

# Dr Swarnamala Sirsi

Associate Professor

Yuvaraja's College, University of Mysore, Mysuru - 570 005, Karnataka, India.

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## TEACHING EXPERIENCE( COURSES TAUGHT)

### ○ B. Sc. course

Mechanics, Optics, Thermodynamics, Current electricity and classical electrodynamics, Atomic and molecular physics, Condensed matter physics, Nuclear Physics, Properties of matter and fluid mechanics, Quantum Physics, Waves and oscillations.

### ○ M. Sc. course

Classical Mechanics, Quantum Mechanics, Group theory, Relativistic electrodynamics, Mathematical methods, Accelerator physics, Continuum Mechanics and Fluid dynamics.

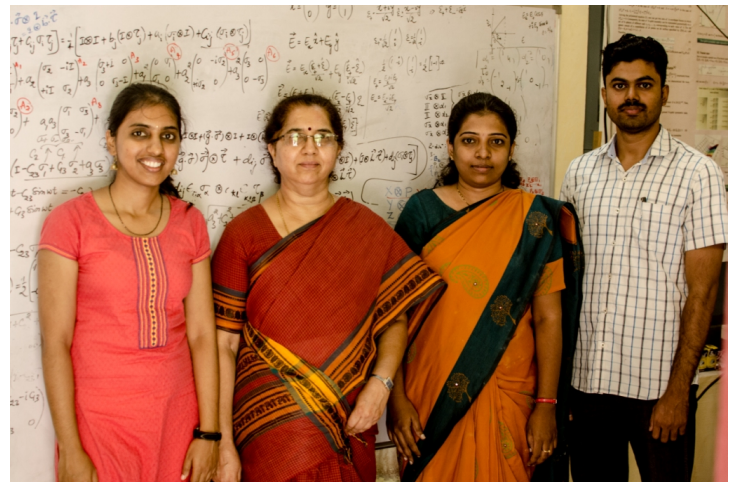
## RESEARCH EXPERIENCE

- University Junior Research Fellow - 1985.
- Council for Scientific and Industrial Research (CSIR), India-1985-87.
- Hon. Research Associate, Schuster's Lab, University of Manchester, UK-1987-89.
- CSIR Research Associate - 1996-99.

In the course of my research, I have participated in several International/National level symposia, workshops, conferences and have published/presented sixty scientific research papers in Theoretical physics. I have given invited talks at National and International conferences and visited Universities/Research Institutions in India, UK, USA, Mexico, France, Austria, Italy and Malaysia where I had the opportunity to deliver talks and have interactions. I was also involved in collaborative research work with the Indian Institute of Astrophysics (IIA), Bengaluru, Bangalore University, University of Nottingham, UK and University of Connecticut, USA.

## RESEARCH STUDENTS

- Dr. Veena Adiga - PhD awarded in 2012.
- Dr. Shilpashree M S - PhD awarded in 2014.
- Dr. Sakineh Ashourisheikhi - PhD awarded in 2014
- Ms. Suma S P - Registered.
- Mr. Shreekanth S- Registered.
- Ms. Smitha Rao H S- Registered.
- Mr. Uday Balegar- Provisionally registered.



## LIST OF RESEARCH PAPERS PUBLISHED/SUBMITTED

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1. **Trivariate analysis of two qubit symmetric separable state**, Suma SP and Swarnamala Sirsi, *Pramana* (2018) (Accepted)
2. **Geometric multiaxial representation of N-qubit mixed symmetric separable states**, Suma SP, Swarnamala Sirsi, Subramanya Hegde and Karthik Bharath, *Phys.Rev. A* **96**, 022328 (2017).
3. **POVM construction: A simple recipe with applications to symmetric states**, Swarnamala Sirsi, Karthik Bharath, S. P. Shilpashree and H. S. Smitha Rao, *International Journal of Quantum Information*, **Vol. 1, No. 6** (2017).
4. **Laziness of symmetric and separable states**, Suma SP and Swarnamala Sirsi, *Int J Theor Phys*, **Vol 56, No. 7** (2017).
5. **Entangling capabilities of symmetric two qubit gates**, Swarnamala Sirsi, Veena adiga, Subramanya Hegde, *Pramana*, **Vol 83, Issue 2** (2014) pp 279-287.
6. **Local Unitary Equivalent Classes of Symmetric N -Qubit Mixed States**, Sakineh Ashourisheikhi and Swarnamala Sirsi, *International Journal of quantum Information*, **Vol 11, No. 8**,(2013).
7. **Photodisintegration of aligned deuterons at astrophysical energies using linearly polarized photons**, S. P. Shilpashree, Swarnamala Sirsi and G. Ramachandran, *International Journal of Modern Physics E*, **Vol. 22, No. 5** (2013)1350030 , World Scientific Publishing Company.
8. **SU(2) Invariants of Symmetric qubit states**, Swarnamala Sirsi and Veena Adiga, *Journal of Russian Laser Research*, **32**, Number 5 Sept, (2011).
9. **Non Zero Moments of some entangled three qubit symmetric States**, Swarnamala Sirsi and Veena Adiga, *AIP conference Proceedings*, 1384, 125-130 (2011).
10. **Bounds on new Polarization Parameters of an entangled channel spin-1 system**, Swarnamala Sirsi and Veena Adiga, proceedings of the *DAE Symposium on Nuclear Physics*, 55 page 272 (2010).
11. **Visualization of an entangled channel spin-1 system**, Swarnamala Sirsi and Veena Adiga, *Phys.Rev. C* **82**, 027601(2010).
12. **Squeezing of Multivariate Spin Systems**, Swarnamala Sirsi *Int.J.Mod Phys B* **20** 1465-1475(2006).
13. **Non-local Bivalued Click-No-Click Probabilities for EPRB Correlations**, A R Usha Devi, Swarnamala Sirsi *J. Phys. A* **38** 2525-2541(2005).
14. **Polarization of Line Radiation in the Presence of External Electric Quadrupole and Uniform Magnetic Fields II: Arbitrary Orientation of Magnetic Fields**, Yee Yee Oo, K N Nagendra, Sharath Ananthmurthy, Swarnamala Sirsi, R Vijayashankar and G Ramachandran, *JQRST*, **90**(2005) 343-366.
15. **Spin Squeezing, Entanglement and Correlations**, Swarnamala Sirsi, *J.Opt.B* **6**(2004) 437-443.
16. **Spin Squeezing and Quantum Correlations**, K S Mallesh, Swarnamala Sirsi, Mahmood A A Sbaiah, P N Deepak and G Ramachandran *Pramana*, **59** (2002) 175.
17. **Spin Squeezing of Mixed Systems**, K S Mallesh, Swarnamala Sirsi, Mahmood A A Sbaiah, P N Deepak and G Ramachandran *J.Phys.A* **34**(2001) 3293-3308.
18. **Squeezing and Non-oriented Spin-1 states**, K S Mallesh, Swarnamala Sirsi, Mahmood A A Sbaiah, P N Deepak and G Ramachandran *J.Phys.A* **33** (2000) 779.
19. **Non-locality in EPRB spin correlations** A R Usha Devi, Swarnamala Sirsi and G Ramachandran, *Physics Teacher(India)*, **39** (1997) 68.
20. **Non-locality in EPR spin correlations**, A R Usha Devi, Swarnamala Sirsi and G Ramachandran, *Int. J.Mod.Phys.*, **A 12** (1997) 5279.
21. **Trivariate quasi-probability distributions for polarised spin-1 nuclei** A R Usha Devi, Swarnamala Sirsi , G Ramachandran and P Devi, *Int. J.Mod.Phys.*, **A 12** (1997) 2779.
22. **Quasi-probability distributions for arbitrary spin-j particles** G Ramachandran, A R Usha Devi, P Devi and Swarnamala Sirsi, *Foundations of Physics* **26** (1996) 401.

23. **Joint Probabilities for aligned spin-1 system** A R Usha Devi, Swarnamala Sirsi, G Devi and G Ramachandran, *J.Phys.G:Nucl.Phys.*, 20 (1994) 1859.
24. **Non-oriented nuclei in external electric and magnetic fields** G Ramachandran, Swarnamala Sirsi and G Devi, *Perspectives in Theoretical Nuclear Physics*, Ed by K Srinivasa Rao and L Sathpathy, Wiley-Easteran (India) Ltd, (1994)76.
25. **Multiaxial decomposition of a cartesian tensor** Swarnamala Sirsi, A R Usha Devi and G Ramachandran, *Mysore University Journal*, Platinum Jubilee Issue, XXXII (1992)541.
26. **Non-oriented spin-1 system** G Ramachandran, V Ravishankar, S N Sandhya and Swarnamala Sirsi, *J.Phys.G:Nucl.Phys.*, 13 (1987) L271-L273.

## LIST OF RESEARCH PAPERS PRESENTED AT CONFERENCES/SYMPOSIA

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1. **Construction of new observables for spin-1 system and their optimum measurement**, H S Smitha Rao and Swarnamala Sirsi, presented at the International conference on Quantum and Nonlinear Optics (QNO2018), at Sunway Resort and Spa, Kuala Lumpur, Malaysia, 2nd-5th February, 2018.
2. **Geometric study of spin-1 MUBs**, H S Smitha Rao and Swarnamala Sirsi, presented at the International Symposium on New Frontiers in Quantum Correlations(ISNFQC18), S. N. Bose National Center for Basic Sciences, Kolkata, 29th January- 2nd February, 2018.
3. **Construction and efficient measurement of new spin-1 observables**, H S Smitha Rao and Swarnamala Sirsi, presented at the International Conference on Quantum Foundations-2017 (ICQF-17), NIT Patna, 4th-9th December, 2017.
4. **Quantum Fisher Information matrix for mixed spin-1/2 system**, Shreekanth S and Swarnamala Sirsi, presented at the International Conference on Quantum Foundations-2017 (ICQF-17), NIT Patna, 4th-9th December, 2017.
5. **PPT criterion of a class of two qubit symmetric separable states in terms of angular momentum operators**, Suma SP and Swarnamala Sirsi, presented at the International Conference on Quantum Foundations-2017 (ICQF-17), NIT Patna, 4th-9th December, 2017.
6. **Multiaxial representation of mixed symmetric separable states**, Suma SP and Swarnamala Sirsi, presented at the 2nd International conference on quantum foundation(ICQF16), NIT Patna, 17th-21st October, 2016.
7. **Complete measurement of spin-1 density matrix using Mutually Unbiased Bases**, H S Smitha Rao and Swarnamala Sirsi, presented at the 2nd International conference on quantum foundation(ICQF16), NIT Patna, 17th-21st October, 2016.
8. **Visualization of separability of mixed symmetric separable states**, Suma SP and Swarnamala Sirsi, presented at International School and Conference on Quantum Information (ISCQI), Institute of Physics, Bhubaneswar, February, 2016.
9. **Construction and interpretation of POVMs on the symmetric subspace of n-qubit states**, H S Smitha Rao and Swarnamala Sirsi, presented at International School and Conference on Quantum Information (ISCQI), Institute of Physics, Bhubaneswar, February, 2016.
10. (Invited talk) **Separability criteria for symmetric N- qubit mixed states using multi-axial representation of density matrix**, presented on a meeting on Quantum information processing and applications at Harish-Chandra Research Institute, Allahabad, India, 07- 13, December, 2015.
11. (Invited talk) **Local unitary equivalent classes of symmetric N-qubit mixed states**, presented at the International Workshop on Quantum Information (IPQI14), Institute of Physics, Bhubaneswar, 17th-28th Feb 2014.
12. (Invited talk) **Representation and Local Unitary Classification of Pure and Mixed Symmetric N qubit States**, Sakineh Ashourisheikhi and Swarnamala Sirsi, presented at the Meeting on Quantum Information Processing and Applications at Harish-Chandra Research Institute, Allahabad, India, 02-08 December, 2013.
13. (Invited talk) **Pure and Mixed Symmetric N-Qubit States, Their Representation and Classification**, Sakineh Ashourisheikhi and Swarnamala Sirsi, at Frontiers in Physics (FIP)-2013, School of Physics, University of Hyderabad, India, 20-22 September, 2013.
14. (Invited Talk)**Symmetric two qubit entangler**, presented at International workshop on Quantum Information, Allahabad, 20-26th Feb, 2012.
15. (Invited Talk) **Entangling properties of some symmetric gates**, presented at Topical Conference of the Indian Society of Atomic and Molecular Physics, Univ of Hyderabad, 9 - 12th Jan, 2012.
16. (Invited talk) **Geometrical representation of entanglement Invariants of symmetric n-qubit state**, presented at International school and conference on quantum information (ISCQI-2011) Institute of Physics, Bhubaneswar, 13-22nd Dec 2011.
17. **SU(2) Invariants of Symmetric Qubit States**, Veena Adiga and Swarnamala Sirsi, presented at International Conference on Squeezed States and Uncertainty Relations (ICSSUR-2011), Sau Paulo, Brazil, 2-6th May 2011.

18. **Symmetric two qubit gates**, Veena Adiga and Swarnamala Sirsi, presented at International conference on Quantum Optics and Quantum Computing (ICQOQC), Noida,India, 24-26th March 2011.
19. **NON-ZERO MOMENTS OF SOME ENTANGLED THREE QUBIT SYMMETRIC STATES** presented at 75 Years of Quantum Entanglement,Foundations and Information Theoretic Applications,S N Bose National Centre for Basic Sciences, Kolkata,January 6-10-2011.
20. **BOUNDS ON NEW POLARIZATION PARAMETERS OF AN ENTANGLED CHANNEL SPIN-1 SYSTEM** presented at DAE Symposium on Nuclear Physics,Birla Institute of Technology and Research, Pilani, Rajasthan, India,December 20-24, 2010.
21. **Entanglement Classes of Mixed Symmetric Two Qubit States**, Swarnamala Sirsi, Invited talk presented at International Program on Quantum Information (IPQI-2010),Institute of Physics, Bhubaneshwar, 18-23 Jan 2010.
22. **Quantum Computation with Entangled States**, Swarnamala Sirsi, Plenary lecture presented at 2nd National Women's Science Congress, All India Institute of Speech and Hearing (AIISH), Mysore, 7-9th November 2009.
23. **Mixed State Entanglement and Generalized Schwinger Model**, Veena Adiga and Swarnamala Sirsi presented at 11th International Conference on Squeezed States and Uncertainty Relations, Olomuc, Czech Republic, 22-26 June 2009.
24. **Geometrical Domain of Spin- $\frac{1}{2}$  Probability Mass Function**, Karthik Bharath, Swarnamala Sirsi and A R Usha Devi. presented at Intl. Indian Statistical Assn. Conf. on Frontiers of Probability and Statistical Science , University of Connecticut, Storrs, USA, 22-25 May 2008.
25. **Spin Squeezing in N-qubit Systems**, Swarnamala Sirsi,presented at Intl. Conf. on Quantum Information , Institute of Physics, Bhubaneshwar, 10-12 March 2008.
26. **Women in Science and Technology Workforce: How to Improve their Status?**, Swarnamala Sirsi, Invited Talk, presented at National Seminar on Women: Science and Technology, Bangalore University, 21-24 Aug 2006.
27. **Squeezing in Multivariate Spin Systems**, Swarnamala Sirsi, Invited Paper, presented at 9th International Conference on Squeezed States and Uncertainty Relations, Besancon, France, 2-6 May 2005.
28. **Multivariate quasiprobability distributions for polarised spin systems**, G Ramachandran, A R Ushadevi, P Devi, Swarnamala Sirsi, Invited talk presented at seminar on point processes and product densities, School of Mathematics, Anna Univ., Chennai, India, 8-9 Aug 2003.
29. **Spin Squeezing Entanglement and Correlations**, Swarnamala Sirsi, 8th International Conference on squeezed states and uncertainty relations, Puebla, Mexico, 9-13, June 2003.
30. **Spin Squeezing and Quantum Correlations**, K S Mallesh, Swarnamala Sirsi, Mahmood A A Sbaiah, P N Deepak and G Ramachandran ,II Winter Institute on Foundations of Quantum Theory and Quantum Optics: Quantum information Processes , S N Bose National Centre for Basic Sciences, Kolkata, 2-11 Jan 2002.
31. **Spin Squeezing in n-n scattering**, KS Mallesh, Swarnamala Sirsi, Mahamoud AA Sbaiah, G Ramachandran and PN Deepak, DAE International Symposium on Nuclear Physics,Mumbai, Dec 2000.
32. **Generalized Schwinger Construction of a Mixed Spin-j State**, Swarnamala Sirsi, KS Mallesh, Mahamoud AA Sbaiah, G Ramachandran and PN Deepak,Fourth International Symposium on Frontiers of Fundamental Physics,Hyderabad, 9-13 Dec 2000.
33. **Generation of Squeezed spin-1 states**, Swarnamala Sirsi and A R Usha Devi DAE Nuclear Physics Symposium.,Bombay, Dec 1998.
34. **Use of biaxial nematics in the preparation of polarized, non-oriented spin-1 systems**, Swarnamala Sirsi and R Somashekar DAE Solid State Physics Symposium.,Bombay,Dec 1997.
35. **Preparation of classical and non-classical polarisation states of spin-1 nuclei**, Swarnamala Sirsi and A R Usha Devi, DAE Nuclear Physics Symposium., Bangalore,26-31 Dec 1997.
36. **Correlation between spin components in aligned spin-1 nuclei**, A R Usha Devi and Swarnamala Sirsi DAE Nuclear Physics Symposium., Bangalore,26-31 Dec 1997.
37. **Theoretical studies on spin distributions in external electric and magnetic fields** Swarnamala Sirsi, DAE symposium on Nuclear Physics, 20-24, Dec, 1996, Pantnagar.

38. **Non-oriented quantum spin assemblies and quasi-probability distributions**, G Ramachandran, A R Usha Devi and Swarnamala Sirsi, XI DAE symposium in High Energy Physics Vishwabharati, Shanti Niketan, 28th Dec 1994 to 2nd Jan 1995.
39. **Wigner-Weyl distribution for aligned spin-1 nuclei**, A R Usha Devi, G Ramachandran, Swarnamala Sirsi and P Devi, DAE Symposium in Nuclear Physics Bhubaneswar, Dec , 1994.
40. **Polarisation of higher spin particles under electric quadrupole and magnetic fields** G Ramachandran, A R Usha Devi , G Devi and Swarnamala Sirsi, International symposium on Non-Accelerator Physics, Jan 2-9, IAP, Bangalore (1994).
41. **Pauli Exclusion Principle Effects in the reaction  $D(\gamma, \pi^-)pp$  in the  $\Delta$ - resonance region** Swarnamala sirsi and G Ramachandran , International Symposium on Perspectives in Nuclear Physics, Madras, 19-23 Jan 1987.
42. **Photoproduction of charged pions on deuterons**, G Ramachandran, M V N Murthy and Swarnamala sirsi, DAE Symposium on Nuclear Physics and Solid State Physics, BHU, Varanasi, 27-31 Dec 1982.
43. **Differential cross section for  $D(\gamma, \pi^-)pp$  using effective energy prescription**, G Ramachandran, Swarnamala sirsi and S B Patangi, VI DAE High Energy Physics Symposium, Mysore, 6-11 Dec 1982.

## **RESPONSIBILITIES SHOULDERED FOR THE UNIVERSITY**

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- **Course Co-ordinator** [2015 – to present ]  
M. Sc. Physics, Yuvaraja's college, Mysuru.
- **Co-ordinator** [2008 – to present]  
Placement cell, Yuvaraja's college, Mysuru.
- **Course Co-ordinator** [17 April 2004 – 12 Dec 2006]  
CIST (Centre for Information Science and Technology), University of Mysore, Mysuru.
- **Deputy Director** [13 Dec 2006 – 23 Aug 2007]  
CIST (Centre for Information Science and Technology), University of Mysore, Mysuru.
- **Secretary** [2005 – 2012]  
Womens Harassment Enquiry Committee, University of Mysore, Mysuru.

## **ACHIEVEMENTS**

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- Passed All India CSIR-JRF test, thereby securing the prestigious Junior Research Fellowship.
- Selected as a Research Associate on the basis of my project proposal and my performance in an All India interview conducted by CSIR, India for a period of 5 years.
- Represented state and south zone in Women's cricket during my college days.

## **SOCIAL INVOLVEMENTS**

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- An active member of a progressive women's organization called **Samata Vedike**.
- An active member of the Vijayanagar 1st Stage residents **Welfare Association**.