

The nature of light: What are photons (& particles)?

Basic Platform (Call to Action!)

Even the scientific methodology of thinking (epistemology) must keep on evolving as our understanding of nature advances! Hence the necessity of a conference and publication platform where one is encouraged to present newer **scientific logics** for deeper and better understanding of nature. It is a universally common experience that in most human endeavors, emulation of a recognized success path brings more successes more easily. Unfortunately, the application of this success principle in scientific enquiry implies that we are consciously forcing our minds to think within the framework of currently working logical system and hence we are retarding the evolution of our own enquiring minds!

Is this the reason why progress in fundamental physics has become stagnant?

It is now 87 years since the birth of quantum mechanics and still “nobody understands quantum mechanics”; we all “just compute” to model measurable data. We are trying to build quantum computers using properties like *single photon interference* by producing *indivisible single photons* through, say, *pair production* using nonlinear down conversion process. There are innumerable papers where one starts with an *indivisible photon* of energy $h\nu$ (with the frequency of oscillation of its E-vector as ν); pass it through an appreciable length of a properly phase-matched crystal (for ν and $\nu/2$) and then *divide* it into a new pair of *indivisible photons* of frequency $\nu/2$! One can also use a QM molecule; access its vibration levels; induce two-level upward jump by absorbing a single *indivisible photon* of energy $h\nu$ and then make the molecule release the energy in two steps of downward transitions while emitting two *indivisible photons* $h\nu/2$ in succession. Irrespective of whether one believes in *indivisible photons* or in *divisible photon wave packets* (a la M. Planck or E. T. Jaynes), the molecular down conversion process relies on two discrete QM level transition in contrast to the purely classical nonlinear energy conversion process requiring a finite volume of a crystal with carefully phase-matched direction of propagation of the light beam for energy conversion. The purpose of raising this example is to question the self-consistency of logics used in mapping these two dramatically different physical interaction processes.

Is the prevailing logic system behind human methodology of thinking (epistemology) of physics capable of leading us out of the existing stagnancy? In spite of undeniably monumental advances in our knowledge of diverse working rules behind the persistently changing and evolving biospheric and cosmo-spheric systems, a section of our community is recognizing the stagnancy in physics, however, only quietly and privately. The reason is obvious; the well-heeled scientific enterprise cannot risk alienating its funding sources and ignore the overwhelming socio-political juggernaut. We must recognize that *collectively it is us* who frown upon any scientist whoever tries to challenge the foundational hypotheses behind the currently accepted Classical Theories, Relativities and Quantum Mechanics. It is time for us to critically analyze the monumental successes behind the prevailing Measurable Data Modeling Epistemology (MDM-E) and appreciate the root of stagnancy due to consciously ignoring the Interaction Process Mapping Epistemology (IPM-E). Insistence of the Copenhagen School to build theories based upon observables only, we have got stuck with ψ as an abstract, *un-observable*, mathematical probability amplitude as we proceed to *compute* QM problems, whether we represent ψ as a matrix vector or a wave function. Is it logically self consistent to keep on claiming that even though $\langle \psi^* \psi \rangle$ corroborates real observables, over 80 years old interpretation of ψ , as an *un-observable* mathematical probability amplitude, must remain un-debate-able? How can two consecutive mathematical processes, ensemble averaging after complex conjugation, extract reality of nature

(validated by measured data) out of an imaginary mathematical world, unless ψ already contains some reality of nature built into it? Or, is the mathematical world superior to the interaction process driven material world?

Our biannual conference series has been launched in 2005 precisely to establish a platform where logically self-consistent discussions are encouraged that challenge the foundational hypotheses behind the current successful theories in such a way that our understanding of the interaction processes in nature are enhanced while resolving the existing contradictions and paradoxes.

Has the foundations for the edifice of physics been already laid down? We are, of course, looking for non-believers from across the globe! All of you are very much welcomed to participate in this series of conferences to promote and strengthen this platform and, in the process, assure that our scientific epistemology keeps on evolving perpetually, instead of becoming just another human religion!