CURRICULAM VITAE OF DR. R. RADHA

Centre for Nonlinear Science(CeNSc), Phone: (Off.) 0091-435-2403119

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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.

RESEARCH PROJECTS UNDERTAKEN

1. 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. 12,68,000/-** for the period 2015-2018. (Ongoing)

2. 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**) (Ongoing)

3. 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)

4. 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)

5. 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)

6. Principal Investigator of the **DST** sponsored Research Project entitled "Identification of Localized Exicitations in Bose-Einstein condensates and their Interaction" worth **Rs. 10,16,148/-** for the period 2008-2011. (completed)

7. Principal Investigator of the **UGC** sponsored Minor Research Project worth **Rs. 80,000/-** for the period 2008-2010. (Completed)

8. 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 SUPERVISON

- **Ph.D:** Completed – 3
- **M.Phil:** Completed - 2

COLLABORATION WITH

Prof. B. A. Malomed
Tel Aviv University
Israel

Prof. Antun Balaz
SCL
Institute of Physics Belgrade
Serbia

Dr. A. I Nicolin
Dept. of Physics
University of Bucharest
Bucharest
Romania

Prof. Arnaldo Gammal
Instituto de Física
Universidade de São Paulo
Brazil

Dr. P. G. Estevez
Departamento de Fısica Fundamental
Universidad de Salamanca
Spain

Dr. Usama Al Khawaja
Dept. of Physics
United Arab Emirates University
United Arab Emirates

Dr. Prasanta Panigrahi
Indian Institute of Science
Education and Research
Kolkatta

Dr. K. Porsezian

Dept. of Physics
Pondicherry University
Pondicherry

Dr. P. Muruganandam

Department of Physics
Bharathidasan University

Tiruchirappalli

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.Antun Balaz**

Scientific Computing Laborotory,

Institute of Physics Belgrade,

Serbia.

E-mail : antun@ipb.ac.rs

4. **Dr. A.I Nicolin**,

Dept. of Physics,

University of Bucharest,

Bucharest, Romania.

E-mail: alexandru.nicolin@nipne.ro

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 2004-05.
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.

REVIEWER FOR

(i) **Physics Letters A** (North Holland, Amsterdam)

(ii) **PRAMANA** (Indian Academy of Sciences)

(iii) **Z. Naturforsch** (Mainz, Germany)

(iv) **Communication in Nonlinear Science and Numerical Simulations** (CNSNS) (Elsevier)

(v) **Modern Physics Letters B** (World Scientific)

RESEARCH CONTRIBUTION

During the past twelve years 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 filed. 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 recently 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 recent exploits in vector BECs and Faraday waves in collisionally inhomogeneous condensates have given a new dimension to the investigation of ultracold atoms. Her recent 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.

Publications

Papers in 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., **A28**, 6977 (1995).
6. **R. Radha** and M.Lakshmanan, The (2+1) dimensional Sine-Gordon equation: integrability and localized solutions, J.Phys. **A29,** 151 (1996).

7. **R. Radha** and M. Lakshmanan, Localized coherent structures and integrability in a generalized (2+1) dimensional nonlinear Schrodinger (NLS) equation, Chaos, Solitions 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. **A30**, 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 solutiions 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 condesates under time dependent trap, Journal of Physics A, **41**, 315209 (2008).

23. V. RameshKumar, R. Radha, M. Wadati, Collisions of soliton in the Electromagentically 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, **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", Physical 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, Physical 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 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", Accepted for Publication in Communication in Nonlinear Science and Numerical Simulation (2017).

56. **R. Radha,** C. SenthilKumar, R. Saranya, "Inelastic Dromions, Rogue Waves and Lumps of (2+1) dimensional Long Dispersive Wave Equation", To Appear in Wave Motion, (2019).

57. **R Radha** , C. Senthil Kumar, K. Subramanian, T. Alagesan, "Drone like Dynamics of Dromion Pairs in the (2+1) AKNS equation", Published in Computers and Mathematics with Applications, (2018).

58. **R. Radha,** C. SenthilKumar, "Digging into the Elusive Localized solutions of (2+1) dimensional sine-Gordon equation" **,** To appear in Zeitschriftfür Naturforschung A (ZNA), (2018).

Papers in Conference Proceedings

1. 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)
2. 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.

3. C. Senthil Kumar, **R. Radha** and M. Lakshmanan, New Locallized 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.

Citations

Total Citations : **973 updated on 22-01-2018**

(https://scholar.google.co.in/citations?user=F3d22SYAAAAJ&hl=en)

CONFERENCES /WORKSHOP CONDUCTED

1. Convenor of the oneday workshop on "Trendsetters in Physics" on 9th Feb, 2004.
2. Organized a Mini Winter School on Ultracold Atoms (UCAT-2014) during Dec 22-24, 2014
3. Organized a Mini Winter School on Python (PYTHON-2017) during February 14-16, 2017.

CONFERENCES ATTENDED / LECTURES DELIVERED

1. Participated and delivered a lecture in the **International** CIMPA School on "Nonlinear Dynamics", from January 2 - 26, 1996 at Pondicherry.
2. Participated and delivered a lecture in the **International** Conference on "Nonlinear Dynamics: Integrability and Chaos", from February 12-16, 1998 at Tiruchirapalli.
3. Attended the **International** workshop on "Optical Solitons – Theory and Experiments", from January 24-29, 2002 at Cochin.
4. Participated in the **International** CIMPA School on "Discrete Integrable Systems" from February 2-14, 2003 at Pondicherry.
5. Participated in the Winter School on "Nonlinear Optics – Theory and Applications", from December 1-13, 2003 at Tiruchirapalli.
6. Delivered a lecture in the **International** conference on "Nonlinear Dynamics", held at Tiruchirappalli from Feb.12-16, 2008.
7. Delivered a lecture in the **International** Conference on cold atoms (ICAA) to be held at IISER, Kolkatta from December 12-16, 2008.
8. Participated in the "**International** Conference on Cold Atoms and Ions – 2010" held at Kolkatta, from Jan 18-21,2010
9. Participated in the "**International** Congress of Mathematicians-2010,Satellite Conference on Integrable Systems and Geometry " held at Puducherry, from Aug 12-17,2010
10. 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.