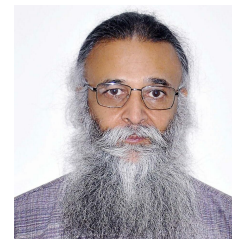


## CURRICULUM VITAE



1. Name : ARVIND
2. Present Position : (a) Vice Chancellor  
Punjabi University Patiala  
(April 2021-Present)  
(b) Professor of Physics, IISER Mohali  
(March 2010-Present, currently on Deputation)
- Mobile : +91 9888564456
- Email : arvind@iisermohali.ac.in,  
arvind.ekalgadda@gmail.com
- Webpage : <http://www.quantumphys.org>
3. Permanent Address : VPO Ekal Gadda,  
Distt. Taran Taran,  
Punjab 143115, India.
4. Date and Place of Birth : 28 October 1968, Jalandhar India
5. Nationality : Indian
6. Marital Status : Married

### 7. Academic qualifications:

Degree	Institution	Year	Remarks
Matriculation	Punjab School Education Board	1983	Merit
Pre Engg.	Guru Nanak Dev University	1985	Merit
B.Sc.(Hons)	Guru Nanak Dev University	1988	Gold Medal
M.Sc.(Physics)	IIT Kanpur	1990	Distinction
Ph.D.(Physics)	IISc Bangalore	1997	

### 8. Awards and recognitions:

SN	Award/Recognition	Year
1.	Indian National Science Academy Gold Medal for Young Scientists	2000
2.	Certificate of merit in UGC-CSIR examination	1989
3.	Certificate of Academic Proficiency in M.Sc. IIT Kanpur	1989
4.	Gold medal in B.Sc.(Honours) GNDU Amritsar	1988

## 9. Positions held

Position	Institution	From (Year)	To (Year)	Remarks
Vice Chancellor	Punjabi Univ. Patiala	2021	Present	
Professor	IISER Mohali	2010	Present	On Deputation
Officiating Director	IISER Mohali	2019	2019	6 Months
Associate Professor	IISER Mohali	2007	2010	
Assistant Professor	IIT Madras	2005	2007	On leave(GNDU)
Reader	GNDU Amritsar	2005	2007	
Special Faculty	Carnegie Mellon Univ. USA	2002	2004	On leave (GNDU)
Lecturer	GNDU Amritsar	1997	2005	

## 10. Other Admin Responsibilities:

Positions	Institution	From (Year)	To (Year)
National Coordinator	QuEST Theme I DST	2018	Present
Coordinator Outreach	IISER Mohali	2012	2019
Dean Students	IISER Mohali	2011	2014
Head Computer Center	IISER Mohali	2007	2014
Dean R &D	IISER Mohali	2007	2010

## 11. Quantitative Academic Output :

SN	Category	Quantity
1.	Number of Publications	95
2.	Number of Conference Talks	115
3.	Number of PhD Guided	12
4.	Number of MS Theses Guided	40
5.	Google Scholar H-Index	21
6.	Google Scholar I10-Index	40

12. Sponsored Research Projects as PI/CoPI:

SN	Project Title	Agency	Years	Role	Amt.
1.	Quantum contextuality: Its role in quantum computation and QKD protocols	DST (QuEST)	2019–	PI	67 L
2.	High-Temperature Photonic Quantum Memory	DST (QuEST)	2019–	Co-PI	73 L
3.	Exploring the quantum measurement problem in the context of weak quantum measurements	DST (SERB)	2015-19	PI	24 L
4.	Studies of dissipative dynamics in quantum computers using NMR techniques	CSIR	2008-11	Co-PI	12 L
5.	Quantum Computing Using Fourier Transform Nuclear Magnetic Resonance DST	DST	2004-07	Co-PI	77 L
6.	Study of Quantum Effects in a Dissipative Environment	INSA	2001-04	PI	1.5 L

13. **Research Interests :**

My research interests encompass the fields of **Quantum Information and Quantum Computation, Foundations of Quantum Mechanics, Quantum Optics, and Physics Education Research.**

14. **Guided Research:**

**PhD:**

1. Akshay Gaikwad (Jointly with Dr Kavita Dorai) “Novel techniques for efficient quantum state tomography and quantum process tomography and their experimental implementation” PhD Thesis Submitted, September 2023.
2. Rajendra Singh Bhati “Quantum measurements: Studies of weak measurements describing the past of quantum particles, no-go theorem, and quantum key distributions” PhD Thesis Submitted, June 2023.
3. Dileep Singh (Jointly with Dr Kavita Dorai) “Experimental studies of quantum contextuality and nonlocality on an NMR quantum information processor” PhD Degree Awarded, June 2023.
4. Jaskaran Singh Nirankari “Studies of quantum contextuality, Bell non-locality and their role in quantum key distribution protocols” PhD Degree Awarded, May 2021.

5. Chandan Kumar “Continuous variable Gaussian and non-Gaussian states: Estimation, nonlocality and quantum key distribution”  
PhD Degree Awarded, May 2021.
6. Amandeep Singh (Jointly with Dr Kavita Dorai) “Generation and Detection of Quantum Correlations and Entanglement on a Spin-Based Quantum Information Processor”, PhD Degree Awarded May 2019.
7. Harpreet Singh (Jointly with Dr Kavita Dorai) “Generation, estimation and protection of novel quantum states of spin systems”, PhD Degree Awarded May 2018.
8. Debmalya Das “Quantum state estimation using weak measurements and entanglement manipulation using local filters”, PhD Degree Awarded May 2016.
9. Shruti Dogra (Jointly with Dr Kavita Dorai) “Novel aspects of multiqubit entanglement and qudit computing on an NMR quantum information processor”, PhD Degree Awarded May 2016.
10. Ritabrata Sengupta “Extremal extensions of positive maps and bound entangled quantum states”, PhD Degree Awarded May 2014.
11. Paramdeep Chandi “Conceptual Experiments for Physics Teaching”, PhD Degree Awarded Feb 2012.
12. Geetu Narang “Study of quantum channels, decoherence and entanglement in quantum information processing”, PhD Degree Awarded April 2008.

**Masters :**

- Around 40 Masters theses guided from IISER Mohali, IIT Madras and GNDU Amritsar.

**15. Professional Responsibilities :**

- Evaluator NAAC, 2011-Present.
- Editorial Board Member, Dialogue :Science Scientists and Society (Indian Academy of Sciences) 2018-present.
- Editorial Board Member, Physics Education, 2012-Present.
- Mentor DBT Star College Initiative, KMV College Jalandhar 2015-present.
- Member IIT-Kanpur Physics Department Review Committee, 2022.
- Member DPR drafting committee for National Mission on Quantum Technologies and Application(NMQTA) 2019-2022.

- Member Academic Senate, IISER Mohali 2007-2021.
- Member Board of Studies (Physics), Guru Jambheshwar University of Science and Technology, Hisar Haryana 2016-2018.
- Member Board of Studies (Physics), Kurukshetra University 2016-2020.
- Member Faculty of Sciences, GNDU Amritsar 2016-2018.
- Member Board of Studies (Physics), NIT Jalandhar 2012-2016.
- Member Integrated PhD Curriculum Review Committee, IIT Mandi, 2016.
- Member Board of Studies (Physics), GNDU Amritsar 2013-2018.
- Member Academic Council University of Jammu, 2011-2015.
- Member Board of Governors, IISER Mohali 2010-2013.
- Convener Curriculum Committee, IISER Mohali, 2007-2009.
- Expert Member, Curriculum Committee for MSc Physics of: (i) Central University Bihar and (ii) IIT Palakkad
- Member of the working committee that drafted the INSA Vision Document 2009.
- Seminar coordinator Physics Dept IIT-Madras
- Member Board of Control Physics Department GNDU 1998.
- Member, Selection Committee to Select Faculty Members for IISER Thiruvananthapuram, NIT Jalandhar, NIT Hamirpur, IIIT Jabalpur, Panjab University Chandigarh, Kurukshetra University.
- Referee for the following International and National Scientific Journals: (a) Physical Review Letters, (b) Physical Review A (c) Physics Letters A (d) Pramana Journal of Physics (e) Current Science (f) IEE transactions (g) Journal of the Optical Society of America.

#### 16. Teaching Experience :

I have taught and designed several courses both at the postgraduate and the undergraduate level at four different institutions. Courses taught include:

- **At GNDU Amritsar:** Mechanics (BSc), Electromagnetic Theory (BSc), Modern Physics (BSc), Spectroscopy (Molecular) (MSc), Classical Electrodynamics (MSc), Particle Physics (MSc), Quantum Mechanics I (MSc), Theoretical Physics II (MSc), Classical Mechanics (MSc), Solid State Physics Lab (MSc), Optics and Spectroscopy Lab (MSc).

- **At IIT Madras:** Quantum Mechanics for Engg. (B Tech), General Physics Lab (MSc), Quantum Information and Quantum Computing (Elective).
- **At IISER Mohali:** PHY101 Mechanics (BSc), PHY102 Electromagnetism (BSc), PHY302 Quantum Mechanics (MSc), PHY303 Classical Electrodynamics (MSc), PHY604 Review of Quantum Mechanics (PhD), PHY411 Nuclear Physics Lab(MSc), PHY611 Advanced optics and spectroscopy Lab (MSc), PHY112 Electromagnetism Lab (BSc), PHY211 Waves and Optics Lab (BSc), PHY631 Quantum Computation and Quantum Information (Elective), PHY661 Topics in Classical and Quantum Mechanics (Elective).
- **At Punjabi University Patiala:** Classical Mechanics to FYIP 1st year students, 2021 and 2023.

17. **(a) Contribution to Institution Building (IISER Mohali):**

IISER Mohali was established in July 2007 and I was one of the founding faculty members who joined IISER Mohali in August 2007. During this period, apart from my teaching and research activities, I also contributed significantly to building the institute. I setup the institute's computing facilities including designing the first webpage, setting up the servers, the email and wifi services and also served as Head Computer Centre from 2007-2014. I contributed to the planning and design of several buildings on-campus and also served as Member of the Building Works Committee and also member of the Project Management Committee of campus construction. I was the Convener of the first National level Curriculum Committee of IISER Mohali, which designed the syllabus for all the courses of the five year Integrated-MS programme of the institute. I organized several programmes under the broad umbrella of Outreach activities, and also served as the Coordinator for the Outreach Programme of the institute from 2012-2019. I was a member of the first Landscape Committee and the Environmental Monitoring Committee. I also held several administrative posts including being the first Dean R&D during 2007-2010, Dean Students during 2011-2014, Member Board of Governors during 2010-2013, and Member Academic Senate from 2007-Present.

**(b) Contribution to Institution Development (Punjabi University):**

After joining Punjabi University Patiala as Vice Chancellor in April 2021, I have started several novel academic initiatives including a Five Year Integrated Masters programmes in six different streams, a Center for Innovation & Rural Entrepreneurship and a Center for Reviving the Ecology of Punjab.

## 18. Science Outreach Activities :

I have been involved for the past two decades with science pedagogy, science communication at levels ranging from middle school to university, training programs for science teachers, and designing new experiments for the physics teaching laboratory curriculum. My thrust has been to bring positive change and help modernize physics education in India so that we produce good quality students who are capable of pursuing physics as a career anywhere in the world.

- I have written several newspaper and popular science articles, popularizing Science in Punjabi and have been invited to speak in various fora, including TV channels, and participated in public debates on Science and Science Policy.
- As Convener Outreach IISER Mohali, I have organized several national-level KVPY camps and the annual institute Science Days, coordinated IISER Mohali's summer research internship program, coordinated visits for groups of science students to IISER Mohali, and have been a mentor for several DST INSPIRE camps nationwide.
- I am on the Editorial Board of Dialog: Science, Scientists and Society (Indian Academy of Sciences) and of Physics Education (Indian Association of Physics Teachers).
- I co-organized a national level workshop on Research Based Pedagogical Tools in collaboration with IISER Pune, DBT and British Council during Jan 24-26, 2017.
- I was instrumental in formulating an MoU between Azim Premji University and IISER Mohali for collaboration on Science Education in 2016.
- I organized a one-day workshop on New Experiments in Physics, Shri Guru Teg Bahadur Khalsa College Anandpur Sahib on October 26, 2016.
- I co-organized Salters camp in collaboration with Royal Society of Chemistry for school students at IISER Mohali July 24-26, 2016.
- I co-organized a Regional National Knowledge Network workshop at IISER Mohali between August 22-23, 2016.
- I organized the DST Ishaan Vikaas program for students from the North East at IISER Mohali between June 6-20, 2016.
- I am involved with RAA mentoring for UT and Punjab to develop concept of science resource generation by science teachers.
- I organized a "Meet a Scientist" series of educational telecasts for EDUSAT Punjab, where 20 programs of one hour duration were recorded and telecast to 3000 schools in Punjab during 2014.

- I organized an Indian Academy of Sciences sponsored course on Experiments in Physics during July 8-23 2014, aimed at university and college physics teachers.
- I have helped the Himachal Pradesh Government in setting up a “Centre for Science Learning and Creativity” and organized three Science Campus for school children in Himachal Pradesh during 2011-2013.
- I have conceptualized and organized two training programs for Punjab Government Science Teachers between 2012-2013.
- I worked with Vigyan Prasar (DST) to make a film on the life and work of Prof. Babulal Saraf.
- I worked as a member of the Joint Review Mission of MHRD to evaluate teacher education in Punjab in 2013.
- I have been involved as a mentor for an NGO Society for the Promotion of Science and Technology in India (SPSTI), working in Haryana and Punjab for science popularization among school students since 2010.
- I have developed several demonstrations around the pin-hole camera effect, to explain sophisticated concepts in optics to middle- and high-school students and science teachers. At IISER Mohali, I have involved undergraduate summer interns in developing physics experiments, including a setup for parallax measurement and a setup to measure the acceleration due to gravity.
- I have been instrumental in designing and developing pedagogical tools for Physics. Experimental setups developed by him include:(i) Random sampling of an AC source with a DC meter; (ii) Understanding normal modes using a single two-dimensional oscillator; (iii) Understanding Stefan’s law via radiation from a bulb; (iv) Demonstration of current through an open circuit; (v) Construction of parallel plate capacitor with an AC source. These experimental setups are being used in the undergraduate physics teaching labs of IISER Mohali, IIT Madras and GNDU Amritsar. The technology transfer process is being formalized with a fabrication company in Ambala, so that these experiments can be produced on a larger scale, to be used by other educational institutions in the country.



## 19. Publications

### (a) Research Papers:

1. Dileep Singh, Jaskaran Singh, Kavita Dorai and **Arvind** (2023). Monogamy relations of entropic non-contextual inequalities and their experimental demonstration. *Europhysics Letters*, <https://doi.org/10.1209/0295-5075/acd954>
2. Akanksha Gautam, **Arvind**, and Kavita Dorai (2023). Protection of noisy multipartite entangled states of superconducting qubits via universally robust dynamical decoupling schemes. *International Journal of Quantum Information*, 0(0):2350016, <https://doi.org/10.1142/S0219749923500168>.
3. Jaskaran Singh, Rajendra Singh Bhati, and **Arvind** (2022). No contextual advantage in nonparadoxical scenarios of the two-state vector formalism. *Phys. Rev. A*, 107:012206.
4. Jaskaran Singh, Rajendra Singh Bhati, and **Arvind** (2022). Revealing quantum contextuality using a single measurement device. *Phys. Rev. A*, 107:012201.
5. Dileep Singh, Vaishali Gulati, **Arvind**, and Kavita Dorai (2022). Experimental construction of a symmetric three-qubit entangled state and its utility in testing the violation of a Bell inequality on an NMR quantum simulator. *Europhysics Letters*, 140(6):68001.
6. Akshay Gaikwad, **Arvind**, and Kavita Dorai (2022). Efficient experimental characterization of quantum processes via compressed sensing on an NMR quantum processor. *Quantum Information Processing*, 21(12):388.
7. Vaishali Gulati, **Arvind**, and Kavita Dorai (2022). Classification and measurement of multipartite entanglement by reconstruction of correlation tensors on an NMR quantum processor. *The European Physical Journal D*, 76(10):194.
8. Akanksha Gautam, Kavita Dorai, and **Arvind** (2022). Experimental demonstration of the dynamics of quantum coherence evolving under a PT-symmetric Hamiltonian on an NMR quantum processor. *Quantum Information Processing*, 21(9):329.
9. Akshay Gaikwad, **Arvind**, and Kavita Dorai (2022). Simulating open quantum dynamics on an NMR quantum processor using the Sz.-Nagy dilation algorithm. *Phys. Rev. A*, 106:022424.
10. Akshay Gaikwad, **Arvind**, and Kavita Dorai (2022). Efficient experimental characterization of quantum processes via compressed sensing on an NMR quantum processor. *Quantum Information Processing*, 21(12):388.

11. Rishabh, Chandan Kumar, Geetu Narang, and **Arvind** (2022). Evolution of two-mode quantum states under a dissipative environment: Comparison of the robustness of squeezing and entanglement resources. *Phys. Rev. A*, 105:042405.
12. Tavshabad Kaur, Maninder Kaur, **Arvind**, and Bindiya Arora (2022). Generating sustained coherence in a quantum memory for retrieval at times of quantum revival. *Atoms*, 10(3).
13. Chandan Kumar and **Arvind** (2022). Estimation of the Wigner distribution of single-mode Gaussian states: A comparative study. *Phys. Rev. A*, 105:042419.
14. Jaskaran Singh, **Arvind**, and Sandeep K. Goyal (2022). Implementation of discrete positive operator valued measures on linear optical systems using cosine-sine decomposition. *Phys. Rev. Res.*, 4:013007.
15. Dileep Singh, **Arvind**, and Kavita Dorai (2022). Experimental simulation of a monogamy relation between quantum contextuality and nonlocality on an NMR quantum processor. *Journal of Magnetic Resonance Open*, 10-11:100058.
16. Akshay Gaikwad, Krishna Shende, **Arvind**, and Kavita Dorai (2022). Implementing efficient selective quantum process tomography of superconducting quantum gates on ibm quantum experience. *Scientific Reports*, 12(1):3688.
17. Dileep Singh, **Arvind**, and Kavita Dorai (2022). Experimental demonstration of the violation of the temporal Peres-Mermin inequality using contextual temporal correlations and noninvasive measurements. *Phys. Rev. A*, 105:022216.
18. **Arvind**, S. Chaturvedi, and N. Mukunda (2021). Properties of spin and orbital angular momenta of light. *International Journal of Modern Physics A*, 36(26):2150180.
19. Chandan Kumar, Gaurav Saxena, and **Arvind** (2021). Continuous-variable Clauser-Horne Bell-type inequality: A tool to unearth the nonlocality of continuous-variable quantum-optical systems. *Phys. Rev. A*, 103:042224.
20. Jaskaran Singh, Sibasish Ghosh, **Arvind**, and Sandeep K. Goyal (2021). Role of Bell-CHSH violation and local filtering in quantum key distribution. *Physics Letters A*, 392:127158.
21. Akshay Gaikwad, **Arvind**, and Kavita Dorai (2021). True experimental reconstruction of quantum states and processes via convex optimization. *Quantum Information Processing*, 20(1).
22. Geetu Narang, Shruti Dogra, and **Arvind** (2020). A comparative study of system

- size dependence of the effect of non-unitary channels on different classes of quantum states. *Quantum Information Processing*, 19(11):397.
23. Harpreet Singh, **Arvind**, and Kavita Dorai (2020). Using a Lindbladian approach to model decoherence in two coupled nuclear spins via correlated phase damping and amplitude damping noise channels. *Pramana*, 94(1):160.
  24. Mayank Mishra, Ritabrata Sengupta, and **Arvind** (2020). Increasing distillable key rate from bound entangled states by using local filtration. *Phys. Rev. A*, 102:032415.
  25. Chandan Kumar, Ritabrata Sengupta, and **Arvind** (2020). Optimal characterization of Gaussian channels using photon-number-resolving detectors. *Phys. Rev. A*, 102:012616.
  26. **Arvind**, S. Chaturvedi, and N. Mukunda (2020). Symplectic group methods and the Arthurs Kelly model of measurement in quantum mechanics. *Physics Letters A*, 384(23) :126543.
  27. K. S. Akhilesh, **Arvind**, S. Chaturvedi, K. S. Mallesh, and N. Mukunda (2020). Geometric phases for finite-dimensional systems—The roles of Bargmann invariants, null phase curves, and the Schwinger–Majorana SU(2) framework. *Journal of Mathematical Physics*, 61(7), 07. 072103.
  28. Akanksha Gautam, Varad R. Pande, Amandeep Singh, Kavita Dorai, and **Arvind** (2020). Simulating the effect of weak measurements by a phase damping channel and determining different measures of bipartite correlations in nuclear magnetic resonance. *Physics Letters A*, 384(30):126760.
  29. Amandeep Singh, Dileep Singh, Vaishali Gulati, Kavita Dorai, and **Arvind** (2020). Experimental detection of non-local correlations using a local measurement-based hierarchy on an NMR quantum processor. *The European Physical Journal D*, 74(8):168.
  30. Chandan Kumar, Jaskaran Singh, Soumyakanti Bose, and **Arvind** (2019). Coherence-assisted non-Gaussian measurement-device-independent quantum key distribution. *Phys. Rev. A*, 100:052329.
  31. Dileep Singh, Jaskaran Singh, Kavita Dorai, and **Arvind** (2019). Experimental demonstration of fully contextual quantum correlations on an NMR quantum information processor. *Phys. Rev. A*, 100:022109.
  32. Amandeep Singh, Akanksha Gautam, **Arvind**, and Kavita Dorai (2019). Experimental detection of qubit-ququart pseudo-bound entanglement using three nuclear

- spins. *Physics Letters A*, 383(14):1549–1554.
33. Atul Singh Arora, Kishor Bharti, and **Arvind** (2019). Revisiting the admissibility of non-contextual hidden variable models in quantum mechanics. *Physics Letters A*, 383(9):833–837.
  34. **Arvind**, S. Chaturvedi, and N. Mukunda (2018). On ‘orbital’ and ‘spin’ angular momentum of light in classical and quantum theories – a general framework. *Fortschritte der Physik*, 66(10):1800040.
  35. Amandeep Singh, Kavita Dorai, and **Arvind** (2018). Experimentally identifying the entanglement class of pure tripartite states. *Quantum Information Processing*, 17(12):334.
  36. Amandeep Singh, Harpreet Singh, Kavita Dorai, and **Arvind** (2018). Experimental classification of entanglement in arbitrary three-qubit pure states on an NMR quantum information processor. *Phys. Rev. A*, 98:032301.
  37. **Arvind**, Kavita Dorai, Subhash Chaturvedi, and N. Mukunda. The development of quantum mechanics (2018). *Resonance*, 23(10):1077–1100.
  38. Samridhi Gambhir, **Arvind**, and Mandip Singh (2018). Intrinsic nonlinearity of a pn-junction diode and higher order harmonic generation. *Physics Education (IAPT)*, 34:3.
  39. Akshay Gaikwad, Diksha Rehal, Amandeep Singh, **Arvind**, and Kavita Dorai (2018). Experimental demonstration of selective quantum process tomography on an NMR quantum information processor. *Phys. Rev. A*, 97:022311.
  40. Amit Devra, Prithviraj Prabhu, Harpreet Singh, **Arvind**, and Kavita Dorai (2018). Efficient experimental design of high-fidelity three-qubit quantum gates via genetic programming. *Quantum Information Processing*, 17(3):67.
  41. Harpreet Singh, **Arvind**, and Kavita Dorai (2018). Evolution of tripartite entangled states in a decohering environment and their experimental protection using dynamical decoupling. *Phys. Rev. A*, 97:022302.
  42. Shruti Dogra, Kavita Dorai, and **Arvind** (2018). Majorana representation, qutrit hilbert space and NMR implementation of qutrit gates. *Journal of Physics B: Atomic, Molecular and Optical Physics*, 51(4):045505.
  43. Maninder Kaur, Bindiya Arora, and **Arvind** (2018). Effect of dissipative environment on collapses and revivals of a non-linear quantum oscillator. *The European Physical Journal D*, 72(8):136.

44. Harpreet Singh, **Arvind**, and Kavita Dorai (2017). Experimentally freezing quantum discord in a dephasing environment using dynamical decoupling. *Europhysics Letters*, 118(5):50001.
45. **Arvind**, S. Chaturvedi, and N. Mukunda (2017). Global aspects of polarization optics and coset space geometry. *Physics Letters A*, 381(35):3005–3009.
46. Jaskaran Singh, Kishor Bharti, and **Arvind** (2017). Quantum key distribution protocol based on contextuality monogamy. *Phys. Rev. A*, 95:062333.
47. Amandeep Singh, **Arvind**, and Kavita Dorai (2017). Witnessing nonclassical correlations via a single-shot experiment on an ensemble of spins using nuclear magnetic resonance. *Phys. Rev. A*, 95:062318.
48. Harpreet Singh, **Arvind**, and Kavita Dorai (2017). Experimental protection of arbitrary states in a two-qubit subspace by nested Uhrig dynamical decoupling. *Phys. Rev. A*, 95:052337.
49. Debmalya Das, Ritabrata Sengupta, and **Arvind** (2017). Measurement-based local quantum filters and their ability to transform quantum entanglement. *Pramana*, 88(6):82.
50. Debmalya Das and **Arvind** (2017). Weak measurement-based state estimation of Gaussian states of one-variable quantum systems. *Journal of Physics A: Mathematical and Theoretical*, 50(14):145307.
51. **Arvind**, S. Chaturvedi, and N. Mukunda (2017). A classical optical approach to the ‘non-local Pancharatnam-like phases’ in Hanbury-Brown–Twiss correlations. *Physics Letters A*, 381(14):1272–1276.
52. **Arvind**, S. Chaturvedi, and N. Mukunda (2018). Entanglement and complete positivity: Relevance and manifestations in classical scalar wave optics. *Fortschritte der Physik*, 66(2):1700077.
53. Amandeep Singh, **Arvind**, and Kavita Dorai (2016). Entanglement detection on an NMR quantum-information processor using random local measurements. *Phys. Rev. A*, 94:062309.
54. Shruti Dogra, Kavita Dorai, and **Arvind** (2016). Experimental demonstration of quantum contextuality on an NMR qutrit. *Physics Letters A*, 380(22):1941–1946.
55. Vikesh Siddhu and **Arvind** (2015). Quantum private comparison over noisy channels. *Quantum Information Processing*, 14(8):3005–3017.

56. Shruti Dogra, **Arvind** Dorai, and Kavita Dorai (2015). Implementation of the quantum Fourier transform on a hybrid qubit–qutrit NMR quantum emulator. *International Journal of Quantum Information*, 13(07):1550059.
57. Debmalya Das, Shruti Dogra, Kavita Dorai, and **Arvind** (2015). Experimental construction of a  $w$  superposition state and its equivalence to the greenberger-horne-zeilinger state under local filtration. *Phys. Rev. A*, 92:022307.
58. Debmalya Das and **Arvind** (2015). Quantum state estimation using weak measurements. *Current Science*, 109(11):1939–1945.
59. Shruti Dogra, Kavita Dorai, and **Arvind** (2015). Experimental construction of generic three-qubit states and their reconstruction from two-party reduced states on an NMR quantum information processor. *Phys. Rev. A*, 91:022312.
60. Harpreet Singh, **Arvind**, and Kavita Dorai (2014). Experimental protection against evolution of states in a subspace via a super-Zeno scheme on an NMR quantum information processor. *Phys. Rev. A*, 90:052329.
61. R. Sengupta, **Arvind**, and Ajit Iqbal Singh (2014). Entanglement properties of positive operators with ranges in completely entangled subspaces. *Phys. Rev. A*, 90:062323.
62. Shruti Dogra, **Arvind**, and Kavita Dorai (2014). Determining the parity of a permutation using an experimental NMR qutrit. *Physics Letters A*, 378(46):3452–3456.
63. Debmalya Das and **Arvind** (2014). Estimation of quantum states by weak and projective measurements. *Phys. Rev. A*, 89:062121.
64. R. Sengupta and **Arvind** (2013). Extremal extensions of entanglement witnesses and their connection with unextendable product bases. *Phys. Rev. A*, 87:012318.
65. R. Sengupta and **Arvind** (2011). Extremal extensions of entanglement witnesses: Finding new bound entangled states. *Phys. Rev. A*, 84:032328.
66. **Arvind**, Gurpreet Kaur, and Geetu Narang (2007). Optical implementations, oracle equivalence, and the Bernstein-Vazirani algorithm. *J. Opt. Soc. Am. B*, 24(2):221–225.
67. Geetu Narang and **Arvind** (2007). Simulating a single-qubit channel using a mixed-state environment. *Phys. Rev. A*, 75:032305.
68. **Arvind**, S Chaturvedi, N Mukunda, and R Simon (2006). The sampling theorem and coherent state systems in quantum mechanics. *Physica Scripta*, 74(2):168.

69. Rangan Lahiri, **Arvind**, and Anirban Sain (2004). Brownian motion in a classical ideal gas: A microscopic approach to langevin's equation. *Pramana*, 62(5):1015–1028.
70. N. Mukunda, **Arvind**, S. Chaturvedi, and R. Simon (2003). Wigner distributions and quantum mechanics on Lie groups: The case of the regular representation. *Journal of Mathematical Physics*, 45(1):114–148, 12.
71. **Arvind** and David Collins (2003). Scaling issues in ensemble implementations of the deutsch-jozsa algorithm. *Phys. Rev. A*, 68:052301.
72. **Arvind**, P. S. Chandi, R. C. Singh, D. Indumathi, and R. Shankar (2004). Random sampling of an alternating current source: A tool for teaching probabilistic observations. *American Journal of Physics*, 72(1):76–82, 01.
73. N. Mukunda, **Arvind**, S. Chaturvedi, and R. Simon (2003). Generalized coherent states and the diagonal representation for operators. *Journal of Mathematical Physics*, 44(6):2479–2506, 05.
74. N. Mukunda, **Arvind**, E. Ercolessi, G. Marmo, G. Morandi, and R. Simon. Bargmann invariants, null phase curves, and a theory of the geometric phase (2003). *Phys. Rev. A*, 67:042114.
75. **Arvind** (2002). U(2) invariant squeezing properties of pair coherent states. *Physics Letters A*, 299(5):461–468.
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78. **Arvind** (2001). Quantum entanglement and quantum computational algorithms. *Pramana*, 56(2):357–365.
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83. **Arvind** and N Mukunda (1999). Bell's inequalities, multiphoton states and phase space distributions. *Physics Letters A*, 259(6):421–426.
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85. **Arvind**, N Mukunda, and R Simon (1998). Characterizations of classical and non-classical states of quantized radiation. *Journal of Physics A: Mathematical and General*, 31(2):565.
86. **Arvind**, K S Mallesh, and N Mukunda (1997). A generalized Pancharatnam geometric phase formula for three-level quantum systems. *Journal of Physics A: Mathematical and General*, 30(7):2417.
87. **Arvind**, N. Mukunda, and R. Simon (1997). Gaussian-Wigner distributions and hierarchies of nonclassical states in quantum optics: The single-mode case. *Phys. Rev. A*, 56:5042–5052.
88. **Arvind** and N. Mukunda (1996). Relativistic operator description of photon polarization. *Pramana*, 47(5):347–359.
89. **Arvind** and N Mukunda (1996). Non-classical photon statistics for two-mode optical fields. *Journal of Physics A: Mathematical and General*, 29(18):5855.
90. **Arvind**, B. Dutta, N. Mukunda, and R. Simon (1995). Two-mode quantum systems: Invariant classification of squeezing transformations and squeezed states. *Phys. Rev. A*, 52:1609–1620.
91. **Arvind**, Biswadeb Dutta, C. L. Mehta, and N. Mukunda (1994). Squeezed states, metaplectic group, and operator möbius transformations. *Phys. Rev. A*, 50:39–61.

**(b) Scientific Reviews:**

1. Kavita Dorai and **Arvind** (2023). NMR Quantum Information Processing: Indian Contributions and Perspectives. *Journal of Indian Institute of Science*, <https://doi.org/10.1007/s41745-022-00353-6>.



2. **Arvind** (2009). Continuous variable systems: Entanglement, decoherence and quantum cryptography. *Journal of Indian Institute of Science*, 89:283–294.
3. Kavita Dorai, T. S. Mahesh, **Arvind** Kumar, and Anil Kumar (2000). Quantum computation using NMR. *Current Science*, 79(10):1447–1458.
4. **Arvind**, B. Dutta, N. Mukunda, and R. Simon (1995). The real symplectic groups in quantum mechanics and optics. *Pramana*, 45(6):471–497.

**(c) Other Articles:**

1. **Arvind**, *The Story of the Human Brain*, (In Punjabi), Punjabi Tribune, December 18, 2022. [Weblink](#)
2. **Arvind**, *The mysteries of the microcosm: Physics Nobel prizes of 2022*, (In Punjabi), Punjabi Tribune, October 8, 2022. [Weblink](#)
3. **Arvind**, *The Martyr of the Peasant movement of Sindh: Sufi Shah Inayat*, (In Punjabi), Punjabi Tribune, November 21, 2021. [Weblink](#)
4. **Arvind**, *Corona Virus: Science and Scientific Thinking*, (In Punjabi), Punjabi Tribune, April 9, 2020. [Weblink](#)
5. **Arvind**, *Science in 2019*, (In Punjabi, year-end review of the progress of Science), Punjabi Tribune, 3-January-2020. [Weblink](#)
6. **Arvind**, *The question of choosing a career: Can I become a scientist?*, (In Punjabi), Punjabi Tribune, 11-April-2019. [Weblink](#)
7. **Arvind**, Draft education policy leaves a lot to be desired, (In English), The Tribune, 12-July- 2019. [Weblink](#)
8. **Arvind**, *Science and Guru Nanak*, (In Punjabi), Punjabi Tribune, 12-November-2019. [Weblink](#)
9. **Arvind**, *Who are Indians?*, (In Punjabi), Punjabi Tribune, 24-November-2019. [Weblink](#)
10. **Arvind**, *Science, scientific temper and pseudo-science*, (In English), The Tribune, January 15, 2019. [Weblink](#)

**20. Conferences, Workshops Seminars and Talks:**

1. Invited lecture, Raman Conference on Light and Matter Physics, RRI Bangalore, August 14-18, 2023.

2. Invited lecture on “Epistememes of Huma Wisdom: Transcending Space-Time”, Ghalib Institute, New Delhi, May 22, 2023.
3. Invited panelist, Public Meeting on In Defense of Science and Scientific Method, Constitution Club, New Delhi, May 21, 2023.
4. Organized and delivered lecture in Second Workshop on Quantum Information Technologies and Photonic Devices, DST-Qust Theme 1 Workshop, CSK Himachal Pradesh Agriculture University, Palampur May 13-14 2023.
5. Invited lecture, International Conference on Quantum Computing and Communications QCC2023, Baba Farid College Bhatinda, February 9-11, 2023.
6. Invited lecture, Nalanda Session, Ahmedabad University, February 8, 2023.
7. Invited lecture, Progress in Quantum Science and Technologies, IIT-Madras Chennai, January 23-27, 2023.
8. Invited lecture on Nobel Prize in Physics 2022 in the Raman Memorial Lecures, Institute of Science Banaras Hindu University, Varanasi, November 7, 2022.
9. Organized and delivered lecture in First Workshop on Quantum Information Technologies and Photonic Devices, DST-Qust Theme 1 Workshop, Punjabi University, Patiala April 1-2, 2022.
10. Invited presentation in the “Panel discussion on the Science Technology and Innovation Policy 2020, JNU New Delhi, 11th March 2021.
11. Theme I (Photonics) Moderator for the Russian-Indian Scientific Quantum Technologies Webinar September 9-10, 2020.
12. Invited Lecture in Public Engagement Series, “ What is Quantum Information Processing?” IISER Mohali, August 29, 2020.
13. Invited Expert Lecture “What are quantum technologies” Faculty Development Program on Exploring Science and Technology Interconnections UIET Panjab University, Chandigarh. August 04, 2020.
14. Invited Webinar on “Future of Quantum Computing” NIT Jalandhar Sri Guru Gobind Singh College, Chandigarh July 29, 2020.
15. Invited talk on “ India’s journey into quantum technologies” Indo-Japan Webinar organized by DST on Quantum Technologies July 28, 2020.
16. Invited Webinar on “Future of Quantum Computing” NIT Jalandhar June 22, 2020.

17. Invited Webinar on “Quantum Biology” SciRox Club Guru Nanak Dev University, May 23, 2020
18. Invited Talk in Sixth Foundations of Biology Meeting, Ashoka University, Sonapat, February 28-March 1, 2020
19. Invited Talk in Anniversary General Meeting of Indian National Science Academy, CSIR-National Institute of Oceanography, Goa, December 15-18, 2019
20. Delivered a guest lecture, titled, “Quantum Cryptography” at SERB School in Non-linear Dynamics GNDU Amritsar December 22, 2018.
21. Delivered an invited talk titled, “ The IISER Experiment in Science Education”, in the Dialogue Event at RRI Bangalore, October 11 2018.
22. Delivered an invited colloquium titled, “Quantum Cryptography”, at IIT BHU, September 22 2018.
23. Delivered an invited talk titled, “Multiphoton Bells inequalities”, at in OSI meeting at IIT Kanpur September 20-22, 2018
24. Delivered an invited talk titled, “Nonclassicality and Entanglement” at RMIT Melbourne July 20, 2018.
25. Participated presented work in TQC at University of Sydney, July 16-18, 2018
26. Delivered and invited talk title, “Quantum Contextuality and Quantum Cryptography” in QFF2018, RRI Bangalore, April 30, May 4, 2018.
27. Participated in the “Foundations of Biology Meeting” as an invited non-biology speaker at Academy meeting in Chindi(Himachal), April 6-8, 2018.
28. Delivered a set of lectures in the workshop in theoretical physics at RKMVU Belur, December 18-21, 2017.
29. Delivered a set of Lectures in the SERB school on Quantum Optics at IIT Guwahati, December 9-December 17, 2018.
30. Delivered an invited talk titled, “Protecting Quantum States of NMR Qubits” in International Conference on Quantum Foundations at NIT Patna, Dec 4-8, 2017.
31. Delivered an invited lecture, “Recent Initiatives in Science Education: Transforming Indian Science”, at Indo German workshop on science communication, NIPER, Mohali, November 8, 2017.
32. Delivered an invited talk titled, “transforming Indian Science: Recent Initiatives in Science Education” at Rethinking contract of science meeting at JNU on October 28, 2017.

33. Participated in the “Foundations of Biology Meeting” as an invited non biology guest at IISER Pune during March 11-14, 2016.
34. Organized a UGC sponsored one-day workshop on “Novel Experiments in Physics Pedagogy” in Guru Nanak Dev University Amritsar, on March 19, 2016.
35. Organized a one-day workshop on “Experiments for physics pedagogy” at Khalsa College Amritsar on February 20, 2016.
36. Delivered an invited talk titled “What scientists expect from science education” in the conference “Trends in science and mathematics education” at Delhi University on February 19, 2016.
37. Delivered an invited talk titled “Enhancing the entanglement detection capacity of positive maps” in the international conference “Mathematical aspects in Current Quantum Information Theory” during February 15-19, 2016, at Daejeon South Korea.
38. Organized a DST sponsored Inspire camp for school students at IISER Mohali during January 2-6, 2016.
39. Participated in the DST sponsored Children’s Science Congress in their “Meet a Scientist” program at Chandigarh University Gharuan on December 27, 2015.
40. Delivered an invited talk titled “Weak quantum measurements” in the international conference “Quantum Foundations 2015” at NIT Patna, during November 30-December 4, 2015.
41. Organized a Lecture workshop on “Recent Trends in Physics” under the Science Academy’s lecture workshop series, at Guru Nanak Dev University Amritsar during September 17-20, 2015.
42. Organized a unique program for “Child Scientists” identified by DST, at IISER Mohali during June 22-July 4, 2015.
43. Organized a camp under the Ishan Vikas program of MHRD at IISER Mohali for school students from the North East during July 6-16, 2015.
44. Lectured in around 10 DST-Inspire camps all over the country as an invited speaker in the period April 2015-April 2016.
45. Delivered an invited talk in the Conference on Science Education organized by SCERT Chattisgarh at Raipur on February 27-28 2015.
46. Delivered an invited colloquium in the Physics Department IIT Kanpur on February 6, 2015.

47. Delivered an invited lecture in the first Outreach Lecture series at Panjab University Chandigarh on January 28, 2015.
48. Delivered an invited lecture in the seminar on "Disciplines, Movements, Policies: The changing relationship between Science, State and Society", at Indian Institute of Advanced Study IAS Shimla November 24-25 2014.
49. Delivered an invited talk in the XXIX IAPT Convention Chandigarh on October 11, 2014.
50. Delivered a set of 02 invited lectures in the Summer School on Science Education at Panjab University Chandigarh on June 18, 2014.
51. Delivered an invited talk in DST-INSPIRE camp at Chandigarh University on June 10, 2014.
52. Delivered an invited talk in DST-INSPIRE camp at Gobindgarh College on November 26, 2014.
53. Delivered an invited talk in DST-INSPIRE camp at CDPE University of Rajasthan on November 7-8, 2014.
54. Delivered an invited talk in DST-INSPIRE camp at Om Institute Hisar on December 5, 2014.
55. Delivered an invited talk in DST-INSPIRE camp at ITM University Gwalior on December 8-9, 2014.
56. Delivered an invited talk in DST-INSPIRE camp at Asian Institute Patiala on December 12, 2014.
57. Delivered an invited talk in DST-INSPIRE camp at Srinagar University Garhwal on December 24, 2014.
58. Delivered an invited talk in DST-INSPIRE camp at KMV Jalandhar on January 09, 2015.
59. Delivered an invited lecture in the Symposium on Recent Research Trends in Physics at Kurukshetra University March 01-02 2014.
60. Delivered an invited lecture to schoolchildren in the "Chandigarh Science Congress (CHASSCON-2014)" at Panjab University Chandigarh February 28, 2014.
61. Chaired a session in the conference "Scientific Temper and Nation" organized by Vigyan Prasar (DST) and NISCAIR New Delhi February 21-22, 2014.

62. Delivered an invited lecture in the “National Seminar on Recent Advances in Physics (NSRAP-2014)” at GNDU Amritsar February 14, 2014.
63. Delivered an invited lecture in the BBSBEC Fatehgarh Sahib Punjab on February 13 2014.
64. Delivered an invited talk in the “Nine Pursuits in Science: One-day meeting in celebration of Professor N Mukunda’s platinum birthday” on January 25 2014 at IMSc Chennai.
65. Delivered an invited lecture in the DST-INSPIRE camp at Chandigarh University Gharuan Punjab on January 22 2014.
66. Delivered an invited lecture in the DST-INSPIRE camp at Guru Gobind Singh Khalsa College Sector 26 Chandigarh on January 7 2014.
67. Delivered an invited lecture in the meeting on “Quantum Information Processing and Applications (QIPA-2013)” at HRI Allahabad December 02-05 2013.
68. Delivered an invited lecture in the DST-INSPIRE camp at Asian Institution Patiala Punjab on November 17 2013.
69. Delivered an expert lecture on “Role of basic sciences in engineering” in the Faculty Development Program at UIET Panjab University Chandigarh November 13, 2013.
70. Chaired the session on Theoretical and Physical Modelling at the International Conference on Interdisciplinary areas with Chemical Sciences ICIAS 2013” organized by Panjab University and INST October 30-November 01 2013.
71. Delivered an invited lecture in the Physics Department of Ljubljana University Ljubljana Slovenia October 3 2013.
72. Delivered an invited lecture in the DST-INSPIRE camp at Chandigarh Group of Colleges Landran Punjab on September 28 2013.
73. Delivered an invited lecture at Guru Gobind Singh Khalsa College Sector 26 Chandigarh on September 11 2013.
74. Delivered an invited lecture in the DST-INSPIRE camp at Guru Nanak Dev Engineering College Ludhiana Punjab on August 09 2013.
75. Presented a poster in the workshop on “Quantum Information and Foundations of Quantum Mechanics” at the University of British Columbia Vancouver Canada July 2-5 2013.

76. Presented a poster in the 10th Central European Quantum Information Processing Workshop Valtice Czech Republic June 5-9 2013.
77. Delivered a set of 03 lectures on Quantum Information in the “Recent Advances in Physics” Refresher Course in Physics at Kurukshetra University May 13-14 2013.
78. Delivered a set of three lectures on Quantum Information Processing as part of Popli Memorial Lecture Series at St. Stephen’s College New Delhi Feb 7-9, 2013.[Invited Lectures]
79. Delivered an invited talk in the International Conference on Quantum Information and Quantum Computing (ICQIQC) 7-11 January 2013.[Invited Talk]
80. Delivered a set of lectures on Quantum Entanglement in the Summer School Programme of CQIQC, IISc, Bangalore during May 15-June 15 2012.[Invited Lectures]
81. Delivered an invited talk in UGC sponsored workshop cum seminar titled Physics Education Research (PER): Research Based Reforms May 22-29 2011 at St. Bede’s College Shimla.[Invited Talk]
82. Keynote Address of the Second National Conference on “Recent Advances in Electronics and Communication Technology” at Guru Nanak Dev Engineering College Ludhiana on March 04 2011. [Invited Talk]
83. Invited talk at the CHASCON Science Congress at PU Chandigarh on February 28, 2011. [ Invited Talk]
84. Invited talk at International conference on 75 years of quantum entanglement at Kolkata during Jan 6-10 2011. [Invited Talk].
85. Invited as INSA nominee to attend the IAP-International conference on “Taking Inquiry-based Science Education into Secondary Education” at University of York UK during October 27-29 2010.
86. Workshop on Quantum Entanglement, February 17-18 2010, Central University, Pondicherry. [Invited Lecture]
87. Seminar on Relevance of philosophy in the era of science and technology, January 11-12 2010, Panjab University Chandigarh. [Invited Lecture]
88. Workshop on History, philosophy and ethics in science December 21-23 2009, IISER Pune. [Invited Lecture]
89. Discussion meeting on Quantum Mechanics December 17-19 2009, Poornaprajna Institute Bangalore. [Invited Lecture]

90. Refresher course on Physics, October 30-31 2009, HP University Shimla. [Invited Lecture]
91. Workshop on Entanglement in quantum condensed matter systems and the annual K. S. Krishnan meeting, November 17-18 2008, ISc Chennai. [Invited Lecture]
92. Lecture on "From classical to quantum physics" October 27 2007, Govt. College for Women, Amritsar. [Invited Lecture]
93. Symposium on Quantum Information March 16-17 2007, Jawaharlal Nehru University University, New Delhi. [Invited Lecture]
94. Indo-US Shared Vision Workshop on Soft, Quantum and Nano Computing 2007, Feb 16-20, Dayalbagh Educational Institute, Agra. [Invited Lecture]
95. Quantum Computing: Back Action, March 16-18 2006 Indian Institute of Technology Kanpur. [Invited Lecture]
96. Gordon Research Conference on Quantum Information Science Feb. 22-27, 2004 Four Points Sheraton: Harbortown Ventura, CA. [Presented a poster]
97. School on Quantum Physics and Information Processing(QPIP) Feb. 18-27, 2002, TIFR Mumbai. [Invited Lectures]
98. Seventh Discussion Meeting in Frontier Area of Physics, Quantum Information and Quantum Computation, Jan. 30-Feb. 5 Mysore, 2002. [Invited Lectures]
99. Discussion meeting on Geometric Phases and Foundations of Quantum Mechanics, March 28-29, 2001, Indian Institue of Science Bangalore, India.[Invited lecture]
100. Winter Institute on Foundations of Quantum Mechanics and Quantum Optics, Jan. 1-13, 2000, S. N. Bose Center for Basic Sciences, Calcutta India.[ Invited lecture]
101. Discussion meeting on quantum computation, Jul 19-24, 1999, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, India.[Invited lectures]
102. Fourth Discussion meeting in Frontier Areas in Physics, Jan 25-31, 1999, Dhvanyaloka, Mysore, India.[Invited talk]
103. International workshop on 70 years of Schroedinger wave mechanics, Dec 27-31, 1996, NISTADS, New Delhi, India.[Invited talk]
104. Workshop on Quantum Dissipation and Applications, July 28-Aug10, 1996, ICTP Trieste, Italy.[ gave a presentation of work].
105. National Workshop on Recent Advances in Quantum Optics, March 7-10 1994, Center for Advanced Technology, Indore, India. [presented poster].



106. Discussion Meeting on Non-Classical Aspects of Radiation, 10-12 January 1994, Indian Institute of Science, Bangalore, India [Invited a talk].
107. Coherent states: New Developments and Perspectives, October 29-31, 1993, University of Hyderabad, Hyderabad India. [Invited talk].