

CURRICULAM VITAE OF DR. R. RADHA

Centre for Nonlinear Science (CeNSc),
PG & Research Department of Physics,
Govt. College for Women (Autonomous),
Kumbakonam – 612 001.

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EDUCATION

- Ph.D. (1997) - Nonlinear Dynamics – Bharathidasan University,
Tiruchirappalli.
- Title of the Thesis - Localized Coherent Structures in (2+1)
Dimensional Soliton Systems.
- Supervisor: Prof. M. LAKSHMANAN
- M.Phil. (1990) - Physics – First Class
Bharathidasan University, Tiruchirappalli.
- M.Sc. (1988) - Physics – First Class
Bharathidasan University, Tiruchirappalli.
- B.Sc. (1986) - Physics – First Class
Bharathidasan University, Tiruchirappalli.

ACADEMIC EXPERIENCE

- Associate Professor of Physics – From 27-08-2008 onwards
Govt. College for Women (Autonomous),
Kumbakonam – 612 001.
- Assistant Professor of Physics – From 27.8.1996 to 26.8.2008,
Govt. College for Women (Autonomous),
Kumbakonam – 612 001.
- CSIR Senior Research Fellow – April 1993 – August 1996
Bharathidasan University,
Tiruchirappalli- 620 024.

CSIR Junior Research Fellow – April 1991 – April 1993
Bharathidasan University,
Tiruchirappalli-620 024.

COURSES TAUGHT

- (i) Mathematical Physics
- (ii) Classical Mechanics
- (iii) Quantum Mechanics
- (iv) Solid State Physics
- (v) Electromagnetic Theory
- (vi) Electronics

FIELD OF SPECIALIZATION

Theoretical and Mathematical Physics with special reference to NONLINEAR SCIENCE.

TOPICS OF RESEARCH

Solitons and Integrability in Higher Dimensions, Magnetic Spin Systems, Nonlinear Optics and Bose Einstein condensates.

INSTITUTES VISITED ABROAD

- (i) Visited University of Tokyo, Tokyo, Japan from March 9 – 30, 2004.
- (ii) Visited Shanghai Jiao Tong University, Shanghai, China from January 24 – February 22, 2005.
- (iii) Visited University of Glasgow, Glasgow, UK from September 11 – 10th October, 2007.

SPONSORED PROJECTS HISTORY

1. Principal Investigator of the **DST** Consolidation of University Research for Innovation and Excellence in Women Universities (CURIE) worth **Rs. 6600000/-** for the period (2022-2025). **(Ongoing)**
2. Principal Investigator of the **DAE-NBHM** sponsored Research Project entitled “Investigation of PT-Symmetric and non PT-Symmetric variable coefficient Nonlinear Schrodinger type equations” worth **Rs. 15,87,400/-** for the period 2021-2024. **(Ongoing)**

3. Principal Investigator of the **CSIR** sponsored Research Project entitled “Exploring the Ultracold Atom Dynamics Through PT Symmetry” worth **Rs. 50,00,000/-** for the period 2019-2022. **(Ongoing)**
4. Principal Investigator of the **DAE-NBHM** sponsored Research Project entitled “A New Algorithm to study the variable coefficient Gross-Pitaevskii (GP) Type equations” worth **Rs. 13,72,000/-** for the period 2015-2018. (Completed).
5. Principal Investigator of the **CSIR** sponsored Research Project entitled “Ultra cold atoms dynamics through a versatile analytical and Numerical approach” worth **Rs. 11,50,000/-** for the period 2015-2018. **(One of the Eight recipients in the year 2015)**. (Completed).
6. Principal Investigator of the **DST** sponsored Research Project entitled “Dynamics of Bose Einstein condensates with both short range and Long range interactions” worth **Rs. 12,44,400/-** for the period 2013-2015. (Completed).
7. Principal Investigator of the **UGC** sponsored research project entitled “Penetrating into the domain of the Bose Einstein Condensates” worth **Rs. 9,36,800/-** for the period 2011-2014. (Completed).
8. Principal Investigator of ‘ **DAE – NBHM**’ sponsored research project entitled “Exploring the dynamics of Bose- Einstein Condensates through a new analytical approach” worth **Rs. 11,68,180 /-** for the period 2011-2014. (Completed).
9. Principal Investigator of the **DST** sponsored Research Project entitled “Identification of Localized Excitations in Bose-Einstein condensates and their Interaction” worth **Rs. 10,16,148/-** for the period 2008-2011. (completed).
10. Principal Investigator of the **UGC** sponsored Minor Research Project worth **Rs. 80,000/-** for the period 2008-2010. (Completed).

11. Principal Investigator of the major research project entitled “Localized Coherent Excitations in (2+1) Dimensional Nonlinear Systems”, sponsored by **Department of Science and Technology** (DST), Govt. of India, worth **Rs. 8,10,600/-** for the period 2005-08. (completed).

RESEARCH SUPERVISION

Ph.D: Completed – 3

M.Phil: Completed - 2

PERSONAL DATA

Born on 28th April, 1966, Unmarried

REFERENCES

- 1. Prof. M. Lakshmanan**
Centre for Nonlinear Dynamics
School of Physics
Bharathidasan University
Tiruchirappalli 620 024.
E-mail: lakshman@cnld.bdu.ac.in
- 2. Prof. B. A. Malomed**
Dept. of Interdisciplinary studies
Tel Aviv University,
Tel Aviv,
Israel.
E-mail: malomed@post.tau.ac.il
- 3. Prof. S. Lakshmi Bala**
Department of Physics
IIT Madras
Chennai - 600036, India
e-mail: slbala@iitm.ac.in
- 4. Prof. Antun Balaz**
Scientific Computing Laboratory,
Institute of Physics Belgrade,
Serbia.
E-mail : antun@ipb.ac.rs
- 5. Dr. A.I Nicolin,**
Dept. of Physics,
University of Bucharest,
Bucharest, Romania.
E-mail: alexandru.nicolin@nipne.ro
- 6. Prof. Prasanta K. Panigrahi**
Physical Sciences (DPS)
IISER Kolkata
Kolkata
e-mail: [pprasanta \[at\] iiserkol.ac.in](mailto:pprasanta[at]iiserkol.ac.in)

ACCOLADES

1. Passed the **Joint CSIR – UGC** Exam. in June 1990.
2. Selected as a **Category A Speaker** under the Theoretical Physics Seminar Circuit (TPSC) Programme sponsored by **Department of Science and Technology (DST)**, Govt. of India for the year 1995-96 and 1997-98.
3. **International Woman of the year 2000**, Member of the “**Who’s who in the World, 1999**”, Member of the “**Dictionary of International Biography**”, 28th Edition.
4. Recipient of the **Tamil Nadu State Council for Science and Technology (TNSCST) Young Scientist award** for the year 1999-2000.
5. **Indian National Science Academy (INSA) Visiting Fellow Award** for the year 2004-2005.
6. Recipient of the **Third World Academy of Sciences (TWAS)-UNESCO Associateship** for the period 2008-2011.
7. Recipient of **Indian National Science Academy (INSA)- Royal Society of London Visiting Fellowship** for the year 2007.
8. Recipient of the **Indian National Science Academy (INSA) -Polish Academy of Sciences Visiting Fellowship** for the year 2012.
9. Awarded the **Visiting Scientist Fellowship** at the **Chinese Academy of Sciences Beijing** for the year 2014-2015.
10. Elected as the **Fellow of Academy of Sciences**, Chennai (from 2021 onwards) .

MEMBERSHIP IN PROFESSIONAL BODIES

- Life Member of **Indian Association of Physics Teachers (IATP)**.

REVIEWER FOR

1. Physics Letters A (Elsevier, Amsterdam)
2. PRAMANA (Indian Academy of Sciences)
3. Z. Naturforsch (Mainz, Germany)

4. Communication in Nonlinear Science and Numerical Simulations (CNSNS)
(Elsevier)
5. Modern Physics Letters B (World Scientific)
6. Indian Journal of Physics
7. Physica Scripta
8. Physica D
9. Chaos, Solitons and Fractals
10. Chaos
11. Symmetry
12. Atoms
13. Results in Physics
14. Scientific Reports

COLLABORATION

(a). International Collaboration

- 1) Shanghai Jiao Tong University Shanghai, China
- 2) University of Tokyo, Tokyo, Japan
- 3) University of Glasgow, UK
- 4) Univerdity of Kung Kee, Seoul, South Korea
- 5) Univerdity of Bucharest, Romania
- 6) University of Serbia, Serbia
- 7) University of Beijing, Chinese Academy of Sciences, Beijing, China
- 8) University of Sau Paulo, Brazil
- 9) University of Tel Aviv. Israel
- 10) University of Salamanca, Spain
- 11) University of AL Ain, UAE
- 12) Institute of Physics, Russian Academy of Science, Makhachkala 367 003, Russia
- 13) University of Cameroon, Cameroon, South Africa
- 14) University of Dunedin, New Zealand

(b). National Collaboration

- 1) IMSc, Chennai.
- 2) IISER, Kolkata.
- 3) Central University of Pondicherry, Pondicherry.
- 4) Bharathidasan University, Tiruchirappalli.
- 5) SASTRA, Thanjavur
- 6) Presidency College, Chennai
- 7) VMKVEC, Salem
- 8) SAMA Artificial intelligence Lab, Chennai
- 9) Velammal Engineering College, Chennai.

PUBLICATIONS

International		National		Others
Journals	Conferences	Journals	Conferences	Books / Chapters / Monographs / Manuals
77	5	1	2	-

Citation Metrics

Cumulative Impact Factor (as per JCR 2021)

h-index

i10 index

Total Citations

Source	
Google Scholar	Web of Science
-	
21	19
43	-
1,530	1,227

LIST OF PUBLICATIONS

(a) Journals

1. **R. Radha** and M. Lakshmanan, “Multisoliton generation in inhomogeneous nonlinear Schrödinger and Heisenberg Spin Systems”, *Chaos, Solitons and Fractals* **4**, 181 (1994).
2. **R. Radha** and M. Lakshmanan, “Singularity analysis and bilinear form of a (2+1) dimensional nonlinear Schrödinger (NLS) equation”, *Inverse Prob.* **10**, L29 (1994).
3. **R. Radha** and M. Lakshmanan, Singularity analysis and localized coherent structures in (2+1) dimensional generalized Korteweg-de Vries equations, *J.Math.Phys.* **35**, 4746 (1994).
4. **R. Radha** and M. Lakshmanan, “Dromion like structures in the (2+1) dimensional breaking soliton equation”, *Phys. Lett. A* **197**, 7 (1995).
5. **R. Radha** and M. Lakshmanan, “On the integrability and singularity structure aspects of deformed nonlinear evolution equations of AKNS type”, *J.Phys. A* **28**, 6977 (1995).
6. **R. Radha** and M.Lakshmanan, “The (2+1) dimensional Sine-Gordon equation: integrability and localized solutions”, *J. Phys. A* **29**, 151 (1996).
7. **R. Radha** and M. Lakshmanan, “Localized coherent structures and integrability in a generalized (2+1) dimensional nonlinear Schrodinger (NLS) equation”, *Chaos, Solitons and Fractals* **8**, 17 (1997).
8. **R. Radha** and M. Lakshmanan, “Exotic coherent structures in the (2+1) dimensional long dispersive wave (2LDW) equation”, *J.Math. Phys.* **38**, 292 (1997).
9. **R. Radha** and M. Lakshmanan, “A new class of induced localized coherent structures in the (2+1) dimensional nonlinear Schrödinger equation”, *J. Phys. A* **30**, 3229 (1997).
10. M. Lakshmanan and **R. Radha**, “Localized coherent structures of (2+1) dimensional generalization of soliton systems”, *Pramana* **48**, 163 (1997).
11. **R. Radha** and M. Lakshmanan, “Generalized dromions in the (2+1) dimensional Long dispersive wave (2LDW) and scalar nonlinear Schrödinger (NLS) equations”, *Chaos, Solitons and Fractals* **10**, 1821 (1999).
12. **R. Radha**, S. Vijayalakshmi and M. Lakshmanan, “Explode-Decay Dromions in the non-isospectral Davey-Stewartson I (DSI) Equation”, *J. Nonlinear Mathematical Physics* **6**, 120 (1999).

13. **R. Radha**, C. Senthilkumar and M. Lakshmanan, “Exponentially Localized Solutions in the Melnikov Equation”, *Chaos, Solitons and Fractals* **22**, 705 (2004).
14. **R. Radha**, C. Senthilkumar, M. Lakshmanan, X.Y. Tang and S.Y. Lou, “ Periodic and Localized solutions of the Long Wave-Short Wave Resonance interaction equation”, *J. Phys. A: Math. Gen.* **38**, 9649 (2005).
15. **R. Radha**, and S.Y. Lou, “Integrability and Novel Localized Solutions in the (2+1) dimensional generalized sasa-satsuma equation”, *Physica Scripta* **72**, 432 (2005).
16. **R. Radha**, X.Y. Tang and S.Y. Lou, “Painleve Truncation Method – A unified approach to exact solutions and Dromion Interactions of (2+1) Dimensional Nonlinear Systems”, *Z. Naturforsch* **62**, 107 (2007).
17. **R. Radha** and V. Ramesh Kumar, “Explode-Decay Solitons in the Generalized Inhomogeneous Higher order Nonlinear Schrodinger equations”, *Z. Naturforsch* **62**, 381 (2007).
18. **R. Radha** and V. Ramesh Kumar, “Bright Matter wave solitons and their collision in Bose-Einstein condensates”, *Phys. Lett. A* **370**, 46 (2007).
19. **R. Radha** and V. Ramesh Kumar, “Gauge equivalence of Gross-Pitaevskii equation and the Equivalent Heisenberg Spin Chain”, *Physica Scripta* **76**, 431 (2007).
20. **R. Radha**, “Induced explode –Decay Dromions in the nonisospectral (2+1) Nonlinear Schrodinger Equation”, *European Physical Journal D* **45**, 317 (2007).
21. V. RameshKumar, **R. Radha** and Prasanta K. Panigrahi, “Dynamics of Bose-Einstein condensates in a time dependent trap”, *Phys. Rev. A* **77**, 023611 (2008).
22. **R. Radha**, V. Ramesh Kumar and K. Porsezian, “Remote Controlling the dynamics of Bose Einstein condensates under time dependent trap”, *Journal of Physics A* **41**, 315209 (2008).
23. V. RameshKumar, **R. Radha**, M. Wadati, “Collisions of soliton in the Electromagnetically induced Transparency”, *Phys, Rev. A (Rapid Commun)* **78**, 041803R, (2008).
24. C. Senthilkumar, **R. Radha** and M. Lakshmanan, “Trilinearization and Localized solutions of (2+1) dimensional K-dV and NNV equations”, *Chaos, Solitons and Fractals* **39**, 942 (2009).
25. **R. Radha**, C. Senthil Kumar, M. Lakshmanan and C. R. Gilson, “The Collision of multimode dromions and a firewall in the two component long wave short wave resonance interaction Equation”, *Fast Track Communications, J. Phys. A* **42**, 102002 (2009).

26. V. Ramesh Kumar, **R. Radha** and Prasanta K. Panigrahi, “Matter wave interference pattern in the collision of bright solitons”, *Phys. Lett. A* **373**, 4381 (2009).
27. **R. Radha** and V. Ramesh Kumar, “Interplay between Nonlinearity and Dispersion in the Femtosecond NLS equation”, *Z. Naturforsch A* **65a**, 1 (2010).
28. **R. Radha**, V. Ramesh Kumar and Miki Wadati, “Line Soliton Dynamics and Stability Bose- Einstein Condensates in (2+1) GP equation”, *J. Math., Phys* **51** , 043507 (2010).
29. V.Ramesh kumar , **R. Radha**, and Miki Wadati, “Phase Engineering and Solitons of Bose Einstein Condensates with Two and Three Body Interaction”, *J. Phys. Soc. Jpn* **79**, 074005 (2010).
30. V. Ramesh Kumar, **R. Radha**, K. Porsezian, “Intensity redistribution and Shap Changing Collision in coupled femtosecond solitons”, *Eur. Phys. J. D* **57**, 387 (2010).
31. **R. Radha**,V.Ramesh Kumar ,Miki Wadati, “Collision of Bright Vector Solitons in Two component Bose Einstein Condensates”, *Phys. Lett. A* **374**, 3865 (2010).
32. H. J. Shin, **R. Radha**, V. Ramesh Kumar, “Bose-Einstein Condensates with spatially inhomogeneous interaction and bright solitons”, *Phys. Lett. A* **375**, 2519 (2011).
33. **R. Radha** , P.S.Vinayagam, “Stabilization of Matter wave solitons in weakly coupled atomic condensates”, *Phys. Lett. A* **376** , 944 (2012).
34. J.B. Sudharsan, **R. Radha** and P.Muruganandam, “Collisionally inhomogeneous Bose Einstein Condensates with both binary and three body interactions in a bichromatic optical lattice” . *J. Phys. B:At. Mol. Opt. Phys.* **46**, 015302 (2013).
35. **R. Radha**. P.S.Vinayagam and K.Porsezian, “Rotation the trajectories of the bright soliton and realignment of intensity distribution in the Coupled Nonlinear Schrodinger equation”, *Phy. Rev. E* **88**, 032903 (2013).
36. J.B. Sudharsan, **R. Radha** and A.Nicolin, “Faraday waves in Cigar shaped BEC with radially inhomogeneous scattering lengths”, *Rom. Rep. Phys* **65**, 820 (2013).
37. P. S.Vinayagam, **R. Radha** and K.Porsezian, “Taming of Rogue waves in Vector BECs”, *Phy. Rev. E* **88**, 042906 (2013).
38. A.I. Nicolin, A. Balaz, J.B. Sudharsan, **R. Radha**, “Ground State of BEC with Inhomogeneous Scattering length”, *Rom. J. Phys.* **59**, 204 (2014).
39. **R. Radha**, P.S. Vinayagam, H.J. Shin. and K. Porsezian, “Spatiotemporal Binary interaction and Designer quasi particle condensates”, *Chinese Physics B* **23(3)**, 034214 (2014).

40. **R. Radha**, P. S.Vinayagam and K. Porsezian, “Soliton Dynamics of Spatially coupled vector BECs”, *Rom. Rep. Phys.* **66**, 427 (2014).
41. A. Balaz, R. Paun, A.I. Nicolin, J. B. Sudharsan, R. Radha, “ Faraday waves in collisionally inhomogeneous Bose-Einstein condensates”, *Phys. Rev. A*, **89**, 023609 (2014).
42. V. Ramesh Kumar, Lin Wen, **R. Radha** and W. M. Liu, “Splitting and recombination of 2d matter-wave solitons in a transient trap”, *Rom. Rep. Phys.* **66**, 443 (2014).
43. **R. Radha**, P.S.Vinayagam, “An analytical window into the world of Ultracold atoms”, *Rom. Rep. Phys.* **67**, 89 (2015).
44. P. S. Vinayagam, **R. Radha**, Vivek M. Vyas and K.Porsezian, “Generalized gauge transformation approach to construct dark solitons of coupled Nonlinear Schrodinger type equations”, *Rom.Rep. Phys.* **67**, 3 (2015).
45. J. B. Sudharsan, **R. Radha**, H. Fabrelli, A. Gammal and B. A. Malomed, “Stable multiple vortices in collisionally inhomogeneous attractive Bose-Einstein condensates”, *Phys. Rev. A* **92**, 053601 (2015).
46. **R. Radha**, P.S.Vinayagam, J. B. Sudharsan and W. M. Liu, “Engineering bright solitons to enhance lifespan and stability of Vector BECs”, *Phys. Lett. A* **379**, 2977 (2015).
47. **R. Radha**, P.S.Vinayagam, J. B. Sudharsan and B.A. Malomed, “Persistent bright solitons of sign indefinite coupled nonlinear schrodinger equation with time dependent trap”, *Communications in Nonlinear Science and Simulations* **31**, 30 (2016).
48. J. B. Sudharsan, **R. Radha**, M. C. Raportaru, A. I. Nicolin and A. Balaz, “Faraday and Resonant waves in binary collisionally inhomogeneous Bose-Einstein Condensates”, *J. Phys. B: At. Mol. Opt. Phys.* **46**, 165303 (2016).
49. P. S. Vinayagam, **R. Radha**, K. Porsezian, “Manipulation of light in a generalized coupled Nonlinear Schrodinger equation”, *Communications in Nonlinear Science and Simulations* **37**, 354, (2016).
50. K. Subramanian, C. S. Kumar, **R. Radha** and T. Alagesan, “Elusive noninteracting localized solutions of (2+1) Maccari equation”, *Romanian Reports in Physics* **69**, 2, (2017).
51. P. S. Vinayagam, **R. Radha**, S. Bhuvaneshwawri, R. Ravishankar and P. Muruganandam, “Bright soliton dynamics in Spin Orbit-Rabi coupled Bose-Einstein Condensates”, *Communications in Nonlinear Science and Simulations* **50**, 68, (2017).

52. P. S. Vinayagam, **R. Radha**, A. K. Usama and L. Ling, “Collisional dynamics of solitons in the coupled PT symmetric nonlocal nonlinear Schrödinger equations”, *Communications in Nonlinear Science and Simulations* **52**, 1, (2017).
53. H. Frabrelli, J. B. Sudharsan, **R. Radha**, A. Gammal, and Boris A. Malomed, “Solitons under spatially localized cubic-quintic-septimal nonlinearities”, *J. Optics* **19**, 7, (2017).
54. P. Albares, P. G. Estevez, **R. Radha** and R. Saranya, “Lumps and Rogue waves of Generalized Nizhnik Novikov Veselov Equation”, *Nonlinear Dynamics* **90**, 2305, (2017).
55. P. S. Vinayagam, **R. Radha**, U. Al Khawaja, Liming Ling, “New classes of solutions in the Coupled PT Symmetric Nonlocal Nonlinear Schrodinger Equations with Four Wave Mixing”, *Communication in Nonlinear Science and Numerical Simulation* **59**, 387 (2018).
56. **R. Radha**, C. SenthilKumar, R. Saranya, “Inelastic Dromions, Rogue Waves and Lumps of (2+1) dimensional Long Dispersive Wave Equation”, *Wave Motion* **85**, 114 (2019).
57. **R Radha** , C. Senthil Kumar, K. Subramanian, T. Alagesan, “Drone like Dynamics of Dromion Pairs in the (2+1) AKNS equation”, *Computers and Mathematics with Applications* **75**, 2356 (2018).
58. **R. Radha**, C. SenthilKumar, “Digging into the Elusive Localized solutions of (2+1) dimensional sine-Gordon equation” , *Z. Naturforschung A* **73**, 415, (2018).
59. T. A. Gadzhimuradov, A. M. Agalarov, **R. Radha**, B. Tamil Arasan, “Dynamics of solitons in the fourth-order nonlocal nonlinear Schrödinger equation”, *Nonlinear Dynamics* **99**, 1295 (2019).
60. V. Rajadurai, V. Rameshkumar, **R. Radha**, “Multiple bright and dark solitons in three component spinor Bose-Einstein condensates”, *Phys. Lett. A* **384**, 126163 (2019).
61. S. Sabari, O.T. Lekeufack, **R. Radha**, T.C. Kofane, “Interplay of three-body and higher-order interactions on the modulational Instability of Bose-Einstein Condensate” *JOSA B* **37**, A54 (2020).
62. Tamil Arasan Bakthavatchalam, Suriyadeepan Ramamoorthy, Malaikannan Sankarasubbu, **R. Radha**, Vijayalakshmi Sethuraman, “Bayesian Optimization of Bose-Einstein Condensates”, **Scientific Reports (Nature)** **11**, 5054 (2021).
63. S. Bhuvanewari, R. Muthuganesan and **R. Radha**, “Robustness of measurement-induced correlations under decoherence effect”, *Int. J Theor. Phys.* **60**, 2145 (2021).
64. S. Bhuvanewari, R. Muthuganesan and **R. Radha**, “Spotlighting Quantum Phase Transition in Spin -1/2 Ising-Heisenberg Diamond Chain Employing Measurement-Induced Nonlocality”, *Physica A* **573** , 125932 (2021).

65. S. Sabari, R. Tamil Thiruvalluvar, **R. Radha**, “Modulation instability of spin-orbit-coupled Bose-Einstein condensates in discrete media”, *Phys. Lett. A* **418**, 127696 (2021).
66. S. Bhuvanewari, R. Muthuganesan and **R. Radha**, “Signatures of intrinsic decoherence and weak measurements on quantum correlations”, *Laser Phys. Lett.* **19**, 015204 (2022).
67. Sabari Subramaniyan, Kishor Kumar Ramavarmaraja, **R. Radha**, and Boris A Malomed “Interplay between binary and three-body interactions and enhancement of stability in trapless dipolar Bose-Einstein condensates”, *Applied Sciences* **12**, 1135 (2022).
68. **R. Radha**, C. SenthilKumar, “Localized excitations and their collisional dynamics in (2+1) dimensional Broer-Kaup-Kupershmidt equation” , *Romanian Reports in Physics* **74**, 104 (2022).
69. Tamil Arasan Bakthavatchalam, Selvakumar Murugan, Suriyadeepan Ramamoorthy, Malaikannan Sankarasubbu, **R. Radha**, Boris A. Malomed and Vijayalakshmi Sethuraman, “Primer on solving differential equations using Machine learning techniques”, *Romanian Report in Physics* **74**, 113 (2022).
70. S. Sabari, R. KishorKumar, **R. Radha**, P. Muruganandam, “Stability of Polariton-Exciton Bose-Einstein Condensate”, *Phy. Rev. B* **105**, 224315 (2022).
71. S. Bhuvanewari, R. Muthuganesan and **R. Radha**, “Quantum correlations and coherence in Unruh-deWitt detector”, *Physica A* **604**, 127934 (2022)
72. P. Naveena, S. Bhuvanewari, R. Muthuganesan and **R. Radha**, “Quantum correlations in mixed spin-(1/2,1) Heisenberg dimer”, *Journal of Magnetism and Magnetic Materials* **563**, 169863 (2022).
73. **R. Radha**, Sudhir Singh, C. Senthil Kumar and Sen Yue Lou, “Elusive Exotic Structures and their Collisional Dynamics in (2+1)-Dimensional Boiti-Leon-Pempinelli Equation”, *Physica Scripta* **97**, 125211 (2022).
74. R. Muthuganesan, S. Bhuvanewari, and **R. Radha**, “Characterizing nonclassical correlations of tensorizing states in a bilocal scenario”, *Quantum Inf. Process* **22**, 44 (2023).
75. S. Bhuvanewari, R. Muthuganesan and **R. Radha**, “Thermal quantum correlations and Teleportation in a Graphene Sheet”, *Applied Physics B* **129**, 73 (2023).

76. J. Meiyazhagan, B. Tamizharasan, V. Murugesan, M. Selvakumar, B Gopinath, S. Malaikannan, **R. Radha**, S. Vijayalakshmi and B. A. Malomed, “Data-driven Multi-valley Dark Solitons of Multi-component Manakov Model using Physics-Informed Neural Networks”, *Chaos, Solitons and Fractals* **172**, 113509 (2023).
77. K. Rajaswathi, S. Bhuvanewari, **R. Radha** and P. Muruganandam, “*Dispersion engineering in spin-orbit coupled spinor $F=1$ condensates driven by negative masses*” *Phys. Rev. A* **108**, 033317 (2023).

(b) Conference Proceedings:

- 1) **R. Radha** and B. Tamilarasan, Analytical signature of ultra cold atoms, at “Recent Trends in Material Sciences” Annamalai University, Chidambaram, on 30th Oct 2018.
- 2) V. Ramesh Kumar, **R. Radha** and Miki Wadati, Collision of solitons in the Electromagnetically Induced Transparency, International Conference on Cold Atoms (ICCA), pp. 21, Dec.12-16 (2008), Kolkatta, India.
- 3) **R. Radha**, V. Ramesh Kumar and K. Porzezian, Remote controlling the dynamics of Bose-Einstein condensates through time dependent atomic feeding and trap, International Conference on Cold Atoms (ICCA),pp.(38-39) Dec.12-16 (2008), Kolkatta, India.
- 4) V. Rameshkumar, **R. Radha** and Prasant K. Panigrahi, Dynamics of Bose-Einstein Condensates in a Time-dependent trap, *Nonlinear Dynamics: Concepts and Applications*, Ed.M. Daniel and S. Rajasekar, (pp.129-132), 2009.
- 5) C. Senthil Kumar, **R. Radha** and M. Lakshmanan, New Localized Coherent Structures an Periodic Solutions of the (2+1) -dimensional KdV equation, *Proceedings of the National Conference on Nonlinear System and Dynamics*, RIASM, University of Madras, Chennai, India (2006) pp 7-10.
- 6) C. Senthil Kumar, **R. Radha** and M. Lakshmanan, Singularity structure Analysis and Exponentially Localized Solutions of a (2 + 1) dimensional Non-linear Evolution equation, *Proceedings of the First National Conference on “Nonlinear Systems and Dynamics”*, Center for Theoretical Studies, Indian Institute of Technology, Kharagpur, India (2003) pp 29-32.
- 7) M. Lakshmanan and **R. Radha**, *Solitons and Inverse Scattering in (2 + 1) dimensions*, *Proceedings of the Symposium on plasma science and Technology*, K. P. Maheswari (Ed.) (Wiley – Eastern, New Delhi, 1992).

BOOK PUBLISHED:

- P. Muruganandam and **R. Radha**, “An Introduction to Ultracold Atoms with Analytical and Numerical Methods ” UK, 2023 (Under Preparation).

CITATION:

Publons : <https://publons.com/researcher/3483319/r-radha/>

Google Scholar: https://scholar.google.co.in/citations?hl=en&user=F3d22SYAAAAAJ&view_op=list_works&alert_preview_top_rm=2&sortby=pubdate

Web of Science: <https://www.webofscience.com/wos/author/record/2374511>

RESEARCH CONTRIBUTION

During the past two decades or so, the applicant has been investigating the nature of nonlinear excitations in (2+1) dimensional integrable models and has contributed in a major way to the development of the field. The applicant for the first time has developed an algorithmic structure to construct “dromions”, exponentially localized solutions in (2+1) dimensions using two non parallel ghost solitons. She has also developed a method for inducing localized solutions in a (2+1) dimensional dynamical system which does not support ghost solitons by harnessing arbitrary functions present in the system. The algorithm developed by the applicant has been applied to a large number of (2+1) dimensional nonlinear systems to construct localized excitations and her results have stimulated a lot of interest in (2+1) dimensional integrable models. “Painleve Truncation Method”, a unified approach developed by her in collaboration with Prof.Lou, Shanghai Jiao Tong University, promises to explore the dynamics of both integrable and nonintegrable models of physical interest in (2+1) dimensions. Her recent investigations on BECs using gauge transformation approach is again considered to be an important development in the domain of BECs where the investigations are completely

dominated by numerical approaches and other approximation methods. The concept of “Taming of Rogue waves in BECs” and “Collisionally inhomogeneous Faraday waves” has given a new dimension to the investigation of ultra cold atoms. Identification of the signatures of Electromagnetically Induced Transparency (EIT) in the collision of solitons is another major contribution to the field of cold atoms. Her exploits in vector BECs and Faraday waves in collisionally inhomogeneous condensates have given a new dimension to the investigation of ultracold atoms. Her investigation on producing tightly confined high power light beams under the interplay of cubic-quintic-septimal power nonlinearities is another interesting development in nonlinear optics. Her investigation in the field of quantum information processing, an area rarely visited in India represents an important development. Her recent investigation in generating the ground states of scalar and vector BECs employing machine learning in collaboration with an Artificial Intelligence (AI) lab at Chennai (Scientific Reports 11, 5054, (2021) promises to be a path breaking initiative.

NOVELTY OF THE WORK

In recent times, **Dr. R. Radha** in collaboration with the team of researchers in an Artificial Intelligence Lab at Chennai has identified a simple protocol to generate ground state wavefunction of Bose-Einstein condensates employing Gaussian process in machine learning can have wider ramifications in the domain of ultracold. Her simple algorithm to generate a localized solutions in (2+1) dimensional integrable models employing the “Hirota method ” and “truncated Painleave Approach” is considered to be a milestone in the domain of integrable models. A new analytical approach employing Gauge transformation to construct bright solitons (Bose-Einstein Condensates) has already been recognized by the condensed matter community in the form of an invited article to commemorate the discovery of BECs (**R. Radha** & P.S.V Rom. Rep. Phys., 67, 89 (2015)).

ACTIVITIES RELATING TO PROMOTION OF SCIENCE IN TAMIL NADU

Centre for Nonlinear Science (CeNSc), a premier research institute established by **Dr. R. Radha** came into being in 2005 under the patronage of Department of Science and Technology (DST). In a span of over a decade and a half, it has now grown into a full fledged, internationally reputed research institute with infrastructural facilities on a par with Institute of Mathematical Sciences (IMSc), Chennai. In a semi urban town like Kumbakonam which is far away from the core research activities, CeNSc is offering a huge platform for young motivated researchers to explore their potential in nonlinear science. CeNSc has so far completed eight major research projects sponsored by DST, DAE-NBHM, CSIR and UGC and there are two ongoing major research projects funded by CSIR and DAE-NBHM. **Dr. R. Radha** has so far mobilized resources to the tune of more than 1.5 crores through these projects for carrying out research in nonlinear science. CeNSc under the stewardship of **Dr. R. Radha** has entered into thriving collaborations with reputed research institutes in India and abroad (Japan, China, South Korea, New Zealand, UK, Israel, UAE, Romania, Spain ,Serbia etc).

On the teaching front, **Dr. R. Radha** had recently organized a webinar on " Virtual Physics Laboratory" as a lockdown initiative and the virtual contents were uploaded in (<https://youtu.be/LYiVTFQb4Uc>) for the benefit of Physics teachers and Undergraduate/Postgraduate students.

This will certainly help Physics teachers across the country to take laboratory experiments to the doorstep of the students virtually.

SOCIETAL IMPACTS OF CONTRIBUTIONS

The increasing complexity and spiraling costs of running clinical trials have forced life science organizations to renew their focus on improving operational efficiencies, particularly as the industry moves to embrace personalized medicine, with its lower per-patient revenue model. There's no silver bullet, of course. But, innovative machine learning techniques show great promise in helping life science companies identify and rectify systemic inefficiencies, allowing them to learn and adapt. In our paper (Scientific Reports (Nature) **11**, 5054 (2021)), we have used Gaussian process to model the ground state wave function using less number of data points which can be used for accelerating clinical trials for authenticating the efficiency of vaccines/medicines during the outbreak of a pandemic.

LIST OF PATENTS OR ANY OTHER INTELLECTUAL PROPERTIES

The results of our paper entitled "*Bayesian Optimization of Bose-Einstein Condensates*", Scientific Reports **11**, 5054 (2021) comes under Intellectual property rights and is being patented. It is under Food and Drug Administration (FDA) approval.

CONFERENCES /WORKSHOP CONDUCTED

- 1) Convener of Webinar on "Virtual Physics Laboratory" held on 29th January 2021.
- 2) Convener of Virtual Workshop on "Scientific Documentation Through Latex" held on 27th February, 2021.
- 3) Convener of national level workshop on "Quantum Espresso – Theory and Practice for beginners" during July 29-30, 2019.
- 4) Convener of mini summer school on "Mathematical Physics and Statistical Mechanics (MPSM-18)" during Oct 3-5, 2018.
- 5) Convener of symposium entitled on "Trend Sttters in Material Science" during Feb 6 -7, 2018.
- 6) Organized a Mini Winter School on Python (PYTHON-2017) during February 14-16, 2017.

- 7) Organized a Mini Winter School on Ultracold Atoms (UCAT-2014) during Dec 22-24, 2014.
- 8) Convener of the one day workshop on “Trendsetters in Physics” on 9th Feb, 2004.

CONFERENCES ATTENDED / LECTURES DELIVERED

- 1) Delivered a lecture on “Analytical signatures of ultra cold atoms” at Annamalai University, Chidambaram, during Dec 18-19, 2018.
- 2) Delivered a lecture at the **National** conference on “Recent Advances in Molecular Physics” held at Queen Mary’s College, Chennai during Feb 10-11, 2011.
- 3) Participated in the “**International** Congress of Mathematicians-2010, Satellite Conference on Integrable Systems and Geometry ” held at Puducherry, during Aug 12-17, 2010.
- 4) Participated in the “**International** Conference on Cold Atoms and Ions – 2010” held at Kolkatta, during Jan 18-21, 2010
- 5) Delivered a lecture in the **International** Conference on cold atoms (ICAA) to be held at IISER, Kolkatta during December 12-16, 2008.
- 6) Delivered a lecture in the **International** conference on “Nonlinear Dynamics”, held at Tiruchirappalli during Feb.12-16, 2008.
- 7) Participated in the Winter School on “Nonlinear Optics – Theory and Applications”, during December 1-13, 2003 at Tiruchirapalli.
- 8) Participated in the **International** CIMPA School on “Discrete Integrable Systems” during February 2-14, 2003 at Pondicherry.
- 9) Attended the **International** workshop on “Optical Solitons – Theory and Experiments”, during January 24-29, 2002 at Cochin.
- 10) Participated and delivered a lecture in the **International** Conference on “Nonlinear Dynamics: Integrability and Chaos”, during February 12-16, 1998 at Tiruchirapalli.
- 11) Participated and delivered a lecture in the **International** CIMPA School on “Nonlinear Dynamics”, during January 2 - 26, 1996 at Pondicherry.