THE SURANGAMA SUTRA AND QUANTUM THEORY

I) INTRODUCTION

Classical Physics, for its artificial and inaccurate philosophical grounds, has only a very limited range of approximate validity. Quantum Theory, otherwise, is one of the most successful theory in Physics, even that the reason it happens is not clear to the physicists.

In the last 14 years, important and striking conclusions were derived from the analisis of the Einstein-Podolski-Rosen objections to Quantum Theory, as well as from experimental tests of Bell's inequalities. As a consequence, "nonlocality phenomena" and "non-realism" of "physical reality" has now to be seriously considered. These aspects have enormous philosophical implications and are probably the most important by-product of the sucess of the theory.

In the search for an epistemological basis to Quantum Theory we suggest it is possible to show a surprising parallelism between its formalism and the philosophical teachings of Buddha (Sidarta Gautama), 2,300 years ago, in India.

Specificaly, in "The Surangama Sutra", Buddha explains the way sentient beings develop separate consciousness of things, showing all of them are but apparent illusions resulting from restrictions applied on Tathagata's Womb.

This concept of Tathagata's Womb has a direct connection with the TAO concept from Lao Tsé, and a strict formal representation in "Wave Function" concept of Quantum Theory.

In the sense, Quantum Theory can be seen as a formal and compact statement of the Surangama Sutra's apparent reality description, as well as of first Tao Te King's verse. This semantic and philosophical deep correctness is suggested to be centrally responsible for the Quantum Theory's success, which doesn't happen with the materialistic and concrete Classical Physics.

The Surangama Sutra is devoted directly to the emancipation of men, and only with this direct proposal, these teachings touch the point of objective reality, showing carefully the way

"sentient being" develop incorrect and narrow views of what they see.

From the side of science, with completely different moving reasons, the effort in achieving a final and complete rational description of reality, led to a striking improvement of language as in the transition from classical physics to modern physics.

These two ways of progress, made possible to the poeple of the both sides see each other with growing interest. Recent further developments is quantum theory show that the two positions are still closer.

Looking from another point of view, we can say that the two approachs are different paths in the same fundamental men's search for the final true Reality. Then it is not surprising the close similitude of the views from both sides.

It is impossible in the scope of this presentation, to go in a deep analisis of "The Surangama Sutra" or any other quantum theory text-book. For this reason we decided to select especially relevant and representative ideas of the both views and, without losing the context, draw comments and conclusions in the line of seeing the common grounds.

II - THE MAIN IDEAS

As we have no opportunity here for a profound discussion of the exact meaning of each expression used for explain both view, it is important to stress that they have the correspondent original meaning as in "The Surangama Sutra" or in any quantum theory text-book language.

In defining reality, it is necessary to consider the way reality is apprehended

In the sense of buddhism, the process of objective "seeing" is a complex operation caracteristic in the sentient beings ". It is a mental process that starts with some information from one of the six senses, evolves to a mental "perception" (by the connection of this information with existing mental expectation structures) originating sensations and new mental structures. This event has two other connections: the experience is registered in all its perceived aspects as a new knowledge, and the knowledge is processed rationally defining or redefining new mental structures.These expectation structures are then the "new glasses" with what that sentient being will discriminate further.

Is is possible to synthesize this concept saying that in the buddhist description, conditional objective seeing is a mental process of entities discrimination by projecting mental expectation structures on the shapeless reality. In this sense, reality is created in the observation process.

Among the scientists is very common the philosophical view called "realism", which is clearly expressed by A. Einstein in the famous EPR objection to quantum theory.

The central idea of "realism" is that there exists an ever present physical reality, exactly defined at any moment or place. The physical theories are better or worse as they represent more or less closely that physical reality. There is also a belief in a "perfect theory" that could describe it exactly, as well as in a "perfect measurement" that does not affect the observed system.

In quantum theory, otherwise reality is represented by the "wave-function" Ψ and described by the "physical observables" that actuate on Ψ. Ψ itself has no physical meaning and cannot be observed, and the "observables" have the meaning of an "expectation structure" with respect to reality.

In classical physics, reality is represented and described by the physical observables having no diference at all between them. The physical observables are seen as the full reality.

In quantum theory formalism, it is allowed for the system to evolve as a whole, without any confusion with the observalbles that are expected to be measured on the system. This important aspect brings the possibility of descriptiom of non-classical phenomena like barrier penetration, double slit effects, quantum interconnectedness or non-local effects.

In quantum physics, objective reality has meaning only at the moment of measurement, and the value of the observables are meaningless logical inductions otherwise.

Only without "expectations" can Reality be seen

In buddhist sense, for objective seeing, it is necessary to use condicional mind, or be, the mind identified with mental expectation structures.

"Pure Mind" or "Essence of Mind" or "Essence

of Sight" is the observing mind, free from mental expectation structures or any discriminative nature. Only that "Pure Mind" can see reality as it is, or be, can see "Reality".

This concept of "Pure Mind" free from expectations is not a theorical idea, but in buddhism, it is the central experience for men emancipation.

In classical physics, it is impossible to find any correspondence with Pure Mind's idea, since "realism" philosophical position does not consider other mind than the objective.

In quantum theory, it is clear that the "wave-function" free from any restriction or conditions represents "nothingness" and no information can be obtained from it. But in the same way the "Pure Mind" gives "objective reality" to an expectation struture, the wave function submeted to conditions will "give" "reality" to these conditions, allowing the calculation of "expectation values" of the "observables".

Accordingly to the selected physical observables it is possible to define a complete set of eigen-vectors corresponding to this complete set of observables, in such a way that the eigen-vectors are the solution of the proposed eigenvalue relations.

The "wave function" can then be expressed as a linear combination of these eigen-vectors. The point is that the "wave-function" itself cannot be measured or observed, since when the "ensemble" of systems interact with the measuring devices, "reduction" takes place and only partial "state vectors" are in fact "seen".

This concept of "reduction" is central in the quantum theory of measurement. It allow us to say that only free from the "observables", that is, free from "expectation structures", and any other restriction, can "Reality" be as it is, but in this way Reality don't shows itself as a concrete and objective entity.

An arbitrary number of "objective reality" aspects can be found from an arbitrary number of independend complete "observable sets" none of then are
the "Reality-wave-function", but only results of some particular expectation structure represented by these observables. It doesn't matter how many of these state vectors are added up, they cannot represent the originality and freedom of the general "Reality-wave-function".

The buddhist concept of Reality, that is, the "Ultimate Principle of Reality", is the "Tathagata's Womb", that have the same meaning as "Essence of Mind", which cannot be objectified.

As is emphasized in "The Surangama Sutra" reality has no material ground, no material essence can be found for what we call "material reality"."Material appearance" is only the result of "contaminations" on the true "Essence of Mind".

True "Pure Essence of Mind" looking at what is called "material reality" sees only "sunyata" or "nothingness".

Identify objetive reality is identify expectation structures attached to mind. Then "Essence of Mind" is the deep source of all apparent reality views and the "objective things" are like figures discriminated in clouds in the sky.

Buddha says sentient beings look all the time at true Reality, but cannot scape of seeing the "contaminations" of their eyes in the form of a fantastic in imaginary objective world. These "contaminations" that mean "expectation structures" passes from life to life, from father to son, without ending, and are the basis of one's self identification.

The Lao Tzu view, as expressed in the "Tao Teh King" is very similar, as can be seen in the famous first verse of this book, written about 500 B.C.

"Tao
the source of the universe
is hidden
in non-existence;
existence
is only its evolution.

If things are explicable
the names we give them
cannot be
the original name
Tao".

III - MUTUAL SUPPORT

Why should the buddhist philosophy be important for quantum theory ? Why the parallels of so much different views like buddhist philosophy and science are investigated ?

Such proximity is very important since it can give philosophycal grounds to the quantum theory formalism and suggest lines for further development.

In science, quantum theory is the most advanced way of looking reality and have as the main caracteristic, the description of the"quantum interconnectedness" as have been "suggested by David Bohm. This effect is an experimental reality, and appears as a direct correlation between two parts of a system that have no "objective" ways for changing information or influence. It means, as in the Einstein-Podolski-Rosen "gedanken experiment", that the two parts of the system interact without any direct physical objective interaction. More recent experimental tests of the Bell's inequalities show that the quantum interconnectedness is in fact a true aspect of reality that is not included in the "realist theories".

Admiting that a system evolves independently from the observables, preserving its originality and "wholeness" sense,even that by "non-objective" means (that is without any physical interaction), quantum theory gets without support from the "realist philosophies" or from the "common sense" and gets closer from the buddhist views.

This proximity brings to quantum theory and to science in general, the buddhist central aspect of including the mind structure of expectations itself,as an observing object when observing anything, and its role in the final conclusions about what have been observed.

Buddhism, accepting an explaining the weakness and narrowness of the "objective" views, helps to widen the space for less restrictive and more real views, where the "objective realities" are sense-images obtained from expectation structures sense-framed.

Quantum theory have an enormous formal beauty in representing and testing this so important core of the buddhist truth.

Accepting as a working hypothesis: the lack of material substanciality for the "material world"; the inexisting reality of space and time; the real inexistence of "particle

trajectories" and of particles; and reducing the experimental observations to mind buildings from sense expectation structures, science would be in front of radically new paradigms that are the buddhist contribution.

In this sense the conception of science would change from "observation and description of objective reality" to "observation and description the way objective reality appears and evolves from the expectation structures". And science would get closer to the buddhist concept of "Dharma", changing its expansive caracter.

It seems that the continuous advance of science has undertaken successive paradigm change, in the direction of less material, more free and less conditioned abstract views of the essence of the objective and material universe. In this sense perhaps the buddhist philosophy may represent a direction for further progress.

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