? Are simple molecules thinking, living creatures? Who orders them to line up and get into a formation like army men or school children?

The kinetic theory of gases [3] has yet another story to tell. When hot, the molecules, under low pressure, fly apart and move in a random manner with a low probability of getting attracted towards each other. But when temperature is low and pressure is high, they meet to get attracted towards each other, leading to liquefaction. Further cooling results in solidification.

Wave-particle duality [4] is another highly interesting phenomenon, which points to existence of God. Way back in 1905, Einstein suggested that all forms of electromagnetic radiation, including light, which propagates as waves are absorbed and emitted as integral numbers of energy quanta. They transmit through space as particles called PHOTONS. Thus radiation can exhibit both wave and particle properties.

A particle of mass  $m$  moving with velocity  $v$  would be associated with a wavelength  $\lambda$  given by –

$$\lambda = h / m v$$

where,  $m$  is the mass,  $v$  is the velocity, (their product being the momentum) and  $h$  is Planck's constant. The validity of this equation given by de Broglie [5] in 1923 was experimentally proved by Davisson and Garmer [6] in 1927.

One of the most important concepts in physical science is the uncertainty principle [7] of Heisenberg according to which it is impossible to determine simultaneously the exact momentum and exact position of a particle. We don't see God and he assumes different forms!

We talk of nuclear energy. What is it? Physicists talk of a C-12 scale which measures the weights of atoms. Thus carbon atom is assumed to have a weight of 12 atomic mass units. One unit of atomic mass =  $1.66032 \times 10^{-24}$  gm. This atomic mass unit is also abbreviated as a.m.u.. Atomic nuclei are made up of protons and neutrons. Mass of one proton = 1.00782522 a.m.u., and of one neutron = 1.00807134 a.m.u. But, when we calculate the mass of an atom by adding the total mass of protons and total mass of neutrons, the actual mass is found to be less than this amount. Actually this missing mass is present in the form of energy known as NUCLEAR BINDING ENERGY given by the Einstein's equation  $E=mc^2$ , where  $m$  is the missing mass and  $c$  is the velocity of light.

It is this energy which is responsible for the enormous amount of energy released by a nuclear bomb.

All students of science know that the nucleus of an atom is positively charged and contains protons. These protons are huddled together inside a very small nucleus. Nuclei have a radius of about  $10^{-12}$  cm, where as the atoms have the radii of the order of  $10^{-8}$  cm. How is it that protons do not repel each other inside the nucleus? Actually the forces that bind the nucleons (collective term for neutrons and protons) together are millions of times greater than those which bind atoms together. Two protons at a nuclear distance undergo a repulsion of about 6 tons, but the nuclear forces attracting these very particles are at least 40 times as great, and actually  $10^{37}$  greater than the gravitational force between the two nucleons.

Nuclear forces [8] operate only over very short distances and vary greatly with change in distance. The force of attraction is maximum at about  $8 \times 10^{-14}$  cm. At a lesser distance, it changes into force of repulsion.

Nuclear forces are frequently called "exchange forces", because the forces between nucleons result from an exchange of energy or matter (or both), in the form of quanta of energy or units of matter, the latter being collectively known as MESONS.

George Gamow, a famous scientist and author of books on popular science, beautifully illustrates the operation of exchange forces by giving an example of two dogs fighting for a piece of bone. The dogs are the nucleons and the bone is the meson. The bone (mesons) is being exchanged continuously between the two hungry dogs and in thus binding them together. The exchange force can easily be calculated. The binding energy  $E$  between nucleons is about  $10^{-4}$  erg (erg is a unit of energy).

$$E = hv$$

(where,  $v$  is the frequency, and  $h$  is the Planck's constant). So,  $v = 10^{-4} / 10^{-27} = 10^{23}$  per second. The meson is exchanged at the rate of  $10^{23}$  times a second!

These are a few examples which indicate the beauty of nature and lead one to wonder about a beautiful God.

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Figure 19.1 – Bravais Lattices of crystals.

