

Colin Benjamin

Curriculum Vitae

School of Physical Sciences,
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Background and Aims

Objectives **To pursue a career in teaching and continue in theoretical research by utilizing my analytical abilities in areas of condensed matter and quantum information.**

Research Interests

- Quantum Inf. & Comp. **Quantum walks, Quantum simulations, Quantum information processing in graphene.**
- Nanoscience **Quantum pumping and full counting statistics, Mesoscopic Aharonov-Bohm effect and persistent currents, spintronics, detecting Majorana fermions in the context of topological quantum computation.**
- Superconductivity **Josephson effect, theory of Ferromagnetic and High Tc superconductors.**
- Quantum Theory **Dephasing and time in quantum mechanics, Hanbury Brown and Twiss correlations and entanglement in nanostructures.**
- Game theory **Nash equilibrium in the thermodynamic limit, Two-player and Two-strategy games, quantum game theory.**

Research/Employment

- July 2019 - **Associate Professor**, *School of Physical Sciences, NISER, Bhubaneswar, India*, Research continuing topic: Theoretical nanoscience, quantum information theory and game theory.
- July 2013 - **Reader-F**, *School of Physical Sciences, NISER, Bhubaneswar, India*, Research topic: Condensed matter theory and quantum information.
- June 2019
- June 2011 - **Assistant Professor**, *School of Physical Sciences, NISER, Bhubaneswar, India*, Research topic: Condensed matter theory and quantum information.
- June 2013
- Dec'2009- **Postdoctoral Research Associate**, *Dept. of Phys. & Ast., Univ. of Georgia, Athens, USA*, Research topic: Quantum simulations.
- Dec'2010
- Oct'2007- **Postdoctoral Research Fellow**, *Quantum Information Group, School of Phys. & Ast., Univ. of Leeds, UK*, Research topic: Topological Quantum Computation.
- Sep'2009
- Oct'2005- **CNRS Postdoctoral Fellow**, *Centre de Physique Theorique, CNRS, Marseille, France*, Research topic: Molecular electronics.
- Sep'2007
- Sep'2004- **Research Fellow**, *Dept. of Physics, Univ. of Salerno, Italy*, Research topic: Electron transport in mesostructures.
- Aug'2005

Education

- 2000-2004 **Ph.D. (Physics)**[Submitted: September, 2004] **Awarded: August 2005**, *Institute of Physics, Bhubaneswar, India*, Thesis Title: Electron Transport and Quantum interference at the mesoscopic scale.
- 1999-2000 **Diploma in Advanced Physics (equivalent to M. Phil.)**, **2000**, *Institute of Physics, Bhubaneswar, India*.
- 1997-1999 **M. Sc. Physics (specialization in Solid state Physics)**, **1999**, *Dept. of Physics, Utkal University, Bhubaneswar, India*, I was ranked second in the university.

1994-1997 **B. Sc. Physics (Honours), 1997**, *B. J. B College, Utkal University, Bhubaneswar*, I secured the first position in the university and was awarded the Gold medal.

Research Funding

- Awarded **Funding Agency- DST Nanomission**, *Project title: Topology, spintronics and quantum computation with Dirac materials, Time: 4 years(2013-2017), Manpower: One Research Associate and one project fellow, Amount: 27 Lakhs, Host: NISER, Bhubaneswar.*
- Awarded **Funding Agency- DAAD “Research stay”**, *Project title: Mesoscopic Superconductivity, Time: May-July 2016, Funds include travel and fellowship of 2000 Euros per month, Host: RWTH Aachen University, Germany.*
- Awarded **Funding Agency- ICTP “Research stay”**, *Project title: “Condensed Matter theory”, Time: June 2-July 2, 2018 , Funds include travel and subsistence, Host: ICTP, Trieste, Italy.*
- Awarded **Funding Agency-DST SERB EMR grant**, *Project title: “Nonlocal correlations in mesoscopic superconducting junctions”, Time: 3 years (2016-2019), Budget of around 25 Lakhs which includes funds for recruiting a Research Associate, Host: NISER, Bhubaneswar.*
- Awarded **Funding Agency-DST SERB Matrics grant**, *Project title: “Nash equilibrium versus Pareto optimality in N-Player games”, Time: 3 years (2019-2022), Budget of around 6.6 Lakhs which includes funds for small equipment and travel, Host: NISER, Bhubaneswar.*
- Awarded **Funding Agency-DST SERB CRG grant**, *Project title: “Josephson junctions with strained Dirac materials and their application in quantum information processing”, Time: 3 years (2020-2023), Budget of around 22 Lakhs which includes funds for recruiting a Junior research Fellow, equipment and travel, Host: NISER, Bhubaneswar.*

Honours, Scholarships, Fellowships

- * **Finalist**, *NASI-SCOPUS Young scientist award in Physical sciences 2014.*
- * **DAAD Research Stay**, *Awarded this fellowship in May-July 2016, Host: Institute of Quantum Information, Aachen, Germany.*
- * **ICTP Research Stay**, *Fellowship held in June 2018, Host: ICTP, Trieste, Italy.*
- * **Foreign Postdoctoral Researcher award from RIKEN an independent research institute under the Govt. of Japan**, *My research proposal was awarded this honor in an international competition conducted by RIKEN in 2010.*
- * **Earlier selections: Assistant Professor in Indian Institute of Technology, Delhi (July, 2008) and Assistant Professor in NISER, Bhubaneswar (Feb. 2011).**
- * **Senior College Merit Scholarship (1994 – 1997).**
- * **Gold medal for being first class first in B. Sc Physics 1997.**
- * **Govt. of India PostGraduate National Scholarship(1997 – 1999).**
- * **Qualified as UGC JRF&L, CSIR-UGC Exam of 20th December 1998**, *(This is a national test conducted by the CSIR, a research council under Govt. of India, qualifying which is mandatory for being appointed as a faculty at any public university in India).*
- * **GATE(Physics)2001, 99.29 percentile, All India Rank 12**, *(This is a national test conducted by the Ministry of Human Resources Development, Govt. of India for Ph. D/M. Tech. fellowships).*

Thesis Supervised

- 15 **Ritesh Das**, *"Thermoelectric Probes for Majorana Fermions"*, Master's (2023).
- 14 **Naini Dudhe**, *"On some applications of quantum stochastic walks"*, Master's (2022).

- 13 **Pravy Prerana**, "*Split-step quantum walks*", Master's (2022) from IISER, Berhampur, Pravy Prerana was a student from IISER, Berhampur who spent the final year working in our group on her Master's thesis.
- 12 **Subhajit Pal**, "*A spin flipper in the vicinity of a superconductor*", **Ph.D. (2022)**, Next Position: Senior Project Associate, Theoretical Sciences Lab, SPS, NISER. Currently, Postdoctoral Fellow at IISER, Kolkata.
- 11 **Arjun Krishnan U M**, "*Nash equilibrium mapping versus Darwinian evolution: A case study of some social dilemmas in the thermodynamic limit*", Master's (2021).
- 10 **Pratyush K. Sahoo**, "*Quantum stochastic walks and its application in understanding photosynthetic complexes, graphs, and quantum neural networks*", Master's (2020) from IISER, Kolkata, Pratyush K. Sahoo was a student from IISER, Kolkata who spent the final year working in our group on his Master's thesis.
- 9 **Abhisek Panda**, "*On quantum walks and quantum games*", Master's (2020), Abhisek Panda got the best thesis award in the School of Physical Sciences, NISER for the year 2020.
- 8 **Aditya Dash**, "*Interpreting Susceptibility and Correlation in the thermodynamic limit of classical and quantum games*", Master's (2019).
- 7 **Arjun Mani**, "*Studies on edge mode transport in quantum Hall, quantum spin Hall, and quantum anomalous Hall samples*", **Ph.D. (2018)**, Next Position: Postdoctoral Research Associate at Information Sciences Institute, University of Southern California, USA. Currently, SERB-NPDF at Indian Statistical Institute, Kolkata.
- 6 **Shubhayan Sarkar**, "*The thermodynamic limit of classical and quantum games*", Master's (2018), Currently Ph. D. student at Centre for theoretical Physics, Polish Academy of Sciences, Poland.
- 5 **Jishnu Rajendran**, "*Quantum Walks in quantum games and quantum graphs*", Master's (2017), Currently Ph. D. student in Condensed Matter Physics and Quantum Technology group at Department of Physics and Astronomy "E. Majorana", Università degli Studi di Catania, Catania, Italy.
- 4 **Nilesh Vyas**, "*Random strategies and the equilibrium solution of quantum games*", Master's (2017), Currently Ph. D. student at Telecom ParisTech, Paris, France.
- 3 **Namit Anand**, "*Quantum games, walks and algorithms*", Master's (2016), Currently Ph. D. student at Dept. of Physics and Astronomy, University of Southern California, Los Angeles, USA.
- 2 **Abhishek Kumar**, "*Weyl semimetal and superconductor junction*", Master's (2016).
- 1 **Avradip Ghosh**, "*Thermoelectric effects in mesoscopic physics and spin transport*", Master's (2016).

Selected Presentations

IISER, **QIQT 2023**, Jun. 2023, Invited talk on "On two applications of quantum walks".
Kolkata,
India

IISER, **QIQT 2022**, Jun. 2022, Invited talk on "Discrete-time quantum walks v Continuous-time quantum walks v Quantum stochastic walks".
Kolkata,
India

IISER, **Summer School on Quantum Information and Quantum Technology 2021**, Jun. 2021, Invited talk on "Quantum thermoelectrics v Quantum thermodynamics".
Kolkata,
India

- GITAM, Bangalore, India, **AICTE ATAL FDP on Quantum Computing Thrust Area Quantum Computation and Information Science**, *Jan. 2021*, Invited talk on “Challenges and Progress towards Physical Realization of Quantum Computers”.
- IOP, Bhubaneswar, India, **Emerging trends in Quantum Matter, Statistical and Biological Physics**, *Nov. 2020*, Invited talk on “Cooperation or Betrayal? An Analytical Investigation of the drivers of Cooperative Behavior ”.
- Berhampur Univ. India, **Quantum computation and Quantum technology-2020**, *March 2020*, Invited talk on “Introduction to quantum games and quantum walks”.
- ISI, Kolkata, **International Conference on Condensed Matter Physics**, *Nov. 2017* , Invited talk on “Probing helicity and the topological origins of helicity via non-local Hanbury-Brown and Twiss correlations”.
- IOPB, Bhubaneswar, **INTERNATIONAL SCHOOL AND CONFERENCE ON QUANTUM INFORMATION**, *Feb. 2016* , Invited lecture on “Quantum games” and Invited talk on “Revisiting the Elitzur-Vaidman bomb paradox”.
- HRI, Allahabad, **Meeting on Quantum Information Processing and Applications (QIPA-2015)** , *Dec. 2015*, Invited talk: Do quantum strategies always win?.
- IOPB, Bhubaneswar, **International program in quantum information**, *Feb. 2014*, Invited talk: Bell Inequality violation and entanglement in Dirac materials.
- Hanoi, Vietnam, **Joint ICTP-VAST-APCTP School**, *Dec. 2013*, Talk: Detecting Majorana bound states.
- ICTP, Italy, **Workshop & Conference on Geometrical Aspects of Quantum States**, *July 2013*, Talk: How to detect a genuine quantum pump effect in graphene?.
- Aachen, Germany, **Institute of Quantum Information, RWTH Aachen University**, *November 2012*, Invited Talk: Detecting Majorana bound states.
- Bonn, Germany, **WE-Heraeus-Seminar on HYBRID QUANTUM SYSTEMS**, *November 2012*, Poster: Can dephasing generate non-local spin correlations?.
- Trieste, Italy, **Summer school and Workshop on Quantum simulations with ultracold atoms**, *July 2012*, Talk and Poster: Quantum simulation of photosynthetic complexes with graphene qubits.
- Dresden, Germany, **International seminar and Workshop on Quantum matter from macro to nanoscale**, *June 2012*, Poster: Can dephasing generate non-local spin correlations? .
- Jerusalem, Israel, **28th Winter School on Theoretical Physics**, *Dec. 2010*, Poster: Detecting Majorana bound states.
- Vancouver, Canada, **QAMF-2010**, *Jul. 2010*, Poster: Detecting Majorana bound states.
- Houston, TX, **APS-DAMOP 2010**, *May 2010*, Talk: Quantum simulations of arbitrary Hamiltonians using superconducting circuits.
- O’gurgl, Austria, **Graphene week 2009**, *Mar. 2009*, Poster: Graphene Josephson Qubit.
- Laussane, Switzerland, **Dimitri Ivanov’s group**, *Feb. 2009*, Invited Talks: Decoherence induced entanglement & Graphene Josephson qubit.
- Newton Inst., Cambridge, UK, **Introductory course on Anderson localization**, *Jul. 2008*, Talk: Effect of disorder on positive HBT correlations: The weak localization regime.
- JINR, Dubna, Russia, **Dubna-Nano 2008**, *Jul. 2008*, Poster: Detecting entangled states in graphene.

- Les Diablarets, Switzerland **Gordon Research Conference on Superconductivity**, Sep. 2007, Poster: Crossed Andreev reflection as a probe of pairing symmetry in Ferromagnetic Superconductors.
- Munich, Germany **Young European Physicists Conference**, Sept. 2007, Talk: Positive Hanbury-Brown and Twiss correlations in superconducting hybrids: Effect of interfaces and interactions.
- Geneva, Switzerland **Markus Buttiker's group**, May 2007, Invited Talk: Controllable π -junction in a Josephson quantum dot device with molecular spin.
- CPT, CNRS, Marseille, France **La journe Marseillaise 2006 de NanoPhysique**, June 1, 2006, Talk: Controllable π -junction in a Josephson quantum dot device with molecular spin.
- Benasque, Spain **Quantum information and decoherence workshop**, Jul. 2005, Talk: Quantum pumps.
- ICTP, Italy **School on Quantum Entanglement, Decoherence and Geometrical Phases in Complex Systems**, Nov. 2004, Talk: Quantum Pumping and its application as a spin polarizer and as an order parameter resolver for High Tc superconductors.
- ICTP, Italy **Spring college on science at the nanoscale**, May. 2004, Talk: Quantum spin pumping.
- ICTP, Italy **Joint ICTP-INFM school on Entanglement at the nanoscale**, Oct. 2002, Talk: Quantum Current Magnification and Switching in an evanescent Aharonov-Bohm interferometer.
- SNBOSE, Kolkata, India **2nd Winter Institute on Foundations of Quantum theory, Quantum Optics and QIP**, Jan. 2002, Talk: Novel quantum interference effects and a simple model for dephasing.

Teaching

- June 2011-continuing **Teaching undergraduate, postgraduate and Ph. D Physics students**, *Mathematical Methods- June - Dec. 2011; Quantum Information & Quantum computation- Jan. - May 2012, Jan. - May 2014, Aug-Dec. 2015 & Aug.-Nov. 2017; Theoretical nanoscience- July - Dec. 2012 , Jan. - May. 2015 & Jan.- Apr. 2018, Electromagnetism to Ph D students- Jan-May 2013, July-Nov. 2013 & July-Nov. 2014, Quantum Mechanics to Ph. D students- Jan-May 2016, Physics Lab I-Aug-Dec. 2016, Physics of Mesoscopic Systems-Jan-May 2017,, School of Physical Sciences, NISER, Bhubaneswar, India.*
- Tutor, '07-09 **Tutorials on undergraduate Physics courses**, *School of Phys. & Ast., Univ. of Leeds.*

Scientific Services

- Referee-Journals **Physical Review Letters, Physical Review B, Applied Physics Letters, Euro Physics Letters, European Physical Journal B, Modern Physics Letters B, Superlattices and Microstructures and Physics Letters A**, 2004 onwards.
- Referee-Grants **DST-India, Czech science foundation, Poland**, 2008 onwards.

Languages

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| English | Fluent | <i>Speaking, reading and writing.</i> |
| Oriya | Fluent | <i>Speaking, reading and writing.</i> |
| Hindi | Fluent | <i>Speaking, reading and writing.</i> |
| French | Beginner's | <i>Speaking and reading.</i> |

Other Activities

- * I was the General Knowledge Champion of Utkal University 1997 – 98.

Research Impact

- * **A review paper on "Quantum thermodynamic devices: from theoretical proposals to experimental reality"**, by Nathan M. Myers, Obinna Abah, and Sebastian Deffner from the University of Maryland, LANL, Durham, UK and Sao Paulo, Brazil in arXiv:2201.01740, <https://arxiv.org/pdf/2201.01740.pdf>, devotes a subsection to our work and explains our paper on quantum Otto engine using magic-angle twisted bilayer graphene published in Phys. Rev. B 104, 125445 (2022) for a wider audience.
- * **A recent blog "Quantum Trick or Treat"**, <https://rjlipton.wpcomstaging.com/2021/11/01/quantum-trick-or-treat/>, cites our work: Order from chaos in quantum walks on cyclic graphs, Abhisek Panda, Colin Benjamin, Phys. Rev. A 104, 012204 (2021).
- * **AIP has found it newsworthy to accord our newly published article(59) "Thermodynamic susceptibility as a measure of cooperative behavior in social dilemmas" in Chaos with a press release**, The press release is interestingly titled "Betrayal or cooperation? Analytical investigation of behavior drivers" and comes with the following tag line- Using game magnetization and susceptibility in an analytic investigation of cooperation with infinite numbers of people., It has been picked up by some of the most prominent science news portals, like EurekAlert: https://www.eurekalert.org/pub_releases/2020-09/aio-p-boc090320.php, also by PHYS.ORG: <https://phys.org/news/2020-09-betrayal-cooperation-analytical-behavior-drivers.html>, news(wise): <https://www.newswise.com/articles/betrayal-or-cooperation-analytical-investigation-of-behavior-drivers>, 7thSpace: http://7thspace.com/headlines/1302715/betrayal_or_cooperation_analytical_investigation_of_behavi sciencenewsnet.in: <https://sciencenewsnet.in/betrayal-or-cooperation-analytical-investigation-of-behavior-drivers/>, and ScienceDaily: <https://www.sciencedaily.com/releases/2020/09/200908113235.htm>.
- * **Our publication(59) in "Chaos" has been accorded the honor of a featured article**, It looks at the problem of cooperative behavior with a new tool, thermodynamic susceptibility, While magnetization, the net difference in the fraction of cooperators and defectors is an extremely good macroscopic measure of cooperative behavior, susceptibility is a more sensitive probe for microscopic behavior, e.g., observing small changes in a population adopting a certain strategy .
- * **Our paper(48) "The emergence of cooperation in the thermodynamic limit"**, has been published as a Letter to the Editor in Chaos, Solitons & Fractals.
- * **Our article(50) on reasons for cooperative behavior in the thermodynamic limit using the template of a Public goods game**, published in Chaos: An Interdisciplinary Journal of Nonlinear Science has been selected as a featured article in Chaos.
- * **The work on Graphene Josephson qubit (Publication No. 23) was featured in the Nanotechweb.org website**, Belle Dume, Graphene ring hits qubit target, Nanotechweb.org, Technology update October 22nd, 2008, available at <http://www.nanotechweb.org/cws/article/tech/36343>.
- * **The work on Fractional steps in the integer quantum Hall effect (Publication No. 35) was featured in the Nanotechweb.org website**, Nanotechweb.org LAB TALK Sep. 26, 2016, available at <http://nanotechweb.org/cws/article/lab/66357>.
- * **The works on seeing a genuine Parrondo's paradox with quantum walks, published in Royal Society Open Science and EPL (Euro Physics Letters) have been featured in Live Science**, a website devoted to the science geek, see Weird Paradox Says 2 Losses Equals a Win. And It Could Lead to Fast Quantum Computers by Marcus Woo., available at <https://www.livescience.com/63142-parrondos-paradox-quantum-computing.html>.

- * The article “Playing a true Parrondo’s game with a three-state coin on a quantum walk” published in EPL (Europhysics Letters) has been featured in PHYS.ORG, see *Parrondo’s paradox with a three-sided coin* by Lisa Zyga, Phys.org feature., available at <https://phys.org/news/2018-07-parrondo-paradox-three-sided-coin.html>.

Publications

I have written 79 papers. I am currently working on three papers which hopefully will be completed soon. In brackets the number of citations are mentioned. Publication no. 12 has the highest number of citations 68, sources of citations is Google scholar. I have been the lead/corresponding author in almost all of my publications and 6 of them are single author papers. Applied Physics Letters, Carbon, Phys. Rev. Applied, Nanotechnology, Euro Physics Letters, Scientific Reports, Phys. Rev. A, Phys. Rev. E and Phys. Rev. B are some of the most highly rated journals in my field and I have publications in each of them. Total number of citations received by my papers is around 868 with an h-index= 18 (hirsch index: 18 papers with ≥ 18 citations) and citations/author ≥ 430 .

- 79 **Spin-flip scattering engendered negative ΔT noise**, Tusaradri Mohapatra, Colin Benjamin, arXiv:2307.14072.
- 78 **Majorana Thermoelectrics and Refrigeration**, Ritesh Das, Colin Benjamin, arXiv:2305.12462.
- 77 **Finite temperature quantum noise correlations as a probe for topological helical edge modes**, Sachiraj Mishra, Colin Benjamin, Phys. Rev. B (2023), arXiv:2302.05961.
- 76 **Recurrent generation of maximally entangled single particle states via quantum walks on cyclic graphs**, Dinesh K. Panda, Colin Benjamin, Phys. Rev. A Letters (2023), arXiv:2301.04501.
- 75 **Resolving degeneracies in Google search via quantum stochastic walks**, Naini Dudhe, Colin Benjamin, arXiv:2207.11429.
- 74 **Yu-Shiba-Rusinov bound states boost odd-frequency superconductivity**, Subhajit Pal, Colin Benjamin, arXiv:2207.05786.
- 73 **Impurity reveals distinct operational phases in quantum thermodynamic cycles**, Aditya Prakash, Abhishek Kumar, Colin Benjamin, Phys Rev. E 106, 054112 (2022).
- 72 **Probing Majorana Bound States via Thermoelectric Transport**, Ritesh Das, Colin Benjamin, arXiv:2207.01515.
- 71 **Honing in on a topological zero-bias conductance peak**, Subhajit Pal, Colin Benjamin, arXiv:2204.09925.
- 70 **Vaccination dilemma in the thermodynamic limit**, Arjun Krishnan U M, Colin Benjamin, arXiv:2110.14291.
- 69 **Josephson quantum spin thermodynamics**, Subhajit Pal, Colin Benjamin, J. Phys.: Condens. Matter 34, 305601 (2022) DOI: 10.1088/1361-648X/ac6f3b.
- 68 **Probing the topological character of superconductors via non-local Hanbury-Brown and Twiss correlations**, Tusaradri Mohapatra, Subhajit Pal, Colin Benjamin, Phys. Rev. B (2022); arXiv:2103.14920.
- 67 **Magic angle twisted bilayer graphene as a highly efficient quantum Otto engine**, Ayush Singh, Colin Benjamin, Phys. Rev. B 104, 125445 (2021).
- 66 **Nash equilibrium mapping vs Hamiltonian dynamics vs Darwinian evolution for some social dilemma games in the thermodynamic limit**, Arjun Krishnan U M, Colin Benjamin, arXiv:2103.00295.
- 65 **Entanglement and quantum strategies reduce congestion costs in quantum Pigou networks**, Naini Dudhe, Colin Benjamin, Physica A 574, 126013 (2021).

- 64 **A thermodynamic probe of the topological phase transition in a Floquet topological insulator**, *Abhishek Kumar*, [Colin Benjamin](#), *Journal of Applied Physics* 130, 205105 (2021).
- 63 **Exciting odd frequency equal spin-triplet correlations at metal-superconductor interfaces**, *Subhajit Pal*, [Colin Benjamin](#), *Phys. Rev. B* 104, 054519 (2021).
- 62 **Generating highly entangled states via discrete-time quantum walks with Parrondo sequences**, *Dinesh K. Panda*, *B. Varun Govind*, [Colin Benjamin](#), *Physica A* 608, 128256 (2022).
- 61 **Order from chaos in quantum walks on cyclic graphs**, *Abhishek Panda*, [Colin Benjamin](#), *Phys. Rev. A* 104, 012204 (2021).
- 60 **Testing quantum speedups in exciton transport through a photosynthetic complex using quantum stochastic walks**, *Naini Dudhe*, *Pratyush K. Sahoo*, [Colin Benjamin](#), *Phys. Chem. Chem. Phys.* 24, 2601 (2022), DOI: 10.1039/D1CP02727A.
- 59 **Thermodynamic susceptibility as a measure of cooperative behavior in social dilemmas**, [Colin Benjamin](#), *Aditya Dash*, *Chaos* 30, 093117 (2020), Impact Factor-2.8, Citations-1.
- 58 **Shot Noise as a probe for the pairing symmetry of Iron pnictide superconductors**, [Colin Benjamin](#), *Tusaradri Mohapatra*, *EPL(Euro Phys. Lett.)*, 132 (2020) 47002, Impact Factor-2.0.
- 57 **Stability of Majorana bound states in the presence of spin-flip scattering**, *Subhajit Pal*, [Colin Benjamin](#), *Physica E* 126, 114389 (2021), Impact Factor-3.57.
- 56 **Disordered contacts can localize helical edge electrons**, *Arjun Mani*, [Colin Benjamin](#), *J. Phys.: Condens. Matter* 31, 34LT01 (2019).
- 55 **Disordered contacts can localize chiral edge electrons**, *Arjun Mani*, [Colin Benjamin](#), *Journal of Physics and Chemistry of Solids* 139, 109313 (2020).
- 54 **Quantized Josephson phase battery**, *Subhajit Pal*, [Colin Benjamin](#), *EPL (Euro Physics Letters)* 126, 57002 (2019), Impact Factor-2.0, Citations-8.
- 53 **Optimal quantum refrigeration in strained graphene**, *Arjun Mani*, [Colin Benjamin](#), *J. Phys. Chem. C* 123, 22858 (2019), Impact Factor-4.3, Citations-3.
- 52 **Entanglement renders free riding redundant in the thermodynamic limit**, *Shubhayan Sarkar*, [Colin Benjamin](#), *Physica A* 521, 607 (2019), Impact Factor-2.0, Citations-4.
- 51 **Quantum Nash equilibrium in the thermodynamic limit**, *Shubhayan Sarkar*, [Colin Benjamin](#), *Quantum Information Processing* 18: 122 (2019), Impact Factor-2.43, Citations-6.
- 50 **Triggers for cooperative behavior in the thermodynamic limit: a case study in Public goods game**, *Shubhayan Sarkar*, [Colin Benjamin](#), *Chaos* 29, 053131 (2019), Impact Factor-2.8, Citations-13.
- 49 **Spin flip scattering engendered quantum spin torque in a Josephson junction**, *Subhajit Pal*, [Colin Benjamin](#), *Proceedings of the Royal Society A* 475: 20180775 (2019), Impact Factor-2.7, Citations-4.
- 48 **Emergence of Cooperation in the thermodynamic limit**, *Shubhayan Sarkar*, [Colin Benjamin](#), *Chaos, Solitons & Fractals* 135, 109762 (2020), Impact Factor-3.8, Citations-3.
- 47 **Are thermal fluctuations the sole reason for finite longitudinal resistance in quantum anomalous Hall experiments?**, *Arjun Mani*, [Colin Benjamin](#), *J. Phys.: Condens. Matter* 30, 37LT01 (2018), Impact Factor-2.7, Citations-1.

- 46 **Yu-Shiba-Rusinov bound states induced by a spin flipper in the vicinity of a s-wave superconductor**, *Subhajit Pal, Colin Benjamin*, *Scientific Reports* 8: 11949 (2018), Impact Factor-5.0, Citations-4.
- 45 **Helical thermoelectrics and refrigeration**, *Arjun Mani, Colin Benjamin*, *Phys. Rev. E* 97, 022114 (2018), Impact Factor-2.3, Citations-16.
- 44 **Playing a true Parrondo's game with a three state coin on a quantum walk**, *Jishnu Rajendran, Colin Benjamin*, *EPL (Euro Phys. Lett.)* 122, 40004 (2018)., This article has been featured in PHYS.ORG, see Parrondo's paradox with a three-sided coin by Lisa Zyga, Phys.org feature at <https://phys.org/news/2018-07-parrondo-paradox-three-sided-coin.html>. Impact Factor-2.0, Citations-18
- 43 **Designing a highly efficient graphene quantum spin heat engine**, *Arjun Mani, Subhajit Pal, Colin Benjamin*, *Scientific Reports* 9: 6018 (2019), Impact Factor-5.0, Citations-4.
- 42 **Role of helical edge modes in the chiral quantum anomalous Hall state**, *Arjun Mani, Colin Benjamin*, *Scientific Reports* 8:1335 (2018), Impact Factor-5.0, Citations-3.
- 41 **Tuning the $0 - \pi$ Josephson junction with a high spin molecule: Role of tunnel contacts, exchange coupling, electron-electron interactions and high spin states**, *Subhajit Pal, Colin Benjamin*, *Scientific Reports* 8: 5208 (2018), Impact Factor-5.0, Citations-3.
- 40 **Strained graphene based highly efficient quantum heat engine operating at maximum power**, *Arjun Mani, Colin Benjamin*, *Phys. Rev. E* 96, 032118 (2017), Impact Factor-2.5, Citations-18.
- 39 **Implementing Parrondo's paradox with two coin quantum walks**, *Jishnu Rajendran, Colin Benjamin*, *Royal Society open science* 5, 171599 (2018), Citations-2.
This article on seeing a genuine Parrondo's paradox with quantum walks, alongwith the article on "Playing a true Parrondo's game with a three state coin on a quantum walk" by Jishnu and me and published in *EPL (Euro Phys. Lett.)* 122, 40004 (2018) has been featured in Live Science, a website devoted to the science geek, see Weird Paradox Says 2 Losses Equals a Win. And It Could Lead to Fast Quantum Computers by Marcus Woo at <https://www.livescience.com/63142-parrondos-paradox-quantum-computing.html>
- 38 **Is the essence of a quantum game captured completely in the original classical game?**, *Muhammed Jabir T, Nilesh Vyas, Colin Benjamin*, *Physica A: Statistical Mechanics and its Applications* 584, 126360 (2021), Citations-2.
- 37 **Characterizing a high spin magnetic impurity via Andreev reflection spectroscopy**, *Subhajit Pal, Colin Benjamin*, *European Physical Journal B* 91: 190 (2018), Impact Factor-1.35.
- 36 **Probing helicity and the topological origins of helicity via nonlocal Hanbury-Brown and Twiss correlations**, *Arjun Mani, Colin Benjamin*, *Scientific Reports* 7: 6954 (2017), Impact Factor-5.0, Citations-9.
- 35 **Topologically induced fractional Hall steps in the integer quantum Hall regime of MoS₂**, *SK Firoz Islam, Colin Benjamin*, *Nanotechnology* 27, 385203 (2016), Impact Factor-3.6, Citations-2.
(This work was featured in the Nanotechweb.org website, Can fractional steps appear in the integer quantum Hallregime?, Nanotechweb.org, LAB TALK Sep. 26, 2016, see <http://nanotechweb.org/cws/article/lab/66357>)
- 34 **Fragility of Nonlocal Edge Mode Transport in the Quantum Spin Hall State**, *Arjun Mani, Colin Benjamin*, *Phys.Rev. Applied* 6, 014003 (2016), Impact Factor-4.1, Citations-4.
- 33 **A scheme to realize the quantum spin-valley Hall effect in monolayer graphene**, *SK Firoz Islam, Colin Benjamin*, *Carbon* 110, 304 (2016), Impact Factor-8.8, Citations-24.

- 32 **Are quantum spin Hall edge modes more resilient to disorder, sample geometry and inelastic scattering than quantum Hall edge modes?**, Arjun Mani and Colin Benjamin, Journal of Physics: Condensed Matter 28 (14), 145303 (2015), Impact Factor-2.7, Citations-10.
- 31 **Adiabatically twisting a magnetic molecule to generate pure spin currents in graphene**, Firoz Islam and Colin Benjamin, Journal of Physics: Condensed Matter 28 (3), 035305 (2016), Impact Factor-2.7, Citations-10.
- 30 **Do quantum strategies always win?**, Namit Anand and Colin Benjamin, Quantum Information Processing 14, 4027 (2015), DOI:10.1007/s11128-015-1105-y. Impact Factor-2.4, Citations-15
- 29 **Strain designed Josephson π junction qubits with topological insulators**, Colin Benjamin, EPL (Europhysics Letters) 110, 50003 (2015), Impact Factor-2, Citations: 5.
- 28 **Persistent currents in absence of magnetic field in graphene nano rings: The ambiguous role of inter-valley scattering**, Colin Benjamin and A. M. Jayannavar, Applied Physics Letters 104, 053112 (2014), Impact Factor-3.6, Citations-5.
- 27 **How to detect a genuine quantum pump effect in graphene?**, Colin Benjamin, Applied Physics Letters 103, 043120 (2013), Impact Factor-3.6, Citations-12.
- 26 **Can dephasing generate non-local spin correlations?**, Colin Benjamin, Euro Physics Letters 96, 67001 (2011), Impact Factor-2, Citations-5.
- 25 **Quantum simulation of molecular collisions using superconducting qubits**, *E J Pritchett*, C. Benjamin, A. Galiatdinov, M. Geller, A. Sornborger, P C Stancil and J. M. Martinis, arxiv:1008.0701, Citations-15.
- 24 **Detecting Majorana bound states**, Colin Benjamin and Jiannis K. Pachos, Phys. Rev. B 81, 085101 (2010), Impact Factor-3.7, Citations-47.
- 23 **π -junction qubit in monolayer graphene**, Colin Benjamin and Jiannis K. Pachos, Phys. Rev. B 79, 155431 (2009), Impact Factor-3.7, Citations-11.
This work was featured in the Nanotechweb.org website, Belle Dume, Graphene ring hits qubit target, Nanotechweb.org Technology update Oct. 22, 2008, available at <http://www.nanotechweb.org/cws/article/tech/36343>.
- 22 **Entangled states in graphene: Detection and use**, Colin Benjamin, G. Creeth and J. K. Pachos, J. Phys.: Conf. Ser. 129 012005 (2008).
- 21 **Detecting entangled states in graphene via crossed Andreev reflection**, Colin Benjamin and Jiannis K. Pachos, Phys. Rev. B 78, 235403 (2008), Citations-49.
- 20 **Positive noise cross-correlations in superconducting hybrids: Role of interfaces and interactions**, *R. Melin*, C. Benjamin and T. Martin, Phys. Rev. B 77, 094512 (2008), Citations-48.
- 19 **Controllable π -junction in a Josephson quantum-dot device with molecular spin**, Colin Benjamin, Thibaut Jonckheere, Alex Zazunov and T. Martin, European Physical Journal B 57, 279 (2007), Citations-38.
- 18 **Crossed Andreev reflection as a probe for the pairing symmetry of Ferromagnetic-Superconductors**, Colin Benjamin, Phys. Rev. B (Rapid Communication) 74, 180503(R)(2006), Citations-21.
- 17 **Detecting a true quantum pump effect**, Colin Benjamin, European Physical Journal B 52, 403 (2006), Citations-12.

- 16 **Non-local pure spin current injection via quantum pumping and crossed Andreev reflection**, Colin Benjamin and Roberta Citro, Phys. Rev. B 72, 085340 (2005), Citations-22.
- 15 **Resolving the order parameter of high-Tc superconductors through quantum pumping spectroscopy**, Colin Benjamin, Phys. Rev. B 71, 174512 (2005), Impact Factor-3.6, Citations-3.
- 14 **Trends in mesoscopic transport**, Colin Benjamin and A. M. Jayannavar, Popular review article, Science Letters 27 No. 5 & 6 page 177 (2004) (published by The National Academy of Sciences, India).
- 13 **Equilibrium currents in quantum double ring system: A non-trivial role of system-reservoir coupling**, Colin Benjamin and A. M. Jayannavar, Int. J. Mod. Phys B 18, 3343 (2004), Citations-1.
- 12 **Quantum spin pumping with adiabatically modulated magnetic barriers**, *Ronald Benjamin and* Colin Benjamin, Phys. Rev. B 69, 085318 (2004), Citations-68.
- 11 **Fano resonances in presence of dephasing and evanescent modes**, Colin Benjamin and A. M. Jayannavar, Indian J. Physics 77A(6), 565-569 (2003), Citations-2.
- 10 **A comparative study of some models of incoherence at the mesoscopic scale**, Colin Benjamin and A. M. Jayannavar, Int. J. Mod. Phys. B 17, 4733 (2003), Citations-1.
- 9 **Features in evanescent Aharonov-Bohm interferometry**, Colin Benjamin and A. M. Jayannavar, Phys. Rev. B 68, 085325 (2003), Citations-17.
- 8 **Quantum current enhancement effects in hybrid rings at equilibrium**, Colin Benjamin and A. M. Jayannavar, Indian J. Physics. 77A(2), 119-123 (2003).
- 7 **Survival of $\Phi_0/2$ periodicity in presence of incoherence in asymmetric AharonovBohm rings**, C. Benjamin, S. Bandopadhyay and A. M. Jayannavar, Solid State Commun. 124, 331 (2002), Citations-5.
- 6 **Wave attenuation model for dephasing and measurement of conditional times**, *A. M. Jayannavar and* Colin Benjamin, Pramana J. Phys. 59, 385 (2002), Citations-2.
- 5 **Study of quantum current enhancement, eigenenergy spectra and magnetic moments in a multiply connected system at equilibrium**, Colin Benjamin and A. M. Jayannavar, Int. J. Mod. Phys. B 16, 1787 (2002), Citations-3.
- 4 **Wave attenuation to clock sojourn times**, C. Benjamin and A. M. Jayannavar, Solid State Commun. 121, 591 (2002), Citations-12.
- 3 **Dephasing via stochastic absorption: A case study in Aharonov-Bohm oscillations**, Colin Benjamin and A. M. Jayannavar, Phys. Rev. B 65, 153309 (2002), Citations-19.
- 2 **Current magnification effect in mesoscopic systems at equilibrium**, Colin Benjamin and A. M. Jayannavar, Phys. Rev. B 64, 233406 (2001), Citations-32.
- 1 **Role of quantum entanglement due to a magnetic impurity on current magnification effect in mesoscopic open rings**, Colin Benjamin, Sandeep K. Joshi, Debendranath Sahoo and A. M. Jayannavar, Mod. Phys. Lett B 15, 19 (2001), Citations-13.