

# RELATIVITY AND REALITY

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[Classical physics was based on the principle of Newtonian Relativity which is basically about the relativity of motion, idea of absolute space and absolute time. In twentieth century, it was the principle of Einsteinean Relativity that shattered the major concepts of classical physics. It is the relativity of space and time here and now space-time is regarded as one integral whole. Einstein made it clear that space and time are not separable entities but single continuum. From the relativity of space and time, another important conclusion has been derived by Einstein—that is the relativity of mass and ultimately the inter changeability of mass and energy. Thus the whole journey of physics from classical physics to modern physics seems like an echo of Buddhist and Vedantic concepts proceeding towards the ultimate unification of concepts.

In Buddhism, Vedanta and Neo-Vedanta the relativity of space and time that form the physical world has already been established. Through this relativity, the highest point— the ultimate state of consciousness is reached where remains no distinction between mind and body, subject and object, where there is no space without time, no time without space, they are interpenetrating.]

Classical physics was based on the principle of Galilean or Newtonian Relativity that consisted of smooth-functioning mechanical universe. It is based on an absolute, steady, immovable and three – dimensional space and absolute time as a separate dimension independent of the material world obeying the laws of Euclidean geometry.

The Newtonian Relativity principle is basically about the relativity of motion. If we ever ride on a train, we know how fast another train moves when it is travelling in the opposite direction and conversely how it appears move slowly or to be even motionless when it is moving in same direction (This can be put in the form of a dictum – ‘The motion of bodies included in a given space are the same among themselves, whether that space is at rest

or moves uniformly forward in a straight line'). It can be phrased in general terms in this way : mechanical laws which are valid in one place are equally valid in any other place which moves uniformly relative to the first.<sup>1</sup>

Despite the remarkable success of Newton's Relativity theory in eighteenth and nineteenth century, a revolutionary thought emerged with Einstein's Relativity theory in the twentieth century shattering all the major concepts of classical physics, i.e. discarding and abandoning the idea of absolute space and absolute time. According to Einstein, the velocity of light is constant throughout the universe and is unaffected either by the motion of its source or the motion of the receiver.<sup>2</sup>

Thus Einstein came to the point through reasoning that if the velocity of light is fixed and constant regardless of the earth's motion, it must be also constant regardless of the motion of any sun or moon or star or any other system moving in the universe. In this way he concludes that neither space is three dimensional nor space and time are altogether separate entities. Rather space and time are intimately connected with each other forming a four-dimensional continuum space-time. It is the relativity of space and time in Einsteinian theory whereas it was the relativity of motion in Newtonian theory. As space-time is one integral whole, all the spatial and temporal measurements and specifications are relative. Time is now regarded as the fourth dimension of space.

The creditable task that Einstein did was not only the introduction of relativity of space and time but his use of velocity of light to weld them together into a single continuum. Thus the essence of Einstein's Special theory of relativity incorporates Newton's Relativity Theory that the laws of nature are the same for all uniformly moving system.

Hence space can be defined as an order of relation of things and time is simply a possible order or series of events for a particular observer to describe the observed phenomena. Generally we tend to separate space and time in our mind but this separation is purely subjective. The physical world is an indivisible space-time continuum. Practically we mean it when we speak of somebody living 'within twenty minutes drive by car' or 'some place which is

four hours away by rail'. Thus motion is a relative state, as it is a change of position with respect to another body.

Now the Special Theory of Relativity is extended to the General Theory of Relativity - The laws of nature are same for all systems regardless of their state of motion. For a more complete and accurate picture of the universe the framework of general relativity plays a fundamental role.<sup>3</sup>

And now the extraordinary truths are derived and revealed. The unification of space and time entails ... a unification of other basic concepts and this unifying aspect is the most characteristic feature of the relativistic framework.<sup>4</sup>

The uniqueness and greatness of Einstein lie not merely in showing the relativity of all phenomena but in establishing universal validity of the fundamental physical laws of physics - "... The universe that he has pictured is not a chaos but a cosmos. He formed unity in diversity and meaning in the apparently meaningless phenomena of the universe".<sup>5</sup>

Revolutionizing the concept of mass (which is popularly identified with weight), the Special Theory of Relativity now reaches the remarkable deduction of the relativity of mass. As a matter of fact, three quantities - time, distance and mass are required to describe the mechanics of the physical universe. Since time and distance are relative quantities ... the most important practical results of relativity have arisen from this principle - the relativity of mass.<sup>6</sup>

Mass of a body which was earlier regarded to be unchanging and fixed in classical physics, is now meant as the resistance of matter to a change of motion. Hence, the mass of a moving body increases with the increase in its velocity. Since motion is a form of kinetic energy, the increased mass of moving body comes from its increased energy, so energy has mass. This extraordinary and remarkable relationship  $E=mc^2$  between the equivalent and interchangeable mass and energy can solve so many mysteries. It's so simple yet unbelievable that mass is no longer a substance but concentrated energy and if matter sheds its mass and travels with the speed of light, we call it energy. The bizarre proof of this principle and its calamitous consequences produced by the atom bomb are too well known to need mention here.<sup>7</sup>

Thus the whole march of physics, from classical physics to modern physics seems to move towards the ultimate unification of concepts passing through the relativity of motion, relativity of space-time, relativity of matter and relativity of all physical phenomena. Is it not a strange stage that this whole discussion about the journey of physics seems like an echo of Buddhist and Vedantic concepts?

For example, Buddhism has always maintained that space and time are not real but relative, limited and illusory. They have been created by our minds ... the past, the future, physical space ... and individuals are nothing but names, forms of thought, words of common usage, merely superficial realities.<sup>8</sup>

One of the finest Buddhist thinkers, Ashvaghosha in the book 'The Awakening of Faith' has linked the notions of both space and time to a particular state of consciousness. He finds ... that space is nothing but a mode of particularisation and that it has no real existence of its own .... Space exists only in relation to our particularising consciousness.<sup>9</sup>

In the Vedantic trend, the great Advaita teacher Śaṅkara identifies Māyā with the conventional notions of space, time and causation; hence they are not the ultimate truth. In Śaṅkara's words whatever is bound by space, time and cause, cannot be real. Our experience has space for its general form, but the real is non-spatial and indivisible. For whatever is spatial is divisible, and the latter is always a produced effect and not a reality which is unproduced and indivisible and therefore non-spatial. The universality (vibhutva) of space is only relative. Whatever is limited in space is limited in time also .... It is real in the world of experience.... The temporal is not the real.<sup>10</sup>

In the Neo-Vedantic trend, contemporary philosopher-saint Vivekananda logically formulated the Vedantic theory of Māyā with its relative status -- The one peculiar attribute we find in time, space and causation is that they cannot exist separate from things. Try to think about space without colour or limits or any connection with the things around -- just abstract space. You cannot. You have to think of it as the space between two limits, or between three objects. It has to be connected with some object to have any existence. So with time, you cannot have any idea of abstract time

but you have to take two events by the idea of succession. Time depends on two events just as space has to be related to outside objects. And the idea of causation is inseparable from time and space.<sup>11</sup>

As Vivekananda analyses, we are bound to see the Reality with the spectacle of space, time and causation or maya and whenever we free ourselves from the bondage of maya, It is Reality realised. "In our desire to solve the mysteries of the universe, we cannot stop our questioning.... A few steps and there arises the wall of beginning less and enters time which we cannot surmount. A few steps, and there appears a wall of boundless space which cannot be surmounted, and the whole is irrevocably bound by walls of cause and effect. We cannot go beyond them .... And this is maya."<sup>12</sup>

Maya or in other words, space, time and causation form the inescapable limitations of our intellect. Attempting to go beyond this relative phenomenal world, we have to move through this tremendous contradiction. It is the essential character of man's spiritual quest as well as the scientific research. In both fields, the objective is the same - to search the basic oneness! As physicist David Bohm remarks, "....moves towards the Absolute by studying the relative, in its inexhaustible multiplicity and diversity."<sup>13</sup>

Another great physicist Erwin Schrodinger accepted that consciousness is never experienced in the plural -- consciousness is a singular of which the plural is unknown ... only one thing and that, what seems to be a plurality is merely a series of different aspects of this one thing, produced by a deception (the Indian maya).<sup>14</sup> This is the same Oneness which is known as 'Tathata' , ' Sunyata ' 'Suchness' the 'void' the 'emptiness' in Buddhism and the Self luminous, infinite consciousness, infinite bliss, the omnipresent Brahman in Vedanta.

Thus, grasping the four-dimensional 'space-time' character of Reality with our sense perception seems strange since our limitations make us observe its three dimensional images with our senses. What Einstein had meant by the unification of inseparably linked four-dimensional space-time is to experience the multidimensional higher levelled Reality transcending the three dimensional relativistic world. Its clearest expression is elaborated in Buddhism in the state of enlightenment. In the worlds of D. T.

Suzuki, this unifying message is—“... a state of complete dissolution where there is no more distinction between mind and body, subject and object .... We look around and perceive that .... every object is related to every other object ... not only spatially, but temporally .... As a fact of pure experience, there is no space without time, no time without space, they are interpenetrating.”<sup>15</sup>

It seems strange that the 1970's physics has not only started moving towards the super-unification of the forces of the universe but it is going to be a unification of subject and object, mind and matter, scientist and experiment. And physicists are definitely not under the influence of any religion or philosophy. These conclusions have been derived by physicists themselves! Physicist Wheeler remarked, what is strange is us, i.e. the observer.<sup>16</sup>

While Einstein called it the 'intuitive leap', Stephen Hawking, on the other hand, finds it very reasonable to suppose that there is some unifying or bigger law from which all other laws can be derived.<sup>17</sup>

This is what exactly Vivekananda highlighted at the Parliament of Religions at Chicago at 1893 — “Science is nothing but the finding of unity .... Physics would stop when it would be able to fulfil its services in discovering one energy of which all the others are but manifest atoms.... Thus it is through multiplicity and duality that the ultimate unity is reached. Religion can go no further. This is the goal of all sciences.”<sup>18</sup>

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- 16 Quoted in Swami Jitatmananda, *op. cit.*, p. 3.
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