

ABSTRACT

The essay attempts to probe the relationship between physics and mathematics in cosmological terms. It explains the big picture with the infinite captions of the subtleties, ambiguities, hidden assumptions, or even contradictions and paradoxes at the intersection of formal mathematics and the physics of the real world pertaining to complex adverbial thoughts of 'MAN'.

Exclaiming, "Nature is Science!"

Trick or Truth: the Mysterious Connection Between Physics and Mathematics

Physics is mathematical not because we know so much about the physical world, but because we know so little; it is only its mathematical properties that we can discover.

— **Bertrand Arthur William Russell, 3rd Earl Russell**

An Outline of Philosophy Ch.15 The Nature of our Knowledge of Physics (1927)

The famous Danish physicist and Nobel Prize winner, Laureate Niels Bohr (1885-1962), was a follower of the Vedas. He said, “I go into the Upanishads to ask questions.” Both Bohr and Schrödinger, the founders of quantum physics, were avid readers of the Vedic texts and observed that their experiments in quantum physics were consistent with what they had read in the Vedas.

Niels Bohr got the ball rolling around 1900 by explaining why atoms emit and absorb electromagnetic radiation only at certain frequencies.

Then, in the 1920's Erwin Schrödinger (1887-1961), an Austrian-Irish, who won the Nobel prize, came up with his famous wave equation that predicts how the Quantum Mechanical wave function changes with time. Wave functions are used in Quantum Mechanics to determine how particles move and interact with time.

In the 1920's Werner Heisenberg (1901-1976) formulated his famous uncertainty principal, which states when a physicist attempts to observe a subatomic particle, the experimental apparatus inevitably alters the subatomic particle's trajectory. This is because they are trying to observe something that is of the same scale as the photons they are using to observe it.

To be more specific, to observe something that is subatomic in size one must use a device (apparatus) that projects photons at the particle being observed. This is because the reception of photons by our retina is what we call vision. Basically, to observe something, we must bounce photons off it. The problem is that the photons disturb the subatomic particles because they are of the same size. Thus, there is no way to observe subatomic particles without altering their trajectories.

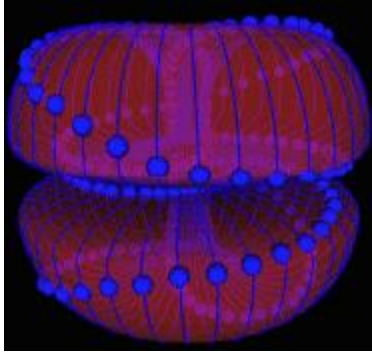
Bohr, Heisenberg and Schrödinger regularly read Vedic texts. Heisenberg stated, “Quantum theory will not look ridiculous to people who have read Vedanta.” Vedanta is the conclusion of

Vedic thought.

Furthermore, Fritjof Capra, when interviewed by Renee Weber in the book The Holographic Paradigm (page 217–218), stated that Schrödinger, in speaking about Heisenberg, has said: “I had several discussions with Heisenberg. I lived in England then [circa 1972], and I visited him several times in Munich and showed him the whole manuscript chapter by chapter. He was very interested and very open, and he told me something that I think is not known publicly because he never published it. He said that he was well aware of these parallels. While he was working on quantum theory he went to India to lecture and was a guest of Tagore. He talked a lot with Tagore about Indian philosophy. Heisenberg told me that these talks had helped him a lot with his work in physics, because they showed him that all these new ideas in quantum physics were in fact not all that crazy. He realized there was, in fact, a whole culture that subscribed to very similar ideas. Heisenberg said that this was a great help for him. Niels Bohr had a similar experience when he went to China.”

Consequently, Bohr adopted the Yin-Yang symbol as part of his family coat-of-arms when he was knighted in 1947.

Schrodinger wrote in his book Meine Weltansicht:

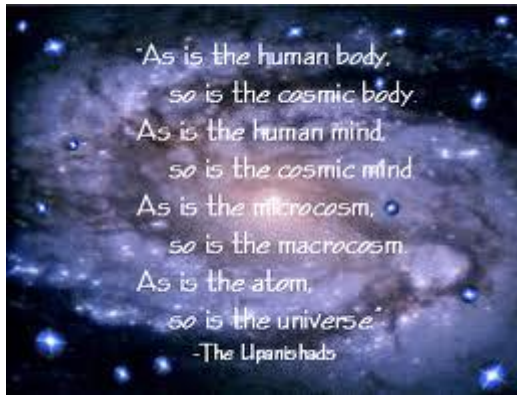


“This life of yours which you are living is not merely a piece of this entire existence, but in a certain sense the whole; only this whole is not so constituted that it can be surveyed in one single glance. This, as we know, is what the Brahmins [wise men or priests in the Vedic tradition] express in that sacred, mystic formula which is yet really so simple and so clear; tat tvam asi, this is you. Or, again, in such words as “I am in the east and the west, I am above and below, I am this entire world.”

*ब्रह्मैवेदममृतं पुरस्तात् ब्रह्म पश्चात् ब्रह्म उत्तरतो दक्षिणतश्चोत्तरेण ।
अधश्चोर्ध्वं च प्रसृतं ब्रह्मैवेदं विश्वमिदं वरिष्ठम् ॥ 2.2.11*

This is a reference to the Mundaka Upanishad mantra (above) in which the Vedic understanding of the connectivity of living entities is put forward to help the Bhakta (practitioner of yoga) to understand the difference between the body and the living entity. How the real nature of the living entity is realized only in union with the source, the supreme being (Brahman/Krishna) through a platform of transcendental divine loving service.

Schrödinger, in speaking of a universe in which particles are represented by wave functions, said, "The unity and continuity of Vedanta are reflected in the unity and continuity of wave mechanics. This is entirely consistent with the Vedanta concept of All in One."



"The multiplicity is only apparent. This is the doctrine of the Upanishads. And not of the Upanishads only. The mystical experience of the union with God regularly leads to this view, unless strong prejudices stand in the West." (Erwin Schrödinger, What is Life?, p. 129, Cambridge University Press)

*"There is no kind of framework within which we can find consciousness in the plural; this is simply something we construct because of the temporal plurality of individuals, but it is a false construction... The only solution to this conflict insofar as any is available to us at all lies **in the ancient wisdom of the Upanishad.**" (Mein Leben, Meine Weltansicht [My Life, My World View] (1961), Chapter 4)*



In his biography on Schrödinger, Moore wrote: “His system – or that of the Upanishads – is delightful and consistent: the self and the world are one and they are all... He rejected traditional western religious beliefs (Jewish, Christian, and Islamic) not on the basis of any reasoned argument, nor even with an expression of emotional antipathy, for he loved to use religious expressions and metaphors, but simply by saying that they are naive. Vedanta and gnosticism are beliefs likely to appeal to a mathematical physicist, a brilliant only child, tempted on occasion by intellectual pride. Such factors may help to explain why Schrödinger became a believer in Vedanta, but they do not detract from the importance of his belief as a foundation for his life and work. It would be simplistic to suggest that there is a direct causal link between his religious beliefs and his discoveries in theoretical physics, yet the unity and continuity of Vedanta are reflected in the unity and continuity of wave mechanics. In 1925, the world view of physics was a model of the universe as a great machine composed of separable interacting material particles, During the next few years, Schrödinger and Heisenberg and their followers created a universe based on superimposed inseparable waves of probability amplitudes. This new view would be entirely consistent with the vedantic concept of the All in One.” (Schrödinger: Life and Thought (Meine Weltansicht), p. 173)

In Schrödinger’s famous essay on determinism and free will, he expressed very clearly the sense

that consciousness is a unity, arguing that this “insight is not new...From the early great Upanishads the recognition Atman = Brahman (the personal self equals the omnipresent, all-comprehending eternal self) was in Indian thought considered, far from being blasphemous, to represent, the quintessence of deepest insight into the happenings of the world. The striving of all the scholars of Vedanta was, after having learnt to pronounce with their lips, really to assimilate in their minds this grandest of all thoughts.”

According to Moore on page 125 of his biographical work, A Life of Erwin Schrödinger, Schrödinger found “Vedanta teaches that consciousness is singular, all happenings are played out in one universal consciousness and there is no multiplicity of selves... The stages of human development are to strive for Possession (Artha), Knowledge (Dharma), Ability (Kama), Being (Moksha)... Nirvana is a state of pure blissful knowledge. It has nothing to do with individual. The ego or its separation is an illusion. The goal of man is to preserve his Karma and to develop it further – when man dies his karma lives and creates for itself another carrier.”

The above quote clearly demonstrates Schrödinger’s firm belief in reincarnation.

Schrödinger wrote in his book My View of the World: “In all the world, there is no kind of framework within which we can find consciousness in the plural; this is simply something we construct because of the temporal plurality of individuals, but it is a false construction....The only solution to this conflict in so far as any is available to us at all lies in the ancient wisdom of the Upanishad” (p. 31).

The Vedas teach that we are more than physical bodies operating according to the laws of physics and chemistry. We, the eternal conscious self (Atma), are inherently connected to the greater whole (ParamAtma), and this eternal inherent connection is totally transcendental to matter. All living entities (Atmas), having free will, are able to ignore this connection or recognize it. The Vedas teach us how to do both. When we act as scientists and look for facts and accept them and then go on to use and act according to our new realizations we can make great progress. Similarly, as living entities, we must scientifically study the great work of the evidential books of the Vedas in order to help us realize the facts of this universe and beyond, and our natural position in it.

Schrödinger explicitly affirmed his conviction that Vedantic jnana (knowledge) represents the only true view of reality, a view for which he was prepared to offer empirical proof (Klaus K. Klostermaier, A Short Introduction to Hinduism, p. 168).

Regarding mystical insights, Schrödinger tells us: “The multiplicity is only apparent. This is the doctrine of the Upanishads, and not of the Upanishads only. The mystical experience of the union with God regularly leads to this view, unless strong prejudices stand in the West” (Amaury de Riencourt, The Eye of Shiva: Eastern Mysticism and Science, p.78).

In autumn of 1925 Schrödinger wrote an interestingly personal account of his philosophy of life called Mein Weltansicht – My World View

He completed this in 1960. In chapter 5 of this book he gives his understanding of the basic view of Vedanta. He writes, “Vedanta teaches that consciousness is singular, all happenings are played out in one universal consciousness and there is no multiplicity of selves.”

Maya (illusion) is the cause of our faulty identification with this material world. In all the embodied forms of existence, Atma (the individual living entity) is fully able to at any time revive his forgotten, eternal and inherent connection with Brahman or Paramatma, the supreme self and source of all the living entities.

Schrödinger did not believe that it is possible to demonstrate the unity of consciousness by logical arguments. One must make an imaginative leap guided by communion with nature and the persuasion of analogies. He understood the nonmaterial eternal nature of the conscious self and how the Atman is intimately connected to the supreme.

In the 1920's quantum mechanics was created by the three great minds mentioned above: Heisenberg, Bohr and Schrödinger, who all read from and greatly respected the Vedas. They elaborated upon these ancient books of wisdom in their own language and with modern mathematical formulas in order to try to understand the ideas that are to be found throughout the Vedas, referred to in the ancient Sanskrit as "Brahman," "Paramatma," "Akasha" and "Atman." As Schrödinger said, "some blood transfusion from the East to the West to save Western science from spiritual anemia."

Cosmology, the universe is cyclically created and destroyed in the timespan of 8.64 billion years. The Hindu cosmology and timeline is the closest to modern scientific timelines and even more which might indicate that the Big Bang is not the beginning of everything, but just the start of the present cycle preceded by an infinite number of universes and to be followed by another infinite number of universes.

The Rig Veda questions the origin of the cosmos in:

"Neither being (sat) nor non-being was as yet. What was concealed? And where? And in whose protection?...Who really knows? Who can declare it? Whence was it born, and whence came this creation? The devas were born later than this world's creation, so who knows from where it came into existence? None can know from where creation has arisen, and whether he has or has not produced it. He who surveys it in the highest heavens, He alone knows-or perhaps does not know." (Rig Veda 10. 129)



Map 1 : Large scale structure of the Universe according to one Hindu cosmology



Map 2 : Intermediate neighbourhood of the Earth according to one Hindu cosmology



Map 3 : Local neighbourhood of the Earth according to one Hindu cosmology

The Rig Veda's view of the cosmos also sees one true divine principle self-projecting as the divine word, Vaak, 'birthing' the cosmos that we know, from the monistic Hiranyagarbha or Golden Womb. The universe is considered to constantly expand since creation and disappear into a thin haze after billions of years.

An alternate view is that the universe begins to contract after reaching its maximum expansion limits until it disappears into a fraction of a millimeter. The creation begins anew after billions of years (Solar years) of non-existence.

The puranic view asserts that the universe is created, destroyed, and re-created in an eternally repetitive series of cycles. In Hindu cosmology, a universe endures for about 4,320,000,000 years (one day of Lord Brahma the creator or kalpa) and is then destroyed by fire or water elements. At this point, Brahma rests for one night, just as long as the day. This process, named pralaya (literally especial dissolution in Sanskrit, commonly translated as Cataclysm), repeats for 100 Brahma years (311 Trillion, 40 Billion Human Years) that represents Brahma's lifespan. Brahma is regarded as a manifestation of Brahman as the creator.

In current occurrence of Universe, we are believed to be in the 51st year of the present Brahma and so about 156 trillion years have elapsed since he was born as Brahma. After Brahma's "death", it is necessary that another 100 Brahma years (311 Trillion, 40 Billion Years) pass until a new Brahma is born and the whole creation begins anew. This process is repeated again and again, forever.

Brahma's day is divided in one thousand cycles (Maha Yuga, or the Great Year). Maha Yuga, during which life, including the human race appears and then disappears, has 71 divisions, each made of 14 Manvantara (1000) years. Each Maha Yuga lasts for 4,320,000 years. Manvantara is Manu's cycle, the one who gives birth and governs the human race. before & after each manvantara there's a sandhikal as long as krutyuga & in that time there is all water on earth. Each Maha Yuga consists of a series of four shorter yugas, or ages. The yugas get progressively worse from a moral point of view as one proceeds from one yuga to another. As a result, each yuga is of shorter duration than the age that preceded it.

The current Kali Yuga (Iron Age) began at midnight 17 February / 18 February in 3102 BC in the proleptic Julian calendar (Year 6898 of the Holocene Era.) kalpa=ahoratra of brahma. Space and time are considered to be maya (illusion). What looks like 100 years in the cosmos of Brahma could be thousands of years in other worlds, millions of years in some other worlds and 311 trillion and 40 billion years for our solar system and earth. The life span of Lord Brahma, the creator, is 100 'Brahma-Years'. One day in the life of Brahma is called a Kalpa or 4.32 billion years. Every Kalpa creates 14 Manus one after the other, who in turn manifest and regulate this world. Thus, there are fourteen generations of Manu in each Kalpa.

*Each Manu's life (Manvantara) consists of 71 **Chaturyugas** (quartets of Yugas or eras). Each **Chaturyuga** is composed of four eras or Yugas: Satya, Treta, Dwapara and Kali. If we add all manvantaras(4320000x71x14)as long as 4 chaturyuga will be missing its because sandhikaal.after & before each manvantara so 15 sandhikaal The span of the **Satya Yuga** is 1,728,000 human years, **Treta Yuga** is 1,296,000 human years long, the **Dwapara Yuga** 864,000 human years and the **Kali Yuga** 432,000 human years.*

When Manu perishes at the end of his life, Brahma creates the next Manu and the cycle continues until all fourteen Manus and the Universe perish by the end of Brahma's day. When 'night' falls, Brahma goes to sleep for a period of 4.32 billion years, which is a period of time

equal one day (of Brahma) and the lives of fourteen Manus. The next 'morning', Brahma creates fourteen additional Manus in sequence just as he has done on the previous 'day'. The cycle goes on for 100 'divine years' at the end of which Brahma perishes and is regenerated. Brahma's entire life equals 311 trillion, 40 billion years. Thus a second of Brahmā is 98,630 years. Once Brahma dies there is an equal period of unmanifestation for 311 trillion, 40 billion years, until the next Brahma is created. During one life of Brahma there are 504 000 Manus (Vedic "Adams") are changing, there are 5040 Manus are changing during one year of Brahma, and 420 Manus manifest during one month of Brahmā.

The present period is the Kali Yuga or last era in one of the 71 Chaturyugis (set of four Yugas/eras) in the life one of the fourteen Manus. The current Manu is said to be the seventh Manu and his name is Vaivasvata.

According to Aryabhata, the Kali Yuga began in 3102 BC, at the end of the Dvapara Yuga that was marked by the disappearance of Vishnu's Krishna avatar. Aryabhata's date is widely repeated in modern Hinduism.

The beginning of the new Yuga (era) is known as "Yugadi/Ugadi", and is celebrated every year on the first day (Paadyami) of the first month (Chaitramu) of the 12-month annual cycle. But this is a disambiguation for beginning of new year in lunisolar calendar followed by most Hindus. The Ugadi of 1999 begins the year 1921 of the Shalivahana era (5101 Kali Yuga, 1999 AD). The end of the Kali Yuga is 426,899 years from 1921.

Overview of Yugas:

- 1. **Satya Yuga (Krita Yuga):-** 1,728,000 Human years*
- 2. **Treta Yuga:-** 1,296,000 Human years*
- 3. **Dwapara Yuga:-** 864,000 Human years*
- 4. **Kali Yuga:-** 432,000 Human years (as of 2009, 5,111 years have passed; 426,889 years remain). Kaliyuga started in 3102 B.C.*

Thus, the evolution of the Universe has resulted into many intertwinings of applied sciences and mathematics exchanging various vows in different sectors.

Foot-notes :

- * **Bertrand Arthur William Russell, 3rd Earl Russell**
- * *An Outline of Philosophy Ch.15 The Nature of our Knowledge of Physics (1927)*
- * *Quotations from simplified history of Quantum Mechanics on Vedic influence*
- * *Erwin Schrödinger, What is Life?, p. 129, Cambridge University Press*
- * *Mundaka Upanishad*
- * *(Mein Leben, Meine Weltansicht [My Life, My World View] (1961), Chapter 4)*
- * *(Schrödinger: Life and Thought (Meine Weltansicht), p. 173)*
- * *Moore on page 125 of his biographical work, A Life of Erwin Schrödinger*
- * *Schrödinger from his book My View of the World (p. 31)*
- * *(Klaus K. Klostermaier, A Short Introduction to Hinduism, p. 168)*
- * *(Amaury de Riencourt, The Eye of Shiva: Eastern Mysticism and Science, p.78)*
- * *1925 Schrödinger Mein Weltansicht – My World View (chp.5)*
- * *Einstein's statment in his letter from to Max Born, 3 March 1947*
- * *Einstein's The World as I See It (p. 24-28)*
- * *Rig Veda 10. 129*
- * *Aryabhata's Philosophical context*