Curriculum Vitae: Radhika Vathsan

Name: Radhika Vathsan
Date of Birth: 25 December 1969
Place of Birth: Salem, Tamil Nadu, India
Nationality: Indian

Present Affiliation: Associate Professor, Department of Physics,
Birla Institute of Technology and Science - Pilani
K K Birla Goa Campus,
NH17B, Zuarinagar
Goa - 403726
email : radhika@goa.bits-pilani.ac.in

Areas of Research:

Quantum theory:	Quantum Computation and Information, Foundations of Quantum Mechanics.
Mathematical Physics:	Formal quantization.
High Energy Physics:	Gravitation, String theory
Many-body Physics:	Multi-particle clusters, Anyon physics, Fractional statistics

Educational Qualification:

Degree	Subject	Year	University/board	Division	Marks
AISSCE	PCM	1987	CBSE, New Delhi	1	90.3%
BSc (Hons)	Physics	1990	St. Stephen's College, Delhi University	1	79.78%
MSc	Physics	1992	I.I.T. Madras	1	9.49 (CGPA)
PhD	Theoretical Physics	2000 (Awarded)	IMSc Chennai, Madras University		

Other Qualifiers:

∘CSIR/UGC NET (1992)
∘GATE (1992) - 97.81 percentile

Work Experience:

- (August 2011 – present) Associate Professor, Physics, BITS Pilani Goa Campus.

- (Jan 2006 – July 2011) Assistant Professor, Physics, BITS-Pilani, Goa Campus.
- (Dec 2004 – Jan 2006) Lecturer, Physics, BITS-Pilani, Goa Campus
- (Dec 2001– Dec 2004) Lecturer, Physics, BITS-Pilani, Rajasthan
- (2000–2001) CSIR Research Associate, Harish-Chandra Research Institute, Allahabad, India
- (1993–1999) Research Scholar, Theoretical Physics, Institute of Mathematical Science, Madras, India

PhD Thesis:

Studies in Quantization: Methods for Constrained Systems and Semi-classical Spectra of Many-body Systems University of Madras, Feb. 2000. Supervisor: Dr. G Date, Institute of Mathematical Sciences, Chennai.

Books/Papers/Preprints:

1. *"Emergence of Classicality in Stern-Gerlach Experiment via Self-Gravity"*, SK Sahoo, A Dash, Radhika Vathsan, T Qureshi, Annalen der Physik, February 2023, DOI: 10.1002/andp.202200627
2. *A Riemannian Genuine Measure of Entanglement for Pure States*, R Dharmaraj and Radhika Vathsan, arXiv preprint arXiv:2211.06309, Dec 2022, submitted to Quantum.
3. *Numerical and Experimental Study of the Effect of the Bridge of Sarasvati Veena on its Timbre*, C. Chauhan, P M Singru and Radhika Vathsan, Acoustics Australia, 10.1007/s40857-022-00280-7, September 2022
4. *Testing gravitational self-interaction via matter-wave interferometry*, S Sahoo, Radhika Vathsan and T Qureshi, Physical Review A (Vol. 106, No. 1), July 2022, doi:10.1103/PhysRevA.106.012215.
5. *Vibro-acoustic Modeling, Numerical and Experimental Study of the Resonator and its Contribution to the Timbre of Sarasvati Veena, a South Indian Stringed Instrument.* C. Chauhan, P M Singru and Radhika Vathsan, The Journal of the Acoustical Society of America 149, 540 (2021)
6. *The effect of the extended bridge on the Timbre of the Sarasvati Veena: a numerical and experimental study*, C. Chauhan, P M Singru and Radhika Vathsan, Journal of Measurements in Engineering, Vol. 9, Issue 1, p. 23-35 (2021)

7. *Acoustic analysis and characterization of Indian musical instrument: Ghumot*, Sundar Akshay, P. V. Hancel, Singru Pravin, Vathsan Radhika, JOURNAL OF MEASUREMENTS IN ENGINEERING, SEPTEMBER 2016, VOLUME 4, ISSUE 3, DOI: 10.21595/jme.2016.16932 (2016)

8. *Study of Sarasvati Veena – a South Indian musical instrument using its vibro-acoustic signatures*, Akshay Sundar, Hancel P V, Pravin Singru, Radhika Vathsan, Journal of Vibroengineering 18(5):3362-3368, August 2016 DOI: 10.21595/jve.2016.16930

9. *Aspects of complementarity and uncertainty*, Radhika Vathsan and T Qureshi,(2016) Int. J. Quantum Inform. DOI: http://dx.doi.org/10.1142/S0219749916400311

10. *Weak value amplification in resonance fluorescence*. Sainadh, U. S., Sandhya, S. N., Vathsan, R., and Narayanan, A. (2015) Current Science (00113891), 109(11).

11. Book: *Introduction to Quantum Physics and Information Processing*, CRC Press, July 2015

12. *Einstein's Recoiling Slit Experiment, Complementarity and Uncertainty*,Tabish Qureshi and Radhika Vathsan, arxiv:1210:4248v1, Quanta, Vol2, Issue 1, April 2013

13. *"Classical and Quantum Mechanics of Anyons"*, G. Date, M. V. N. Murthy and Radhika Vathsan, Invited Review published in NEW RESEARCH IN QUANTUM PHYSICS - 2004 Ed. V. Krasnoholovets and F. Columbus (Nova Science),
`cond-mat/0302019`

14. *"A Note on Fermion and Gauge Couplings in Field Theory Models for Tachyon Condensation"*, D. P. Jatkar, Radhika Vathsan and Subrata Sur, **Phys.Lett. B520** (2001) 391-397, `hep-th/0107075`.

15. *"Stable Solitons in Field Theory Models for Tachyon Condensation"*, D. P. Jatkar and Radhika Vathsan **JHEP 0106** (2001) 039, `hep-th/0104229`

16. *"Classical Many-body Clusters in Two Dimensions"*, G. Date, M. V. N. Murthy and Radhika Vathsan **J. Phys. Condensed Matter, 10** (1998) 5876, `cond-mat/9802034`

17. *"Reduction of Anyons to One Dimension and Calogero-Sutherland-type Models"*, Radhika Vathsan **IJMP A, 13** (1998) 4123, `hep-th/9804137`

18. *"Remarks on the Quantization of Gauge Theories"*, Radhika Vathsan **J. Math. Phys. 37 (4)** (1996) 1713-1723; Erratum-ibid. 37 (1996) 6590, `hep-th/9507066`

Recent Talks and Presentations:

1. 14 Nov 2022: "Quantum Entanglement: Nobel 2022", Institute Colloquium

2. 6 July 2022: "Testing Gravitational Self-interaction via Matter-wave Interferometry", Invited talk in QIQT 2022,

3. 16 March 2021, *"Contemporary approach to Quantum Theory and its application to Information theory"*, a two-part lecture as part of "Refresher Course in Physics" held at Bangalore University.

4. 28 Feb 2020, *"Raman and his Nobel-winning Effect"*, C V Raman Memorial Lecture, Goa Science Cente,.

5. 21 Dec 2019: *"Quantum Physics: a modern perspective"*, set of two lectures, IAPT UGCP @ BITS Goa,

6. 24 June 2018: *"Some Subtle Issues in Quantum Information",* at Physics Department, University of Windsor, Canada.

   Seminar at Raman Research Institute, Bangalore,28 March 2013

Teaching Experience

Taught twenty years of undergraduate and MSc (Hons) courses at BITS Pilani, Pilani and Goa campuses, including

1. MSc Elective course on Quantum Optics (Gerry and Knight)

2. Introduction to Quantum Computation and Information (text book authored by me),

3. Quantum Information Theory

4. Reading course on Foundations of Quantum Theory

5. Reading course on Open Quantum Systems

6. Reading Course in Quantum Field Theory

7. First course in Mechanics, Waves and Oscillations (Physics 1) based on "Mechanics" by Kleppner and Kolenkow,

8. First course in Electricity and Magnetism (Physics II) based on "Introduction to Electromagnetism" by D J Griffiths

9. First course in Mechanics and Thermodynamics (General Physics) based on "University Physics" (6th edition), by F W Sears, M W Zemansky and H D Young

10. MSc course on Introductory Particle Physics based on "Introduction to Elementary Particles" by D J Griffiths

11. MSc course on Mathematical Physics based on "Applied Partial Differential Equations" by R Haberman

12. MSc course on Quantum Mechanics based on "Introduction to Quantum, Mechanics" by R Liboff and "Modern Quantum Mechanics" by J J Sakurai

13. First level Undergraduate Physics Laboratory.

14. MSc Physics Laboratories: (a) Electromagnetism and Optics, (b) Modern Physics, (c) Advanced Physics

15. Introductory Computer Programming (CP I) Theory and Laboratory based on "Introduction to Computing Systems" by Y N Patt and S J Patel and "Programming in ANSI C" by E Balaguruswamy.

16. Digital Image Processing based on "Digital Image Processing" by R C Gonzalez and R E Woods

17. Indian Classical Music (Carnatic): Theory and Practice on the instrument Veena.

18. MSc student projects in Quantum Foundations, Quantum entanglement, Open quantum systems, Quantum Field Theory, String theory, Quantum Computation and Information, Digital Image Processing, Music and Acoustics.

Courses Developed

New Courses:

1. BITS F386 Introduction to Quantum Information and Computation, designed and developed from scratch, lecture notes converted into a published textbook

2. PHY F481 Quantum Information Theory developed and modified from other existeing courses abroad to suit an undergraduate audience

3. PHY F316 Musical Acoustics

4. HSS F347 Introduction to Carnatic Music

5. HSS F348 Introduction to Hindustani Music

6. HUM F229 Introduction to Western Music

Other Experience

- Helped design and implement construction of Optical Observatory at BITS Goa
- Head of Department of Physics since Nov 2019
- Developed online course for Quantum Information and Computation
- Was part of the committee for designing the convocation at BITS Goa, an was on the stage committee for the first 6 convocations.
- Helped develop online delivery of course material for Basic Physics and Basic Physics Laboratory on the Moodle LMS, by setting up server and developing the course material.
- Was on the organizing committee of the Fifth meeting on "Field Theoretic Aspects of Gravity" (FTAG-5) held at BITS Goa in December 2006.
- Helped develop undergraduate Physics Laboratory in BITS Goa, including setting up of equipment and bringing out the laboratory manual.
- Worked in Center for Software Development, BITS Pilani as Faculty in charge of BITS Website
- Nucleus member of the Center for Software Development in BITS Goa, responsible for setting up and maintaining the mail server and other servers.
- Developed and set up courses in Indian Classical Music (Carnatic and Hindustani, Vocal and Instrumental), Western Music and Indian Classical Dance (Bharatanatyam).
- Faculty in charge for SPICMACAY BITS Goa chapter, organized two music and dance conventions at BITS Goa, including Virasat and Goa state convention in 2012.

Computer Experience

- Installed, configured and run the MOODLE course management system on a Linux server running CENTOS, catering to all courses run on BITS Goa Campus
- Installed and successfully run the Zimbra Email server on a Linux server running CENTOS, catering to the email needs of BITS Goa Campus for 4 years.
- Familiar with the Unix Workstation environment, as well as with PC's running Linux and Windows
- Installed, designed and run several websites including IMSc Website (http://www.imsc.ernet.in) from 1995 to 1999,
  was Webmaster at HRI (http://www.mri.ernet.in), 2000-2001
- Have been a member of the computer committee in IMSc during 1996-1998, having closely observed many details of systems administration, including up various system services, buying/installing new software, system security, budget allocations etc.
- Languages: fairly conversant with C.
- Other packages: have expertise in LaTeX and HTML, have worked with and programmed in the Mathematica package and GNU octave for symbolic manipulation as part of my research and teaching work.