From Optics & Photonics News

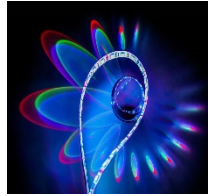# Non-Interaction of Waves (NIW): Applications in Astrophysics

(The modified ether, as the stationary Complex Tension Field, or CTF, can be the foundation of a possible unified field theory.)

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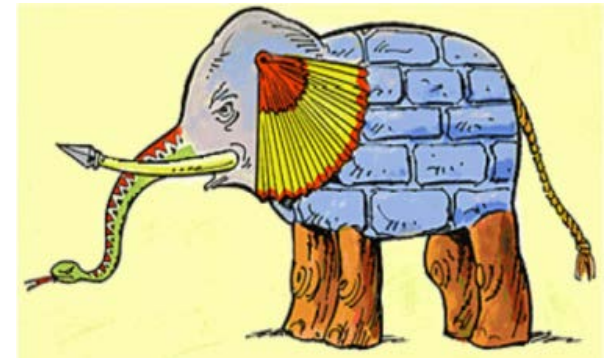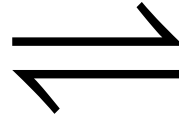**October 6, 2017**

How to think!

We are all "blind"

The classic allegorical story.

! No sensor can gather all the relevant information ever !
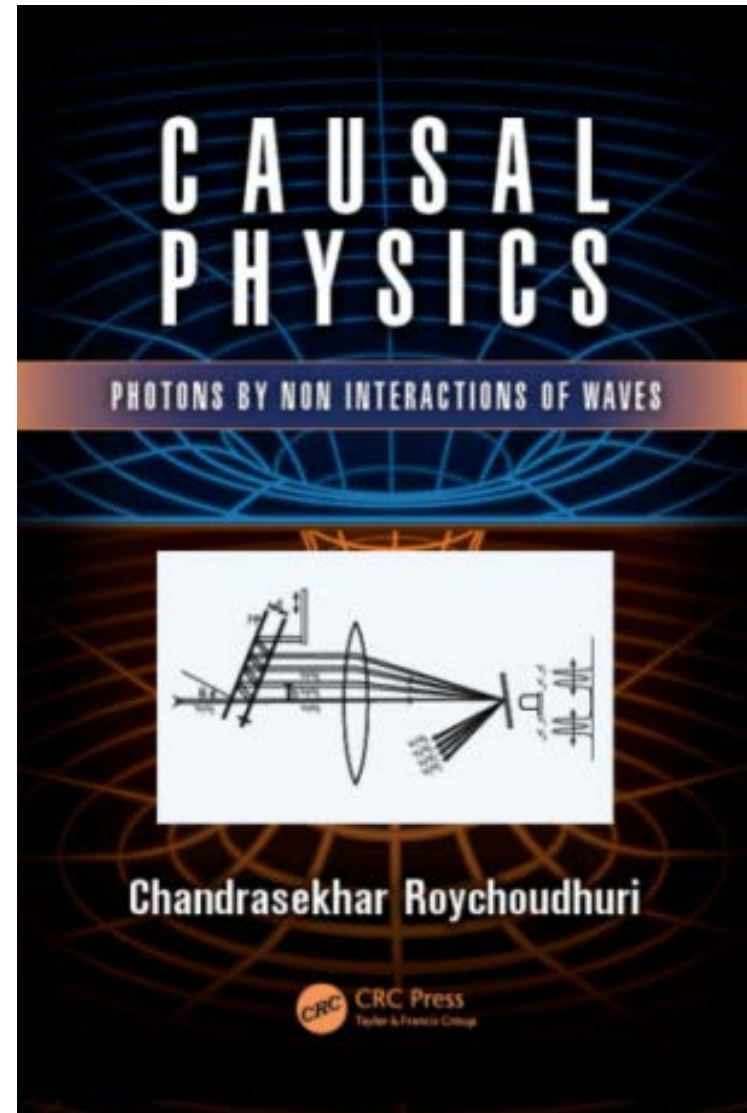!! Evidence based science is always incomplete !!

We must iterate, iterate, iterate, …., our working theories from the very foundations.
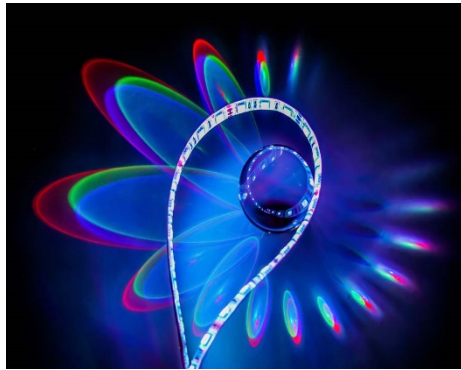
⇌

- Gather diverse input.
- Visualize conceptual continuity among them.
- Refine the concept by imposing logical congruence between many observations.
- Iterate the theories forever.
- There are no final theories.

Evolutionary Process-Congruent Thinking

1. **Nature is the most creative system engineer.**

2. **We need to be reverse system engineering thinkers to understand nature.**

3. **Modern physics thinking does not explicitly recognize this critical issue.**

CAUSAL PHYSICS

PHOTONS BY NON INTERACTIONS OF WAVES

Chandrasekhar Roychoudhuri

CRC Press
Taylor & Francis Group

From Optics &
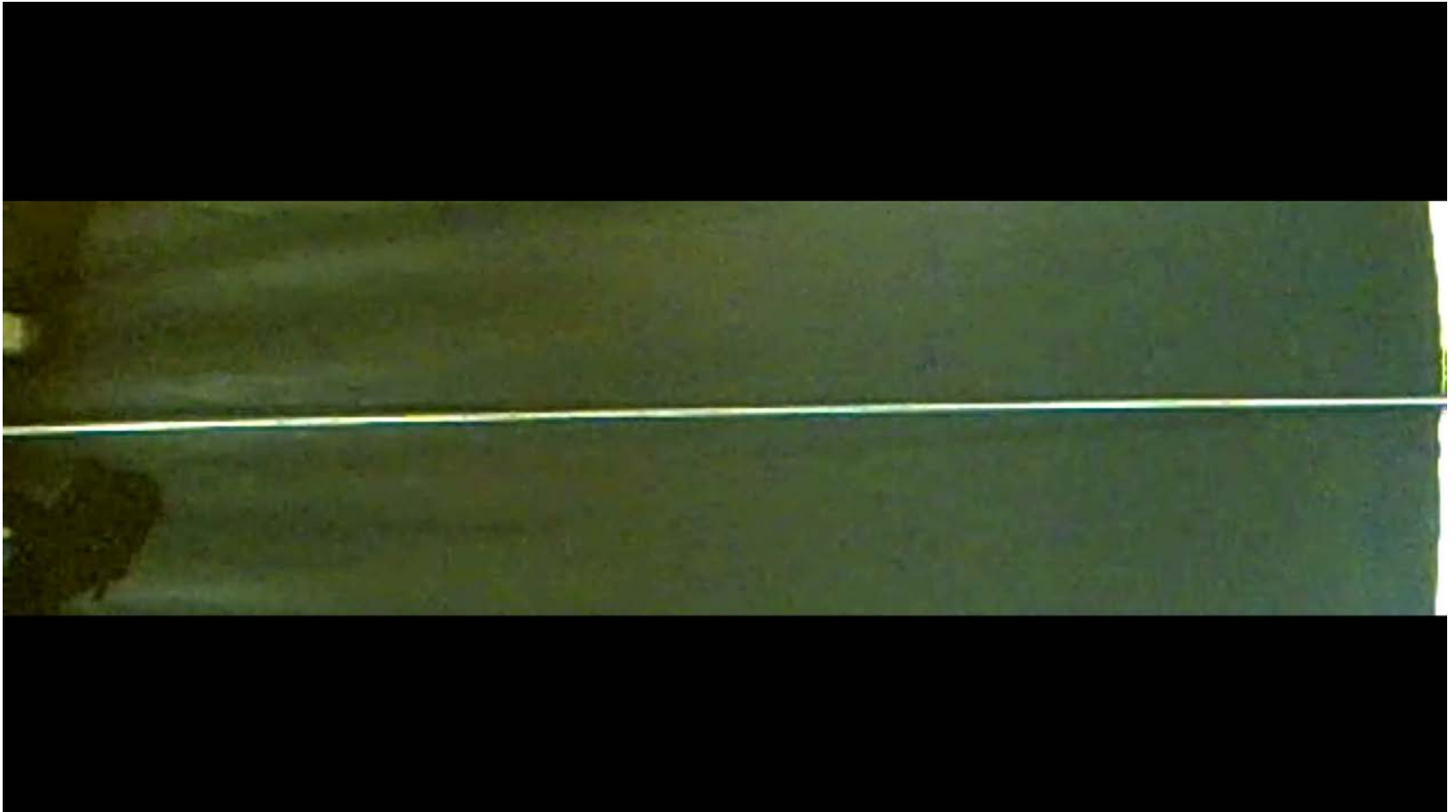Photonics News.

**Appreciating NIW
as a routine phenomenon:-
1. Down on earth,
2. And, in space.**

Waves (*excitation*) of water surface-tension field pass through each other without interacting.

Appreciation: (i) Michael Ambroselli, my PhD student, for video recording and processing.

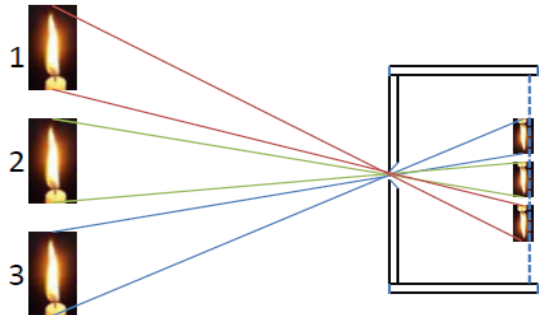# Waves (*excitation*) of mechanical spring-tension field pass through each other without interacting

Appreciation: (i) David Park, a high school student for diverting me to use spring instead of rope. (ii) Michael Ambroselli for video recording and processing.

For light, NIW was also known since ancient times!

Ibn al-Haytham (Alhazhen), a major physicist (*965-1040*) of the Arab world.

Christian Huygens (*1629-1695*)

Alhazen, using an array of candles and a pin-hole camera, experimentally demonstrated that light beams crosses through each other without destroying any information they are carrying.

Huygens clearly wrote in his 1690 book that waves evolve by spreading diffractively through each other without altering each other physical properties.

EM waves (*excitation*) of Complex Tension Field (CTF) are passing through each other unperturbed from all corners of the cosmic space with the same perpetual and constant velocity "c" for 13.5 billion years!

Hubble Deep Field   HST · WFPC2
PRC96-01a · ST ScI OPO · January 15, 1996 · R. Williams (ST ScI), NASA

Astrophysics observational data are reproducible because of the NIW property of EM waves.

**Non-Interaction of Waves and the Linearity,
are built into the wave equation.
They are inseparable!**

Deriving EM wave equation as per classical stretched string model, assuming CTF possesses electric & magnetic tensions.

Classical string wave derivation:

The wave equation for a string under tension is derived by equating two balancing forces. Inertia times acceleration of an elemental string length equals the restoring tension force. Displacement of string position is "y".

$$ma = F$$

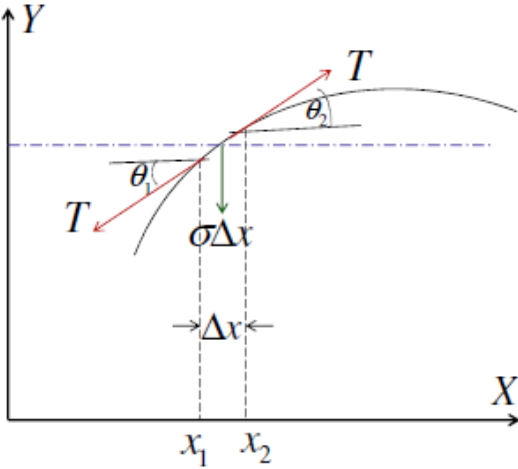$$\sigma \Delta x \frac{\partial^2 y}{\partial t^2}(x,t) = \Delta_x (T \sin \theta) \approx T \Delta_x \left(\frac{\partial y}{\partial x}\right)$$

→ Inertia to material movement

$$\sigma \Delta x \frac{\partial^2 y}{\partial t^2}(x,t) = T \Delta_x \frac{\partial y}{\partial x} \implies \frac{\partial^2 y}{\partial t^2}(x,t) = \frac{T}{\sigma} \frac{\partial}{\partial x} \frac{\partial y}{\partial x}(x,t) = v^2 \frac{\partial^2 y}{\partial x^2}(x,t)$$

$$\boxed{\frac{\partial^2 y}{\partial t^2} = v^2 \frac{\partial^2 y}{\partial x^2}; \quad v^2 \equiv T/\sigma}$$

EM wave derivation as per string model:

The wave equation for "vacuum" under tension is derived by equating two balancing forces. Mass times acceleration of an elemental string length equals the restoring tension force. Displacement of string position is "y".

$$ma = F$$

$$\mu_0 \Delta x \frac{\partial^2 y}{\partial t^2}(x,t) = \Delta_x (\varepsilon_0^{-1} \sin \theta) \approx \varepsilon_0^{-1} \Delta_x \left(\frac{\partial y}{\partial x}\right)$$

→ Inertia to magnetic field generation

$$\mu_0 \Delta x \frac{\partial^2 y}{\partial t^2}(x,t) = \varepsilon_0^{-1} \Delta_x \frac{\partial y}{\partial x} \implies \frac{\partial^2 y}{\partial t^2}(x,t) = \frac{\varepsilon_0^{-1}}{\mu_0} \frac{\partial}{\partial x} \frac{\partial y}{\partial x}(x,t) = c^2 \frac{\partial^2 y}{\partial x^2}(x,t)$$

$$\boxed{\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}; \quad c^2 \equiv \varepsilon_0^{-1}/\mu_0}$$

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Photonics News.

Removing wave-particle duality.

Particles are localized self-looped and resonant doughnut-like oscillations of CTF.

Does ψ really represent the "Abstract Mathematical Probability (Pilot) Wave? Or, is it a real a physical oscillatory amplitude of some field-gradient?

All these harmonic undulations can be expressed by the same exponential function:

$$a \exp(i\omega t) \equiv a \exp(i2\pi\nu t) = a \exp(iEt/\hbar); \ with \ the \ postulate: \ E = h\nu$$

Diagrams adapted from web

If the particles are localized resonant oscillations of the vacuum (Complex tension Field, or CTF; then Schrodinger's "wave function" represents real physical harmonic excitations rather than various abstract mathematical probability amplitudes as "Pilot or plane waves".

SCHRODINGER

$$i\hbar \frac{\partial \psi}{\partial t} = \left(\frac{p^2}{2m} + V \right)\psi = H\psi$$

Mathematical plane wave does not exist in the real world !

❖ *Wave-particle duality started as "lack of detailed knowledge". It is not a new definitive knowledge.*

Then, what are particles?
They are also oscillations of the same CTF!

Particles are localized resonant oscillations of other component tension fields of the same CTF. The oscillations are most likely self-looped doughnut-like to acquire their "localized" properties. These are not De Broglie's Pilot Waves guiding the material particles existing independent of CTF.

Particles have internal oscillations (energy) that determines their very existence, which is already captured by Schrodinger's expression for free particle:

$$\psi_{in} = e^{-i(^{in}E)t/\hbar} = e^{-i(^{in}f)t}; \quad \text{where} \quad {}^{in}E = h\,({}^{in}f)$$

I am hypothesizing that particles acquire a different kind of external oscillation frequency as they kinetic motion and energy while "falling" into potential gradients produced in the CTYF by other particles. There are no force. There are only potential gradients generated in the CTF due to the localized oscillations of particles.

$$\psi_k = e^{-i(^{k}E)t/\hbar} = e^{-i(^{k}f)}; \quad \text{where} \quad {}^{k}E = h\,({}^{k}f)$$

Notice that the kinetic energy can be related to the particle mass and velocity and hence a fictitious De Broglie wavelength. For zero velocity, the De Broglie wave length is infinite; but the kinetic frequency is zero (well defined):

$$^{k}E = m\mathrm{v}^2/2 = h\,(^{k}f) \qquad (^{k}\lambda)(^{k}f) = \mathrm{v} \Rightarrow (^{k}\lambda) = \mathrm{v}/(^{k}f) = h\mathrm{v}/(m\mathrm{v}^2/2) = 2h/p$$

Waves and particles, both are emergent excited states of CTF of certain energy; which is still held by CTF.

C. Roychoudhuri, U. Connecticut & Femto Macro Continuum

From Optics & Photonics News.

Appreciating the impact of
NIW in all branches of physics

Recognizing Non-Interaction of Waves (*NIW*)

NIW & constancy of "c" everywhere requires a ***stationary*** Complex Tension Field (***CTF***)

EM energy is transported by Maxwell's waves; but the energy remains bound with the ***CTF*** as its excited state.

NIW & CTF Driven Optical Physics

NIW & CTF Driven Quantum Physics

NIW & CTF Driven Astro-Physics

Replace "**Space as a 3D Vacuum**" by "Space as a 3D Complex Tension Field (CTF)". This re-instates improved "ether" by a stationary "CTF".

To accommodate null-drag of ether (MM Expts.), the particles are postulated to be localized doughnut-like self-looped oscillation of the same CTF.

The forces are secondary gradients in the CTF generated by the high frequency complex harmonic oscillations of the self-looped oscillations.

The atoms in stellar and terrestrial environment are floating in the same stationary CTF. Therefore, the laws of physics apply everywhere!

Stationary CTF brings back "Classical Doppler Effect". Actual and measured Doppler shifts for source movement and detector movement are discernable.

Consequently, Cosmological Redshift cannot be optical Doppler Effect. It is, most likely, due to energy dissipative property of the CTF.

Further, the absolute velocities of stellar objects through the stationary CTF can be measured using precision spectrometry based on rockets in outer space.

References:
1. C.R., "Causal Physics: Photon Model by Non-Interaction of Waves", CRC, 2014.
2. Download papers from the website accessible through the department.

Impact of Non-Interference (non-interaction) of Waves (NIW)

Impacts in Classical Physics

1. Spectrometry: The resolution limit $\delta\nu\,\delta t \geq 1$ is not a principle of nature.

2. Coherence: Waves are never incoherent. Visibility (correlation) is determined by the time constant of the detecting system.

3. Polarization: NIL implies superposition of orthogonally polarized beams cannot generate elliptically rotating E-vector.

4. Mode locking: A laser pulse is generated by "time gating" of saturable absorber, not locking of modes

5. Pulse broadening: Is due to time diffraction, not due to dispersion of Fourier frequencies.

6. Fourier transform & light beating spectroscopy determine real carrier frequencies, not Fourier frequencies.

Impact in mathematical framing of physics problems

Mathematical operating symbols should be carefully tied with transformational interactions

The time-frequency Fourier theorem is not a principle of nature!
No natural interactions create Fourier frequencies out of a pulse nor create a pulse out of Fourier frequencies.

Wiener-Khintchine theorem – Fourier spectral density and autocorrelation functions form a "Fourier transform pair" – is based on non-interference of Fourier sinusoids!
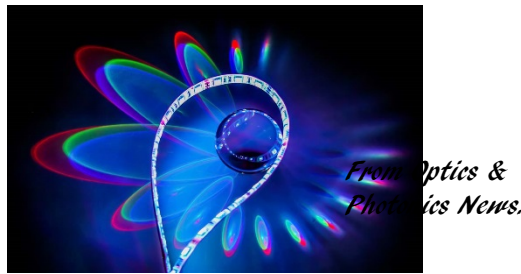
More to come!

Impact in Quantum Physics

1. Photons are divisible & summable in light-matter interactions.

2. Dirac's "photons" do not conform to causality & energy conservation

3. Classical photon as an exponential wave packet conforms to quantum predictions: $\Delta E_{mn} = h\nu_{mn}$

4. A photon cannot interfere with itself. "Which way?" photon travels, is a meaningless question.

5. Bell's Inequality theorem is inapplicable to superposition effects due to photons.

6. Indivisible entangled single photon interference does not exist

The NIW-property enhances the conceptual foundation of physics

1. Replace Einstein's "**indivisible quanta**" by Planck's divisible classical wave packet, while energies of photo electrons are quantized.

2. Replace Dirac's "**A photon interferes only with itself**", by "A detector's simultaneous stimulations due to multiple excitations, create superposition effect".

3. Replace Dirac's photon as a "**Fourier mode of the vacuum**" by "Classical wave packet of the "Complex Tension Filed (CTF)".

4. Replace "**Space as Vacuum**" by "Space as Complex Tension Field (CTF)". Re-instate improved "ether" by "CTF".

5. Replace Born's interpretation of Ψ as "**mathematical probability amplitude**" by physical stimulation of internal structure of particles.

6. Drop "**Bell's In-equality theorem**" as it does not map Superposition Effect and re-instate "EPR Reality & Locality".

7. Replace "**Uncertainty Principle**" by "information retrieval problem"

8. Replace "**Relativistic Doppler Effect**" by "Classical Doppler Effect". Actual and measured Doppler shifts are different for source movement and detector movement. Drop "**Expanding Universe**" by "Stationary Universe".

9. Replace de Broglie's "**pilot wave**" $\lambda = h / p \ [\to \infty \text{ for } v = 0]$, by internal harmonic frequency proportional to its kinetic energy.

10. Replace "**wave-particle duality**" by separate realities for waves and for particles.

11. Replace "**4-D Space**" by "3-D Space" since running time is not measurable physical attribute of anything in this universe; frequency is.

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Appreciating deeper physical processes behind Doppler Effects

❖ **The physical processes behind the spontaneous & the stimulated emissions tell us that source & detector velocities are discernible for actual & apparent Doppler Shifts!**

❖ **Optical Doppler effect is not determined by the source-detector relative velocity only, albeit mathematically correct!**

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Summary

Summary

To accommodate NIW, the space needs to be a stationary Complex Tension Field (CTF):

(i) EM waves and particles are simply different kinds of excited states of the same stationary CTF and hence the absence of MMX- ether drag.

(ii) Atoms experience the same stationary CTF everywhere in the universe. And, hence the same laws of physics are obeyed everywhere.

(iii) Doppler effects due to source velocity and detector velocities are discernible for both the terrestrial and Steller sources.

(iv) Cosmological Redshift cannot be due to Doppler Effect. Alternate explanation is suggested.

(v) Space experiments have been proposed to determine the stationarity of CTF (one-way light velocity).

(vi) Space experiments have been proposed to determine the absolute velocities of Stellar objects (spectrometer receiver on rocket to recover quantum transition frequency of specific lines).

To be successful space travelers:
We must learn to utilize the various embedded tension energies anywhere in space. CTF holds 100% of the cosmic energy.

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How do we know this is true?

Are there any questions?

- ❖ **We never know what is absolutely true!**
- ❖ **Physics must try to map the interaction processes.**
- ❖ **Technology innovation is simply emulation of interaction processes allowed in nature**
  - ❖ **Demand on process visualization will automatically force us to keep on iterating our theories for continuous evolution.**
- ❖ **Working theories should be used to explore our further ignorance about nature.**

My paper download site through UConn Physics: http://www.natureoflight.org/CP/

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C. Roychoudhuri, Femto Macro Continuum & University of Connecticut.