

Modern Physics and Hindu Philosophy

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There are amazing similarities between implications of theories of modern physics and ancient Hindu philosophy as expressed in Vedas and Upanishads. The basis of Hindu philosophy is the mystical idea of Brahman. The Brahman is usually described by the words “Neti, Neti” meaning, not this, not this! When I went into study of physics, I realized that, as far as knowledge of ultimate reality is concerned, physicists are in exactly same situation as the ancient Rishis. Both cannot describe it in everyday language. In Mundak Upanishad, knowledge is divided into two parts: Para Vidya which deals with the eternal truth that can lead to self realization and Apra Vidya which deals with knowledge about material world. Under this classification, Physics might come under Apra Vidya. But, I would like to convince you that Modern Physics is also Para Vidya!

A number of early pioneers in quantum theory such as Bohr, Schrodinger, Heisenberg and later Bohm, were deeply influenced by eastern mystical ideas. A number of books have been written on this subject. Fritz Capra’s book in seventies on “The Tao of Physics” started the ball rolling. More recently, physicists Subhash Kak, Amit Goswami, John Hagelin (Maharshi Mahesh Yogi’s group) and some others have published extensively on this subject.

Now, I will describe briefly implications of some of the theories of modern physics for non-physicists. Physics which was discovered before the 20th century is known as classical physics which describes everyday physics like major parts of mechanics, heat, electricity-magnetism, optics etc which are used extensively in engineering and technology. At the beginning of 20th century, experimental data and certain inconsistency problems compelled physicists to accept two revolutionary theories: Quantum theory and Relativity theory. Physicists were forced to change their view of nature drastically as a result. Initially, there was immense reluctance to give up classical ideas. They were forced into quantum theory and relativity theory kicking and screaming. First of all, it was found that the world is not made out of rigid firm objects like billiard balls or bricks. At the atomic and sub-atomic level it consists of fuzzy wavelike objects and lot of empty space. So the solid nature of objects we see around is only apparent. As one goes deeper and deeper, one keeps on finding vacuum all the way. This reminds one of the ideas of sunyata and Maya or illusion covering the whole universe, as Adi

Shankaracharya said “Brahma Satyam, Jagat Mithya”. Brahman is the only truth; the world is a false illusion. Now, just like us, he must have seen solid bodies, rigid walls and trees. I believe he realized that all of this disintegrates and thus cannot be fundamental reality. Thus, because of the covering of Maya, one does not see the underlying real Brahman. (Previously, the concept of Maya from Mandukya Upanishad was emphasized by Shankaracharya’s spiritual grandfather Gaudapadacharya). Similarly, in physics, one sees only the material objects around and does not see strange quantum fuzzy world underlying all the matter. Moreover, the particles of modern physics are believed to be in some kind of suspended state devoid of any specific properties until they are measured. They are in some sense both here and there at the same time and are described by a wave function, a superposition of seemingly contradictory properties. Such a description is very similar to the description of Brahman e.g. in Ishopanishad: “It moves and it moves not; it is far and it is near; it is within all this and it is also outside all this.” Then the ultimate shock of quantum theory came when Bell’s theorem and subsequent experiments proved the so called entanglements to be right. In such cases, two or more atoms, electrons or photons demonstrate correlated properties even at distances where no communication is possible between them during the given time. These developments are the most important developments in the history of physics and perhaps in the whole of science. They give rise to the idea of the interconnected wholeness of the world and non-local interactions in contrast to the separate identities with local interactions. Thus atoms also exhibit holistic like properties and perhaps some primitive relationship to consciousness. So it is not proper to say that any analysis starting with atoms is reductionist and not holistic. The four Mahavakyas express similar concept about individual and Brahman. **Pragnanam Brahman** - "Consciousness is Brahman" (Aitareya Upanishad 3.3 of the Rig Veda) **Ayam Atma Brahman** - "This Self (Atman) is Brahman" (Mandukya Upanishad 1.2 of the Atharva Veda) **Tat Tvam Asi** - "That Thou art " (Chandogya Upanishad 6.8.7 of the Sama Veda) **Aham Brahmasmi**- "I am Brahman" (Brhadaranyaka Upanishad 1.4.10 of the Yajur Veda) . Thus Brahman is present in everything. This matches very well with the concept of modern physics that everything is made out of the same fundamental particles. Another basic finding of quantum theory is the involvement of the observer in the observed things. It is impossible to separate the effect of the measuring apparatus from the object measured. Detachment of the two is just not possible. Such an idea about the observer and the object of observation is also emphasized in Upanishads. It is behind the holistic philosophy about mind and body.

A leading current model of origin of universe assumes that there was total vacuum in the beginning and the universe arose from a quantum fluctuation. In this way something came out of nothing. At that time it was totally dark since light had not emerged from vacuum yet! Compare this model with the following quotation from Vayupuran about origin of universe. “In the beginning, there was nothing in the universe. The Brahman (the divine essence) alone was everywhere. The Brahman had neither color nor scent; it could not be felt or touched. It had no origin, no beginning or no end. The Brahman was constant and it was the origin of everything

that was destined to be in the universe and the universe was shrouded in darkness. “ Nasadiya Sukta (story of creation) also mentions that there was total darkness before creation.

There are strange facts in the theory of relativity also: It requires that measurement of time depends on observer’s motion and also the strength of gravitational field he/she is in. An often recurring mention in Hindu scriptures is that Brahma’s time is different from ours. When one hears about Arjun looking at the past, present and future in the mouth of Lord Krishna in Vishwaroop Darshan (Ch.11 of Bhagvatgeeta), one is reminded of collapse of the space time coordinate system near singularities of general theory of relativity. Also, it is well known that Hindu scriptures came up with the correct order of magnitude of the age of universe of several billion years, when other religious systems insisted on the age to be a few thousand years.

As an example of violation of conventional logic, let me mention one situation. Consider a simple logical inference such as: if in a roomful of 200 people, 50 have brown eyes, then 150 do not have brown eyes. Bell’s inequalities are based on such logical statements when applied to quantum objects. They are violated by experimental results on atomic systems. Conclusions from quantum theory agree with the experiments. Such a situation would correspond to Upanishad’s idea that Brahman cannot be understood by logic! If it can be understood, it is not Brahman! There is a story about two yogis. One meditated all day. The other one read scriptures all day. At the end of every day the second one always said “I do not understand. I do not understand”. Then one day, to the great surprise of the first one, the second one said loudly, “I understand. I understand”. The first yogi asked him with astonishment as to what suddenly happened. “Now you understand everything suddenly!” The second yogi replied “I now understand that this cannot be understood!”

Anyway, to me, it does not appear surprising that when one tries to put mathematical ideas of modern physics in human languages, they look similar to the philosophical ideas of ancient Rishis obtained after deep meditations. In fact it would be shocking if they did not agree. This would be true if e.g. the world was described by classical physics. I think the nature of reality is such that both parties were forced to adopt these ideas. As for Rishis, it is not clear when that classical to quantum transition took place or indeed if there was a sharp transition like modern physics. Some parts of Vedas are full of worship of natural elements like wind, water, fire etc and also picture Gods to look like human beings in the form of avatars. In some parts of Vedas and many Upanishads, we see clearly concept of abstract, omnipresent, invisible, eternal, transcendent and immanent Brahman who has qualities unfamiliar in our everyday life. Just as many things in everyday world are described by classical physics, concept of deities would correspond to classical concepts in our scriptures. There is nothing wrong with that. Concept of Brahman would correspond to quantum concept.

Now, a standard explanation for the seemingly bizarre behavior of particles in modern physics, which most physics professors tell their students, is that we are looking at the systems which are tens of billions times smaller than our everyday world. Thus we should not be

surprised that these do not correspond to our everyday life models and our everyday language may very well fail to describe these. One may argue that large objects like us consist of trillions and trillions of atoms. They have to approach classical limit. There is some truth in that. Crawling babies find out pretty soon that they cannot go through the walls like electrons. One caution against these arguments is that physicists have been finding quantum effects in larger and larger systems (such as lasers, superconductivity, superfluidity, Bose-Einstein condensation etc) and entanglements have been found at distances of several miles. Thus it is not clear that quantum mechanics is not applicable to large systems. Also, what about consciousness and thought processes? Is there something quantum mechanical about them? As a matter of fact many scientists such as Penrose, Hameroff and Stapp have suggested that consciousness in our brain may arise from atomic size domains and hence consciousness may be quantum mechanical in nature. Admittedly, these are preliminary models and currently there is no real understanding of consciousness.

Both modern physics theorists and Rishis reciting Upanishads were using their thought processes in brain. Obviously human brain evolved as human body evolved in nature. So one possibility is that some cognitive information about nature may be stored in the brain. A question for physics is that why mathematics works so well when our intuition based on everyday life fails. After all, mathematics is also creation of human mind. In fact, as I mentioned before, Bell's inequalities bring out in a superb way that conventional logic fails in quantum theory. Thus somehow mathematics describes systems which are outside our everyday experience. Similarly, why Rishis realized something in their meditations which went beyond their everyday intuitions? They were living in the classical world like everybody else in cottages, carrying out the usual human activities. In both cases the analysis looks irrational from the conventional logical point of view. Perhaps deep within our brain, there is some component which goes farther than experiences in everyday world. It is somehow sensing the so called "ultimate reality" which physicists have arrived at by using mathematics and Rishis arrived at by deep meditations. This may be like the story of several blind men touching different parts of an elephant and drawing different conclusions about the shape of the elephant.

Some time one hears the argument that internal world is different from external world. Even some Swamijis emphasize that material and spiritual world are different. I was never convinced by that argument. World is world. How can internal laws be different from external laws? My internal world is actually somebody else's external world! If we assume that the internal world cannot be independent of the external world, we have to conclude that this similarity in philosophical statements of modern physics and ancient Indian mysticism is not a coincidence. It must be the "ultimate reality" of nature. Most of the western scientists and many Indian scientists believe this to be merely coincidence without any significance. In fact some western scientists have ridiculed such similarities as accidental and misleading. I have been myself wavering for a number of years about whether this is accidental and forced association or genuine. Now I am convinced that it is a real association. I suspect there is an all pervading

holistic non-local layer which we may call Brahman. Part of our consciousness may draw on this. This connection may be what is called Atman. Non-local entanglements of atoms may be also related to this layer. Local interactions which one sees in physics and also in everyday life may be superimposed on this. These are much more prevalent. The main point of this article is that somehow sensory and non sensory aspects of the universe agree. A complete answer to these puzzles will come when we understand consciousness and its relation to the nature at large.

Some authors (notably Amit Goswami) conclude that consciousness creates reality including atoms. I have some reservations about this conclusion. From the perspective of Physics, it is well-known that quantum mechanical reactions went on during big bang and stars long before any conscious living being was born. So it is hard to believe this. Similar arguments can be made against Maharshi Mahesh Yogi's program of unified field of consciousness. The program of grand unified field theory of physics is nowhere near completion, especially as far as gravity and strong interactions are concerned. Also, scientifically we know very little about consciousness. It is really too premature to talk about a unified field of consciousness although it could be true. From the point of view of physics I would like to have a program to understand consciousness starting with atoms or elementary particles i.e. a bottom up approach rather than a top down approach. Starting with elementary particles, inanimate objects like rocks etc, then cells, plants, bacteria, animals and finally human beings would have progressively increasing consciousness. All of this will be related to the ultimate reality and it is our task to understand it. A well known physicist has talked about the search of a fundamental particle (Higgs particle) as "God particle" in a joking manner. But if the mystic association with Brahman is true then the joke would have a sense of reality and we may be closer than ever in our understanding of Brahman.

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