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# Urgency of evolution process congruent thinking in physics

An advocacy to elevate the prevailing abstract physics-thinking towards functionally useful system engineering thinking.

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## **How to channel our perpetual biological and intellectual desires to do better?**

In our biosphere, all biological activities, and hence the evolution of all species, from virus to humans, is driven by the perpetual *desire* to do better than the current best that we have. We should continue to humbly emulate nature; rather than telling her how she ought to behave based on human mathematical logics. Viruses invent molecular tools. Humans invent more complex technologies. At the molecular level tool making, viruses always out smart us. Viruses have been systematically over-riding our anti-viral medicines (molecules) within weeks' of introduction!

## Abstract

The prevailing culture in physics is that the foundation of the edifice of Physics has been firmly laid by the twentieth century theories of Relativities and Quantum Mechanics. If I really believe this; then I am proactively urging my enquiring mind to stop evolving any further; since the final path to explore and understand nature has already been discovered. The only option remaining for me is to discover some natural stones; or burn some new bricks; whose shapes are such that they will conveniently fit into the current edifice of Physics. Unfortunately, the actual reality is hammered in by one of the recent books, “The Sixth Extinction: An Unnatural History” by Elizabeth Kolbert [Ref.1]. Collectively, all the currently “working” theories of physics (and other sciences combined) are unable to give us the confidence that we can carry out the necessary geo-engineering to successfully reverse the diverse extinction processes we have indirectly caused over several past centuries purely because of our limited knowledge about the deeply inter-connected and utterly complex interaction processes between the diverse components of the biosphere, and between the diverse species. Accordingly, I propose that the fundamental purpose behind all knowledge gathering/generating processes should be anchored to “The urgency of evolution-process congruent thinking” [Ref.2,3]. First, it will engage all the creative minds to address our long-term sustainability from all possible diverse angles; while assuring socially (better, biospherically) responsible behaviors. Let us also recognize that, since many millions of years past, our evolution has always been guided by innovations of tools and technologies by our smart engineers. These innovations derive through diverse permutations and combinations of nature-allowed processes, irrespective of whether the correct and final theories behind the natural phenomena under considerations have been understood. I will use a few examples from current “working” theories of physics to underscore the significance of iteratively enhancing our mental maps of the ultimate interaction processes behind persistent changes (evolution) in nature.

**Keywords:** Physics epistemology; Consilient epistemology; Evolution-congruent epistemology; Superposition Effect; Non-Interaction of Waves.

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# Introduction

## **Generic troubles with the paradigm-shift driven thinking by our human cultures necessary to control & manage the tribes!**

Throughout ages since many millennia past, many advanced cultures in different parts of the world, were asking big questions (i) the meaning and purpose of human life, (ii) role of human in the biosphere, (iii) where we are from, (iv) what is out there, etc., etc. Enquiring mind must have been built into our evolutionary biological impetus (biological intelligence?). Our cultures are driven by diversity of concepts and ideas. “Freedom of expression” is considered our “birth right”. So, enquire we must. But, we must remember that each of our neural logical pattern inside each of our head is different. So, we frame our questions differently and extract different answers out of the same set of “observations”. These “evidence based” individual explanations appear to be logically self-consistent; and hence, we separately think of them to be the most objective ones! And we fall in love with a paradigm and enforce on the entire culture. Time after time, to get out of wrong paradigms and shift to better ones, human cultures have been periodically experiencing enormous sufferings. ***So, the best thing for us is to share our thoughts and develop collaborative views for early detection of incorrect postulates behind working theories (paradigms).*** This is why ancient Indians used to, and the current Buddhists still encourage, persistent debates; since nobody knows everything. [continued next page]

## Generic troubles with the paradigm-shift driven thinking by our human cultures necessary to control & manage the tribes! [Contd.]

The story of five blinds, modeling an elephant through their collective efforts of iteratively using their “sensorial evidences”, says it eloquently! After all, evolution is collaborative, out of diversity of interactions (thinking). Even pure biological sustainability thoroughly relies upon symbiosis, synergy and food-chain-eco driven competition. This is mutual dependence, not “doggy-dog competition”. We need to get rid of our residual Neo-Neanderthal genes of managing human societies through greed, envy and deceptive skill sets. All multi-cellular specie are still nurtured by the most “primitive” bacteria, usually numbering ten times more than the host body cells! This is real “food for thinking” for the Homo Sapiens to advance to the next stage of our collective culture-driven evolution!

Nobody has found the answer to the ultimate questions: For what purpose the humans have evolved on the Earth? We need to be more humble, yet ambitious in seeking out knowledge. We do not have much choice but to be *evolution process congruent thinkers* to bring consilience out of divergences; while assuring our sustainability. The fields of science, sociology, arts, economics, politics all need to be driven by the common purpose of our sustainability on our miniscule “pale blue dot” floating within the gigantic cosmic system.

# Is there really a connection between physics-thinking and evolutionary-process?

- Physics has given us astounding degree of understanding about nature – from the micro world of elementary particles to the macro world of billions of galaxies in our unfathomable cosmic system. We now understand that intelligent life producing planet is possibly rare in our galaxy!
- Yet, physics has been basically stagnant for almost 90+ years. Staggering volume of global publications in physics are still accepting the same foundational postulates of Relativity and Quantum Mechanics without questions. Alternate thinking are routinely rejected
- Implication: (i) We have already laid the found the edifice of physics. (ii) And/or, we are so confused in finding our way out that we stay happy with glorious anthropomorphic explanations!
- The first one stagnates the evolution of our enquiring mind. The second one dissociates us from the rest of the biological species, even though we are being nurtured by the most elementary lives – diverse bacteria that emerged on earth some 3.5 billion years ago!
- We now do acknowledge that all scientific theories are work-in-progress.

# Is there really a connection between physics-thinking and evolutionary-process? [Continued]

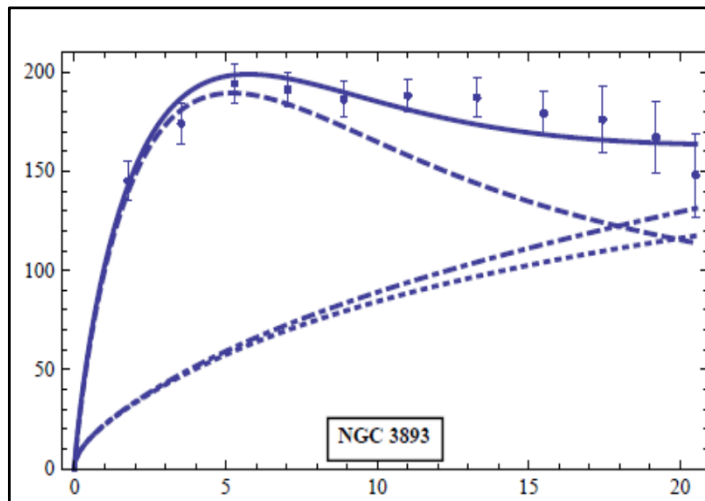
- Then, the lesson from the current stagnancy is that we need a better thinking methodology to seek out nature's ontological reality, the *interaction processes* behind biospheric and cosmo-spheric evolutions. *Explaining and visualizing these processes are the responsibility of physics.*
- **Why?** Today humans have reached the height of the evolutionary ladder because of their technological supremacy through collective engineering innovations and system thinking since the earliest primitive stage. Innovation is successfully putting together nature allowed processes to make new functional tools and technologies. We do not have to have the final correct theory. We never do, anyway! So, physicists must learn to work with innovative system engineers to facilitate new innovations that are essential for sustainable evolution and overcome current Global warming and Solar Warming, in a Billion year future!
- Our current physics paradigm is Measurable Data Modeling Thinking (MDM-T); which is evidence based science. Currently, we are not focused on interaction process visualization and understanding.
- Cosmic & biospheric *evolutions* are taking place through diverse *interaction processes*. So we propose a “back to the future” paradigm of Evolution Process Congruent Thinking for all human endeavor, not just physics thinking! This is along the line of consilient thinking promoted by E. O. Wilson (“Consilience”).  
*Evolution congruency provides the necessary path towards achieving consilience.*



**Raising questions about the  
limitations of current physics**

## “The Trouble with Physics” – Lee Smolin

- Why the Huygens-Fresnel diffraction rule is only a **PRINCIPLE**, while Newton’s rule for Gravity is a **LAW**? Both are over 300 years old!
- The HF-rule is still the “bread-n’-butter” for optical engineers for modeling all macro to nano optical devices.
- Yet, we have been neglecting to explore the deeper, physical processes behind the concept of Huygens’ secondary wavelets and the concomitant source of energy (or the field) that can generate these secondary wavelets everywhere, including the entire cosmic space.
- Newton’s gravity is in flux. Even Einstein’s General Relativity that is supposed to be a better model than that of Newton’s, is being challenged. Ad hoc hypotheses like “Dark Energy”, “Dark Matter”, etc.
- Do we really understand what is the **physical process** behind the gravitational attraction from a distance? What physical properties does the intervening medium possess?



Measured and expected rotational velocity distribution of stars in the galaxy NGC 3893, from its center to the outer edge. The dashed curves represent different theories. The solid curve corresponds to the Conformal Gravity theory as proposed in [Ref.2], which does not require the hypothesis of Dark Matter. The solid circles represent measured data.

## Crisis in physics thinking as perceived by great contributors

1. *“For the mind of man is far from the nature of a clear and equal glass, wherein the beams of things should reflect according to their true incidence, nay, it is rather like an enchanted glass, full of superstition and imposture, if it be not delivered and reduced. For this purpose, let us consider the false appearances that are imposed upon us by the general nature of the mind.”* **Francis Bacon**, *Idol*
2. *“It is the theory which decides what we can observe.”* **Albert Einstein**.
3. *“The basic trouble is that many quite different theories can go some way to explaining the facts. If elegance and simplicity are ... dangerous guides, what constraints can be used as a guide through the jungle of possible theories? ... The only useful constraints are contained in the experimental evidence. Even this information is not without its hazards, since experiment “facts” are often misleading or even plain wrong. It is thus not sufficient to have a rough acquaintance with the evidence, but rather a deep and critical knowledge of many different types, since one never knows what type of fact is likely to give the game away.”* —Nobel laureate **Francis Crick** [12.1d]; this is also quoted by Nobel laureate **Philip Anderson** [1.14].

## Crisis in physics thinking as perceived by great contributors

4. *“How can we understand the world in which we find ourselves? How does the universe behave? What is the nature of reality? Where did all this come from? Did the universe need a creator? Most of us do not spend most of our time worrying about these questions, but almost all of us worry about them some of the time. Traditionally these are questions for philosophy, but philosophy is dead. Philosophy has not kept up with modern developments in science, particularly physics. Scientists have become the bearers of the torch of discovery in our quest for knowledge.”*

**Steven Hawkins and Leonard Mlodinow**

5. *“... Such crude anthropic explanations are not what we have hoped for in physics, but they may have to content us. Physical science has historically progressed not only by finding precise explanations of natural phenomena, but also by discovering what sorts of things can be precisely explained. These may be fewer than we had thought.”* **Steven Weinberg** [12.1j].

See Ch.12 in “Causal Physics: Photon Model by Non-Interaction of Waves”, Taylor & Francis, 2014.

## Why are we facing the crisis?

The crisis in our epistemology has appeared because modern humans, specifically of last thousand years, have been trying to *conquer nature*, rather than humbly *live with the nature* while understanding the *physical processes* behind all the different phenomena that constitute the biospheric and cosmo-spheric evolutions

**Our past, present and future successful evolution, all had required; and will require engineering thinking and innovations of tools and technologies! System engineering thinking is critical for our sustainable evolution.**

## Evolution

It is the highest force behind the perpetual changes in the bio-sphere and the cosmo-sphere

### Nature's evolution as causal engineering processes

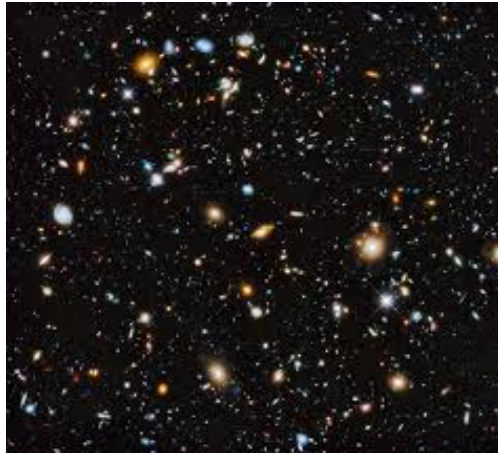
The interaction processes that empower evolution, albeit being invisible to our eyes, are causal, repeatable and reproducible. Interaction processes represent our access to nature's ontological reality. Hence, Physics-thinking must be anchored to interaction process visualization (mapping). Our epistemology must try to emulate nature as a superb engineer, and not as an abstract mathematical logician, or a mystic with multiplicity of appearances to keep us at bay from understanding her.

### Biological evolution is driven by engineering skills of tool making process

In the biological domain, the desire and pro-active drive to do better than the present best started as early as ~3.5 billion years past when the viruses and bacteria started evolving. They make molecular tools and they are still smarter than us in countering our anti-viral medicines! Anthropologists assure us that human evolution was accelerated when we started making complex tools, and eventually technologies to make our life better.

### Survival of the human species will be dictated by our engineering successes!

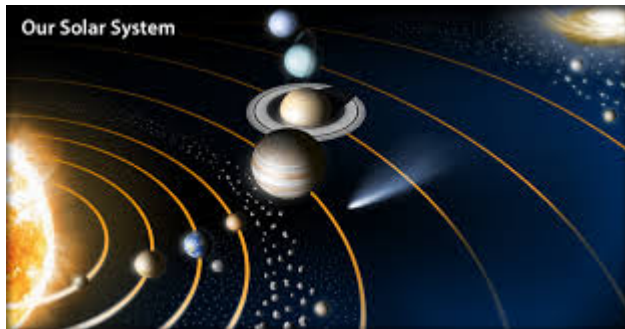
It is our agricultural technologies that is keeping our 7+ Billion people alive today. Global Warming is an urgent problem. A major portion of our scientific efforts must empower the necessary geoengineering technologies. Solar Warming is coming to wipe out the earth, albeit a Billion years in future. We need to put serious efforts in becoming space-faring engineers; abstract theories will not help. For the survival of the human species beyond the Solar Warming, our *fundamental scientific thinking must be evolution process congruent*. Then our engineers can work hand-in-glove with the scientists in making technologies that are necessary for our collective well being (survival), not to make the maximum profit by the current quarter. Invention of new necessary technologies requires the engineers to carry on various permutations and combinations of allowed processes in nature; they do not need to know the final theories; which we will never have, anyway!



Many billions of galaxies



Our Milky way Galaxy



Our Solar system



Our earth



North pole inhabitants

Images are from the web

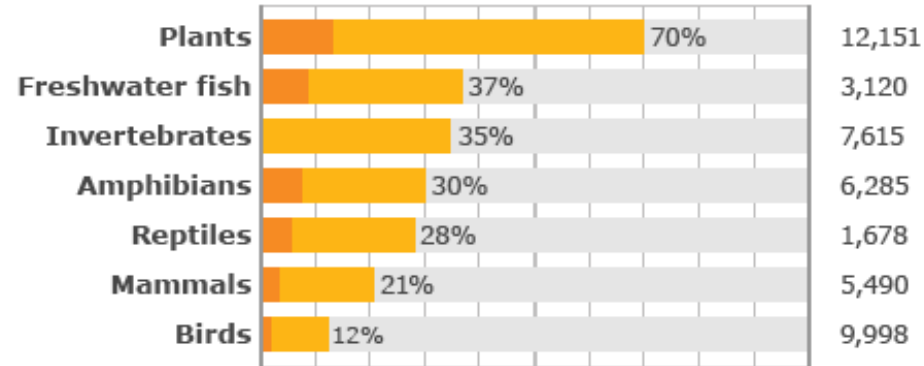
**System engineering minded humans will be forced to become a spacefaring species due to Solar Warming; provided we succeed in overcoming the Global Warming through necessary geo-engineering technologies.**

**Species under threat globally**

% of species assessed so far that are threatened:

■ Critically Endangered where known
 ■ Endangered or Vulnerable

Number of species assessed



Source: IUCN

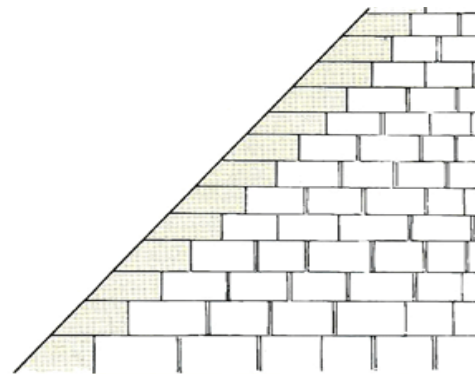


## **Identifying the root causes behind the current crisis in thinking!**

- I. The prevailing culture in physics asserts that the foundation of the edifice of Physics has been firmly laid by the twentieth century theories of Relativities and Quantum Mechanics**
- II. We have fallen in love with our successes: Today we firmly believe that we have understood both the micro world of elementary particles and the macro world of the vast cosmic system.**
- III. “Evidence based science” , based upon the prevailing Measurable Data Modeling Epistemology (MDM-E), has been, so far, the best approach.**
- IV. We are not trying to emulate nature herself as a system engineer; even though we do not have choice but to learn to live within her engineered system.**

# I. The foundation of the edifice of Physics has been firmly laid

- If I really believe this; then I am proactively urging my enquiring mind to **stop evolving** any further;
- Since the paths to exploring and understanding nature have already been discovered; the only option remaining for me is to discover some natural stones; or burn some new bricks; whose shapes are such that they will conveniently fit into the current edifice of Physics.
- I am reverting back again to engineering devoid of asking fundamental questions. Discussions related to QM reveals fracture. “Nobody understands Quantum mechanics”. “Just compute.” No further enquiry is encouraged.



Photos copied from the web.

# **I. The foundation of the edifice of Physics has been firmly laid**

**Only the complete knowledge of the design of an edifice  
allows the proper foundation to be constructed!**

- We certainly do not know the complete design of the very complex cosmic edifice.
- Hence, by definition, we could not have succeeded in laying the foundation of the edifice of physics.
- Unfortunately, science and engineering now being a global economic enterprise, the management of this enterprise is afraid of “rocking the boat” by allowing foundational questions.
- Fortunately, in spite of the dominance of such a of “foundation has been laid”; the strong undercurrent of perpetual scientific enquiry is still alive and well. This conference is a one of such examples.
- An example: The Copenhagen Interpretation of Quantum Mechanics keeps on insisting that QM formalism is complete. However, papers challenging this position have been steadily trickling in!
- The reason is as follows. QM is an excellent measurable data modeling theory; which correctly predicts wide variety of measured data. It was not designed to explain the ontological processes of nature.
- QM’s foundational postulates did not explicitly enquire about the physical interaction processes behind the emergence of measurable data.

## II. We have fallen in love with our successes

Today we firmly believe that we understand both the micro world of elementary particles and the macro world of the vast cosmic system.

- a. Emulation of a validated success path generally brings more successes more rapidly, in the beginning; then it slows down as we get stuck in our success rail”. Then we spend more time admiring the “success rail”, rather than questioning the fundamental postulates behind the original theory.
- b. We dare not question anymore whether our thinking logic has matured enough to accept the prevailing mode of thinking as the final path to our scientific enquiry.
- c. A tiny sub-section of a very large system can be modeled many different sets of self consistent logical rules; none of which may exactly map the rules behind the large system. This is known mathematical complexity.
- d. We have now started imposing our working models for a separate few cosmic sub-system even before succeeding in making a proper unified theory.
- e. Our failure to unify them is still not guiding us to question the foundational postulates behind the working theories. We keep on employing more and more mathematical tricks as if mathematics represents the logics of the creator; albeit being invented by limited human neural network over the last couple of millennia!

**We have failed to remain as objective scientists. We have become anthropocentric – the universe has been designed for US!**

**III. Evidence (Measurement) based science is the best approach for us. But, it provides insufficient thinking tool to connect with nature's magnificent system engineering activities**

## “Measurement Problem” cannot be wished away by elegant mathematical theorems!

### It is a perpetual Information Retrieving Problem

- **1. Measurables Are Transformations:** We can measure only physical transformations.
  - **2. Preceded by Energy Exchange:** There are no transformations without energy exchange.
  - **3. Guided by Forces of Interaction:** Energy exchange, and consequent transformations, must be guided by an allowed force of interaction.
  - **4. Must Experience Physical Superposition:** Interactants must be within each other’s sphere of influence to be able to interact under the guidance of an allowed force to exchange energy and undergo transformations. Thus, all **interactions producing transformations must be “local”!**
  - **5. Through Some Physical Interaction Process:** The understanding & visualizing the invisible interaction process anchors us to inch towards understanding cosmic logics (reality).
  - **6. Always Requires a Finite Duration:** Transformations in the interactants from one specific state into another specific state requires “compatibility sensing dancing period” before accepting the transition.
- **Corollary 1: Impossibility of Interaction-free Transformation:** Superposed waves cannot interfere to re-distribute their energy since there are no forces of interaction between them in the linear domain. Hence, my **proposed NIW-principle** (Non-Interaction of Waves).

We can never gather all the information about anything through any set of experiment since the details of none of the interaction processes and those of the interactants are completely known to us, as yet. But the rules (cosmic logics) behind **interaction processes are invariant**, which we are after!

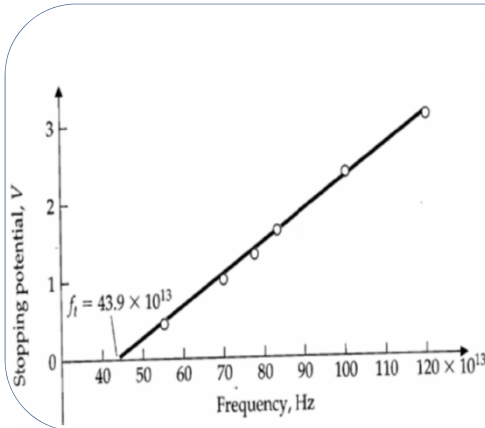
## **IV. A system engineering approach – Evolution Process Congruent Epistemology**

- If direct measurements can never give us complete information about anything, then we must figure out how to indirectly access nature's ontological reality.
- We posit that nature is causal. The cosmic (ontological) rules behind cause-effect driven interaction processes can be accessed if we accept that interaction processes are driven by the causal cosmic rules.
- Then we add to the prevailing Measurable Data Modeling Epistemology (MDM-E) an additional mode of thinking, Interaction Process Mapping Epistemology (IPM-E).
- We can now utilize our evolution-provided faculty of imagination to visualize the invisible interaction processes. In general, it would be a rare to correctly visualize the ontological processes behind a specific measurement in a single attempt, even when the theory is correctly provided the by prevailing MDM-E.
- So, we propose a repetitive, iterative approach. Keep on creating different visual process models that gives the best conceptual continuity between different related phenomena, while imposing cause-effect congruence that can be given by the best the best MDM-E theory. This IPM-E recipe requires challenging the foundational postulates behind all existing theories; irrespective of their “democratic” dominance.
- IPM-E, along with MDM-E, will be our epistemological thinking tools towards discovering the ontological cosmic rules

**Examples of applying IPM-E on to successful  
MDM-E derived photoelectric effect and  
Superposition Effect**



## Visualizing the interaction processes behind the photoelectron emission; which Einstein did not attempt to model or describe!



$$h\nu = \phi_{work\ fn.} + (1/2)mv_{el.}^2$$

Millikan's experimental validation of Einstein's photoelectric effect can be presented by the above Eq., and by the plot on left[7]. The stopping potential  $V$  reflects the kinetic energy of the released photo electron. It is a "book-keeping" to balance the energy budget. Interaction process is not mapped by this equation.

$$\langle h\nu \rangle = \langle |\psi_{res.}|^2 \rangle = \langle \left| \sum_q \chi(\nu_q) E(\nu_q) \right|^2 \rangle = \chi^2 \langle \left| \sum_q E(\nu_q) \right|^2 \rangle = \langle \phi_{work\ fn.} + (1/2)mv_{el.}^2 \rangle$$

Now, let us try to imagine, or map the interaction process. All photo electrons are bound quantum mechanically inside the solid materials. So we can only measure ensemble averaged photo current,  $\langle \phi_{work\ fn.} + (1/2)mv_{el.}^2 \rangle$  and the optical frequency  $\langle \nu \rangle$  and hence  $\langle h\nu \rangle$ . These two modified terms Einstein's equation are further expanded by IPM-E mapping process. The bound electron, before release, forms a dipole with a positively charged site. It is stimulated (forced to oscillate) by the electric vector of the incident light. Using the concepts of QM, the energy transfer process is modeled as  $\langle |\psi_{res.}|^2 \rangle$ , the square modulus of the excited dipole. This can be written, using the linear polarizability of the dipole while stimulated by many wave packets (experimental reality) as,  $\langle \left| \sum_q \chi(\nu_q) E(\nu_q) \right|^2 \rangle$ . The process mapping forces us to recognize the presence of many waves and a material dipole holding the electron. So, the electron's binding energy is quantized, not that of the EM waves. This is a very important new information compared to Einstein's "indivisible quanta"!

**The quantum cup of a stimulated dipole can be filled up by many energy contributors, not just by an “indivisible quanta”**

$$\langle h\nu \rangle = \langle |\psi_{res.}|^2 \rangle = \langle \left| \sum_q \chi(\nu_q) E(\nu_q) \right|^2 \rangle = \chi^2 \langle \left| \sum_q E(\nu_q) \right|^2 \rangle = \langle \phi_{work\ fn.} + (1/2)mv_{el.}^2 \rangle$$

- The third term represents the sum total dipolar stimulation by all the incident light waves. So, the “quantum cupful” of energy is absorbed by the dipole from many different waves, not an “indivisible quanta”. Besides, the QM theory has never demanded a postulate, correctly so, that all quantum transition must be triggered by a quantum donor having the exact quantum cup of energy.

## Process map differentiates between Superposition Principle vs. Superposition Effect

$$E_{res.}(\nu) = \sum_n E_n(\nu)$$

Superposition principle resultant stimulating amplitudes available for a detector. The waves, by themselves, do not re-organize their energies in the space or in the time domain in the absence of resonant detecting dipoles. They always emerge unperturbed out of their volume of superposition as dictated by their individual Poynting vectors. Only material detecting dipoles with linear polarizability  $\chi$  can sum the effects as a joint dipolar stimulation.

$$\psi_{Res.Stm} = \sum_n \chi_n(\nu_n) E_n(\nu_n) = \chi \sum_n E_n(\nu)$$

The transition take place only if the frequency is allowed by QM. Notice that every single beam contributes to the quantum cupful of energy,  $\Delta E_{pq} = h\nu_{pq}$ . *The assumption that only a single indivisible photon from one of the beams satisfy this quantum condition is inconsistent with the mathematical logic.*

$$|\psi_{Res.Stm}|^2 = \left| \sum_n \chi_n(\nu_n) E_n(\nu_n) \right|^2 = \left| \sum_n \chi E_n(\nu) \right|^2 = \sum_n \chi^2 E_n^2(\nu) + 2 \sum_{n \neq m} (\chi E_n(\nu)) (\chi E_m(\nu)) \cos 2\pi\nu\tau_{mn}$$

For the case of a two beam superposition, the math is much simpler:

$$|\psi_{Res.Stm}|^2 = \chi^2 E_1^2(\nu) + \chi^2 E_2^2(\nu) + 2(\chi E_1(\nu))(\chi E_2(\nu)) \cos 2\pi\nu\tau_{12}$$

## “Unreasonable effectiveness” of the formalism of quantum mechanics

The unusual success of QM formalisms derives from its ability to guess the 3-step correct recipe to model measurable data as the (i) ensemble average (ii) of the square modulus (ii) of the stimulated wave function. The recipe has embedded in it the interaction process that nature follows in two steps. First,  $\Psi$  represents amplitude stimulation of our desired entity induced by another controlled entity that interacts with its own phase-dependent property. When this phase dependent amplitude-amplitude stimulation finds that a quantum rule allows them and to carry out a resonant transition, then only the energy is exchanged. This results in a physical transformation leading to a measurable datum. When the data is gathered for a sufficiently large ensemble; we get the validation of QM prediction  $\langle \psi | H | \psi \rangle$ .

Notice that by applying the Interaction Process Mapping Epistemology (IPME); we have interpreted  $\Psi$  as real physical *amplitude* stimulation. We have dropped Born's interpretation,  $\psi$  as an abstract mathematical probability amplitude!

**This is one more example that we can extract more realities out of QM by the application of IPM-E than by applying Copenhagen Interpretation!**

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Jason Scott Nicholson, A Perspective on Wigner's “Unreasonable Effectiveness of Mathematics”, Notices of the AMS, Vol.59, No. 1, p.38.

## Summary

1. We have argued that physics is stagnant for over many decades; the view supported by many famous physicists.
2. Then we presented problems behind our current thinking methodology, Measurable Data Modeling Epistemology (MDM-E). We tried to convince you that evidence (measurement) based science, albeit being the best approach, is fundamentally incomplete; because no measurement can provide complete information about anything.
3. We also argued that nature appears to be a marvelous system engineer; and our successful evolution is being driven by engineering thinking and innovations. So, physics thinking must be re-organized to become evolution congruent and work with system engineers.
4. We also argued that we must adopt the natural system engineering thinking, or Evolution Process Congruent thinking. For Physics, we should introduce Interaction Process Mapping Epistemology (IPM-E). The idea is to visualize the invisible interaction processes and apply the technique iteratively over and above MDM-E.
5. Then we have given a couple of examples related to photoelectric effect and Superposition Principle to show that we can extract more physics out of quantum phenomena when we iteratively apply IPM-E, over and above MDM-E.

## **Connecting it all together!**

**Framing the question determines the answer we can extract. It is the purpose, accepted or pre-supposed by our neural network, which dictates the inherent structure of our enquiring questions. *Our biological and intellectual purposes, “live long and prosper”, must now converge to evolution congruency!***