Some Points of comparison between Yogic Theory and Quantum Physics

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The science of Physics is the fundamental material science. Its aim is to find and formulate the dynamic laws that are governing matter and material energy. Directly and indirectly, this science has influenced the world that surrounds us in the most profound way. Through modern technology, which is based on physics, this influence is greater than ever in our time. Although this practical influence is the most recognizable, there also exists another type of influence. The laws formulated by theoretical physicists during the last three or four centuries have had an ever increasing impact on philosophical thought. Rightly interpreted, these laws can certainly teach us much about Nature, our relations to it and our possibilities for gaining true information about it.

Newton's Principle

For a long time, theoretical physics was dominated by the principles of Newtonian mechanics. These principles are of a definite deterministic character. They state among other things that cause and effect are uniquely interrelated. Thus the same cause will always give the same result. Also, according to Newton's mechanics, the only limitations imposed on physical observations are the resolving power of the measuring apparatus.

Thus by constructing finer and finer instruments, physicists rightly expected to get an ever expanding knowledge of Nature. They felt that there was nothing in principle that would prevent them from gaining the ultimate

knowledge of the material world. Of course it was admitted that the ever increasing difficulties in constructing suitable instruments might delay or even stop the developments towards that goal, but these were only practical obstacles. The fundamental working principles of the material universe were considered to be already known.

The Golden Road

For more than a century, the developments of both theoretical and experimental physics went along these lines, and the scientists felt more and more convinced that they had found the golden road towards knowledge and mastery of Nature. Then, in the beginning of the twentieth century, the resolving power of the applied instruments had become strong enough to enable physicists to make at least crude observations regarding the molecular and atomic structure of matter. To their astonishment, the observations indicated a quantic nature of the observer's physical data. For instance, the measured energy of an atomic system was never continuous. It could only take on certain definite discrete values, as was the case with all observed data. This was clearly contrary to Newtonian principles and, worse than that, careful theoretical analysis of the consequences of this discovery clearly showed that there was (and was ever to be) an inherent uncertainty in all observed physical quantities. In the macroscopic world these uncertainties were too small to be of any practical importance.

The Quantum Theory

If they were insignificant there, in the atomic area they could not be ignored. This of course led to a crisis in the scientific understanding. After some intense theoretical and experimental work, a new physical theory and mathematical system arose out of the crisis. This Quantum Theory and its

working principles are of a more subtle kind than those of classical, Newtonian physics. According to the older theory, everything was analyzed down to certain fundamental concepts as particles, waves, positions in space, time instances, etc. All these are familiar concepts from everyday life and are quite easy to visualize in our minds. In the atomic world, all phenomena cannot be described by such familiar terms. For instance, in certain processes a phenomenon may have the characteristic of a particle and a wave at the same time.

In some of the finer aspects of the Quantum theory, we cannot introduce the gross material concepts at all. Here the processes can only be described by complicated mathematical symbols. The difficulties of forming mental notions of these subtle things, together with the complexity of the associated mathematics, is a great hindrance to gaining further knowledge of the atomic world**.** Now more than ever, the development of physics depends on a suitable development of scientists' intellectual abilities.

The Black Holes in Universe

Modern science has at present no idea how to affect such a development in a planned, orderly way. It seems as if the main concern on the agenda of advanced physics is in resolving the antagonism that exists between quantum mechanics and Einstein's sustained gravitation theory in his general theory of relativity. It would seem today, its main concern is to understand the black holes that render Quantum mechanics and Einstein's theory null and void, where singularity is at the heart of the new enigma.

Quantum Physics Philosophical Consequences

The philosophical consequences of Quantum physics may be summarized as follows:

1) the familiar physical concepts from the macroscopic world cannot be applied directly in the atomic realm, and
2) determinism in the classical meaning of the term is not always valid in Quantum systems. The same cause does not always give the same effect. However the probability that a given cause applied to a given atomic system will give a certain effect always remains the same. Thus, performing a great number of identical experiments will not always yield the same result, but the numerical propositions between the different results will always be retained.

There is intrinsic uncertainty in observed physical data, which cannot be avoided by constructing better instruments. Today's instruments are not sophisticated enough to approach the limits of accuracy stated by Quantum theory, but observed physical data up to the present supports the deduction above. Here all physicists do agree. There has, however, been a great dispute between scientists about the reality behind the three statements above.

The two positions in this dispute are represented by the eminent scientists, Niels Bohr and Albert Einstein. Bohr held the view that it represents the real nature of microcosm. What is going on there is to a certain extent happening by chance; we can never know beforehand with 100% certainty the effect of a certain cause. Statistically, we are only able to give a positive answer, stating the probability of a certain effect. We experience this when flipping a coin in the air. We are never certain which side will turn up when it lands, but we know by experience that each side will show up in 50% of the cases.

God does not play dice

Contrary to this, Einstein expressed the belief that the microcosm too, is governed by strictly deterministic laws. The determining factors might be

outside our possibilities of observation forever, but not necessarily outside the realm of our thoughts. His principle view may be expressed by citing one of his typical remarks in this connection: "*God does not play dice*".
But what is it then that makes our observations of the microcosm indeterminable? To observe something, we have to use our senses and, in many cases, some scientific apparatus as well. However, irrespective of the amount of advanced instruments we are using, we always need a certain small amount of physical energy to activate our sensory receptors.

When we observe a microcosmic system, the energy of the system might be of the same order of magnitude as the energy involved in the act of observation. So, by observing the system, we change it, and therefore we cannot tell how the system would behave without the interference of the observation. In this way uncertainty is always introduced by the act of observation. The finer the observed object, the more uncertainty will be introduced into the observed data.

Compatibility With Yogic Theory

Many aspects of Quantum theory are consistent with yogic theory. Yogic theory clearly states that there is a limit to the knowledge that can be attained in the sensory way. Above a certain level, indicating the subtleness of the phenomenon involved, it is not possible to perform sensory observations. This level, technically called the *anu 1)* level, apparently corresponds in some way to the energy involved in the act of observation. Although the *rishis* (the "seers" of Yoga) and modern Physics have come to similar conclusions, these have been reached by quite different methods. The knowledge of the *rishis* has not come from physical experiments and mathematical analyses, but by practicing Yoga to elevate their minds above

the sensory level. (In contrast, many of the leading physicists do not recognize a world outside the physical or a level of consciousness beyond the sensory level.) They are thus able to experience a quite different world on a super-sensory level, and then come back to the sensory level again, aware of the difference. Regular practice in this way leads to a definite knowledge about the world beyond the sensory and about the border between the two worlds. They will then be able to formulate their knowledge (to a certain degree) in language for the information of those who cannot go beyond the sensory level.

Reality's Correct Image

This apparently was the standpoint of Niels Bohr, when advocating the quantum mechanics description of the atomic world to be in principle a picture of the ultimate reality. Also Einstein admitted it to be a correct description of the microscopic world as experienced by physical observations, but his religious feelings and spiritual intuition made him to refuse to regard it as an expression of the ultimate reality.

From a philosophical point of view, the Quantum theory may be regarded as the intellectual mind's evaluation of the interaction between the sensory activation energy and the object under observation. Here we may consider three different situations:

a) when the energy of the observed physical object is much greater than the energy involved in the act of observation, we can, without much error, revert to the classical physics of everyday experience and ignore the latter in comparison with the former;

b) when the energy of the observed object and the sensory activation energy are of the same order of magnitude, we must apply Quantum theory to make the best out of the situation (while never fully escaping from

uncertainties and indeterminacy[2] as long as we operate in the sensory field);

c) when the energy of the observed object is much less than the sensory activation energy, the former will of course be more or less drowned in the latter and there will be no possibility to make reliable physical observations (in other words, the object is no longer a physical object).

How to Proceed Henceforth ?

What can be done to proceed further in the science of microphysics, a.k.a. atomic physics? As mentioned before, the theoretical limit of physical observations (the level of *anu* according to yogic concept) has not actually been reached, although overwhelming experimental evidence makes it clear that such a limit exists. According to the deductions above, two factors may contribute to the acquisition of more knowledge in this field.

i. A reduction of the energy involved in the act of observation.
ii. An enhanced intellectual power on the parts of the scientists.

The first factor may be achieved either by enhanced sensitivity of the senses, more sensitive scientific instruments, or a combination of the two. Enhanced sensory power is achievable to a great extent by the process of Hatha Yoga, although this has hardly even been recognized by scientists. Therefore the second path has been followed exclusively by physicists, and not without success. The ability to make refined measurements on atomic systems is ever increasing, but as the absolute limit is approached, the difficulties of retrieving information from experiments on microcosm is also increasing.

The Limitizing Factor

Here, the intellectual power of the working scientists is the limiting factor. As the familiar concepts from our daily life become less useful, the reasoning has to proceed to an ever increasing extent to higher mental levels, called *vikshipta* in yogic terminology. Not many modern scientists feel at home here, and most of the few who really do master these matters are one-sided and overspecialized. Therefore they cannot easily make connections to other realms of human culture in order to contribute to the development of refined philosophical knowledge. No doubt, the scientists' abilities to form abstract conceptions have grown with recent scientific developments. Concepts which were 100 years ago only understood by a few leading physicists are now taught even in quite elementary courses of Physics. This is evidently the positive result of increased training in intellectual reasoning.

A Different Method

However, according to Yoga, there is another method of developing the consciousness beyond the sensory level. This consists of bringing the mind immediately above the intellectual level by the practice of mental concentration. Here, at the so-called *dhi* level, the mind is focused on the object of meditation to such an extent that all reasoning will cease. By regular practice, the power of reasoning will be enhanced when the mind is back on the ordinary level. By this process intelligence is developed in a general and harmonious way through the various processes of Hatha Yoga. A yogic practitioner may then apply this development of body and mind toward a specialization in some branch of science or art.

The Insuperable Limit

However, no matter how far intelligence may be developed or how refined

the technique of observation may be, there is a limit which cannot be surpassed as long as the act of observation is of sensory type. Although physical science does not recognize the acquisition of knowledge in other ways than the sensory, much of the aim and meaning of Yoga is the elevation of the consciousness above the sensory level. According to Yoga, it is possible to experience the material world both in extrasensory and suprasensory states. Here, however, as no material energy is involved, the limitations treated by Quantum Theory do not apply. Likewise, at still higher mental states the yogi may experience preliminary stages of matter in the form of *mahabhutas* and *tanmatras*. So by regular practice of mental concentration on the various levels referred to above, the material world may be known in all its phases and levels. However, it's no easy task to reach these higher states of consciousness. If science—not only physics, but all related sciences such as chemistry, biology, etc.—is to proceed beyond its present limitations, there is hardly an alternative way to it. Scientists will have to work not only with matter but also directly with consciousness. A deeper knowledge of physics and other related sciences will not be possible without that kind of introspective knowledge.

One Consciousness

To conclude, the main difference between Science and Yoga lies in the fact that Science only acknowledges one form of consciousness, namely the brain-related consciousness. Yoga, however, has a broader scope. The brain, according to Yoga, is not a consciousness-generating organ, but rather a reducing factor of a more encompassing consciousness. If consciousness somehow is liberated from the limitations produced by the brain, it is then possible to surpass its usual sensory limits and access a broader consciousness. This does not in and of itself insure that we will be able to

resolve all issues connected to the sensory world. Thus we need both the higher consciousness to clearly see the solution to the problems we face during ordinary, karmic-regulated human life, and ordinary consciousness endowed with the individual's power to cope with these problems.

Improved Life Conditions

One of the primary aims of yogic practice is the attainment of a higher, non-sensory consciousness. If such an aim could actually be achieved by a greater part of mankind, it would be a real step towards higher living style as well as better life conditions for this planet. Yogic practice would then be an intrinsic part of scientific work and higher education. The development of science and yogic practice would be interrelated parts of human development and understanding.

The considerations expressed above were developed within the context of the author's engineering education, nuanced by many years of receiving Sri Shyam Sundar Goswami's spiritual teachings. The essential scientific points expressed herein are in accordance with the opinions of such advanced scientists as J.T. Bennet and Einstein, as well as many among today's active scientists.

1 - In the Kanâda school of thought, *anu,* following a reduction of mass that amounts to its measureable disappearance, becomes a point with no magnitude.

2 - In the standard description of quantum physics, quantum indeterminacy is the apparent necessary incompleteness of a physical system. Cf. also Heraclitus' famous statement: *"No man ever steps in the same river twice, for it's not the same river and he's not the same man."*