

# Understanding Mysticism through Quantum Physics

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**M**YSTICISM IS AN INNATE human capacity that manifests based on one's inner spiritual growth. It is not describable in terms of intellectual knowledge. It is the experience of eternal Self within, conditioned by our dimensionally-limited mind, intelligence, and egoism. Psychology, being the science of mind, comes closer to mysticism than physics, which is closer to biology. Two persons' mystical experiences cannot be identical. Swami Vivekananda said that religion is the only science taught as a science of experience, which is termed as 'mysticism'.<sup>1</sup> The book from which this is learned is one's own mind and heart. This is the real science of religion. But the mind is not an independent entity. Our body is the slave of our mind. The body and the mind, the controller of sense organs, together are tied to the law of causality, which in nature dictates with certainty. This mind, commonly identified as the ego, holds us captive in this world where time, space, and causation rule, thus depriving us of freedom.

Vedanta is a mighty investigation, a grand exploration into one's own inner world of the Self. It is a scientific quest into the basis and nature of our daily experience, and from an analysis of our daily perceptions, we come upon the profound truth of our life and existence. The supreme goal of human life according to Vedanta is to free this mind from the clutches of nature in the form of space, time, and causality, and is

commonly termed as moksha, meaning freedom. In the words of Aldous Huxley in *The Perennial Philosophy*, 'Man's life on earth has only one end and purpose: to identify himself with his eternal Self and so to come to unitive knowledge of the Divine Ground.'<sup>2</sup> A gross illustration of moksha is the escape velocity of an object from earth, whereby the object is freed from earth's gravitational pull for no-return. This occurs when the kinetic energy of the object—which is equal to half of its mass times square of the velocity—overcomes the earth's gravitational pull. Similarly, the mind, when it is voluntarily freed from that thralldom to the sensory system becomes purified, and this higher mind goes beyond the grip of space, time, and causality. So, by denying the senses one can enjoy the spiritual freedom.

Mystics seek the realisation of ultimate Reality or Atman, which comes after one has dispensed with all the enjoyments of the world of senses. Atman is inaccessible by the senses and the ordinary or lower mind, but can be known and realised by a pure mind cleared of all its attachments, both external and internal. Mystics are spiritual geniuses grounded in solid experience and intense self-sacrifice associated with moral greatness and physiological transformation. Intellectually-rich scientists might also have a solid experience of their disciplines but may not necessarily be established in the other two qualities. Though great scientists like Archimedes, Newton, and Einstein are often cited

as examples because of their so called 'mystical' experiences in the course of their discoveries, no such evidence is found for their being established in the latter two characteristics.

The strength of science is its objective experimental verification. But mysticism is a subjective realisation of the Truth underlying macrocosmic and microcosmic universe. The common ground between Eastern mystical insight and modern physics is the fact that in the former, one experiences through the investigation of the inner world, while in the latter, one experiences the outer world through objective investigation. However, our life is an indivisible whole comprised of both the inner and the outer worlds. One cannot live in parts and it is the incongruity of our inner life with outer worldly life that is the root cause of all our miseries. All our worldly actions are reflections of our inner self, therefore frequent synchronisation is necessary for harmonious living. Only a few great souls' inner world is near to the ideal, or *ritam*, the Truth. Most people's inner world is full of lofty desires and aspirations which often rush out through all that they think, speak, do, or do not do. Whatever we are in our inner world is expressed, voluntarily or involuntarily, in our external activities. Sri Ramakrishna said: 'If one eats radish, one belches radish.'<sup>3</sup> Thus, the inner and outer, together form our overall self.

Many discoveries in modern science, especially in the quantum physics, have broadened the scientific horizon and as a result many scientists now believe that the objective method and subjective mind are interrelated, intertwined, and inseparable. Erwin Schrödinger, one of the pioneers of quantum physics, proposed in his book *What is Life?* that, contrary to the beliefs of classical physics, our life is different from the inanimate world, inhabiting a borderland between the quantum and classical worlds.<sup>4</sup> Heisenberg's

Uncertainty Principle, being the base of quantum physics, is the prime ground leading to physicists' incorporation of the role of mind in objective investigation. We cannot restrain ourselves from unpleasant and undesirable affairs in life, though neurologists say the mind is colourless as it is independent of *motor control* or *neuronal potentials* unlike the brain.<sup>5</sup> Not sure what point he is making with this statement? Or how it relates to the cited source? 'Our perception of the world is relative to our neurological structure and the ways in which social conditioning has taught us to see,' said Alan Watts.<sup>6</sup> In other words, the mind is conditioned by our prejudice arising from past experiences. By detaching one's mind from this prejudice one can realise freedom. In the Bhagavadgita, the attainment at this state is termed as *sthitha-prajna*, meaning steady wisdom, breaking off all ties that bind one to this world.<sup>7</sup>

Physics deals with the phenomenal world of matter. The phenomenal world is studied using the principle of reductionism, whereby a complex system is analysed in terms of its component parts. But in quantum physics, in contrast to common belief, the holistic or macroscopic behaviour of the object is *not* determined by the microscopic behaviour of its constituent parts. The macroscopic universe seems to behave very differently than the microscopic. Thus, experimental discoveries made in the field of modern physics that could not be explained by classical physics, if taken seriously, require a paradigmatic change in our understanding of our relation to the phenomenal world. Quantum physics involves a conceptual departure from the reductionist view. The foundation of scientific knowledge has not only shifted, it has shattered! This is not an evolution in science, but a revolution, as Thomas Kuhn observed in 1962.<sup>8</sup> A prior paradigm-shift moved scientific theory from the

Ptolemaic system—the earth is at the centre of the universe—to the Copernican system—the sun is at the centre of the universe; the new shift is now moving from Newtonian physics to relativity and quantum physics.

There is a deep discrepancy between how we perceive the world and the way things really are. Scientists do not deal with Truth, but with limited and approximate descriptions of what is seen. Swamiji said: ‘Man is not travelling from error to truth, but from truth to truth, from lower to higher truth.’<sup>9</sup> While quantum physics, being one of the highest developments in modern science, is not explicitly similar to mysticism or spirituality, they share some common philosophical ground; both are concerned with subtle areas inaccessible to our senses.

Quantum physics incorporates three major characteristics: The subjectivity concept of Heisenberg’s Uncertainty Principle that denies the possibility of the objective study of reality; interconnectedness, where the part is determined by the whole, not the other way around; and a holistic and implicate order.

These latter two are also views shared by Eastern philosophy, where the world is understood to be ‘organic’ and all parts are interconnected and interrelated manifestations of the same fundamental reality. This is in sharp contrast to Western philosophy in which the world is perceived as a multitude of separate objects and events. The broad area of agreement between the Eastern mystical insight and the revolutionary vision of the universe postulated in modern physics is the monistic view of the world, and this becomes increasingly evident at the subatomic level where all the phenomena are interrelated and cannot be viewed as autonomous and isolated things or processes. Relativity theory, on the other hand, affirms that scientific knowledge based on sense perception is only

relative. Quantum physics asserts that individual parts are connected to each other in a whole. Vedanta is a third force, it is neither reductionist nor holistic where the whole is not the sum of its component parts. Quantum physics only says parts are subtly interrelated.

Brian David Josephson, a physics Nobel laureate, comments: ‘[Rabindranath] Tagore is, I think, saying that truth is a subtler concept than Einstein realises.’<sup>10</sup> Swamiji said: ‘Any work, any action, any thought that produces an effect is called a Karma. Thus the law of Karma means the law of causation, of inevitable cause and sequence. Wheresoever there is a cause, there an effect must be produced; this necessity cannot be resisted, and ... is true throughout the whole universe. Whatever we see, or feel, or do, whatever action there is anywhere in the universe, while being the effect of past work on the one hand, becomes, on the other, a cause in its turn,

*Brian David Josephson (b. 1940)*



and produces its own effect.<sup>11</sup> It involves three stages: objective, subjective, and finally oneness, or complete interconnectedness.

This eventually expands our individuality and makes it broad and liberal, and the effect of causality is minimised while one approaches Oneness. Oneness is the most fundamental principle—Oneness at the physical, mental, and spiritual levels. The more the individuality, the stronger is the binding of causality. The God of Vedanta is the Absolute beyond relativity, beyond space, time, and causality. ‘Remember the superconscious never contradicts reason. It transcends it, but contradicts it never’ as stated by Swamiji.<sup>12</sup> Brian David Josephson, in this context cited the interesting analogy of biosystems in which there is no degree of control over the internal structure of the system under investigation.<sup>13</sup> As a result, causality in classical physics is turned into chance in quantum physics. For what we call ‘chance’ or ‘accident’ there always exists an intuitive subtle cause which is not grossly manifested, which is why it is overlooked at the superficial level. This simply reveals that quantum mechanics is more intuitive than classical physics, which may seem paradoxical at first glance.

### **What is Mysticism?**

*The Oxford English Dictionary* defines the ‘mystical’ as having ‘a spiritual symbolic or allegorical significance that transcends human understanding’. In the mystical experience the individual self is completely dissolved and identified with the ultimate Reality. William James identified four hallmarks of mystical experience: ineffability, noetic quality, transiency, and passivity.<sup>14</sup> The name of this ineffable state in Vedanta is described as Existence, Knowledge, and Bliss—*sat, chit, ananda*. The general experience of beauty in nature is not mystical because it fulfils only

the ineffability criterion. One does not claim that one has become one with the beautiful object. As with most of our experiences there is certainly a unity in our perception of beautiful things. Many of our experiences also do involve a loss of self, but it is imprecise to term them mystic. In the words of Radhakrishnan, the mystic experience is one ‘in which feelings are fused, ideas melt into one another, boundaries broken and ordinary distinctions transcended. ... In this fullness of the felt life and freedom, the distinction of the knower and the known disappears. The privacy of the individual self is broken into and invaded by a universal self which the individual feels as his own.’<sup>15</sup> Once one is qualified, the experience is spontaneous and sudden. Apart from the traditional mystics, whose mindframes are essentially religiously-oriented and who undergo various spiritual disciplines to attain that mystical state, there are poets, philosophers, and scientists too, who have had a sudden visionary experience once or even several times in their life, without the practice of esoteric discipline. Pascal, Bucke, Tennyson, Wordsworth, and Tagore are some examples of this kind of mystical vision.

Of the three levels of mental states, instinct is inbuilt and unconscious, below the plane of reason; intellect is conscious and on the plane of reason; and the spiritual experience lies above the plane of reason, therefore is superconscious. The mystery is with this third state, identified as ‘mystic’ of which most of us are not aware and cannot justifiably explain, although from prehistoric ages till to the present it has existed and manifested in quite a few persons, and has been well documented. It is this level of ‘superconscious’ which transcends space, time, and causality.

Spiritual phenomena involve three key components: actual experience, high moral

perfection, and physiological transformation enabling transcendence. For example, the secular practice of meditation is associated with a range of physiological effects, including lower blood pressure, lower cortisol, cortical thickening, and activation of brain areas associated with attention and emotion regulation.<sup>16</sup> And real experience involves active participation, not simply reading or hearing about something. Sri Ramakrishna often used to say that it is not growing horns on one's head but profound change in character with steady wisdom.<sup>17</sup> He used to give another illustration: 'Some have heard of milk, some have seen milk, and some have drunk milk' (802–3, 836, 344). The whole personality and character of the perceiver is transformed. A sustainable experience requires a proper container. In this case, what is required is purity or perfection of body-mind complex through elimination of lust, greed, and anger. We commonly hear of people having a transient experience gained by psychosomatic drugs which temporarily elevates the mind through suppressing the restless mind, but this is not sustained because of lack of purity or perfection. The fact that such temporary state can be attained is also mentioned in Patanjali's *Yoga Sutras*.<sup>18</sup> Some such techniques are birth, medicine, mantra, and austerity. Literally, 'transcend' means to climb beyond. The idea of transcendence has deep roots. Transcendence in religion implies a reality that is not purely material. It was by a call of the Transcendent that the masters—the musicians Beethoven and Mozart; the painters Rembrandt and Van Gogh; the poets John Donne and William Butler Yeats; and even some of the greatest scientists, like Newton and Einstein, experienced such a state. *Katha Upanishad* has elaborated that it cannot be attained either through the agency of the senses or through intellectual speculations as such.<sup>19</sup> Due to inadequacies of the intellect, one must

transcend the limitations of the senses. Being analytical, the intellect tends to visualise things in a piecemeal manner while the experience of a mystic is supreme synthesis. It is the state when the five instruments of knowledge—the senses—and their controller—the mind, stand still and the intellect does not function.

From times immemorial the mystical state has been held to be a vision of divinity, God, Brahman, or any celestial or supernatural being. There have been well-known mystics in modern times in whom ecstasy started from childhood, as in the case of Sri Ramakrishna, Guru Nanak, and Jnaneshwar. The state of intense absorption was, as it were, a natural state of the mind, though with intense practice. Mystical vision

Dr Sarvepalli Radhakrishnan (1888–1975)



and the miracles associated with it, now classified as psychic phenomena, have assumed an urgency and importance that they never possessed before during the last two centuries of psychology. This shows how erroneous the intellect can be. The widespread thirst for self-awareness or the occult side of nature, which is a striking feature of our day, is utterly inexplicable in the light of modern psychology.

Mysticism, as it is a form of subjective experience, cannot be investigated with intellectual objective understanding. In conventional science, our knowledge is objective and the approach of the scientific method erects an impermeable wall between the subject and the object. But in mystical experience we are transcended to a state/plane where the veil between the knower and the known is lifted, only the knowledge remains, and the apparent duality is erased. This is the basic concept in Advaita Vedanta. Vedanta urges us to live in constant union with the infinite whole, losing our individual identification with names and forms. This cannot be described by any linguistic categories or even through subjective identity. Mysticism in the real sense of the term means extra-sensual perception of our inbuilt reality, which is intrinsically connected with many supernatural experiences that cannot be explained by normal human reasoning and are often falsely identified with occultism, magic, drug-induced experiences, or other altered states.

There can be different levels of mystic experiences depending upon one's temperament, outlook, and mental constitution. Often one's conduct and character manifest the intensity of mystical experience. But one thing is certain: a mystic is totally unconnected with the materialistic aspect of life, so body-consciousness is gone and the person is apparently experiencing a power which is beyond space and time. Our senses and intellect operate within

the framework of time and space. Our sensations and thoughts are rooted in time and space, which inherently condition our worldly experience. But the mystical experience is independent of any such conditioning or limitation. It is beyond space, time, and causality. Consequently, a mystic is completely at a loss to communicate the experience. Words fail, the person feels choked and stifled. A mystic often advocates the language of silence. The experience sometimes comes in the form of visions, voices, or some supernatural favours, although supernatural or miraculous powers are never sought, regarded as a hindrance to spiritual life. These experiences are described in five religious or spiritual traditions: Hinduism, Buddhism, Christianity, Sufism, and Kabbalah, yet are incomprehensible to human reasoning. Mystics form an uncommon class of people who, though belonging to different religions, countries, races, and ages, all 'speak the same language' in the words of Saint-Martin.<sup>20</sup> The visions often bear great significance for their future spiritual life. Einstein said 'the fairest thing we can experience is the mysterious.'<sup>21</sup> Again Sri Ramakrishna's experience and also his illustrative parables may be cited as examples. He used to say, 'Something rises with a tingling sensation from the feet to the head. So long as it does not reach the brain, I remain conscious, but the moment it does so I am dead to the outside world.'<sup>22</sup>

Mystical knowledge cannot be obtained by mere observation but only through participation, and only if one is qualified. This participation is fundamental in mystical tradition. The mental equipment required for subjective method needs to be highly specialised and purified; since Nature does not confide her secrets causally to anyone, they are accessible only to a qualified few. We are limited by the very nature of our mind since what we assimilate is what we

express. The mind needs training in both cases, but especially in the latter case, since the mental equipment is required to transcend space-time-causality barrier and it needs supreme moral perfection to be able to arrive at new power of understanding. If, however, the mind is trained in one direction it would be easier to pursue the latter. The acquired subjective knowledge of Vedanta philosophy has existed for at least three thousand years, and has nothing to do with the so-called mystical physics, which is only a newborn child of the last century. But it appears that the behaviour of the subatomic particles is similar to the experiences of mystics. As Capra asserted, the principal ideas of modern physics 'confirm', 'rediscover', or otherwise parallel the ideas of Hinduism, Buddhism, and Taoism.<sup>23</sup> Modern physics entered this dimension through quantum windows and relativity, through space, time, and causality, while the Eastern ideas were discovered through the inner investigation of consciousness. According to Swamiji's definition, 'Religion is not in doctrines, in dogmas, nor in intellectual argumentation; it is being and becoming, it is realisation.'<sup>24</sup>

Some occult powers, as described in *Vibhuti Pada* of the *Yoga Sutra*, may or may not come; however, such powers are not regarded as indications of mystical experience. By the path of yoga one can get mystical experience, and it is considered a miraculous harvest of yogic discipline that one can also achieve *ashta-siddhis*, eight powers: ability to read others' thoughts, become small, large, heavy, light, to fly, invisibility of the body, and ability to levitate. These are all distractions for a yogi and can act as impediments to progress in the path of self-realisation. As a person progresses in the path of realisation, these may occur naturally; one should put them aside if one wants to proceed onwards, lest one become enamoured by them, as their attainment

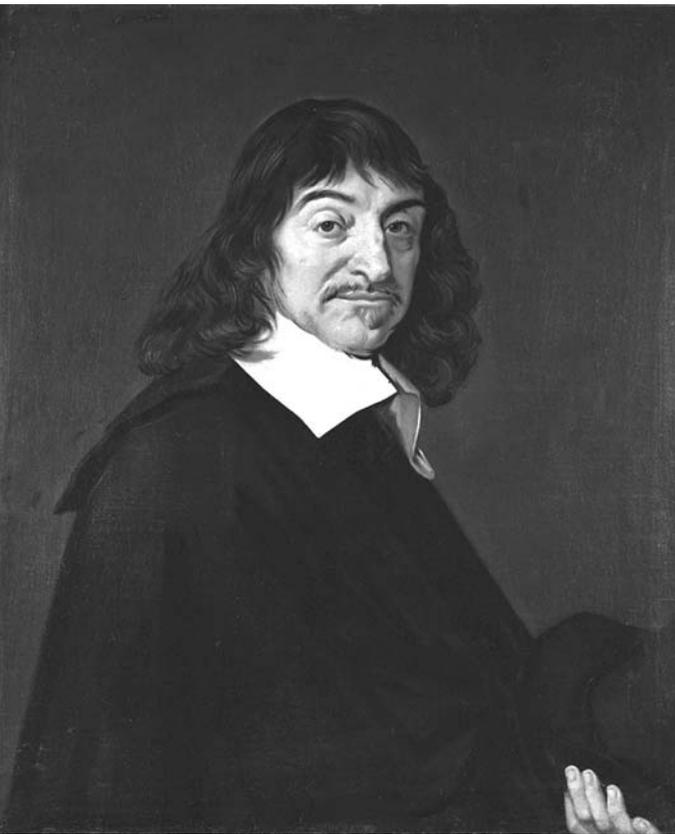
will be an enormous ego-booster and thus will prevent one's further progress. Depending upon one's choice and temperament, one or more of the yogas—jnana, bhakti, karma, or raja—has to be adapted as one's path. All that is required is the three-fold course in *ashtanga-marga*, eight limbs, of Patanjali which are categorised as high moral elevation, physical training of the body, and steady mental concentration. All true mystics have been people of intense sacrifice, moral greatness, austerity, and contentment, and models of simplicity and unworldliness. These are essential prerequisites for success in this sublime quest. Once one is qualified the experience is not gradual or progressive but spontaneous and sudden.

In the experience, the privacy of the individual self is invaded by a universal self. The difference between a mystical experience and a worldly experience is that the mystical experience leaves a lasting and indelible impression on the self by virtue of its subjectivity, which does not happen due to the objectivity in the case of the worldly experience. The mystic is not completely lost or melted away in the undifferentiated One like a rain drop in ocean; the person remains existentially a distinct being. An example to illustrate this is a red-hot iron, where the heat does not become the iron, or the iron heat. If this were not so, the logic of working hard to earn spiritual experience would not stand; one then would be completely deprived of the fruit—enjoyment of the blissful state. Sri Ramakrishna used to say, Acharya Shankara retained the ego of knowledge in order to teach human beings, while the Divine Mother has kept for him the purified ego as 'ego of servant', 'ego of child', 'ego of devotion', so that he is not lost in the undifferentiated One, but to remain *bhava-mukha*, the threshold of consciousness.

### **'Mysteries' in Quantum Physics as Against Familiar Classical Physics**

In the laws of physics, we attempt to understand the natural order governing the material world through our experience and experimentation. The foundations of this so-called classical physics were laid in the late seventeenth century. It is also termed as Newtonian physics, because Isaac Newton formulated this mechanical motion through unification of earlier works of Copernicus, Kepler, Bacon, Galileo, and Descartes. He posited that the physical world is made up of separate, irreducible building blocks of matter, the movements of which could be predicted and observed by a neutral observer. It has been remarkably successful in explaining macroscopic events and has attained an iconic status of reliability. Everything in nature could be explained in terms of mechanical laws, termed as causality or deterministic physics. Any interactions are independent of human observation. Every action is completely determined by mechanical

*René Descartes (1596–1650)*



conditions alone, without one's thought, idea, feeling, or intuition. Using this deterministic rule of classical or Newtonian physics, the course of future events can be exactly predicted. In this way logic and common sense are established. In the social regime, Newtonian physics apparently influenced the thinking of Karl Marx, Adam Smith, and Charles Darwin into the regime of causality. This close linking of cause and effect influenced the economic viewpoint of Karl Marx in his theories of class struggle, Adam Smith's self-regulating liberal economy, and Charles Darwin's theory of evolution. The IQ—Intelligence Quotient—was developed in 1912 with the hope of providing scientific justification for measuring human intelligence. But as in the other examples of improper application of classical physics to human social phenomena, IQ is not the sole criteria for human intelligence, thus Emotional Intelligence quotient (EQ), and the supreme, Spiritual Intelligence quotient (SQ), have subsequently taken over.

While classical physics attempts to describe the physical reality macroscopically in concrete, easily understandable terms, quantum physics deals with the microscopic world of atoms and subatomic particles, such as electrons and protons, which are inaccessible to direct perception. Classical physics' focus is on macro objects, things we can see around us, not on atomic level objects. In the new realm of microscopic phenomena, things behave very strangely, and our common logic no longer holds. It is even nonlinear, the output is not proportional to the input and, unlike the macroscopic, not a linear combination of independent components. Quantum physics views the subtle particles as nonphysical and nonlocal, interconnecting this universe as a united whole on all levels—from subatomic particles to the outermost galaxies. There is a paradigm shift, as if the qualities of objects have changed. The two original

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architects of quantum theory are Max Planck, for black-body radiation in 1900, where radiation is emitted not continuously, but in tiny discrete packets, named quanta; and Neils Bohr, for the development of the theory of atomic spectra in 1913, where emission of radiation from atoms can take place in quantum of energy. It is often said in the quantum regime that things do not exist in physical form, unless they are observed by a conscious observer. So, it is the observer that determines its existence. In contrast, the classical laws of mechanics affirm there is always a separation between the object known and the knower.

Quantum physics is not restricted to the microscopic world of nuclei, atoms, and molecules but can be applied also to macroscopic systems. We recognise that many modern inventions and appliances have come about as a result of quantum research. It is astonishing to note that quantum mechanics strengthens the range of scientific discovery for practical applications. An estimated, about thirty percent of the US gross national product is based on inventions only made possible by quantum mechanics; these range from semiconductors in computer chips to lasers in compact-disc players, magnetic resonance imaging (MRI) in hospitals, and many others.<sup>25</sup> It is true that without quantum physics, we would be unable to describe many phenomena such as the structure and function of DNA, the mechanism of brain and many other actions inside our body, and also the stability of atoms, chemical bonds, diodes, transistors, and light emitting diodes (LEDs) in the world of fascinating displays, cell phones, TVs, lasers, and many other modern devices. Interestingly, in current high level discussions consciousness is being treated as macro-quantum effect with involvement of superconductivity, super-fluidity, and Bose-Einstein condensation.

The following are the interrelated features of quantum physics:

### 1. Quantum Step or Discreteness

While action is continuous at the macroscopic level, the action in quantum physics is discrete, designated as quanta occurring in steps starting often not from zero. This quantum and minimum serve as characteristics of the system.

### 2. Uncertainty or Beyond Space, Time, and Causality

It is revealed that certain events happening in microscopic or sub-atomic regime, termed as the quantum world, cannot be asserted but can be surmised with probabilities which hinder exact or precise descriptions in place of causality or determinism, breaking our common sense. The Copenhagen interpretation of quantum physics reinterprets it as inherently non-mechanical and irrational. But in later developments, quantum indeterminism is also interpreted as causation but from subtler, non-physical rather than animated levels so that our acts of free will are involved through our self-conscious minds.

### 3. Duality

The central strangest feature of the quantum world is the notion that objects exhibit dual behaviour, they are neither particle nor wave, but they exhibit both types of behaviour depending upon external conditions. Both aspects are necessary for the complete description; they are complementary *but not contradictory*.

### 4. Interconnectedness, Oneness

In the quantum view we cannot decompose the world into independently existing smallest units, there is an inherent interconnectedness, where *everything is connected to everything else*. There are only wholes and not parts, implying deep unity, which no technology can reveal. The classical description is based on the decomposition of a system into a collection of simple independent local elements, and where the whole is determined by the behaviour of parts.



Niels Bohr (1885–1962)

### 5. Conscious Observer

Quantum physics asserts the conscious observer has an essential role in the experiment, termed as subjective role, although in classical physics the observer is outside the scenario of events, as if the observer is inside a glass-paned room and there is no way for them to interfere in outside measurement.

Because of these peculiarities, the quantum theory was initially seen by many as a rather unclear theory because probabilities and uncertainties hinder precise descriptions. Quantum physics is shocking because quantum experiments reveal the abovementioned mysterious properties that challenge our physical worldview. To tackle these contradictions, some of the prominent pioneers—including Schrödinger, Heisenberg, Bohr, Oppenheimer, and David Bohm—turned to Vedanta of

Eastern philosophy. These early founders connected quantum mechanics to the mysticism of Vedanta and Upanishads from Indian traditions. These brilliant scientists speculated the connection between these two because they were aware of Vedic texts. Niels Bohr was first accused by Einstein of introducing ‘mystic’ elements in his explanation of quantum physics—mystic elements which in Einstein’s view had no place in science. Both Bohr and Schrödinger, the founders of quantum physics, were avid readers of Vedic texts and observed that their experiments in quantum physics appeared consistent with what they had read in the Vedas. Heisenberg has well said: ‘What we observe is not nature in itself, but nature exposed to our method of questioning.’<sup>26</sup> Vedanta has always spoken about the importance of the conscious observer; it stresses the perceiver’s responsibility. The mystic and the physicist have now apparently arrived at a similar conclusion, one starting from the inner realm, the other from the outer world. Newton’s classical, objective science is devoted only to that which is observed, while the Eastern mystics have pushed this other notion to the extreme, to a point where the observer and the observed, the subject and the object, are not only inseparable but also become indistinguishable. The *Mundaka Upanishad* says that this consciousness cannot be seen by the eyes, cannot be heard by the ear, and cannot even be worked out by the ordinary logical and worldly, so-called ‘prejudiced’ intellect, but can only be realised through a purified mind.<sup>27</sup>

So the mind, the instrument of perception, can be made superconscious after going through the process of ultra-purification, becoming freed from both subtle and gross bondage. One way by which it can be purified is through the practices of *yama* and *niyama*, as described in Patanjali’s *Yoga Sutra*. The ancient wisdom of Eastern

IMAGE: THE AMERICAN INSTITUTE OF PHYSICS / AB LAGRELIUS AND WESTHAL

philosophy has asserted and assigned primary importance to this cogniser, instead of the act of cognition, as Physics has been doing. This perceiver is Atman or Brahman in Vedanta, while in Science it has been the ordinary mind or intelligence. For Eastern mystics, all things and events perceived by human senses are interrelated and interconnected and are but different manifestations of the same ultimate Reality. In contrast, Western thinking understands and perceives the world as a multitude of separate objects and events. Quantum physics has abolished the notion of independent, separated parts through the introduction of a participator at the scenario in place of an observer. To further describe this, David Bohm offers an explanation of reality involving an 'implicate' and 'explicate' order.<sup>28</sup> All order is stored at all times in the implicate order in an unmanifested state. Information continually becomes manifest from the implicate order as the explicate order of our experience. This is termed as super-deterministic order by some. Although he accepts the reality of a whole, containing distinguishable parts, it is devoid of variety or individuality. The hologram provides an easily understandable example of this, which he cited to illustrate this concept more clearly, because in a hologram, the whole picture is present in each part of the hologram. In fact, a hologram is capable of storing thousands of two-dimensional pictures in different perspectives of the object.

### ***Some Connections of Quantum Physics with Vedanta***

The journey from classical physics to quantum physics is from a gross, separated, causal world to a mystical, subtle, oneness kingdom of spirituality. 'In their struggle to grasp the nature of atomic phenomena, scientists became painfully aware that their basic concepts, their language,

and their whole way of thinking were inadequate to describe this new reality', says Fritjof Capra.<sup>29</sup> The theory of indeterminism in nature apparently conveys the message that the secrets of nature's functioning would not be let known to scientists. This Newtonian view of science is quite contradictory to Vedanta. The God of Vedanta is the Absolute beyond all relativity, all space, time, and causation. In looking for the unifying force that is the building block of the universe, quantum physics has put us closer to the Vedanta viewpoint. It suggests that we abolish the absolute separation between the known and the knower and accept the fact that mind and matter are co-dependent, each depending on the other for its existence. Some of the basic parallels between quantum physics and mysticism are discussed below.

#### **A. Probability or Law of Karma and Quantum Jump**

Success in our life is unpredictable but we always keep on our efforts for a breakthrough, even though causality is the only certain law in this world. Newton's laws form the basis of this causality, which dictates that progress is determined by the amount of effort we invest. Our thought processes are habituated to follow the logic of classical physics. But sometimes such logical process leads us to no conclusion. Then after a long unsuccessful search, suddenly sometimes new ideas may emerge through inspiration from beyond the limits of well-defined conceptual terms. This is often referred to as a quantum jump. At this so-called quantum level, the thinking process is apparently determined by an inherent past experience, for example, of pleasure, pain, taste, or similar previous experience. Some people even believe that life on earth originated with a similar quantum leap.

In the old quantum theory explanation of atomic spectra—being the characteristic light

emitted from an atom—Neils Bohr proposed that the revolving electron around the nucleus of an atom can experience a quantum jump only under the influence of an external agency, forcing the emission of characteristic radiation, otherwise the electron would continue to revolve around the nucleus of the atom in the same orbit without any emission. Although in the classical theory Newton's second law admits that this can occur only with additional effort—that is, with external energy one would be able to lift an electron from the usual state to a new state—in quantum mechanics this quantum jump to other state is interpreted as a probabilistic event determined by the so-called overlapping integral—that is, the extent of overlapping of the initial state with that of the final state. In Vedanta, according to Acharya Shankara, a person continues from birth to death and is reborn again to live the same life unless they achieve/realise a quantum jump to a higher life or to liberation. This latter is also probabilistic, depending upon the grace of God. This can occur only for those spiritual aspirants who have prepared for this, apart from fulfilling all the objective requirements. Various scriptures codify basically cutting off oneself from the world outside, both externally and internally, as a necessary condition for attaining moral perfection. But final transformation is indeed uncertain depending upon the perfection achieved. This transformation is the subjective aspect. This subjectivity in spirituality involves physiological transformation in body-mind complex after being established in moral excellence. Vedanta, in the Gita,<sup>30</sup> says that in spite of one's wholehearted efforts, there exists an unseen factor, often termed as *adrishhta* or *daiva*, an invisible merit, that turns out to be crucial in determining the realisation of the fruits of action. The question of probability of attaining this success also has been elaborated in

the Gita (7.3), which states that out of thousands who try, one and perhaps only one could be successful. There are various techniques across a wide variety of Vedanta literature describing the way one is prepared for this upgradation. These include, for example, *Narada Bhakti Sutras*, Patanjali *Yoga Sutras*, and also in the Gita, importance is given to one's association with illumined personalities.

#### **B. Conscious Observer / Interconnectedness / Beyond Space, Time, Causality (STC)**

Everything in nature is determined in terms of mechanical laws termed as causality but at the level of quantum physics objects and events are dependent on human observation. If the mental process of experiencing pleasure or pain has no effect upon physical world, the question arises: what keeps a person's mental world aligned with physical situations? Conscious actions do make a difference in real term. The Copenhagen interpretation of quantum theory developed by Bohr and Heisenberg reveals an essential interconnectedness of the universe. We cannot decompose the world into independently existing smallest units. Any object is a manifestation of the interaction between the processes of preparation and measurement. Penetrating deeper into matter, we find that it is made of particles, but these are not the 'basic building blocks' in the way Newton meant. Isolated material particles are only abstractions, their properties being definable and observable only through their interactions with other systems. Science extends boundaries of the ignorance as one digs deeper. The more we know the more we want to know so the boundaries of knowledge and ignorance are limitless. Any attempts to quantify this, leading thereby to dissolution of the problem, are as if a salt doll were trying to measure depth of the ocean, to borrow an analogy from Sri Ramakrishna.<sup>31</sup> How can the knower know

himself? According to Sir James Jeans: ‘Trying to observe the inner working of an atom is like plucking off the wings of a butterfly to see how it flies ... Each observation destroys the bit of the universe observed.’<sup>32</sup> As a result, the physical science deals with a dead rather than with a living world. In Plank’s words ‘Science cannot solve the ultimate mystery of nature ... we ourselves are a part of the mystery that we are trying to solve.’<sup>33</sup> We are made captive to this world with the lower mind which needs to be disciplined for manifestation of higher mind. But the problem is that the lower mind is overwhelmed by the external world through the senses. This mind only knows how to function and orient itself in the realm of objects. The higher mind is boundless. According to the Yoga philosophy, there are seven levels of mind. It expresses ‘worldliness’ at the three lower planes: the navel, the organ of generation, and the organ of evacuation. The higher mind includes the heart, the throat, the forehead, and the top of the head. Our higher mind tries to share with us the eternal joy. There are many functions in our body that take place without our attention. These involuntary actions include respiration, digestion, homeostasis, and others that take place automatically. Respiration is perhaps the only action in our body that is both voluntary and involuntary. Through rhythmic breathing the yogis can control various actions in their bodies and minds. By obstructing the free working of the higher mind, we lose the fruits of higher or cosmic mind. Only the wise, who through withdrawing their ego let the cosmic mind play the life game freely, have the best development, since in this state the body, mind, and senses work consonantly. Karma is the action of lower mind bound by causality, while *akarma* is the free flow of action from the cosmic mind. The Gita highlights this.<sup>34</sup>

Patanjali *Yoga Sutra*<sup>35</sup> prescribes the technique by which one can attain this state through the change of perception of the world from self-centric to cosmo-centric. This is also echoed in the Bhagavata, which says that the immortal Brahman alone is before, that Brahman is behind, that Brahman is to the right and left.<sup>36</sup> Brahman alone pervades everything above and below; this universe is that supreme Brahman alone.

### C. Action at Distance, Einstein-Podolsky-Rosen (EPR) Paradox

In classical physics all influences are transmitted essentially by contact interactions between the neighbouring parts and there are no influences propagating faster than the speed of light. But in quantum theory, a ‘change in the spin of one particle in a two-particle system would affect its twin simultaneously, even if the two had been widely separated in the meantime.’<sup>37</sup> This *simultaneous* occurring is not allowed in special relativity, as it is a part of classical physics, which forbids the transmission of any signal faster than the speed of light.

An important characteristic of the Eastern worldview is the awareness of the unity and mutual interrelation of all things and events. The basic oneness of the universe is the central characteristic of the mystical experience; this is also one of the most important revelations in quantum physics. The mystic’s vision is of a world where they participate in its seamless existence, they are indivisibly united with the universe around them. This is indeed no different from the view put forth in 1964 by the physicist John S Bell. This vision becomes apparent at the atomic level, manifesting increasingly as one penetrates deeper into the realm of subatomic particles. In modern physics, the question of consciousness has arisen in connection with the observation of atomic phenomena. Quantum theory has made

it clear that these phenomena can only be understood as links in a chain of processes, the end of which lies in the consciousness of the human observer. Nature as it exists is not 'something' that is limited to what we observe. Because we observe, we see what we see. The entanglement of photons—also true for electrons and other fundamental particles—seen in the EPR, the Einstein-Podolsky-Rosen paradox experiments, raises questions as to why they are not seen in objects of larger sizes.<sup>38</sup> The answer is because our limited vision of the universe creates what we experience. The EPR paradox experiments showed that each particle readjusts itself in response to any change in the state of its counterpart, which might even be several millions of miles away. Regardless of how far apart the two particles are the change occurs instantaneously—at a speed faster than the speed of light. This is the mystery of entanglement. Readjustment is instantaneous and happens without any kind of messaging link between them like the speed of light. An invisible wholeness unites the objects that are given birth in the universe. Thus, objects in the physical world cannot be regarded as distinct, separate entities.

#### **D. Wave-Particle Duality and the Reality**

Duality, a central concept of quantum physics, addresses the inadequacy of classical concepts of objects to meaningfully describe the behaviour of quantum objects like 'particle' and 'wave'. Louis de Broglie originally established that all objects exhibit wave/particle duality to some extent and the larger the object is the harder it is to observe the wave behaviour. Wave-particle duality asserts that light and matter exhibit properties of both waves and particles. This duality is a quantum phenomenon observable in photons, electrons, protons, and other ultra-tiny objects. Quantum theory states that light or electromagnetics in general

is emitted in quantum of energy, in this case a photon. Bohr stated in his complementarity principle that the wave and the particle properties of light are complementary but not contradictory; both are essential to a complete description of light. Likewise the human body is a complementary union of machine-like and non-machine-like properties. The machine-like properties can be investigated rationally based on bio-cybernetics. Schrödinger, in his 1933 Nobel Lecture, explained that the new paradigm replaces 'either-or' with 'both-and'.<sup>39</sup> The Relativity theory of Einstein indicates that all sense perceptions are relative.

Vedanta says that Reality cannot be constrained by a particular form which limits its behaviour, but can be formless as well, so it has an infinite number of dimensions. The Reality remains the same, although it appears in different names and forms, *nama* and *rupa*. It is without any intrinsic attributes. Sri Ramakrishna often used to say that Brahman, the Ultimate Reality cannot be limited by any form. Personalities may vary, persons may be numerous, but the basic humanness remains the same. Viewed by the senses, it is finite; upon penetrating deeper, it reveals its infinite dimensions.

Vedanta also says one has only to find the constituent and not to get lost in the different varieties. Some examples that illustrate the difference are: the sugar in sugar sweets, and the gold in golden ornaments. Vedanta advises to destroy the prison house of name and form, clearing mind of its afflictions, and also to keep the mind sharp and maintain tranquillity, to not lose mental balance and to maintain equanimity. From the perspective of ultimate reality, the differences between pairs of opposites or binaries are relative. However, the conflicts and tensions generated by the pairs of opposites provide the motivating force for humans to

move towards the transcendental level. Sensual joys are only trickles of the infinite bliss of Brahman, proclaims Vedanta. The Self in every one of us is also the Self of the universe in the form of consciousness. This truth is corroborated by Erwin Schrodinger, in an epilogue to *What is Life?*: ‘Consciousness is never experienced in the plural, only in the singular. ... Consciousness is a singular of which the plural is unknown.’<sup>40</sup> The polar opposites are never a static quantity, but a dynamic play between two extremes. One must learn to navigate through these contrary currents so that one can benefit from the ascending spiritual force and avoid the descending unspiritual inertia. Nature possesses a qualitative energy through which we can either expand into wisdom or contract into ignorance. This navigation is nicely illustrated by Swami Vivekananda in a story he narrated to the then-famous French singer and actress Emma Calve when she was under deep depression:

One day a drop of water fell into the vast ocean. ... When it found itself there, it began to weep and complain just as you are doing. The great ocean laughed at the drop of water. ‘Why do you weep?’ it asked. ‘I do not understand. When you join me, you join all your brothers and sisters, the other drops of water of which I am made. You become the ocean itself. If you wish to leave me, you have to only rise up on a sunbeam into the clouds. From there you can descend again, a little drop of water, a blessing and a benediction to the thirsty earth.’<sup>41</sup>

In the Gita, this is illustrated by the total unidentifiable river water terminating at the vast unfathomable ocean which is unaffected though constantly being filled.<sup>42</sup> Also, in the Gita, Sri Krishna’s advice to Arjuna is to absorb worldly opposites and be *trigunatita* or *nirguna* (2.45). One is required to be *nirguna*, without quality or condition-less, beyond duality.



Louis de Broglie (1892–1987)

With the introduction of probability into this quantum world, physicists have found yet another area of striking resemblance to Eastern mysticism. Describing the probability of a particle existing in a certain place, Robert Oppenheimer says: ‘If we ask whether the position of the particle remains the same, we must say “no”, if we ask whether the electron’s position changes with time, we must say “no”. If we ask whether the electron is at rest, we must say “no”, if we ask whether it is in motion, we must say “no”.’<sup>43</sup> This closely echoes the words of the *Katha Upanishad*, a sacred book of Hinduism where it is said: ‘It moves, it moves not; it is far, and it is near. It is within all this, and it is outside of all this.’<sup>44</sup>

### **The Search for Reconciliation**

Quantum theory seems to describe our overall activities both as knowledge-seeking and knowledge-acquiring agents. It is the agent that exploits the concepts of science in our life from

theory. The two kinds of descriptions jointly comprise the active foundation of reality. Niels Bohr, himself the founder of quantum theory, stated in his later years: 'On the scene of existence we are ourselves actors as well as spectators.'<sup>45</sup> In the words of Aldous Huxley: 'Man possesses a double nature, a phenomenal ego and an eternal Self, which is the inner man, the spirit, the spark of divinity within the soul. It is possible for a man, if he so desires, to identify himself with the spirit and therefore with the Divine Ground, which is of the same or like nature with the spirit.'<sup>46</sup>

Mystical knowledge can never be obtained by observation, but it involves the full participation of the body-mind-intellect complex. The observed, the observer, and the knowledge are indistinguishable. The subject and object of Heisenberg uncertainty principle are fused into an unified and undivided whole.

The *shanti* mantra, invocatory verse, of the *Isha Upanishad* dictates in the same tune:

Pure consciousness is perfect fullness. This manifest universe of matter, of names and forms in being, is full. This fullness has been projected from perfect fullness. When fullness merges in perfect fullness, all that remains is fullness. That [supreme Brahman] is infinite. This [the manifested universe that in reality is Brahman couched in name and form] is infinite. From [that] infinite has been projected [this] infinite. Taking the infinitude of [this] infinite, [that] infinite [supreme Brahman] alone remains.

Reference may be made to what Swamiji said to Mary Hale on God or Brahman: 'All this is not, God alone *is!*'<sup>47</sup>

This idea is reflected also in the Gita, where Sri Krishna talks about *kshetra* and *kshetrajna*.<sup>48</sup> The word *kshetra* literally means the field of manifestation or experience and the word *kshetrajna* means the knower of the field of manifestation,

that is, the observer. All that exists, moveable and immoveable, comes about by the union of the *kshetra* and the *kshetrajna*, being the totality of knowledge. The knowledge of the *kshetra*, object and *kshetrajna*, subject together form the totality of knowledge. We must go beyond appearances so that the whole experience could be taken into consideration. Unless all facts are obtained, we cannot arrive at true knowledge. We, being the subject, are no longer passive observers of the universe and the world around us; we have started to accept that we are part of it. We have entered a period of thought where processes have replaced objects, and feelings have replaced logic. We have begun to believe that borders between countries should be lifted. We are living in a global village network where economic or political upheavals in any country in the world can within minutes affect other economies in the world. While Newtonian physics held sway, it was accepted that life was wholly observable, measurable, and quantifiable, and social events, the economy, supply and demand, and almost everything else was understood in a reductionist way as the sum of its components. But this is no longer true; holistic growth and interconnections are now the general themes. This is what Vedanta has been visualising. Both Eastern mysticism and modern physics speak of reality as transcending space, time, and causality. The same idea is reflected in the scripture *Mundaka Upanishad* where both the *para vidya*, meaning higher knowledge, and *apara vidya*, lower knowledge, together form the totality in supreme knowledge, both kinds of knowledge need to be cultivated in our lives; they are complementary to each other.<sup>49</sup>

The apparent conflict between conventional science and mysticism is a conflict between two types of knowledge, objective and subjective. The objective method of assessment

in conventional science is the sole cause of this conflict. The conscious observer is introduced as the upper mind. It should be independent of the sense organs, able to guide, control, and discipline the sense organs. But its real status is when it is able to say ‘no’ to the sense organs, or ‘yes’ to the sense organs, as a result of its own discrimination. The introduction of Vedanta is an attempt to solve the problem by going beyond the appearance, that is, the objectivity, termed *nama* and *rupa*, meaning name and form. Introducing this mystical idea into quantum theory has enriched the convergence of mysticism while physics as physics continues to probe deeper and deeper into nature.

### **A Glimpse of Contradictory Views**

Victor Stenger finds: ‘Reductionist Classical Physics did not make people egoists. People were egoists long before reductionist classical physics. In fact, classical physics has nothing to say about humans except that they are material objects like rocks and trees, made of nothing more than the same atoms—just more cleverly organized by the impersonal forces of self-organization and evolution.’<sup>50</sup> He continues: ‘Thoughts of our participation in cosmic consciousness inflate our egos to the point where we can ignore our shortcomings and even forget our mortality’ (ibid.). There is no point in blaming science, but with proper wisdom one should interpret to evaluate the developments.

John Ankerberg and John Weldon comment on Ken Wilber’s *The Holographic Paradigm and Other Paradoxes*:<sup>51</sup> ‘He [Ken Wilber] points out that the mystic and physicist aren’t even talking about the same worlds. The “new physics” has nothing to do with the so-called “higher” levels of “mental” reality that mystics claim to encounter ... it is obviously irrelevant when it comes to living in the day-to-day world. ... the physicist

sees a “oneness” at the sub-atomic level, but not in the real world.’<sup>52</sup>

The crucial question has been how to bridge the gap between causality and non-causality. The principle of causality is the rule for scientific world, while non-causality or probability is for the spiritual, mystic world. In the former view, ‘God helps those who help themselves’, the result is as much as the efforts put in; while in the latter, ‘God helps those who do not help themselves’, indicating that the outcome is irrespective of self effort. Quantum physics serves as a bridge by shifting the paradigm, as it took the bold step of including subjectivity, in the form of a conscious observer, in addition to objectivity, and hence oneness in scenario. Quantum physics is the link, the bridge, over the centuries-old chasm between science and religions; it is the ‘science of transcendence’ we have been waiting for, given that there is a deep disparity between how we perceive the world and the way things really are. The only problematic aspect of quantum jump is that we cannot be sure when the electron jumps or where it jumps to, the best we can do is to figure a probability curve. And locality was crucial to classical physics, in order to have objects existing independently and separate from one another, but quantum objects spread like a cloud over great distances and collapse only when observed.

Finally, it has been stated emphatically by leading neuroscientist Sultan Tarlac, in an editorial on *Probabilistic Quantum Thinking*:

Quantum Physics is not only the Physics of non-living matter. In our biological makeup, a large number of events, millions even, are taking place that involve Quantum Physics. ... Even though we do not at present have very strong evidence, there is great likelihood that in the nervous system, some higher cognitive functions such as consciousness, mind and learning are related to this kind of quantum neurobiological process, only more complicated.<sup>53</sup>

Time and science will give us the best proof of this.

The fundamental levels of existence cannot be explained by scientific concepts. Moreover, some have realised that the function of science is not to explain the basis of existence, but rather to give us a framework for understanding our perception of it. This is a quantum leap in scientific attitude. Our fundamental nature is inexplicable. Modern science and mystical systems are starting to speak the same language. We have entered a period of thought where subjectivity has replaced objectivity. There is no sharp separation between object and subject, the observer and the observed, since the observer, like the mystic, is an active participant in the experiment, and forms the whole together with whatever is being observed. The only thing that one has to be cautious about with the novel concept of the ‘conscious observer’ introduced in quantum physics, is judiciously withdrawing one’s ego from where it is not needed. This observer is not passive but conscious, and thus capable of discrimination. This is the awakening of *viveka*, discernment, which is one of the prime teachings of Vedanta, as illustrated in the Gita,<sup>54</sup> where causality and non-causality are nicely elaborated through introduction of *karta* and *akarta*, one’s authority and non-authority in work.

Albert Einstein stated:

A human being ... is a part of the whole, called by us “Universe”, a part limited in time and space. He experiences himself, his thoughts and feelings as something separated from the rest—a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest to us. Our task must be to free ourselves from this prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its

beauty. Nobody is able to achieve this completely, but the striving for such achievement is in itself a part of the liberation and a foundation for inner security.<sup>55</sup> 

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