



Quantum Physics and the Jaina View of Space, Time and Matter

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Abstract

In the present article we shall cover the following points which reveal the existance of modern quantum concepts in the Jaina scripture.

(1) Concept of Bosons and the presence of two or more than two Pudgala Paramāṇu at one Place, (2) Concept of Fermions and the absence of two or more than two Kālāṇu at one palace, (3) Quantization of space, (4) Quantization of time, (5) The link between the probabilistic behaviour of events described in quantum mechanics, hidden variables, Skandha and the minute Karmic dust.

Introduction

In the scientific world, Quantum Physics or Quantum Mechanics¹ is considered as one of the best creations of the human mind. It was discovered and developed in the twentieth century. Many scientists including planck, Einstein, Bohr, de Broglie, Compton, Heisenberg, Schrodinger, Dirac received their Nobel Prizes for their contributions to Quantum Mechanics. Quantum Mechanics deals with the ultimate foundation and basic laws governing all the events in the universe. Specially, microscopic phenomena can not be understood without quantum mechanics. Jainology is very old and rich philosophy. The Jainology also discusses very minute details of space, time and material particles. Thus it would be very interesting and useful to discuss some fundamental concepts of Jainology in view of the most fundamental modern science which is known as quantum mechanics.

At macro level. there is little quantitative difference between Newtonian Physics and Quantum Physics. But at micro level, both differ significantly, qualitatively as well as quantitatively. It is well known that at micro level the Newtonian Physics fails.

Many concepts of quantum mechanics do not appeal to our common sense. But such new concepts of quantum mechanics are very useful in understanding the difficult Jaina description of Pudgala, Ākaśa and Kāla Dravya. For example, after learning the concept of Samaya (the smallest quantum of time) from the Jaina scriptures, when one asks why the half of a 'Samaya' is not possible then we can see that there is Quantum Mechanics which has similar concept of indivisible quantum of energy and various other physical quantities.

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(1) Concept of Bosons and the presence of two or more than two Pudgala Paramāṇu at one Place, (2) Concept of Fermions and the absence of two or more than two Kālāṇu at one palace, (3) Quantization of space, (4) Quantization of time, (5) The link between the

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probabilistic behaviour of events described in quantum mechanics, hidden variables, Skandha and the minute Karmic dust.

Bosons and Fermions

There are two types of quantum statistics² : (1) Bose-Einstein statistics, and (2) Fermi-Dirac statistics. Particles such as electrons and protons obey Fermi-Dirac statistics and are called Fermions. Similarly, the particles such as mesons and photons obey Bose-Einstein statistics and are called Bosons. It is a well established fact that two similar identical fermions can not occupy the same state but any number of similar bosons can occupy the same state.

According to Jainology pure liberated souls, known as Siddha exist in Siddhālaya such that many souls can reside in the same space³. In other words, one soul resided into other soul and still both are independent and have individual existence. This concept is similar to the concept of bosons of quantum mechanics. (It may however, be kept in mind that quantum mechanics is limited to matter, space and time only.)

As regards the material particles, the Jainology clearly states the provision of existence of two or more than two Pudgala Paramāṇu at the same location. For example, in Pravacansāra. Ācārya Kundakunda writes: [4].

आगासमणुणिविद्वं आगासपदेस सण्णया भणिदं ।
सट्वेसिं च अणूणं सक्कदि तं देदुभवगासं ।

This verse says that the space occupied by one Paramāṇu is called one Pradeśa of Ākāśa and that one Pradeśa of Ākāśa is capable of accommodating all Paramāṇu.

This shows that the concept of two or more than two Pudgala Paramāṇu at the same location is consistent with quantum mechanics. However, Kālāṇu (an 'atom' of special kind of substance known as Kāla that resides at every Pradeśa of Lokākāśa) behaves as a fermion, i.e., two Kālāṇu can not be at the same location [5].

Quantization of space and time -

According to Jainology, the space is infinite. The whole infinite space is considered as a sum of two parts: (1) Lokākāśa, and (2) Alokākāśa. The space where except space nothing exists is known as Alokākāśa. Its volume is infinite. The space where substances other than space also exist is called Lokākāśa. The Lokākāśa has volume equal to 343 cubic Rāju.[6] (Rāju is a unit of length). A section of the Lokākāśa is shown in figure 1. Further, there is a concept of the smallest unit of the space known as Pradeśa of space. By smallest unit we mean that the further division of one Pradeśa of Lokākāśa is not possible[7]. The volume of one Pradeśa is nonzero. In other words, a Pradeśa is not a geometrical point. Thus the number of Pradeśa in the finite volume of whole Lokākāśa is not infinite.

Here the point of interest is the impossibility of a fraction of one Pradeśa of space according to Jainology. Such concept of the smallest unit of space volume looks strange to our common sense. Our common sense permits us to imagine any further division of any small volume of space. However, quantum mechanics can comprehend such smallest

quantum of space. Thus space quantization of Jainology is one of such advanced concepts which had no place in the old science of 19th century but is appreciated and honoured by the latest science known as quantum mechanics. It is well known in quantum mechanics that in the phase space, the volume of one cell is h^3 , where h is Planck's constant. It may, however, be noted that the exact analogous concept of one Pradeśa of Lokākāśa is not yet available in quantum mechanics.

Similarly, in Jainology we come across the minimum amount of time which is called Samaya[8]. The Samaya may be translated as 'Timon'. According to Jainology a fraction of Samaya is impossible[9]. Again such concept can not be understood by the old science of 19th century but can be appreciated by quantum mechanics.

Uncertainty Principle and the probabilistic behaviour -

Quantum mechanics has a very strange feature that gives the probabilistic nature of the events and the uncertainty principle. The probabilistic nature of events described in quantum mechanics says that the same cause under identical conditions can lead to different results. We can not say with certainty that a cause X under identical conditions would produce result Y . In this connection it would be appropriate to quote the following from a book on quantum mechanics by Dirac (a Nobel Prize winner):

"When an observation is made on any atomic system that is in a given state, in general the result will not be determinate, i.e., if the experiment is repeated several times under identical conditions several different results may be obtained. It is a law of nature, though, that if the experiment is repeated a large number of times, each particular result will be obtained in a definite fraction of the total number of times, so that there is a definite probability of its being obtained. This probability is what the theory sets out to calculate. Only in special cases when the probability for some result is unity the result of the experiment is determinate." [10]

Thus, the probabilistic nature leads to the failure of the law of causation. The law of causation is well known and it says that the same cause produces same effect in identical conditions. Due to strong faith in the law of causation even Einstein was not happy with the probability nature of events described in quantum mechanics. His views are represented very well by his famous quotations, 'God does not play dice', and, 'I look at quantum mechanics with admiration and suspicion.' [11]

Einstein tried hard to reformulate quantum mechanics so as to attain the validity of the law of causation. He could not gain success but still today there are scientists such as David Bohm[12] who believe that in the deeper sense there should be certainty. According to Bohm[12] the existence of some 'hidden variables' not known to the scientists till today may be responsible for the incomplete description of any process that leads to the probabilistic behaviour. Thus Bohm relates the probabilistic nature to the ignorance of the present day physics.

The concern regarding the failure of the law of causation and the necessity of hidden variables can get some light from the Jainology. The Jainology has a concept of

Karmic particles which are very small as compared to any of the smallest particles (elementary particles such as protons, electrons, mesons) known to scientists. The Jaina philosophy describes important role of present and past thoughts of the living beings on the physical events through the Karmic particles bonded with the soul.

We very well know the tallying of the cash register and cash by a bank cashier. If he forgets to record an entry then the account does not tally. Thus the failure of the law of causation given by quantum mechanics may be due to the fact that at present some entries might be missing, e.g., the karmic dust is likely to exist but the scientist have not been able to count (observe) due to the limitations of the present state of the advancement of the science [13].

The requirement of some entries has motivated some authors to write some popular scientific books such as 'The Ghost in the Atom' [14]. Whether one ghost or many ghosts? Who are these ghosts? The answer may be multifold and it may suggest the importance of acceptance of soul and karmic dust so far unknown to the science.

A practical advantage of this type of knowledge to a lay person may be seen in the books such as 'Quantum Healing' [15]. On the basis of the probabilistic behaviour of events described in quantum mechanics, Deepak Chopra argues that the same medicine under identical physical conditions but with different thought patterns of the patient can give different results. In general, in recent years, there have been a large number of scholars and psychologists [16] who advocate the effect of mind over matter. All these suggest the necessity of purifying our thoughts to attract good coincidences in our life.

The uncertainty principle of quantum mechanics says the impossibility of the simultaneous accurate determination of the location and velocity of a particle. This is a consequence of the probabilistic behaviour of events described in quantum mechanics. The uncertainty in the location of a single particle can, however, be explained to some extent if somehow one can conceive a single particle as a 'thermodynamic system' of a large number of smaller particles. Here again the concept of Skandha of Jainology may be helpful: According to Jainology the smallest unit of matter is Pudgal Parmanu which can not be further divided. Very small particle such as an electron or a proton that we conceive/observe through the scientific and mathematical tools is Skandha (a combination of two or more than two Pudgala Paramāṇu), and is likely to behave as a 'thermodynamic system'.

Concluding remarks -

One can find a large number of complex facts stated by our ancient Ācārya that are in agreement with the latest branches of science, e.g., a well-known distinguished physicist of present era Prof D.S. Kothari, ex-chairman of the University Grants Commission of India, published an article [14] that discusses the concept of wave-particle duality of quantum mechanics in the light of Syādvādā of Jainology.

Whether Jaina Teachers who wrote the scriptures in the forests without any worldly motive were knowing the concepts of modern science such as Quantum Mechanics.

Based on the above description, we would see that the answer of this question would very likely be 'Yes'. However, one should not forget that the main interest of Jain philosophers was to describe the way of attaining peace and bliss by understanding the soul. As such the maximum advantage of studying such philosophy would be in attaining the peace and bliss.

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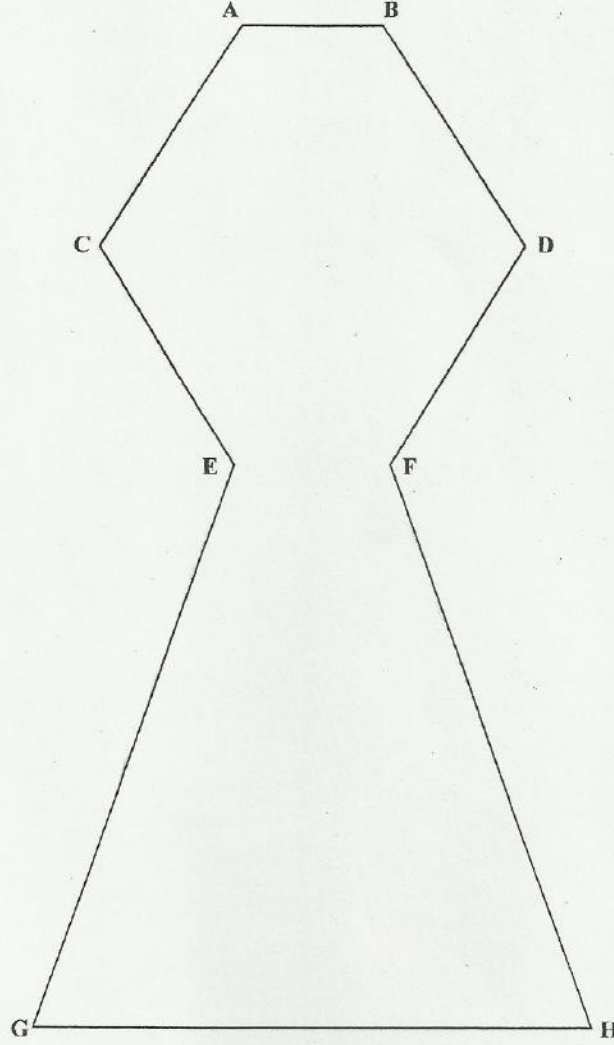


Figure 1: According to Jainology space is quantized. One quantum of space is known as one Pradeśa. The figure shows the boundary ACEGHFDB of a section of the Lokākāśa. The number of Pradeśa in the Lokākāśa is not infinite, but infinite Pudgal Paramāṇu resides within the Lokākāśa. This reveals the 'Boson' concept. However, the number of Kālāṇu in the Lokākāśa is equal to the number of Pradeśa in the Lokākāśa. This gives the 'Fermion' concept.

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