

## ChandraSekhar Roychoudhuri

### Research Interests

Prof. ChandraSekhar Roychoudhuri is currently engaged in exploring the fundamental nature of light and particles. Chandra has initiated the continuing biennial SPIE conference series, “Nature of light: What are photons?”, since 2005. He has written a book, “Causal Physics: Photon Model with Mon-Interaction of Waves”, Taylor & Francis March, 2014; and edited a book, “Nature of light: What is a photon”, CRC, 2008. During 2003, he had raised funds to defray the cost of publishing a multi-author Special Issues of Optics and Photonics News (OSA) on “The nature of light: What is a Photon?” : [http://www.osa-opn.org/home/articles/volume\\_14/issue\\_10/features/opn\\_trends%E2%80%94the\\_nature\\_of\\_light\\_what\\_is\\_a\\_photon/](http://www.osa-opn.org/home/articles/volume_14/issue_10/features/opn_trends%E2%80%94the_nature_of_light_what_is_a_photon/) . He has also been actively nurturing a web discussion forum on the nature of light and particles at: <http://www.natureoflight.org/index.php?mpage=disc> .

The reason behind so much effort in engaging other reserachers is to open up out-of-box thinking in physics and overcome the prevailing belief that the foundation of the edifice of physics has been finalized by the prevailing “working” theories. For, example, the appearance of dark fringes on a detector array due to the superposition of crossing light beams is thought to be due to non-arrival of “photons”; or due to absence of wave energy in those spatial locations. In reality, crossing beams pass through each other and emerge out unperturbed in their individual wave characteristics. Within the volume of beam superposition, where ever the detecting dipoles experience  $180^{\circ}$  out of phase E-vectors, or resultant zero-amplitude E-vectors; the detector remains un-stimulated and cannot absorb energy out of the superposed fields. These regions appear as “dark fringes”. In a way, this is built into Glauber’s statement, “A photon is what a detector detects.” A quantized detector will always absorb a “quantum cupful of energy” proportional to the square modulus of the sum total dipolar stimulations induced by all the fields. Various experiments have been carried out by Chandra, whcih demonstrate that the crossing beams emerge out of the superposition volume and continue to propagate completely unperturbed in their original individual wave propagation characteristics, as if they have never crossed through each other. This is “Non-Interaction of Waves”, or NIW. This is built into our current Huygens-Fresnel diffraction integral. This NIW property was experimentally recognized by Alhazen around 1080; postulated by Huygens in his 1678 (?) book; and also recognized by Planck in his 1913 book. These are all cited in Chandra’s book, “Causal Physics”. Explicit recognition of this NIW-property will facilitate the opening up of the healthy doubts that the current working theories are not the final theories to explain all the interaction processes in nature. There are a lot of new things to be discovered in Physics by our next generation students.

In the recent and distant past, Chandra has worked on a wide variety of topics in optical science and engineering. During the decades of early eighties and late nineties, while in industry and also in academia, he has worked on a wide range of optical engineering applications: from developing GHz satellite-satellite communication system to experimental studies of coherence properties of pulsed lasers using holography and developed instruments for ultra-high resolution spectrometry. He has also participated and nurtured the advancements in technologies related to incoherent and coherent high power diode lasers and their applications (from laser communication, laser radar to laser material processing/machining) for which he has been elected as Fellows of OSA and SPIE.

(CV)

## Education

PhD -Institute of Optics, University of Rochester, NY, USA.

M.Sc.- Physics (Specialization in Nuclear Physics), Jadavpur University, Kolkata, INDIA.

B. Sc. – Physics (Honors), Jadavpur University, Kolkata, INDIA.

## Experience

Post Doc.- 1973-74, Institute of Optics, University of Rochester

Research Scientist – 1974-78, National Institute of Astrophysics Optics and Electronics (INAOE), MEXICO.

Industry Scientist – 1978-86, TRW, USA

Manger Laser Systems –1986-90, Perkin-Elmer, USA

Chief Scientist- 1990- 1992, Optics and Advanced Technologies Lab., Optical Systems, United Technologies, USA.

Director & Research Professor - 1992-2000, Director, Photonics Research Center, University of Connecticut.

Research Professor - 2000- Present, Physics Department, University of Connecticut.

## Professional Societies & Honors

Fulbright Scholar from India (1968-74)

Xerox Award: At UConn for organizing the Connecticut Photonics Industry Cluster, 199X.

Director-at-Large – SPIE, 3-years; 2000, '01 & '02.

Board of Directors – OSA, 2-years, 1997 & '98.

American Physical Society – Life member.

Optical Society of America – Fellow; Life Member (offered by OSA).

Deliver frequent workshops to OSA student chapters around the world on Non Interaction of Waves.

SPIE - Fellow; Member.

IEEE, Photonics Society - Life Member (offered by IEEE).

Optical Society of India - Life Member.

Associate Editor - Journal of Nanophotonics, 2006-Present.

Associate Editor - Physics Essays, 2010-Present.

## Selected Publications

1. M. Ambroselli and C. Roychoudhuri, “Did Planck, Einstein, Bose count indivisible photons, or discrete emission / absorption processes in a black-body cavity?” Proc. SPIE Vol. 9570-9 (2015).
2. C. Roychoudhuri and M. Ambroselli, “Could space be considered as the inertial rest frame?” Proc. SPIE Vol. 9570-30 (2015).
3. C. Roychoudhuri, “Urgency of evolution process congruent thinking in physics: An advocacy to elevate the prevailing abstract physics-thinking towards a functionally useful reverse-engineering thinking.” Proc. SPIE Vol. 9570-7 (2015).

4. C. Roychoudhuri, A review of the book, Light: The Physics of Photons by Ole Keller, in Am. J. Phys. 83 (3), pp.286-7, March 2015.
5. C. Roychoudhuri, “Replacing The Paradigm Shift Model in Physics with Continuous Evolution of Theories by Frequent Iterations”, Ch.10 in *Death and Anti-Death, Vol.13: Sixty Years after Albert Einstein*, Ed. Charles Tandy, Ria University Press, 2015.
6. C. Roychoudhuri, A. Kracklauer and H. DeRadet, Vol. Editors, Proc. SPIE Vol.9570, “Nature of Light: What Are Photons?-VI”, SPIE Annual Conference, San Diego, 2015.
7. C. Roychoudhuri; *Causal Physics: Photon Model with Non-Interaction of Waves*. 273 pages. CRC/Taylor & Francis, May 22, 2014. [http://www.amazon.com/Causal-Physics-Photons-Non-Interactions-Waves/dp/1466515317/ref=sr\\_1\\_1?s=books&ie=UTF8&qid=1404416043&sr=1-1&keywords=causal+physics+photons+by+non-interactions+of+waves](http://www.amazon.com/Causal-Physics-Photons-Non-Interactions-Waves/dp/1466515317/ref=sr_1_1?s=books&ie=UTF8&qid=1404416043&sr=1-1&keywords=causal+physics+photons+by+non-interactions+of+waves)
8. C. Roychoudhuri, A. Kracklauer & H. De Raedt, “Nature of light: What are photons?-V”; Proc. SPIE Vol.8832 (2013).  
[http://spie.org/Publications/Proceedings/Volume/8832?origin\\_id=x4325&start\\_volume\\_number=8800&end\\_volume\\_number=8899](http://spie.org/Publications/Proceedings/Volume/8832?origin_id=x4325&start_volume_number=8800&end_volume_number=8899)
9. C. Roychoudhuri, “Tribute to H. John Caulfield: Hijacking of the “Holographic Principle” by cosmologists”; Proc. SPIE 8833-15 (2013).
10. C. Roychoudhuri and M. Ambroselli, “Can one distinguish between Doppler shifts due to source-only and detector-only velocities?” SPIE 8832-49 (2013).
11. C. Roychoudhuri, “How would photons describe natural phenomena based upon their physical experiences?”; SPIE 8832-34 (2013).
12. C. Roychoudhuri, “Next frontier in physics – space as a complex tension field”, J. Mod. Phys., Volume 3, Number 10, 2012, pp.1357-1368. [http://file.scirp.org/pdf/JMP20121000004\\_71849789.pdf](http://file.scirp.org/pdf/JMP20121000004_71849789.pdf)
13. C. Roychoudhuri, M. Barootkoob and M. Ambroselli, “The constancy of “c” everywhere requires the cosmic space to be a stationary and complex tension field”; SPIE Conf. Proc. Vol.8121-23 (2011).
14. C. Roychoudhuri, “Appreciation of the nature of light demands enhancement over the prevailing scientific epistemology”; in this volume; Proc. SPIE Vol.8121- 58 (2011).
15. N. Tirfessa and C. Roychoudhuri, “Analysis of spectrometric data and detection processes corroborate photons as diffractively evolving wave packets”, Proc. SPIE **Vol.8121**-33 (2011).
16. C. Roychoudhuri, “Re-interpreting *coherence* in light of Non-Interaction of Waves, or the NIW-Principle”; SPIE Conf. Proc. Vol.8121-44 (2011).
17. M. Ambroselli and C. Roychoudhuri, “Visualizing superposition process and appreciating the principle of Non-Interaction of Waves”; Proc. SPIE Vol. 8121-49 (2011).
18. M. Ambroselli, P. Poulos and C. Roychoudhuri, “Nature of EM waves as observed & reported by detectors for radio, visible and gamma frequencies”, Proc. SPIE Vol.8121-41 (2011).
19. C. Roychoudhuri, A. F. Kracklauer and A. Khrennikov, Organizing Editors; “*The Nature of Light: What Are Photons?* Proc. SPIE Vol.**8121** (2011).  
[http://spie.org/Publications/Proceedings/Volume/8121?origin\\_id=x4325&start\\_volume\\_number=8100&end\\_volume\\_number=8199](http://spie.org/Publications/Proceedings/Volume/8121?origin_id=x4325&start_volume_number=8100&end_volume_number=8199)
20. C. Roychoudhuri, “Principle of non-interaction of waves”, J. Nanophoton., Vol. **4**, 043512 (2010); doi:10.1117/1.3467504.
21. C. Roychoudhuri, “Measurement Epistemology and Time-Frequency Conjugate Spaces”, doi:<http://dx.doi.org/10.1063/1.3431483>; AIP Conf. Proc. 1232, pp. 143-152 (2010).
22. C. Roychoudhuri, “Various Ambiguities in Generating and Reconstructing Laser Pulse Parameters”, Ch.7 in *Laser Pulse Phenomena and Applications*; Ed. F. J. Duarte; InTech (2010).

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