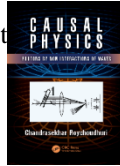**We have been neglecting daily observations, early experiments, early postulates & current diffraction theory; all supporting Non-Interaction of Waves (NIW). But modern interpretations of optical phenomena ignore NIW in favor of mystical & pedantic duality! Evidence based science, properly theorized, is the best knowledge for now But it must be challenged continuously for its evolution!!**
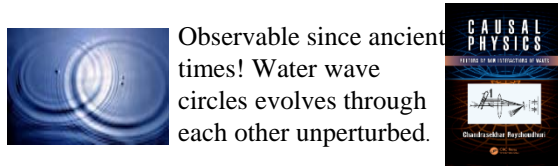
Observable since ancient times! Water wave circles evolves through each other unperturbed.

~965-1040

Alhazen's experiment

Light does not interact with light!

Huygens: A wave is a perpetually propagating set of secondary wavelets, **that evolve through each other without interacting with each other.**

1629-1695

Newton: Light is "corpuscular" in its nature of emission, albeit displaying interference effects later. :

1642-1727

Young: Originator of the famous double-slit superposition effect & re-establish the wave nature of light

1773-1829

Fresnel: Mathematically framed Huygens' principle. The integral automatically incorporates Huygens' non-interaction of wavelets.

1788–1827

Planck: The father of light emission as a quantum (Planck's Law), also underscored the NIW-property of light.

1858-1947

Einstein: 1905-Photons are "Indivisible quanta". But said in1955 –"What are light quanta?"

1879-1955

Bose: In his QM-derivation of Planck's Law, the photon number stays same in each "box", implying photons do not interact with each other.

1894-1974

De Broglie: Interaction of particles are guided by their associated "Pilot Waves"! Established "duality" as a new knowledge!!

1892-1987

Dirac: Mathematically quantized waves as photons, as Fourier modes of the "vacuum". Forced to conclude "different photons do not interfere"!
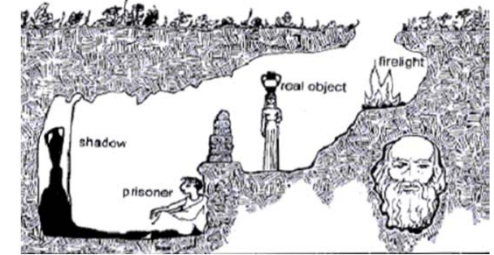
1902-1984

Plato's (~428-348 BC) allegorical story of interpreting reality behind the shadows cast by external light by cave-dwelling people. *Experimental evidence does not contain all the truth!*

Some 6-thousand years old Indian allegorical story: We are all "blind". The model of the Cosmic Elephant derived out of our individual sensorial input is quite limited. But *collaborative synthesis brings out somewhat better reality* .

Detailed reality invisible to blinds.
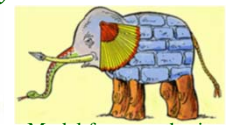
Model from synthesis of multitudes of observed data.

To appreciate the deeper implications of the NIW-property in current and long-term applied and basic physics, see the book, "Causal Physics: Photon Model by Non-Interaction of Waves", CRC. 2014.

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A brief summary of the book, "Causal Physics" through chapter abstracts

Chapter 1-Contradictions: We have identified a series of contradictions that are now being used to explain various optical phenomena. These are results of not accepting the NIW property explicitly.

Chapter 2 -Establish Non-Interaction of Waves (NIW): Here we present logical arguments and a series of experiments to demonstrate that well-defined wave groups can cross-propagate or co-propagate through each other and then reemerge as unperturbed original waves without interacting (interfering) with each other as long as the medium is non-interacting and linear in response.

Chapter 3 -Superposition Basic: Mathematically, we just need to replace the traditional "summing of wave amplitudes" by "summing of conjoint amplitude stimulations carried out by the detecting dipoles." Replace SP (mathematical superposition principle) by SE (superposition effects as experienced by detectors), because SP promotes the misconception of mutual interaction between waves, rather than accepting the reality of NIW property (Non-Interaction of Waves).

Chapter 4—Diffraction: Here we discuss that Huygens–Fresnel diffraction integral, representing summation of secondary sinusoids (wavelets), obeys the NIW property; so does Maxwell's wave equation. SP works only through the process described by the acronym SE. A detector array placed at any forward plane will display the recorded intensity as the square modulus of the evolved HF integral because the detector carries out this physical quadratic algorithm to absorb energy from the composite field. The HF amplitude integral continues to represent the unperturbed spatial expansion of all the secondary wavelets, as if they are not experiencing each other's presence while evolving.

Chapter 5—Spectrometry: Traditional spectrometers (gratings and Fabry-Perot's) are linear amplitude replicators of the incident beam into a train of periodically delayed set of new beams. Our approach recognizes spectrometers' characteristic time constants and their temporal evolutionary behavior by propagating carrier frequency of time finite pulses, instead of propagating non-causal Fourier monochromatic modes. Resolving power is never limited by the Fourier bandwidth product; there is no time-frequency uncertainty limit in nature. The instrument impulse response can be de-convolved. Limits of human invented theories and experimental devices should not be assigned as principles of nature.

Chapter 6—Coherence: We replace the prevailing "coherence property of waves" by measurement-driven property, "correlation property of detectors," and recognize their (1) intrinsic quantum mechanical "time averaging" property and their (2) system-driven "time integration" property. A wave packet is always a "coherent collective bundle" in nature. It is never incoherent.

Chapter 7—Laser Mode Lock: We replace the prevailing "mode lock" concept (mode amplitudes sum to create energy pulses), by the "synchronous time gating" behavior of intra-cavity phase-locking devices, which allows the emergence of energy pulses out of the cavity.

Chapter 8—Dispersion: We need to re-examine the concept and the theory of "group velocity." It is based on the non-causal SP as a measurable effect, violating the NIW-property. We should always propagate the source-generated carrier frequency contained in a pulse.

Chapter 9—Polarization: We drop the concept of elliptical polarization. E-vectors do not sum to spin helically. Wave interactions with the boundary molecules and/or bulk materials of optical components that modify the propagations of all the Ex's and Ey's, are correctly modeled by the Jones' matrix method. It correctly sums Ex's and Ey's separately & finds energy separately for x & y componets. This method, just like the HF integral, has the NIW property built into it.

Chapter 10—Photons: Photons are non-interacting and diffractively expanding classical wave packets conforming to QM frequency and energy requirements. They are not indivisible quanta. We should not assign the QM properties of photoelectrons to photon wave packets. Properly polarized light beams and the stimulations induced by the orthogonal E- and B-vectors can be modeled as angular momentum of material particles. However, we should not assign these characteristic responses of particles as those of the waves.

Chapter 11—Optics, Relativity, and Space: We replace "space as a vacuum" by space by the enhanced "ether" concept as a Complex Tension Field (CTF) with embedded properties like ε & μ, etc., which provides medium driven high velocity, $c^2 = 1/\varepsilon\mu$ without further support from the emitters. The NIW property also requires a CTF. Existence of a stationary CTF demands revitalizing physics through iterative reevaluation of all fundamental postulates behind all major "working" theories. Some examples are given.

Chapter 12—How to overcome the limits of "evidence based science": We should recognize the complete information retrieval bottle-neck out of experimental data. Overcome this by perpetual iteration of the foundational postulates.