

Biographical Sketch

(Last updated or compiled on April 26, 2012.)

Name : K. V. Shajesh
Name on passport : Kuloth Vayalombbron Shajesh
Work authorization : Indian passport. "Permanent resident" of United States.
Date and place of birth : On Dec 4, 1972, in Ghaziabad, India.

Contact Information

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1 Family

1.1 Family members

Father: V. Karunan. Born on July 3, 1944. Served in the The Indian Air Force from 1964 to 1994. Currently retired and settled at 'Shayeka', Perunthatyl, Tellicherry, Kerala - 670107, India. Tel: +91-(490)-235-2061.

Mother: K. Yeshoda. Born on Aug 6, 1951. Has been a tremendous support to my father all along.

Sister: K. V. Shamna, Ophthalmologist. Born on May 29, 1971. Married to Dr. Krishnan Digvijay on Jul 10, 2003. Their first son, Krishank, was born on June 14, 2004. Their second son, Kaushik, was born on Feb 12, 2008. They are currently residing in Muscat, Oman.

2 Academics

2.1 Academic Record

16. Apr 2012 - Present: Visiting postdoctoral fellow at Department of Energy Process and Technology, Norwegian University of Science and Technology (NTNU), Trondheim, Norway. Project advisor: Iver H. Brevik.
15. Feb 2012 - Mar 2012: Visiting postdoctoral fellow at the University of Oklahoma, Norman, Oklahoma, USA. Project advisor: Kimball A. Milton.
14. Jul 2010 - Jan 2012: Postdoctoral associate at Rutgers University, Newark, New Jersey, USA. Project advisor: Martin Schaden.
13. Aug 2008 - Jun 2010: Physics teacher at Saint Edward's School, Vero Beach, Florida, USA.
12. Aug 2001 - Jul 2008: Ph. D. in Physics at University of Oklahoma, Norman, Oklahoma, USA. Dissertation title: Casimir effect: An avatar of the quantum vacuum. Thesis advisor: Kimball A. Milton.
11. Jun 2001 - Jul 2001: Visiting research scholar at Center of Theoretical Studies, Indian Institute of Technology, Kharagpur, India.
10. Jan 2001 - Apr 2001: Visiting research scholar at The Institute of Mathematical Sciences, Chennai, India.
9. Aug 1996 - Aug 2000: Research Scholar at Physical Research Laboratory, Ahmedabad, India.
8. Aug 1994 - Aug 1996: Masters degree (M. Sc.) at Indian Institute of Technology, Kharagpur, India. CGPA : 6.95 / 10
7. Aug 1991 - Aug 1994: Bachelors degree (B. Sc.) at Banaras Hindu University, Varanasi, India. Percentage marks : 68.3 %
6. Aug 1990: Passed my Secondary School Examination (A. I. S. S. C. E.). Percentage marks : 76.2 %
5. Aug 1988: Passed my High School Examination (A. I. S. S. E.). Percentage marks : 69.8 %
4. Aug 1986 - Aug 1990: Schooling from Class IX to Class XII at Kendriya Vidyalaya, Air Force Station Sulur, Coimbatore, India.
3. Aug 1981 - Aug 1986: Schooling from Class III to Class VIII at Kendriya Vidyalaya, Air Force Station Avadi, Chennai, India.
2. Aug 1978 - Aug 1981: Schooling from Class I to Class III at Kendriya Vidyalaya, Air Force Station Pune, Pune, India.
1. Aug 1976 - Aug 1978: Kindergarten at Air Force Station Pune, Pune, India.

2.2 Academic Awards

8. 2009: Awarded the Neilsen Prize for the best Ph.D. thesis (item [9] in Section 3.1) by Homer L. Dodge Department of Physics and Astronomy, University of Oklahoma.
7. 2009: My Ph.D. thesis (item [9] in Section 3.1) was nominated for the University of Oklahoma Provost's Dissertation Prize for the year 2009. According to unofficial sources I was placed second by the Dissertation award committee.
6. 2008: My article titled "Quantum mechanics using Fradkin's representation" (item [17] in Section 3.1) is listed in "The Net Advance of Physics", which is a collection of review articles and tutorials in an encyclopedic format, supported by The Massachusetts Institute of Technology. My article is listed under the topic "Field Theory" and under the subtitle "Fradkin representation". The internet link to the article is (<http://web.mit.edu/redingtn/www/netadv/Xfieldtheo.html>).
5. 2004: My web-page was spotlighted on the main page of the University of Oklahoma's Arts and Science's web-page for one week starting from Dec 9, 2004, by web-mistress Angela P. Startz. The archived page is available at College of Arts and Sciences, The University of Oklahoma (http://casweb.ou.edu/home/past_indices/index_20041209_3.htm).
4. 2000: Passed the CSIR-UGC Net examination which is a requirement for "Graduate Research Fellowship" in India.
3. 1994: Gold medalist in the National Graduate Physics Examination (N. G. P. E.) conducted by the Indian Association of Physics Teachers(I. A. P. T.) in the year 1994.
2. 1990: Was selected for studying in U. S. S. R. in the discipline of Physics and Mathematics with full scholarship by "Indo Soviet Medical Education Care and Research Foundation".
1. 1989: A mathematical teaching exhibit describing the "Zeros of a Polynomial" was designed, built and presented in the Jawaharlal Nehru National Science Exhibition at Jaipur Cantt, India.

3 Physics

3.1 Publications in Physics

1. K. V. Shajesh and M. Schaden, "Significance of many-body contributions to Casimir energies," arXiv:1112.1383 [hep-th].
2. K. V. Shajesh and M. Schaden, "Repulsive long-range forces between anisotropic atoms and dielectrics," Phys. Rev. A **85**, 012523 (2012), arXiv:1112.1348 [physics.atom-ph].
3. K. V. Shajesh and M. Schaden, "Many-body contributions to Green's functions and Casimir energies," Phys. Rev. D **83**, 125032 (2011), arXiv:1103.3048 [hep-th].
4. P. Parashar, K. A. Milton, I. Cavero-Pelaez and K. V. Shajesh, "Electromagnetic non-contact gears: Prelude," Quantum field theory under the influence of external conditions (QFEXT09), devoted to the centenary of H. B. G. Casimir (pp 48-54), proceedings of the ninth conference, University of Oklahoma, USA, (2010), arXiv:1001.4105 [cond-mat.other].

5. K. A. Milton, P. Parashar, J. Wagner and K. V. Shajesh, “Exact Casimir energies at nonzero temperature: Validity of proximity force approximation and interaction of semitransparent spheres,” *Doing physics: A festschrift for Thomas Erber*, edited by Porter Johnson, Illinois Institute of Technology Press (2010), arXiv:0909.0977 [hep-th].
6. I. Cavero-Pelaez, K. A. Milton, P. Parashar and K. V. Shajesh, “Leading- and next-to-leading-order lateral Casimir force on corrugated surfaces,” *Int. J. Mod. Phys. A* **24**, 1757 (2009) [arXiv:0810.1787 [hep-th]].
7. I. Cavero-Pelaez, K. A. Milton, P. Parashar and K. V. Shajesh, “Lateral Casimir forces on parallel plates and concentric cylinders with corrugations,” *J. Phys. Conf. Ser.* **161**, 012008 (2009) [arXiv:0810.1786 [hep-th]].
8. K. A. Milton, P. Parashar, J. Wagner, K. V. Shajesh, A. Romeo and S. Fulling, “How Does Quantum Vacuum Energy Accelerate?,” arXiv:0810.0081 [hep-th].
9. K. V. Shajesh, “Casimir effect: An avatar of the quantum vacuum,” Ph. D. Thesis, The University of Oklahoma, 2008, 153 pages. Available under ‘Open Access publishing’, a service offered by UMI Dissertation Publishing, at (<http://pqdtopen.proquest.com/#abstract?dispub=3315897>).
10. I. Cavero-Pelaez, K. A. Milton, P. Parashar and K. V. Shajesh, “Non-contact gears: II. Casimir torque between concentric corrugated cylinders for the scalar case,” *Phys. Rev. D* **78**, 065019 (2008), arXiv:0805.2777 [hep-th].
11. I. Cavero-Pelaez, K. A. Milton, P. Parashar and K. V. Shajesh, “Non-contact gears: I. Next-to-leading order contribution to lateral Casimir force between corrugated parallel plates,” *Phys. Rev. D* **78**, 065018 (2008), arXiv:0805.2776 [hep-th].
12. K. A. Milton, I. Cavero-Pelaez, P. Parashar, K. V. Shajesh and J. Wagner, “PT-Symmetric Quantum Electrodynamics–PTQED,” arXiv:0712.0045 [hep-th]. Revised version published in *Int. J. Theor. Phys.* **50**, 963 (2011).
13. K. V. Shajesh, K. A. Milton, P. Parashar and J. A. Wagner, “How does Casimir energy fall? III. Inertial forces on vacuum energy,” *J. Phys. A: Math. Theor.* **41**, 164058 (2008), arXiv:0711.1206 [hep-th].
14. K. A. Milton, S. A. Fulling, P. Parashar, A. Romeo, K. V. Shajesh and J. A. Wagner, “Gravitational and Inertial Mass of Casimir Energy,” *J. Phys. A: Math. Theor.* **41**, 164052 (2008), arXiv:0710.3841 [hep-th].
15. K. A. Milton, P. Parashar, K. V. Shajesh and J. Wagner, “How does Casimir energy fall? II. Gravitational acceleration of quantum vacuum energy,” *J. Phys. A: Math. Theor.* **40**, 10935 (2007), arXiv:0705.2611 [hep-th].
16. S. A. Fulling, K. A. Milton, P. Parashar, A. Romeo, K. V. Shajesh and J. Wagner, “How does Casimir energy fall?,” *Phys. Rev. D* **76**, 025004 (2007), arXiv:hep-th/0702091.
17. K. V. Shajesh and K. A. Milton, “Quantum mechanics using Fradkin’s representation,” [arXiv:hep-th/0510103].
18. C. M. Bender, I. Cavero-Pelaez, K. A. Milton and K. V. Shajesh, “PT-symmetric quantum electrodynamics,” *Phys. Lett. B* **613**, 97 (2005) [arXiv:hep-th/0501180].
19. N. D. Hari Dass and K. V. Shajesh, “Vacuum polarization induced coupling between Maxwell and Kalb-Ramond fields,” *Phys. Rev. D* **65**, 085010 (2002) [arXiv:hep-th/0107006].

20. K. V. Shajesh, “Effective Lagrangian for the pseudoscalars interacting with photons in the presence of a background electromagnetic field,” [arXiv:hep-th/0008187].
21. D. Basu, S. Bal and K. V. Shajesh, “The Character of the Exceptional Series of Representations of $SU(1,1)$,” J. Math. Phys. **41**, 461 (2000) [arXiv:hep-th/9906066].
22. J. A. Grifols, E. Masso, S. Mohanty and K. V. Shajesh, “Pair production of light pseudoscalar particles in strong inhomogeneous fields by the Schwinger mechanism,” Phys. Rev. D **60**, 097701 (1999) [Erratum-ibid. D **65**, 099905 (2002)] [arXiv:hep-ph/9906255].
23. S. Bal, K. V. Shajesh and D. Basu, “A Unified Treatment of the Characters of $SU(2)$ and $SU(1,1)$,” J. Math. Phys. **38**, 3209 (1997) [arXiv:hep-th/9611236].

3.2 Exposure to developments in physics

20. 2011, Sep 18 - 24: Attended the tenth workshop on ‘quantum field theory under the influence of external conditions’ (QFEXT11) at The Centro de Ciencias de Benasque Pedro Pascual, Benasque, Spain.
19. 2011, Sep 14 - Aug 17: Visited Prof. Iver Brevik’s research group at Norwegian University of Science and Technology (NTNU), Trondheim, Norway.
18. 2011, Aug 18 - 19: Attended the workshop on ‘Theoretical Atomic-Molecular-Optical Physics: Recent Developments and a Vision for the Future’ at NSF Headquarters, Arlington, Virginia, USA.
17. 2011, May 18 - 19: Attended the workshop on ‘Quantum Vacuum’ at University of Oklahoma, Norman, Oklahoma, USA.
16. 2010, Jul 8 - 9: Attended the workshop on ‘Quantum Vacuum’ at Texas A & M University, Texas, USA.
15. 2010, Apr 9 - 10: Attended Non-Perturbative Quantum Field Theory (NPQFT) 2010 (Milton Fest), a conference celebrating 48 years of Kim Milton’s research, at University of Oklahoma, Norman, Oklahoma, USA.
14. 2009, Dec 15 - 20: Attended ‘Miami-2009’, a topical conference on elementary particles, astrophysics, and cosmology at Lago Mar Resort, Fort Lauderdale, Florida, USA.
13. 2009, Jul 22 - Aug 15: Visited Prof. Kimball Milton’s research group at Homer L. Dodge Department of Physics and Astronomy, University of Oklahoma, USA.
12. 2008, Mar 15 - 16: Attended the workshop on ‘Quantum Vacuum’ at University of Oklahoma, Norman, Oklahoma, USA.
11. 2007, Sep 17 - 21: Attended the eighth workshop on ‘quantum field theory under the influence of external conditions’ (QFEXT07) at University of Leipzig, Leipzig, Germany.
10. 2007, Aug 6-8: Attended the workshop on ‘Quantum Vacuum’ at Texas A & M University, Texas, USA.
9. 2006, June 28 - July 1: Attended the workshop on ‘Quantum Vacuum’ at University of Oklahoma, Norman, Oklahoma, USA.
8. 2006, April 22-25: Attended American Physical Society (APS) April meeting 2006, at Dallas, Texas, USA.
7. 2005, July 18 - 29: Attended Prospects in Theoretical Physics (PiTP-2005), a two-week summer program on “Introduction to Collider Physics” at Institute for Advanced Study, Princeton, New Jersey, USA.

6. 2003, Sep 15 - 19: Attended the sixth workshop on ‘quantum field theory under the influence of external conditions’ at University of Oklahoma, Norman, Oklahoma, USA.
5. 1999, March: Attended the SERC school on High Energy Physics at Mysore University, Mysore, India.
4. 1998, March: Attended the SERC school on High Energy Physics at Shantiniketan University, Shantiniketan, India.
3. 1997, October: Attended the SERC school on High Energy Physics at Khalsa College, New Delhi, India.
2. 1995, August - 1996, May: Did my M. Sc. project on ‘Classification of the unitary irreducible representations of the $SU(1,1)$ group’ under the guidance of Prof. Debabrata Basu.
1. 1995 May - June: Did a project on ‘Quark confinement – MIT Bag Model’ under the guidance of Prof. S. Naik at Mehta Research Institute, Allahabad, India.

3.3 Talks, Lectures, and Presentations

21. 2012, Mar 29: ‘Repulsive Casimir force: Non-intuitive manifestations of quantum vacuum fluctuations,’ Neilsen Prize Colloquium talk at Homer L. Dodge Department of Physics and Astronomy, University of Oklahoma, USA.
20. 2012, Jan 25: ‘Repulsive Casimir force: Non-intuitive manifestations of quantum vacuum fluctuations,’ Seminar at Department of Physics, Rutgers University–Newark, Newark, New Jersey, USA.
19. 2011, Sep 23: ‘Significance of many-body contributions to Casimir energy,’ Quantum field theory under the influence of external conditions (QFEXT11), The Centro de Ciencias de Benasque Pedro Pascual, Benasque, Spain.
18. 2011, Sep 15: ‘Macroscopic manifestations of the quantum vacuum,’ Norwegian University of Science and Technology (NTNU), Trondheim, Norway.
17. 2011, May 18: ‘Many-body Casimir energies,’ Quantum vacuum meeting, Department of Physics and Astronomy, University of Oklahoma, USA.
16. 2010, Apr 10: ‘Casimir energy using Fradkin’s representation,’ NPQFT 2010 (Milton Fest), University of Oklahoma, Norman, Oklahoma, USA.
15. 2009, Dec 20: ‘Electromagnetic non-contact gears: Lateral Casimir force between dielectric slabs,’ Miami-2009, Lago Mar Resort, Fort Lauderdale, Florida, USA.
14. 2008, Jul 15: ‘Casimir effect: An avatar of the quantum vacuum,’ Thesis defense, Department of Physics and Astronomy, University of Oklahoma, USA.
13. 2008, Mar 15: ‘Casimir torque between corrugated surfaces: I. Next-to-leading-order contributions,’ Quantum vacuum meeting, Department of Physics and Astronomy, University of Oklahoma, USA.
12. 2007, Sep 21: ‘How does Casimir energy fall? III. A progress report on an investigation of inertial property of vacuum energy,’ Quantum field theory under the influence of external conditions (QFEXT07), University of Leipzig, Leipzig, Germany.
11. 2007, Aug 6: ‘How does Casimir energy fall? Renormalization of gravitational and inertial masses,’ Quantum vacuum meeting, University of Texas A & M, Texas, USA.

10. 2007, Jan 11: Invited by K. Radhakrishnan, head of the ‘Satellite Based Remote Education’ program, Everonn Systems India Limited, to present a guest lecture on ‘Electromagnetism and Gravity’. The lecture was broadcasted live to more than 100 schools from the transmission studio based in the Chennai office of Everonn Systems India Limited.
9. 2006, Jun 28: ‘Quantum mechanics using Fradkin’s representation,’ Quantum vacuum meeting, Department of Physics and Astronomy, University of Oklahoma, USA.
8. 2006, May 8: ‘Particle Theory with Extra Dimensions,’ Department of Physics and Astronomy, University of Oklahoma, USA.
7. 2006, Apr 23: ‘Quantum mechanics using Fradkin’s representation,’ APS April meeting, Dallas, Texas, USA.
6. 2004, Mar 10: ‘Eikonal Approximation,’ Department of Physics and Astronomy, University of Oklahoma, USA.
5. 2003, Feb 3: ‘Breakdown of vacuum into e^+e^- pairs in the presence of a classical background electromagnetic field,’ Department of Physics and Astronomy, University of Oklahoma, USA.
4. 2002, Sep 19: ‘Dirac quantization of electric charge,’ Department of Physics and Astronomy, University of Oklahoma, USA.
3. 2002, Feb 12: ‘An integral transform connecting the Hilbert space of Quantum mechanics ($L^2(R)$ space) and the Bargmann-Segal Hilbert space,’ Department of Physics and Astronomy, University of Oklahoma, USA.
2. 2001, Jun 26: ‘An integral transform connecting the Hilbert space of Quantum mechanics and the Bargmann-Segal Hilbert space,’ Center for Theoretical Studies, Indian Institute of Technology, Kharagpur, India.
1. 1999 Sep: ‘Effective Lagrangian for the pseudoscalars interacting with photons in the presence of a background electromagnetic field,’ Physical Research Laboratory, Ahmedabad, India.

3.4 Probable referees

1. Kimball A. Milton, George Lynn Cross Research Professor of Physics, Department of Physics and Astronomy, University of Oklahoma, 440 West Brooks Street, Norman, OK - 73019, USA. Email: milton@nhn.ou.edu.
2. Martin Schaden, Associate Professor, Department of Physics, Rutgers, The State University of New Jersey, Newark, NJ - 07102, USA. Email: mschaden@andromeda.rutgers.edu.
3. Iver H. Brevik, Department of Energy and Process Engineering, Norwegian University of Science and Technology, N-7491 Trondheim, Norway, Email: iver.h.brevik@ntnu.no.
4. N. D. Hari Dass, DAE Raja Ramanna Fellow, Centre for High Energy Physics, Indian Institute of Science, Bangalore, India. Email: dass@cts.iisc.ernet.in.

4 Teaching

4.1 Teaching Positions

1. Aug 2008 - Jun 2010: Taught all the physics courses as the Physics Instructor at Saint Edward's School, Vero Beach, Florida, USA. I taught courses at three different levels: College Preparatory Physics (aimed for students who are not expected to take physics courses after graduating), Honors Physics (aimed for students who intend to major in fields requiring knowledge of physics), and Advanced Placement Physics (aimed for students earning college credit).

4.2 Teaching Assistant Positions

14. Spring 2008: Teaching assistant to Dr. Ronald Kantowski for the course on Physics for Engineers I (PHYS-2514), Department of Physics and Astronomy, University of Oklahoma, USA.
13. Fall 2007: Teaching assistant to Dr. Dick Henry for the course on Musical Acoustics (PHYS-1453), and, part time teaching assistant to Dr. Mike Strauss for the course on Physics for Life Sciences I (PHYS-2414), Department of Physics and Astronomy, University of Oklahoma, USA.
12. Spring 2007: Teaching assistant to Dr. Sheena Murphy for the course on General Physics Laboratory II (PHYS-1321), Department of Physics and Astronomy, University of Oklahoma, USA.
11. Fall 2006: Teaching assistant to Dr. John Moore Furneaux for the course on General Physics Laboratory I (PHYS-1311), Department of Physics and Astronomy, University of Oklahoma, USA.
10. Spring 2006: Teaching assistant to Dr. John Moore Furneaux for the course on Physics for Life Sciences II (PHYS-2424), Department of Physics and Astronomy, University of Oklahoma, USA.
9. Fall 2005: Teaching assistant to Dr. Dick Henry for the course on Musical Acoustics (PHYS-1453), and, part time teaching assistant to Dr. John Moore Furneaux for the course on Physics for Life Sciences II (PHYS-2424), Department of Physics and Astronomy, University of Oklahoma, USA.
8. Spring 2005: Part time department tutor for all the undergraduate courses, and, part time teaching assistant to Dr. Brad Abbott for the course on Physics for Life Sciences I (PHYS-2414), Department of Physics and Astronomy, University of Oklahoma, USA.
7. Fall 2004: Department tutor for all the undergraduate courses, Department of Physics and Astronomy, University of Oklahoma, USA.
6. Spring 2004: Teaching assistant to Dr. Lloyd Bumm for the course on General Physics Laboratory I (PHYS-1311), Department of Physics and Astronomy, University of Oklahoma, USA.
5. Fall 2003: Teaching assistant to Dr. Patrick Skubic for the course on Physics for Engineers I (PHYS-2514), Department of Physics and Astronomy, University of Oklahoma, USA.
4. Spring 2003: Teaching assistant to Dr. Lloyd Bumm and Dr. Bruce Mason for the courses on Physics for Life Sciences I (PHYS-2414) and Physics for Engineers II (PHYS-2524) respectively, Department of Physics and Astronomy, University of Oklahoma, USA.
3. Fall 2002: Department tutor for all the undergraduate courses, Department of Physics and Astronomy, University of Oklahoma, USA.

2. Spring 2002: Grading assistant to Dr. Michael Santos for the course on Solid State Physics (PHYS-4243), Department of Physics and Astronomy, University of Oklahoma, USA.
1. Fall 2001: Grading assistant to Dr. James Shaffer for the course on Physical Mechanics (PHYS-3054), Department of Physics and Astronomy, University of Oklahoma, USA.

4.3 Tutoring

3. 2001 - 2006: I enjoyed giving one on one private tutoring for courses related to Physics and Mathematics. I have given an average of 50 hours of tutoring per year between 2001 to 2006.
2. Summer 2004: Provided private tutoring on Electrodynamics.
1. Fall 2001: Official tutor for the Cadet Tutoring Program in the ROTC, University of Oklahoma.

5 Miscellaneous Projects

2. 2005 - Present: **Personal accounting program:** As a hobby I have maintained precise and elaborate account of my financial expenditures since the year 1990. I have used this unique experience to write a computer program, using the programming language Perl, that can maintain personal accounts. The program is functional since year 2005 but is still in a developmental stage. In the current form it can maintain accounts, display expenses in simplified categories, and prepare budgets. I intend to program it to be able to do most of the usual analytics. Currently it runs as a script on a Linux platform and does not support graphical interface.
1. Feb 2003 - Jul 2008: **Understanding the golf swing:** I have been involved in a project with Dr. O'Tar T. Norwood, and Dr. Osama Alkhouli, which is aiming at understanding the physics of a golf swing. We have investigated if an impulsive pull of the golf club an instant before its impact with the ball increases the range of the shot significantly. Most recently we have connected accelerometers to a golf club and collected data with professionals and amateurs swinging the club. Analysis of the data is still pending.